

City of Ottawa: Energy Conservation and Demand Management Plan 2024

Introduction

Ontario regulation [O.Reg 25/23](#), made under the Electricity Act, requires all public agencies, including Municipalities, to develop Energy Conservation and Demand Management (ECDM) Plans every five years that outline the corporate energy initiatives implemented in the previous five years and the initiatives planned for the upcoming five years. The legislation also requires annual reporting of natural gas and electricity consumption for the City's facilities.

As outlined in the Regulation, the ECDM plans must be approved by Senior Management and be published on the City's website on or before July 1, 2024, and every fifth year thereafter. Flexibility is left to the agency to determine the approval process. The previous ECDM plan, which focused on facility initiatives in its analysis, was brought forward by the Recreation Cultural and Facility Services (RCFS) department and was received by Council on June 26th, 2019, under report [\(ACS2019-RCF-GEN-0005\)](#).

Since the last plan, the City has approved the [2020 Climate Change Master Plan](#) and the [Energy Evolution Strategy](#). Currently, the City of Ottawa does not have firm energy reduction goals, but instead has corporate goals for GHG (greenhouse gases) reductions. As such, the 2024 City of Ottawa ECDM Plan goes beyond the legislated requirements of O.Reg 25/23 to report on facility energy usage and renewable energy generation by taking a broader look at corporate-wide energy use and emissions.

On April 17, 2024, a new Strategic Initiatives Department was created to bring together expertise in key areas with single points of accountability to deliver on Council's highest priorities, including climate change and resiliency. As such the 2024 ECDM Plan will be approved by the director of Climate Change and Resiliency.

Goals, objectives and governance

The City's GHG corporate goals were approved as part of the 2020 Climate Change Master Plan. The targets are a 30% emissions reduction from the 2012 baseline by 2025, 50% by 2030, and 100% by 2040. The progress is reported in GHG inventories that are provided to Council by Climate Change and Resiliency Services (CCR).

The City's energy transition is guided by the Climate Change Master Plan and the Energy Evolution Strategy but is also impacted by other plans including the Transportation Master Plan, Solid Waste Master Plan, Long Range Financial and Asset Management Plans.

The ECDM plan outlines projects approved through the normal budget process. Beyond 2024, energy conservation projects will be subject to annual budget approval, prioritized through enhanced project selection, or through approval of long-range financial plans and other Council reports. These projects will be reported on in future ECDM plans or other departmental reports to Council.

Defining baseline energy consumption and savings to date

The City of Ottawa’s energy portfolio consists of over 1,800 electricity and natural gas accounts across over 1,000 facilities and outdoor lighting sites, amounting to approximately 310 million kWh of electricity and 19.4 million m³ of natural gas consumption in 2023. In addition, the City purchases approximately 48.2 million litres of fuel (diesel and gasoline) annually for its fleet of over 2,800 pieces of equipment and vehicles and 750 OC Transpo buses.

As reported in the [City’s 2020 Corporate and Community Greenhouse Gas Inventories](#)¹, roughly half of corporate GHG emissions are from diesel consumption, while natural gas is the second highest source of emissions. With the expectation that the Ontario electricity grid will move to zero emission generation, the City has started to more aggressively target the electrification of City facilities and transit to meet both financial and GHG emissions reductions targets simultaneously.

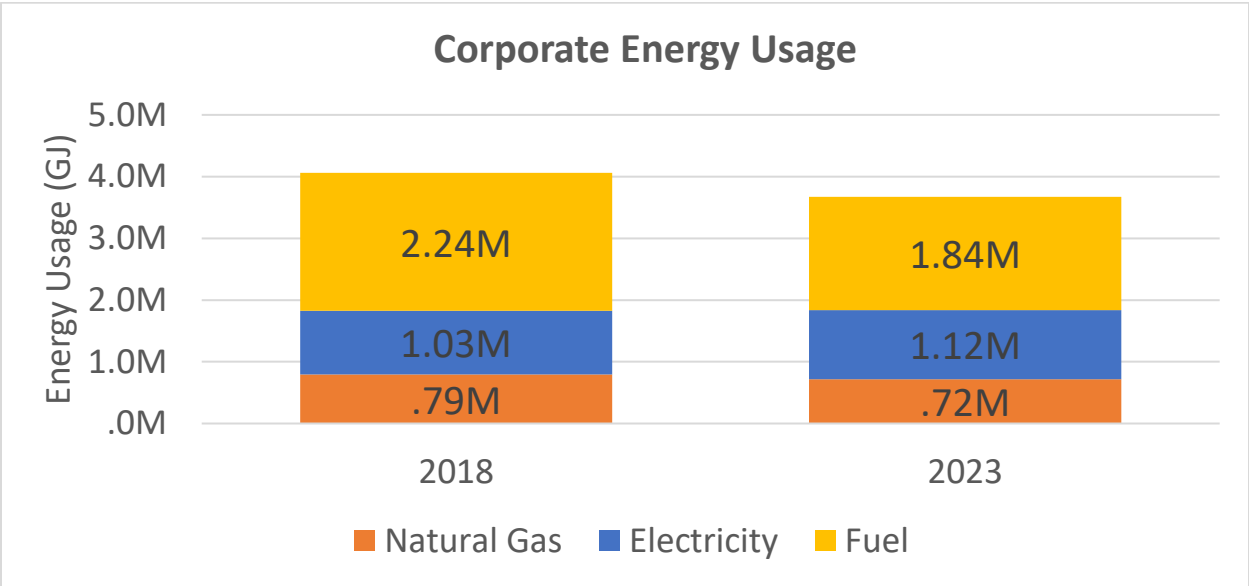


Chart 1: Total Corporate energy consumption for the years of 2018 and 2023.

The most significant impact to the City’s energy usage over the last five years has been the introduction of Phase 1 of the electric light rail transit (LRT) system. This project, combined with facility retrofits and the LED (Light Emitting Diodes) streetlight conversion, has led the City to see a net increase of 8.4% in its electricity usage, but a decrease of 9.5% in natural gas and 21.9% in fuel use from 2018 to 2023. Overall, the City saw energy reductions of 9.6% or an average of 1.9% per year. The City continues to undertake GHG emission inventories to track progress towards achieving the short-term, mid-term, and long-term GHG targets.

Energy Conservation and Demand Management Measures

¹ The 2020 Corporate and Community Greenhouse Gas Inventories are currently undergoing a third-party review and results may be subject to change.

Each energy conservation measure outlined below has a brief description, a summary of projects completed over the past five years, projects expected to be completed and their estimated energy/GHG savings. The list of projects in this section is non-exhaustive but highlights the City's energy initiatives and provides estimated reductions. It is important to note that project costs may include significant contributions from asset management budgets, facility budgets or other funding sources where appropriate. The City has started to use measurement and verification methods on strategic projects including pilots and large projects to ensure results are being achieved. While streetlighting and transportation are not legislatively required, the City has many significant energy initiatives in these areas.

Facilities

Under the regulation, municipalities must report on energy measures and demand management activities at the following prescribed facilities:

1. Administrative offices and related facilities, including municipal council chambers.
2. Public libraries.
3. Cultural facilities, indoor recreational facilities, and community centres, including art galleries, performing arts facilities, auditoriums, indoor sports arenas, indoor ice rinks, indoor swimming pools, gyms, and indoor courts for playing tennis, basketball, or other sports.
4. Ambulance stations and associated offices and facilities.
5. Fire stations and associated offices and facilities.
6. Police stations and associated offices and facilities.
7. Storage facilities where equipment or vehicles are maintained, repaired, or stored.
8. Buildings or facilities related to the treatment of water or sewage.
9. Parking garages.

Facility conservation measures include lighting retrofits, heat pumps, building automation system enhancements, electric boilers, floating head condensers, building envelope improvements, deep retrofits, and other miscellaneous projects. The City's main demand management activities are related to the Industrial Conservation Initiative (ICI) program.

City facilities prescribed in the regulation saw an overall decrease in energy of 7.0% from 2018 to 2023. Facilities decreased natural gas consumption by 14.5% while seeing a slight increase in electricity of 0.6%.

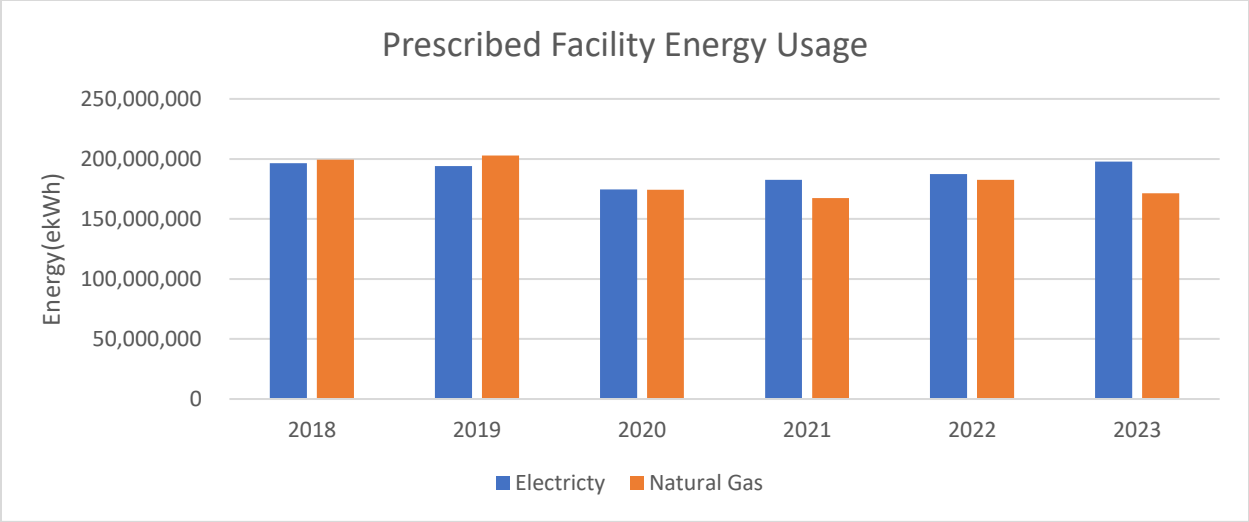


Chart 2: Total corporate prescribed facility (excludes LRT) energy consumption from 2018 to 2023.

Lighting Retrofits

Description

- Old lighting technology is being upgraded to more efficient and longer lasting Light Emitting Diodes (LEDs).

Projects Completed 2019-2023

- Approximately 165 LED retrofits have been completed or initiated over the last 5 years at various facilities mostly led by the RCFS department. LED conversions completed between 2019 and 2023 will reduce City of Ottawa facilities electricity consumption by over 4,390,000 kWh annually. These projects cost a combined \$5,900,000, with estimated annual savings of \$656,000.

Planned Projects and Estimated Results

- Most larger facilities in the RCFS portfolio have already been upgraded to LED lights. Moving forward, the City will look to complete lighting retrofits at smaller facilities and investigate larger opportunities in other departments. Lighting retrofit projects set for completion in 2024 will reduce annual electricity consumption by over 734,000 kWh. These projects are estimated to cost \$834,000, with estimated savings of \$111,000 annually.

Heat Pumps

Description

- A heat pump is a device that can heat or cool a building (or part of a building) by transferring thermal energy to or from the space using a refrigeration cycle.

Projects Completed 2019-2023

- The City has completed pilot projects that include cold-climate air-source heat pumps, through the wall heat pump units and ground-source heat pumps. Some of these projects have focused on facilities which use higher GHG emitting fuels including oil and propane. From 2019 to 2023, around 13 projects were completed costing \$1,150,000. These projects are estimated to have

annual reductions of natural gas by over 80,000m³ and propane by over 19,000L, with annual savings estimated at \$40,000 and a reduction of 178 tonnes of CO₂e.

- One project used waste heat from pumps in a mechanical room to heat a pool loop. This project and an additional project that expanded the loop to include the whirlpool cost a combined \$315,000, saving an estimated 226,000 kWh, over \$28,000 and a reduction of 3 tonnes of CO₂e annually.

Planned Projects and Estimated Results

- The Asset Management team will accelerate the use of heat pumps moving forward, with at least six facilities approved for heat pump installation under the 2024 budget. Dual-fuel units may also be piloted which can reduce emissions by approximately 80% compared to using only natural gas and are less expensive to operate than cold-climate heat pumps.
- Moving forward, heat pumps will be the primary focus for reducing GHG emissions at facilities. These projects will raise the electricity consumption for their respective facilities but will reduce the amount of fossil fuels required for heating. Cumulatively, it is estimated that these projects will reduce annual GHG emissions by 143 tonnes of CO₂e.
- Heat pump projects approved under the 2024 budget are expected to increase electricity consumption by 163,000kWh, while reducing natural gas consumption by 51,000m³. These projects are estimated to cost \$978,000, with estimated savings of \$52,000 annually.
- Additionally, the new garage facility for the zero-emission bus project will operate heat pump technology.

Building Automation System (BAS)

Description

- BAS's are the automatic centralized control of a building's heating, ventilation, and air conditioning (HVAC), electrical, lighting, and other interrelated systems. Some objectives of building automation are improved occupant comfort, efficient operation of building systems, reduction in energy consumption, and reduced operating and maintenance costs.

Projects Completed 2019-2023

- The City of Ottawa's BAS Integration Program has been in place since 2010, managed by the Building Engineering & Energy Management (BEEM) team. The project continues to onboard facilities with network access to the BAS Integrator.
- BEEM is also leading the Booking System Integration project which links the ActiveNet booking system schedules to the BAS schedules within our city facilities. This project's purpose was to reduce energy consumption by reducing temperature setpoints in rooms with intermittent use. HVAC systems return to regular operation when there is programming booked for a space or the motion sensor is triggered.
- From 2019-2023, BAS/Booking System Integration projects have led to estimated annual reductions of 2,290,000 kWh of electricity, 557,000 m³ of natural gas and over 1,100 tonnes of CO₂e. These projects cost approximately \$3,440,000 while saving \$520,000.

Planned Projects and Estimated Results

- With improved monitoring in mind, the BAS Integration Program expansion will continue to be a high priority. BEEM is continuing to look at expanding to remote facilities outside of network access through cellular communication.

- Under the 2024 budget process, \$300,000 was approved to fund BAS projects were approved that are expected to save 210,000 kWh of electricity, 22,500 m³ of natural gas and over \$41,000 annually.

Electric Boilers

Description

- Electric boilers are used for heating water at facilities and generate much lower emissions compared to fossil fuel boilers. Facilities use building automation to automatically switch from gas boilers to electric boilers for space and process heating when the Hourly Ontario Electricity Price (HOEP) is low enough to make heating with electricity less expensive than gas.

Projects Completed 2019-2023

- The City of Ottawa has installed electric boilers at five large facilities. In addition to providing heat with less cost and emissions than gas, these boilers have been used to manage electricity demand at facilities, allowing them to participate in the Industrial Conservation Initiative (ICI) program.
- These projects cost a combined \$1,100,000 and are expected to reduce over 700,000 m³ of natural gas while adding over 5,400,000 kWh of electricity consumption annually. This will lead to approximately \$85,000 savings and reduce GHG emissions by over 1,000 tonnes of CO₂e annually, accounting for over 2% reduction in GHG emissions from facilities.

Planned Projects and Estimated Results

- One facility has been selected for an electric boiler project under the 2024 budget that will cost approximately \$500,000, while reducing annual gas consumption by approximately 97,000m³ and GHG emissions by approximately 160 tonnes of CO₂e. The project is expected to have annual savings of \$50,000. The City will continue seeking opportunities to install electric boilers at facilities that will save costs and reduce emissions.

Floating Head Condenser Controls

Description

- Floating head heat exchangers offer better resistance to thermal stress and fatigue than typical shell and tube heat exchangers, which makes them well suited for use in ice plants at skating rinks.

Projects Completed 2019-2023

- From 2019-2023, two projects targeting multiple ice rinks have had floating head controls installed leading to estimated annual reductions of 315,000 kWh. These projects cost approximately \$300,000 while saving over \$58,000 annually.

Planned Projects and Estimated Results

- Seven rinks were approved under the 2024 budget for projects that will replace existing Ice-Tek controllers and add floating head condenser controls. These projects are expected to cost \$525,000, with annual electricity savings of over 430,000 kWh and \$65,000. This will also result in the reduction of 13 tonnes of GHGs annually.

Building Envelope

Description

- A building envelope comprises all building materials that separate the inside from the outside, including wall assemblies, doors, windows, and roofing systems. Improvements to building envelopes can help a facility reduce its energy consumption and associated GHG emissions.
- Windows are typically one of the weakest points in a building envelope when it comes to thermal performance. While older windows can have an approximate R-Value of R2, high performance windows can display R-Values up to R18.9 for the glass and frame and R21.7 for the centre of glass. These windows increase thermal performance, provide better sound insulation, better longevity and lower life cycle costs compared to traditional windows.
- The installation of high-performance windows will reduce the heating and cooling loads of a building, with results varying based on the existing window performance and the space available for the new windows.

Projects Completed 2019-2023

- The City has installed high performance windows at six facilities from 2019-2023, including a designated heritage area of City Hall. The cost of these projects was approximately \$1,420,000. Combined, these projects are estimated to reduce electricity consumption by 37,000 kWh, natural gas consumption by 7,000m³ and energy costs by \$3,600.

Planned Projects and Estimated Results

- The 2024 budget process approved \$250,000 for building envelope upgrades as incremental additions to existing projects and will mostly be window upgrades. Annually, these projects are expected to reduce electricity consumption by 85,000kWh, gas consumption by 12,500m³ and energy costs by over \$16,000.

Deep Retrofits

Description

- A deep retrofit is an extensive, holistic overhaul of a building's systems, utilizing best practices with the goal of significantly reducing energy consumption and greenhouse gas emissions. Deep retrofits will often employ many of the measures listed previously, encompassing them under one project.

Projects Completed 2019-2023

- The Hintonburg Community Centre was selected for a deep energy retrofit pilot project in line with the requirements of the Municipal Buildings Renewal and Retrofit Program outlined in the City's Energy Evolution Strategy. Building envelope improvements were started at the facility in 2022 and continued in 2023. Through the Green and Inclusive Community Buildings Program (GICB), the government of Canada will be contributing up to 80% of eligible expenses related to the project.

Planned Projects and Estimated Results

- The deep retrofit at Hintonburg Community Centre will continue in 2024, with more building envelope improvements, energy recovery, and the replacement of the building's HVAC systems with air source heat pumps. The project is estimated to reduce the facility's energy consumption by 64% and GHG emissions by 22.6 tonnes of CO₂e annually.

- The Southpointe Community Building has been selected as the next facility to undergo a deep retrofit. It is estimated that the project will reduce the facility's energy consumption by 66% and GHG emissions by 11.2 tonnes of CO₂e annually. A funding application has been submitted to GICB and the City is waiting for funding approval before continuing with the project.
- CCRS is in the initial stages of the Municipal Zero Carbon Building Project which will determine a viable path for the organization to achieve its zero-carbon emission target by 2040 for building related emissions. The project has four key priorities: defining and quantifying the net zero carbon target, integrating the target into existing processes, building implementation capacity, and post-project implementation. Across these priorities, the project will seek to align with relevant internal and external initiatives to reduce costs and combine stakeholder engagement where possible.

Demand Management

Description

- One key demand management activity involves shifting and/or reducing demand at times that coincide with Ontario's electricity grid's peak load. The Industrial Conservation Initiative (ICI) is a form of demand response that allows participating customers to manage their costs by reducing demand during the top five peak Ontario demand hours over a one-year period.
- Another form of demand management comes from efforts to minimize monthly billing demand for electricity accounts. Demand is billed according to the highest 15 or 60 minutes of usage each month.

Projects Completed 2019-2023

- The City of Ottawa currently has 19 electricity accounts participating in the ICI program.
- The City monitors the IESO's forecasted demand daily, sending notifications to facility operators when a grid peak is possible. Some City facilities, including water and wastewater treatment plants, are actively shifting loads during peak periods with no service delivery impacts. Through BAS's, the City's electric boilers at recreational and administrative facilities reduce electricity consumption automatically during grid peaks.
- The City's participation and efforts in the ICI program have resulted in a cost avoidance of over \$18,200,000 over the last 5 years. Water Services has the greatest savings of City departments with over \$11,800,000 during that time thanks to their load shifting efforts.

Planned Projects and Estimated Results

- Energy teams will continue collaboration with facilities to improve their demand management plans for the ICI. Through enhanced facility automation and energy management, the City will achieve greater and more accurate load shifts/reductions during grid peaks.
- The City monitors legislation for changes in the program that could either allow for greater benefit or require change in operations and is working to bring other accounts into the ICI program based on eligibility requirements.
- Reducing energy consumption during grid peaks reduces GHG emissions since the Ontario grid relies on fossil fuel-burning generation stations to meet peak loads.
- City departments, including OC Transpo, will be working towards minimizing monthly billing demand. This will be accomplished through an automated energy management system for the

Zero Emission Bus program that could save approximately \$2,200,000 per year for the planned 350 electric buses.

Miscellaneous

Description

- The City has completed other projects and is exploring other opportunities relating to energy conservation and demand management and will continue to look for and investigate new opportunities as they arise.
- Thermographic imaging uses infrared cameras to measure the surface temperature of different building components. It can be used to identify issues with roof membranes or areas with poor insulation or used with a blower door test to identify sources of air leakage.
- Energy storage can be used for demand management including load shedding during grid peaks to help facilities participating in the ICI program realize greater financial savings. Energy storage can have additional benefits including resiliency and potentially price arbitrage. There are many technologies that can be used, including lithium-ion batteries and thermal energy storage with phase change materials.
- Low emissivity ceilings can help lower refrigeration costs and condensation problems in ice rinks by reducing the amount of heat radiated from the ceiling to the ice.

Projects Completed 2019-2023

- In 2022, the City selected 16 facilities for a complete thermographic imaging survey. The information from the reports will be used for identifying needed repairs and informing project selection and prioritization. At the Hintonburg Community Centre, thermographic imaging identified air leakage around the public entrances and heat loss behind the building's radiators. It was also used to determine the effectiveness of innovative curtain wall improvements tested to minimize thermal bridging.
- A project was completed to install electric heaters in two snow melt pits at a facility with ice rinks. This replaced the need to spray the discarded snow with domestic hot water. The project cost approximately \$90,000, and saves an estimated 14,000m³ of natural gas and \$18,000 annually. This also greatly reduces the need for domestic water.
- Three more projects were completed which included various measures but did not qualify as deep retrofits. These projects cost a combined \$814,000 while saving over 386,000 kWh of electricity, 50,000 m³ of natural gas, and \$73,000 annually.
- A project seeking to improve waste heat recovery at a pool cost \$44,000, leading to savings of over 7,000 m³ of natural gas and \$14,000 annually.
- The installation of two variable frequency drives (VFDs) with control panels on two chillers cost approximately \$348,000 and is expected to save over 244,000 kWh and \$36,000 annually.

Planned Projects and Estimated Results

- One ice rink was identified under the 2024 budget process for installation of a low emissivity ceiling as the existing ceiling was removed due to poor condition. The project is expected to cost \$29,000 while reducing annual electrical consumption by over 16,000 kWh and costs by over \$2,400.
- The new Ādisōke library that will finish construction within the next five years will be connected to the Energy Services Acquisition Program (ESAP) district energy system to provide heating and cooling for the facility.

Renewable Energy

Description

- Renewable energy is energy that is collected from renewable resources that are naturally replenished.
- The City currently captures and utilizes biogas at its wastewater treatment facility, ROPEC, as well as at the Trail Road landfill. Biogas is a gaseous fuel produced by the fermentation of organic matter.
- The City also uses hydraulic power from the nearby Ottawa River at the Fleet Street Pumping Station. This renewable energy reduces the need for electrical pumps to distribute the City's drinking water.
- The Electricity Resource Strategy was identified as one of the top 20 priority project overviews in Energy Evolution, targeting 20 MW of solar installed by 2025.
- In May 2022, Committee/Council directed staff to identify suitable roofs at City-owned facilities to increase renewable electricity generation through leasing solar rooftop equipment for net metering.

Projects Completed 2019-2023

- Prior to 2016, electricity from renewable generation was purchased at above market prices, leading to shorter payback periods and increased adoption of renewables. The City of Ottawa capitalized on these with the installation of solar PV systems on 12 of its facilities, four of which are owned and operated by the City while the other eight are owned and operated by a third party. In 2023, the four systems owned and operated by the City generated over 18,200 kWh of electricity.
- In search for new renewable opportunities, CCRS retained a consultant to undertake a Sewer Waste Heat and Geothermal Energy Study. This study identified and quantified sources of below-ground thermal energy resources to provide guidance on how they might be employed as part of new development. Sewer Energy Exchange Systems (SEES) and geothermal systems are two possible options to avoid the combustion of fossil fuels for building heating and cooling.
- A third party operates a gas-to-energy station at the City's Trail Road landfill. The facility captures methane released from the site and converts it to electricity, generating over 40,000 MWh annually and drastically reducing methane emissions.
- At ROPEC, biogas is captured and used to power a 2.4MW co-generation unit. The electricity generated is used to offset electricity required from the grid, and heat generated from the unit is used to heat the facility. In 2023, it produced 14,617,130 kWh, avoiding more than \$1,500,000 in electricity charges.
- On average, Fleet Street Pumping Station reduces approximately 6,946,000 kWh worth of electricity using hydraulic power annually.

Planned Projects and Estimated Results

- The City is planning to install solar on two facilities which will include up to 800 kW of total generation. The installations will be net-metering or load displacement systems and will be treated as a pilot project to test a new way of procuring energy for the City. The successful proponent will own and maintain all equipment at the facility and will sell the generated

electricity to the City at a competitive rate per kWh. Pending the successful completion of this pilot, the City will move forward with renewable generation installations on other facilities and will aim to dedicate a resource for planning and managing these projects. The quantity of generated electricity (kWh) and cost savings of this project are yet to be determined.

- The City is currently reviewing a proposed SEES pilot project near LeBreton Flats. The project proposes to connect to a large trunk sewer to provide heating and cooling to two high-rise residential buildings. Should the SEES design be acceptable to the City, the system is expected to be in full operation by early 2027. Under this arrangement, the City would be selling the energy to the partner. The pilot project is expected to inform future SEES projects in the City.
- The IWS Department is looking to optimize its biogas produced at ROPEC. Methane, a by-product of the wastewater treatment process, can be used by co-generation units to produce heat and electricity. This reduces the amount of electricity and natural gas required from utility suppliers, which in turn also reduces the City's greenhouse gas emissions. Another option being investigated is the production of renewable natural gas.
- Future uses for solid waste and biogas produced by waste are being investigated by public works. The contract for Trail Rd landfill gas expires in 2027 and will be renegotiated with a greater focus on GHG reductions and financial benefits. This will be coupled with the anaerobic digestion project with the current contract for organic waste expiring in 2030. Also, a project investigating waste sorting and a waste-to-energy incineration plant has recently commenced.
- The City is having geothermal testing completed at the site of the future Gladstone development. The results will inform a feasibility study and concept design for a net-zero district energy system that would serve the development and potentially other buildings in the vicinity.

Transportation

Beyond the legislative requirements, this report highlights the large energy projects the City has undertaken for transportation. As the City transitions from fuel to electricity, the projects in the transportation section account for a substantial portion of the planned GHG reductions during this report's term.

Light Rail Transit (LRT)

Description

- Light rail transit provides a faster and higher capacity alternative to bus transit. LRT can be operated above ground or in tunnels, or a combination of both. The Transit Services Department is responsible for the City's LRT.

Projects Completed 2019-2023

- The O-Train Confederation Line (Line 1) was completed in 2019, replacing 12.5 km of bus rapid transit corridor and putting 34 electric powered trains into service. The fully electric light-rail service connects 13 stations from Tunney's Pasture in the west to Blair in the east, with multiple stops as it passes through a 2.5km tunnel in the downtown area.
- The first phase of the LRT is estimated to have removed about 136 buses from service, saving about 13,800,000 L of diesel fuel consumption.

Planned Projects and Estimated Results

- Stage 2 of the LRT project will add 44km of rail and 24 new stations to the LRT system.

- On top of less road congestion and reduced commuting times, Stage 2 East of the LRT system is expected to reduce bus requirements by about 14 buses, while Stage 2 West is expected to reduce by 39 buses. This is forecasted to save an estimated 5.5M L of diesel fuel consumption.

Fleet

Description

- Fleet Services is responsible for the purchase, maintenance, and disposal of over 2,800 pieces of equipment and vehicles which support city-wide operations. Fleet's work ensures that key service vehicles, such as fire trucks, snowplows, By-law vehicles and ambulances, are available 24/7 to support city staff in their service to the community. Not included in the fleet are Transit revenue vehicles. Fleet continues to test, evaluate, and replace vehicles with green options, where available, that maximize environmental sustainability and operational success, while minimizing future lifecycle costs and remaining financially prudent.

Projects Completed 2019-2023

- The City's municipal fleet is grouped into five operational classes: ambulances, fire trucks, heavy vehicles, light vehicles, and equipment. Green options have been tested and are commercially sold within the light vehicle class and for many pieces of equipment. 241 units from the City's fleet inventory have been replaced, or growth units have been purchased, by the end of 2023 with hybrid or electric alternatives. Of the green vehicles in service by the end of 2023, 60 are fully electric and 181 are hybrid. Units, with viable and available green options, will continue to be transitioned as part of their regular lifecycle replacement schedule.
- The City also applies for external funding where possible, to support green initiatives and purchases. In 2022, the City was successful in securing \$247,500 in funding from Natural Resources Canada through the Zero-Emission Vehicle Infrastructure Program to support EV charging infrastructure for municipal vehicles from 2023 to 2026.
- 38 units were identified for replacement or growth units in 2023, which will reduce approximately 564 tonnes of CO2 emissions over their life.

Planned Projects and Estimated Results

- "Lifecycle Renewal" or replacement planning includes, when possible, the selection and acquisition of Hybrid Electric Vehicles (HEV) and Battery Electric Vehicles (BEV). Supply chain constraints experienced through the pandemic continue to pose challenges in the purchase of electric or hybrid vehicle options that meet the needs of City operations. Despite the challenges, Fleet's first choice is to always look at hybrid and electric options. The market continues to predict that challenges for BEV and HEV availability will continue in 2023 and 2024.
- 43 units have the ability to be replaced with hybrid and electric models in 2024 and could result in over 1,615 fewer tons of GHG emissions over their life cycle.
- The City has started transitioning from the Municipal Green Fleet Plan, which had a short-term focus, to an updated Green Fleet Strategy. The new strategy will provide a 20+ year roadmap across all unit platforms, including both capital and infrastructure costs, which will act as input for future budget approvals. The strategy will provide an analysis and direction for how the City may progress towards achieving net zero fleet operations by 2040.
- The Green Fleet Strategy will be presented to Committee & Council in Q4 2024.

OC Transpo Buses

Description

- Electric buses operate in a comparable way to other electric vehicles, charging a large battery on board to power the bus during its route. Using electricity from the Ontario electric grid, the buses will produce significantly less emissions than the diesel-powered alternatives. The Transit Services Department is responsible for the City's conversions to electric buses.

Projects Completed 2019-2023

- To support Council's goal of reducing corporate GHG emissions to net zero by 2040, Council directed staff to introduce electric buses to the OC Transpo fleet.
- A pilot project was initiated in 2021 with the purchase of four New Flyer electric buses. The buses underwent testing to understand their performance, which included the use of water dummies to simulate passengers. The first bus entered service in February 2022, with the remaining three joining by the end of March 2022.
- In 2023, the four electric buses travelled a combined 242,408km.

Planned Projects and Estimated Results

- Between 2024 and 2027, OC Transpo will introduce up to 350 battery-electric buses that will replace buses to advance the fleet's conversion to zero emission technology. 1500 St. Laurent Blvd, the facility where the buses will be charged, is upgrading infrastructure to increase electrical capacity, as well as having a backup natural gas generator for resiliency.
- This project is expected to cost around \$974,000,000 with Infrastructure Canada (INFC) funding and a loan from Canada Infrastructure Bank (CIB) to be paid back through energy and maintenance savings.
- It is expected that by 2027, the electric buses in service will be annually offsetting over 12,000,000 litres of diesel. However, technology is rapidly changing, including the size of bus batteries, so costs and savings are expected to change as well.

Streetlighting

Description

- Existing High-Pressure Sodium (HPS) streetlights are being upgraded to more efficient and longer lasting Light Emitting Diodes (LEDs). The new lights allow for more precise roadway lighting levels, enhanced monitoring, enhanced safety and a reduction in light trespass and light pollution.

Projects Completed 2019-2023

- From 2019 to 2023 the Public Works department has overseen the conversion of over 23 thousand streetlights to LED, with additional capacity for a smart grid and controls. The focus of these retrofits was roadway safety while also maximizing opportunities for energy and maintenance savings.
- Streetlights converted from 2019 to 2023 reduced annual electricity consumption by approximately 13,000,000 kWh.

Planned Projects and Estimated Results

- Approximately 10,000 streetlights remain to be converted to LEDs, including decorative streetlights, pedestrian lights, and coach style streetlights. These will continue to be converted to LED as annual budgets allow, leading to further energy and maintenance savings.