



SUBJECT: Corporate Energy & Emissions Management Plan progress report

TO: Environment, Infrastructure & Community Services Cttee.

FROM: Environment and Energy

Report Number: EICS-06-23

Wards Affected: All

File Numbers: 210-01

Date to Committee: June 28, 2023

Date to Council: July 11, 2023

Recommendation:

Submit relevant content/data attached as Appendix A of environment, infrastructure and community services report EICS-06-22 to the Ontario Ministry of Energy and published on Burlington's website to encourage energy awareness, conservation and meet the reporting requirements under Ontario Regulation 507/18.

PURPOSE:

This report presents data on energy and greenhouse gas emissions from corporate operations in 2022, including a comparison to 2021, 2020 and 2019. The method of presenting the data (Appendix A) is consistent with Ontario Regulation 507/18 which requires municipalities to report and publish energy consumption data and greenhouse gas emissions annually. Also included is an update to the measures identified in the Corporate Energy and Emissions Management Plan (CEEMP) that was approved by Council in July 2019.

Vision to Focus Alignment:

- Support sustainable infrastructure and a resilient environment
- Deliver customer centric services with a focus on efficiency and technology transformation

Background and Discussion:

In 2009, Council approved a corporate energy policy (CSI-3/09) which provides guidance and direction to staff on the development and implementation of a comprehensive corporate energy management program.

The City of Burlington has significant energy and environmental impacts associated with its own operations. This was identified in the City's Strategic Plan 2015-2040 with a goal of having the City's operations become net carbon neutral by 2040. The 2019 Corporate Energy and Emissions Management Plan meets the objectives identified in Ontario Regulation 507/18 as an Energy Conservation and Demand Management Plan, and also defines the City's carbon reduction target of 2040. The City continues to report on energy consumption as required since 2013 under the former Green Energy and Green Economy Act (GEGEA).

In early 2023 the Ministry of Energy implemented new requirements to streamline reporting and tracking of energy consumption and greenhouse gas emissions.

Energy conservation typically means reducing the total amount of energy consumed (kWh of electricity and m³ of natural gas). Demand management refers to either using efficient technologies or changing usage to reduce peak load. These are designed to help manage Ontario's total use and peak demand for electricity.

Strategy/process/risk

Environment and Energy Services staff assist other City staff in identifying, implementing, and reporting on opportunities that reduce the City's direct carbon footprint, reduce current and future operating costs, and generate revenue where possible. Since June 2022 (most recent update report to the CEEMP) City staff have continued implementation and development of several actions within the plan as well energy saving and carbon reduction projects. Highlights are included here:

Deep Energy Retrofit Studies

In June 2021 staff applied to The Federation of Canadian Municipalities (FCM) – Green Municipal Fund (GMF) - GHG reduction pathway feasibility studies funding stream and were successful in obtaining \$200,000 in funding to begin studies at Appleby Ice Centre, Brant Hills Community Centre, Fire Station 2, and Fire Station 7.

Over the past year City staff from the corporate energy, asset management, project management, and operations teams have been working with DIALOG Design to perform the studies at the above-mentioned facilities. The Design team was asked to

prepare four different pathway scenarios as part of the studies. These scenarios included:

- Scenario 1: A 10-year plan that achieves a minimum 50% reduction in on-site GHG reduction emissions vs. current performance and a 20-year plan that achieves a minimum 80% reduction in on site GHG emissions vs current performance.
- Scenario 2: A “short-term deep retrofit”: This includes the same GHG reduction measures as scenario 1, except that all measures are implemented in the first two to five years. This pathway could potentially be used for funding applications for future projects if appropriate funding streams become available from senior levels of government.
- Scenario 3: A “maximum site potential” scenario: This targets the greatest reduction potential possible, independent of capital considerations
- Scenario 4: An “optimized outcome” scenario: This considers cost-per-ton-CO₂e targets, GHG reduction targets and other qualitative and quantitative impacts optimized according to project objectives. This scenario is the best combination of measures identified in the first three scenarios and is the scenario suggested for implementation at each facility.

These studies have been recently completed. The studies contain a vast amount of detail for each of the scenarios, therefore, highlights are provided below, and additional details summarizing the “Optimized Outcome” scenario for each of the facilities is located in Appendix B.

Appleby Ice Centre - Carbon Reduction Measures recommended:

- Electric Domestic Hot Water and Ice Resurfacing; Packaged Air Source Heat Pumps and Heat Recovery Ventilators; LED Lighting Upgrades; Ice Plant Upgrades for both Plant A and B; Reverse Osmosis Water Treatment; and Rooftop Photovoltaic Panels

Brant Hills Community Centre - Carbon Reduction Measures recommended:

- Roof Insulation Upgrade; High Performance Glazing and Doors; HVAC Upgrades; Electric Domestic Hot Water Heater; LED Lighting upgrades; and Rooftop Photovoltaic Panels

Fire Station 2 - Carbon Reduction Measures recommended:

- Roof Insulation Upgrade; High Performance Glazing; Air Sealing; Automated Exhaust System Electrification; HVAC Upgrade; and Rooftop Photovoltaic Panels

Fire Station 7 - Carbon Reduction Measures recommended:

- High Performance Glazing; Air Sealing; Domestic Hot Water Electrification; HVAC Upgrade; and Rooftop Photovoltaic Panels

Building Systems Upgrades

Building upgrades have been completed over the past year or are currently underway at various City facilities, some highlights with respect to energy and emissions reductions include:

Fire Station 8 – HVAC and Building Automation System Upgrades

The newly installed HVAC and Building Automation system is operational and allows more direct control by city operations staff with variable capacity cooling and more appropriate amounts of fresh air to assist in controlling the building’s humidity.

Art Gallery of Burlington – Rooftop Unit Replacement.

The new rooftop units to be installed will utilize heat pump technology for its first stage of heating and rely on natural gas backup only when the temperatures drop significantly below zero. These will be the first rooftop units of their kind on a city facility and energy staff will be monitoring them closely to track their performance and impact on the facility’s greenhouse gas emissions.

Beachway Pumphouse – Burlington Green

In 2023 an Air Source Heat Pump will be installed at the BurlingtonGreen Eco Hub facility so it can be used as a demonstration for homeowners to promote the benefits of heat pumps. An EV charging station will also be installed close to the Eco Hub to promote electric mobility, supported with NRCan funding.

Major Project Updates

Several major construction projects are currently underway that will have an impact on the City’s progress toward our net carbon neutral goal including.

City View Park Pavilion – Solar Installation

City staff have now been able to track the facility’s electricity consumption and solar production data for a complete year since the buildings electricity metering system came online in early 2022. The facility has performed very close to its expectations during the design phase. The table below shows a summary of the data from March 2022 to February 2023.

City View Park Pavilion – Performance	
Modelled Electricity Use	47,400 kWh
Actual Electricity Use	57,520 kWh
Modelled Electricity Production	51,430 kWh
Actual Electricity Production	50,740 kWh

The facility did experience issues with heating and fan controls in the early part of 2023 which caused increased electricity consumption. These issues were fixed during the facility's commissioning process in the late spring of 2023.

Solar Array at Fire Station 5

Installation of a net metered solar photovoltaic (PV) array at Fire Station 5 in Kilbride will be operational by Q4 2023. It is estimated that the system will offset slightly more than 100% of the building's electricity usage, which will allow us to offset a portion of the increased electricity use of future electrification of the heating systems in the facility when they are up for capital renewal.

Skyway Arena & Community Centre

Construction on the City's first low carbon arena continues and is expected to be complete in late spring 2024. Corporate energy staff are involved in all aspects of the mechanical and electrical system installation as well as leading the commissioning activities on the project to ensure the facility operates as per its design intent. The facility includes a geothermal field and ice plant heat recovery to eliminate the use of fossil fuels in the building.

Robert Bateman High School Renovation

The project team for the redevelopment of Robert Bateman High School has set out a roadmap for the City to transform the facility from a 1960s-era low efficiency high school to a net carbon neutral facility that will be both an example to the community and municipalities across the country. With construction just getting under way in the first phase of the redevelopment project, the construction team will implement the following energy and carbon reducing measures to the facility.

- Upgrades to the buildings wall systems to increase insulation values and replace glazing units.
- Air-side heat recovery on all the new Air Handling Units that serve the facility.
- Upgrades to infrastructure that support ultra low temperature heating water, and
- Installation of heat recovery chillers which will be used to pre heat the domestic hot water for the facility and reduce the use of the natural gas boiler plant for water heating. In future these chillers will act as heat pumps and connect to a geothermal field.

Like the construction of Skyway Arena & Community Centre, corporate energy staff will be heavily involved in the construction project including leading the commissioning activities.

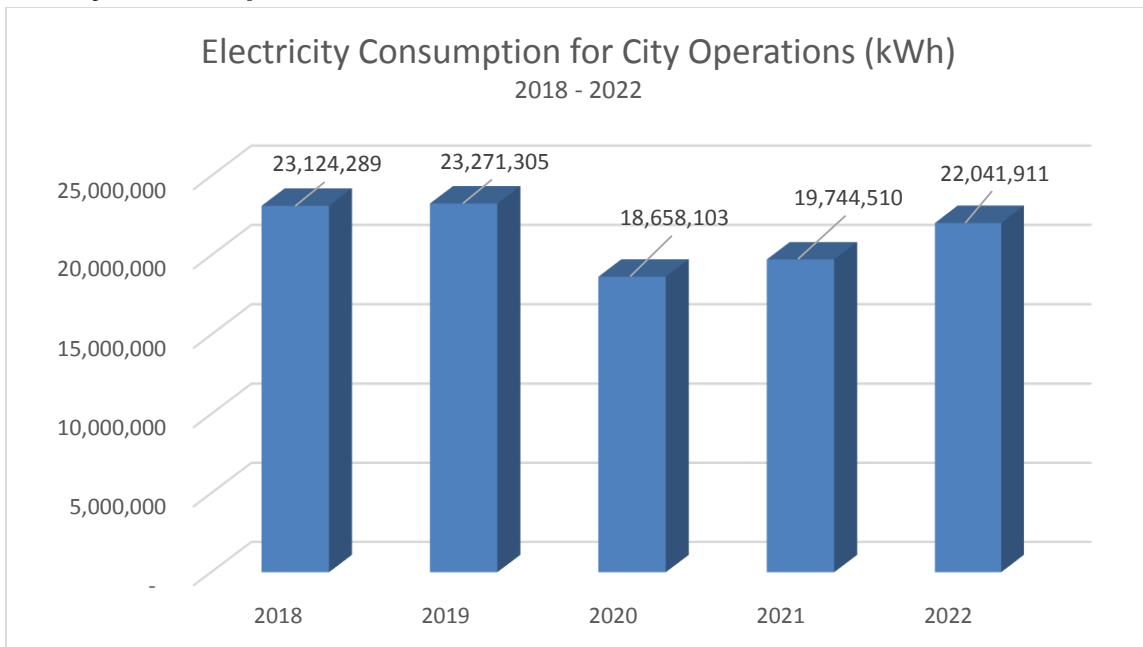
Future phases of the work include installation of a geothermal bore field, upgrades to roof insulation through a future roof replacement project, and the installation of a solar PV array to displace carbon emissions from Ontario’s electricity grid.

Corporate Utility Data

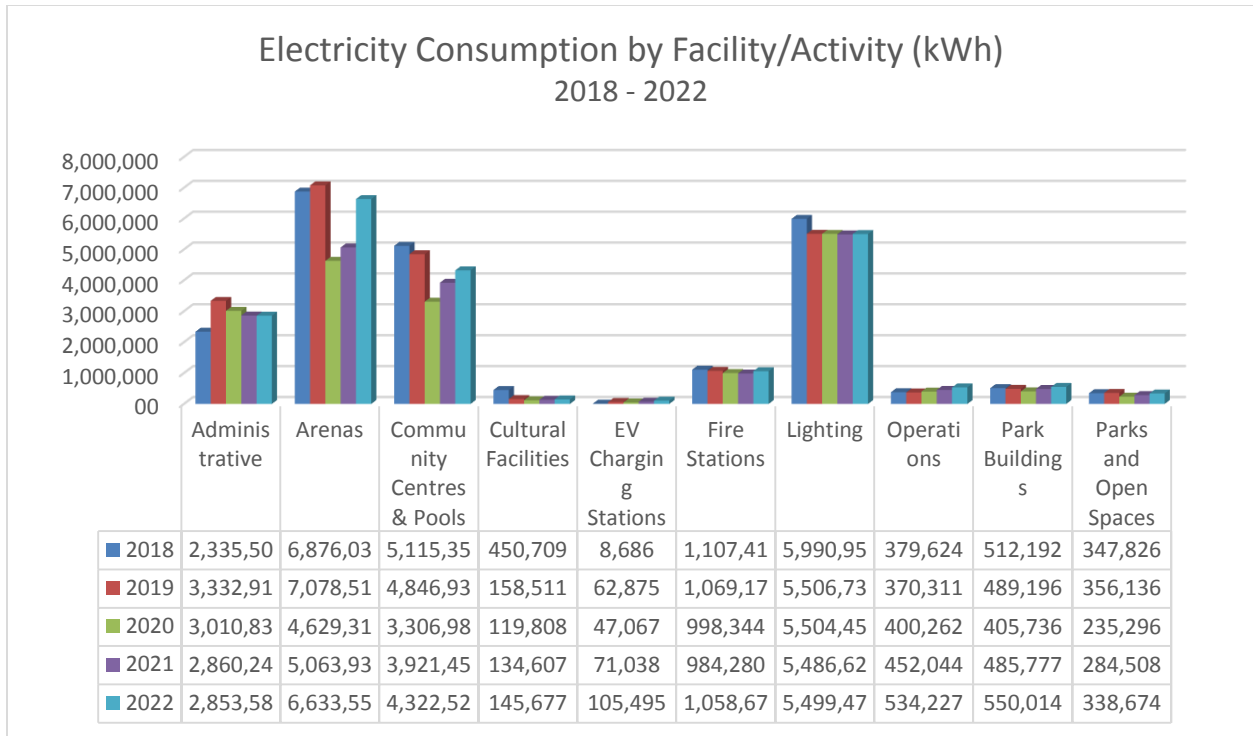
Below is consumption data for 2018 to 2022 for Electricity, Natural Gas and Water. Additional data on a building-by-building basis can be found in Appendix A. Also included below is fuel consumption data for Corporate Fleet, Burlington Fire Fleet as well as the Burlington Transit Fleet. It should be noted that the following facilities were added to the City’s corporate portfolio in 2022, only partial data is available for some utility types at these facilities in the graphs below.

- Forestry Operations Facility – 4-1340 Brant St (3,560 ft²)
- Transportation Building – 3-1328 Brant St. (3,400 ft²)
- Transportation Storage Building - 5-1328 Brant St. (3,622 ft²)
- Robert Bateman High School – 5151 New St (212,000 ft²)

Electricity Consumption

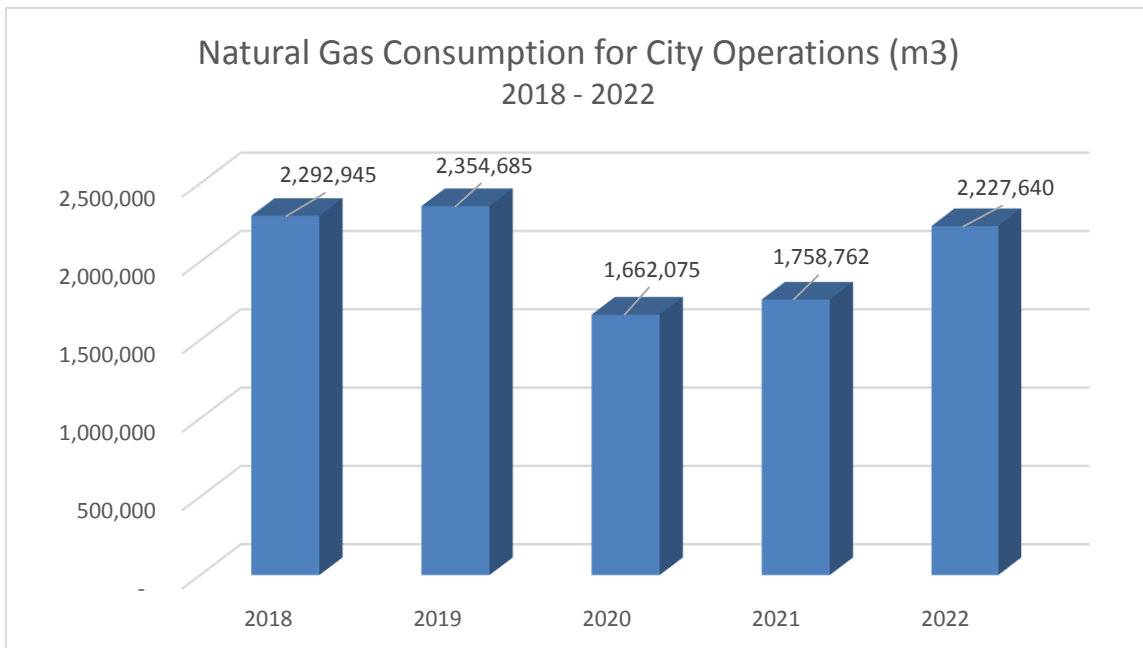


Electricity consumption increased from 2021 to 2022 (10%) but remains pre-covid levels which can be attributed to our facilities returning to normal levels of programming. This is a 5% reduction from the 2018 CEEMP baseline consumption data across City assets.

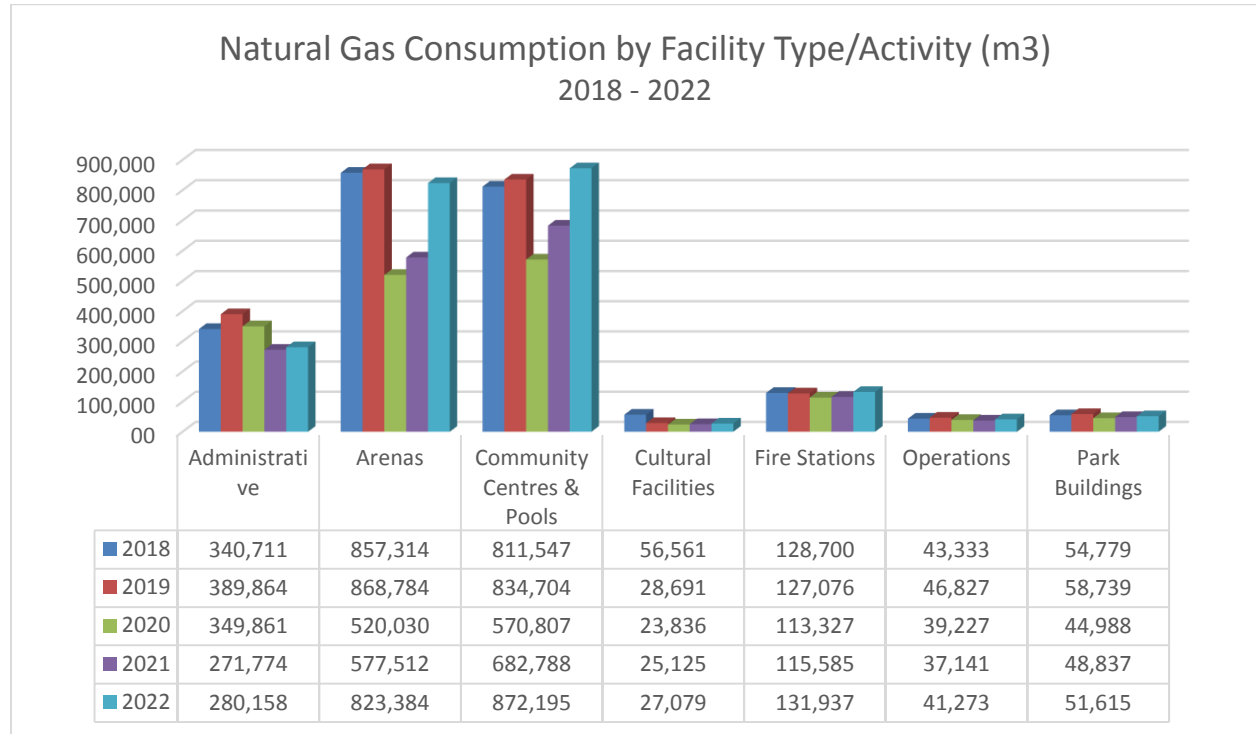


Increases in electricity consumption can be seen in almost all asset groupings of facilities in 2022 compared to 2021 except for administrative facilities, which had a slight decrease from 2021 to 2022 due to the continuation of remote work.

Natural Gas

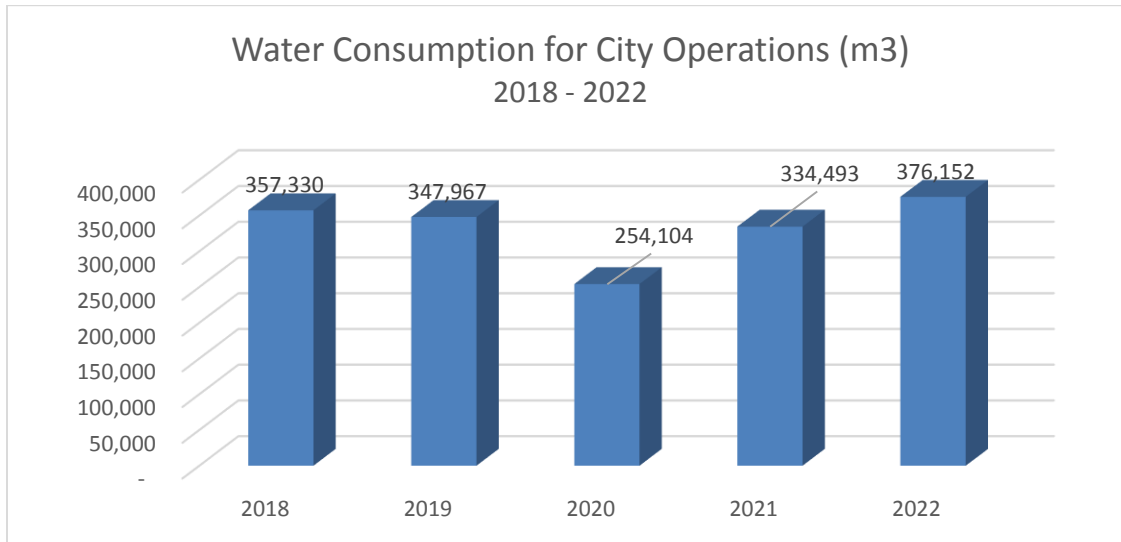


Natural Gas consumption increased significantly from 2021 to 2022, to just over 21%. This is still a 3% reduction from the 2018 CEEMP baseline consumption data across City facilities.

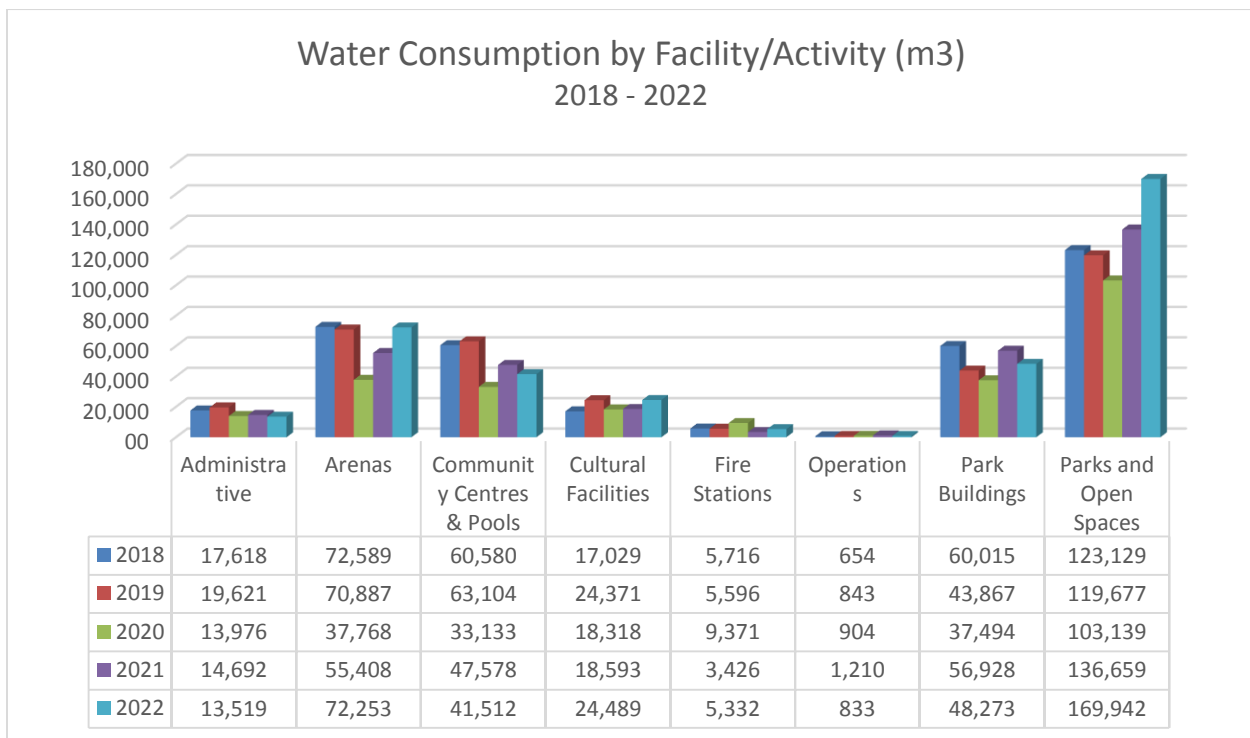


Increases in natural gas consumption can be seen in most public facing facilities due to increases in availability and programming in 2022 compared to previous years, as well as the addition of Robert Bateman High School in late 2022. There has also been some difficulty in obtaining accurate gas data, and billing errors from Enbridge since the change from Union Gas.

Water Consumption



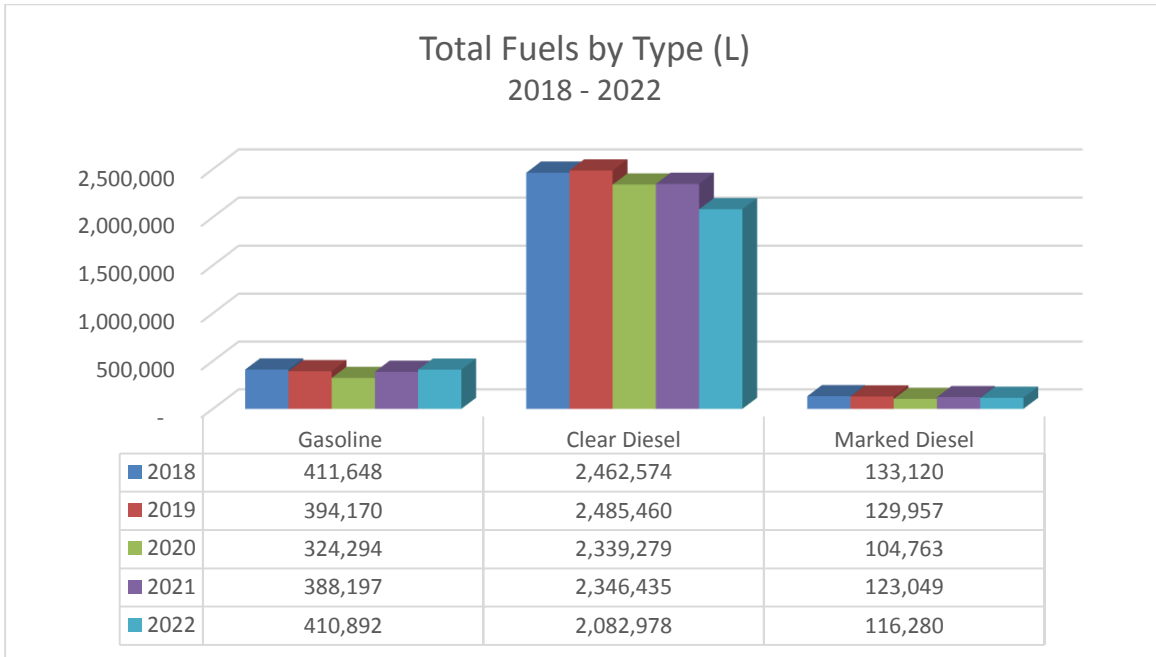
Water consumption has increased from 2021 to 2022 by 11% due to increased usage of facilities and increased outdoor amenities such as splash pads and has now surpassed 2018 CEEMP baseline levels by 5%.



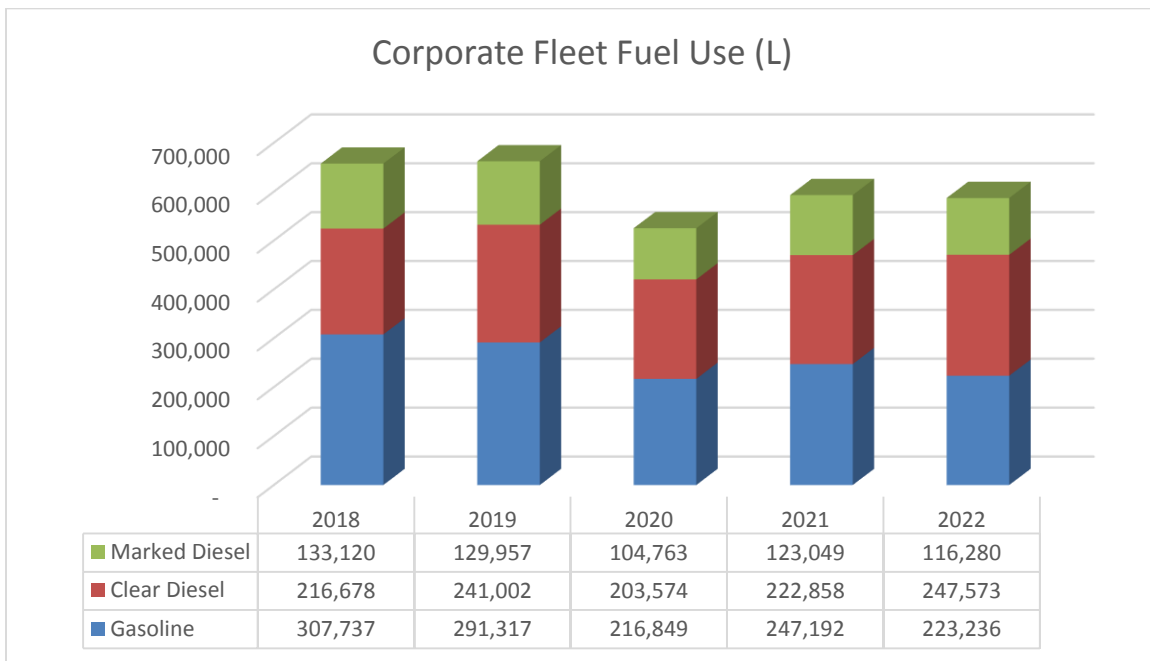
Increases can be seen in almost every asset category from 2021 to 2022 due to increased levels of programming, increased square footage, and splash pad operation.

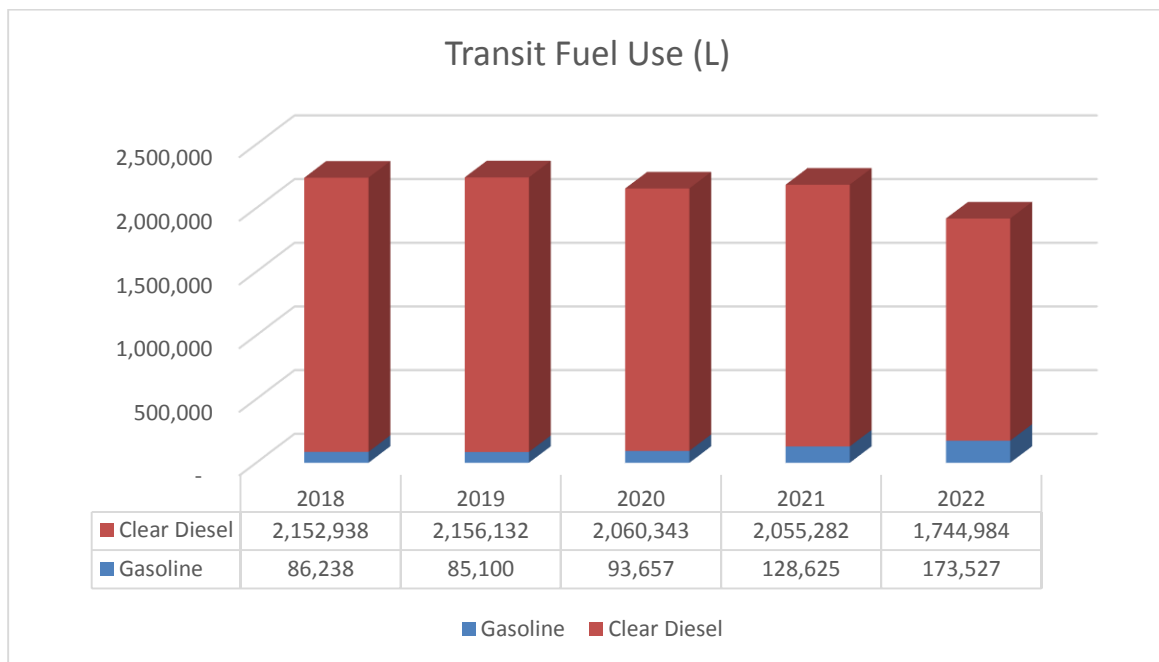
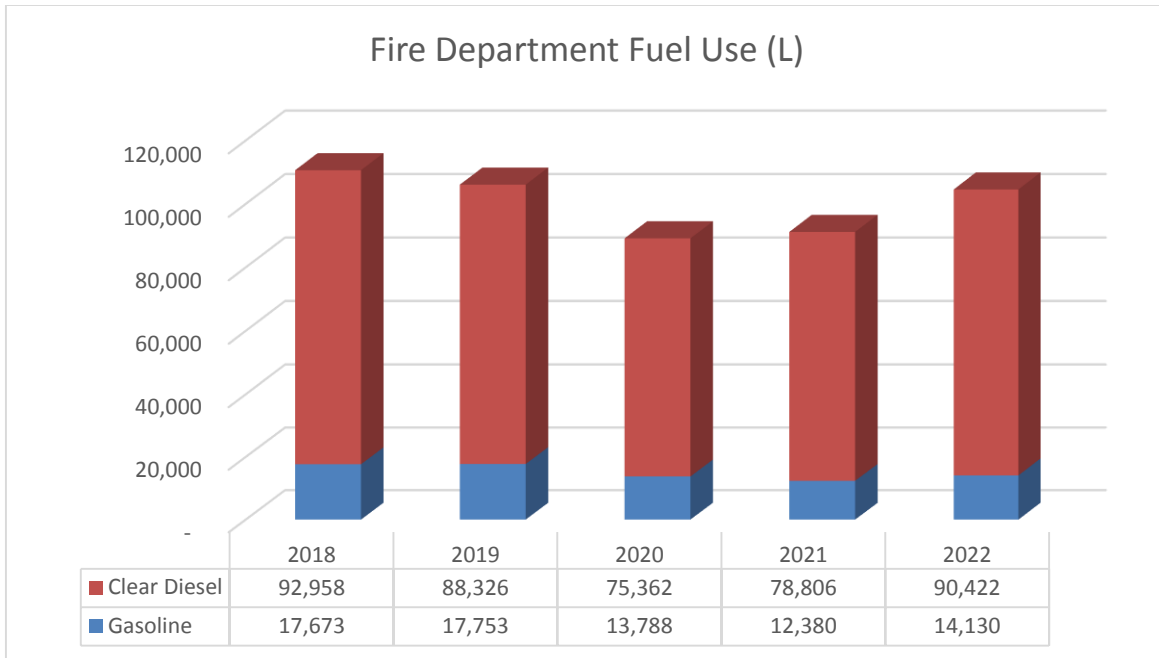
Fleet Fuel Consumption

Total City fuel consumption (Corporate Fleet, Fire Fleet and Transit Fleet) decreased in 2022 by 9% from 2021 levels. Marked fuel is primarily used in off road equipment.



Below are consumption graphs by fuel type presented by Corporate Fleet (not including Fire and Transit vehicles), Fire Fleet and Transit Fleet.



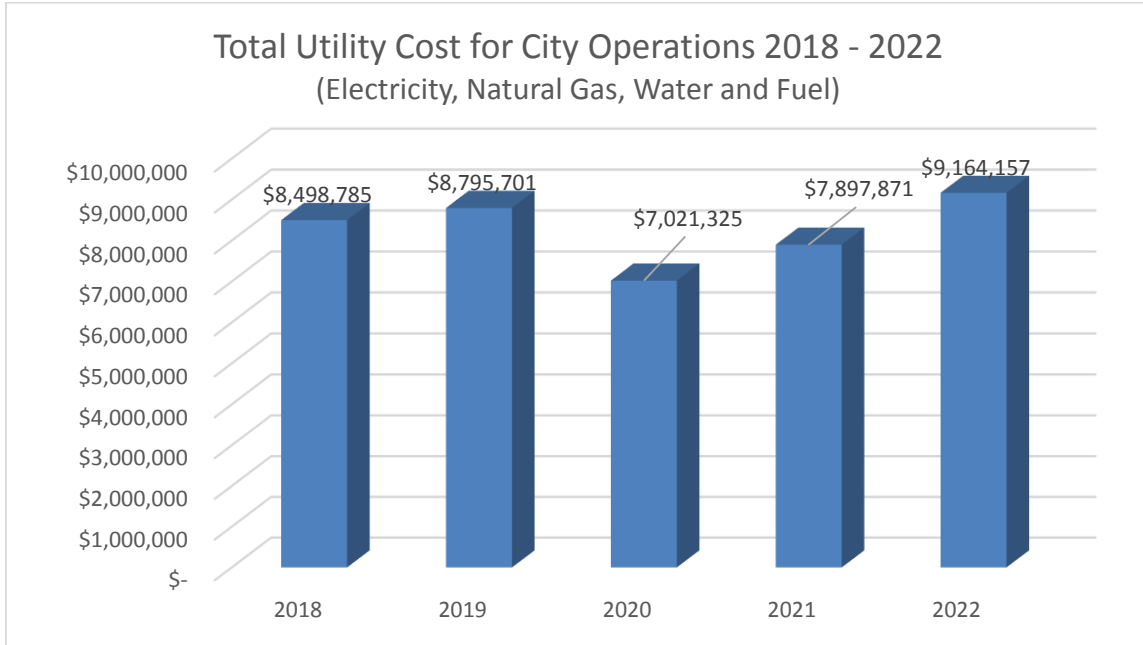


Options Considered

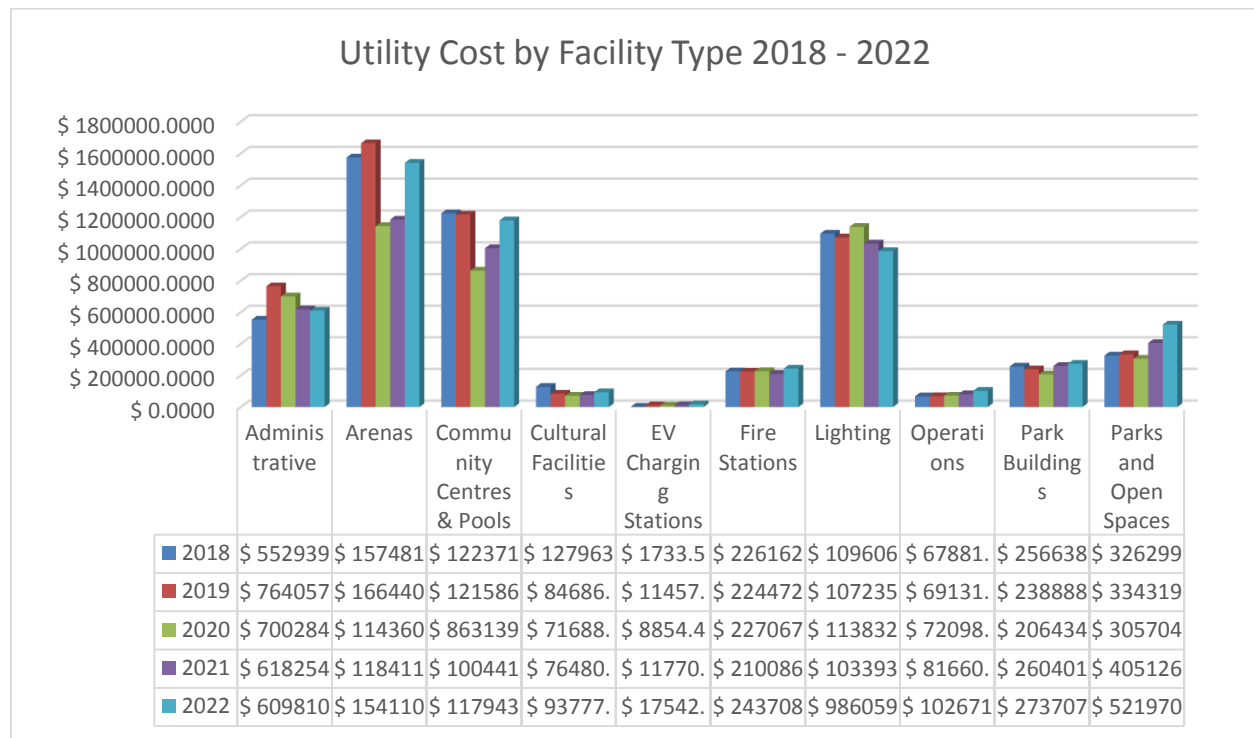
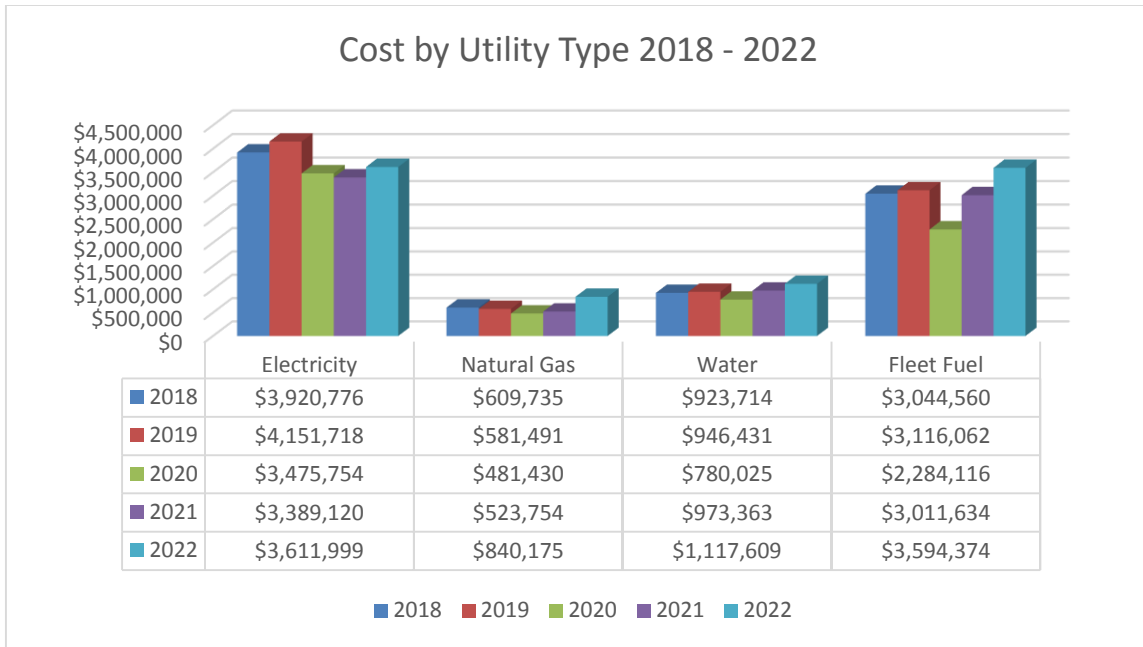
The Corporate Energy and Emissions Management Plan provides a pathway to meet the Burlington target to become a net carbon neutral in our operation by 2040. The measures identified in the plan and its processes must be implemented to meet this target. The city could choose business as usual and the do-nothing options but then would fail to show community leadership in acting on climate change.

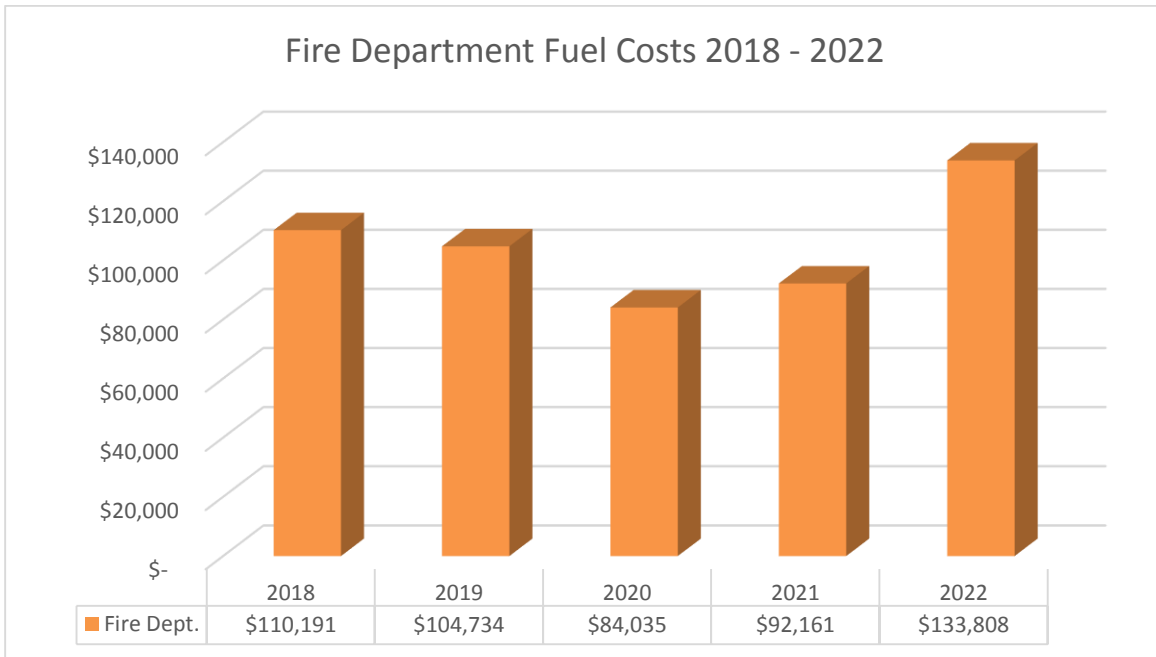
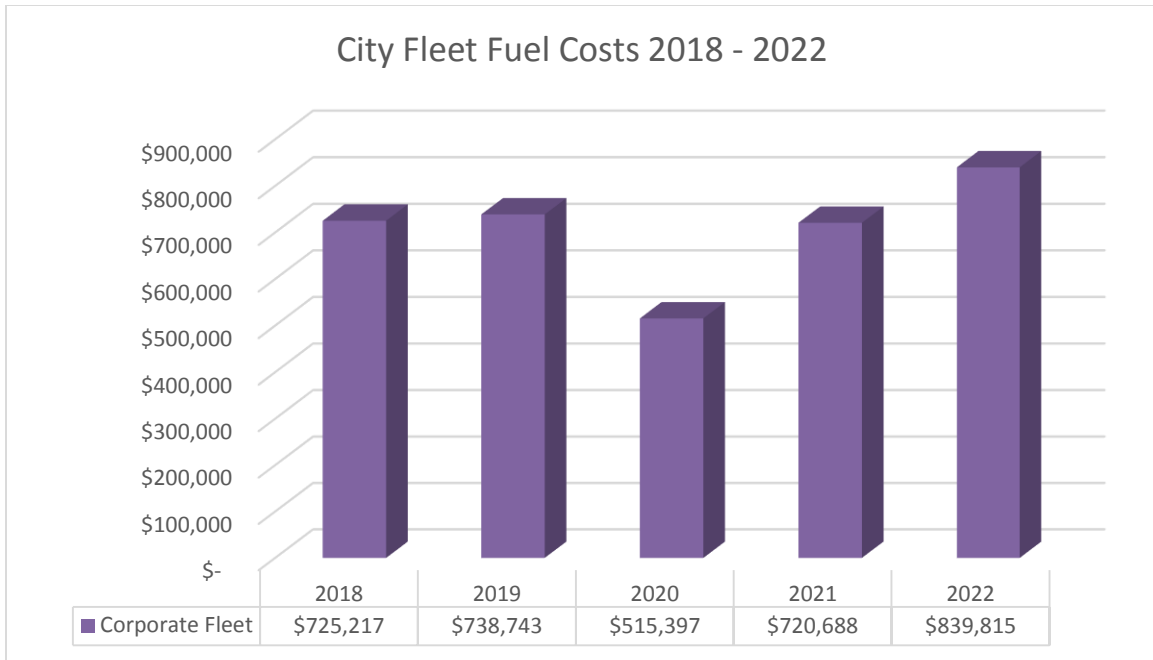
Financial Matters:

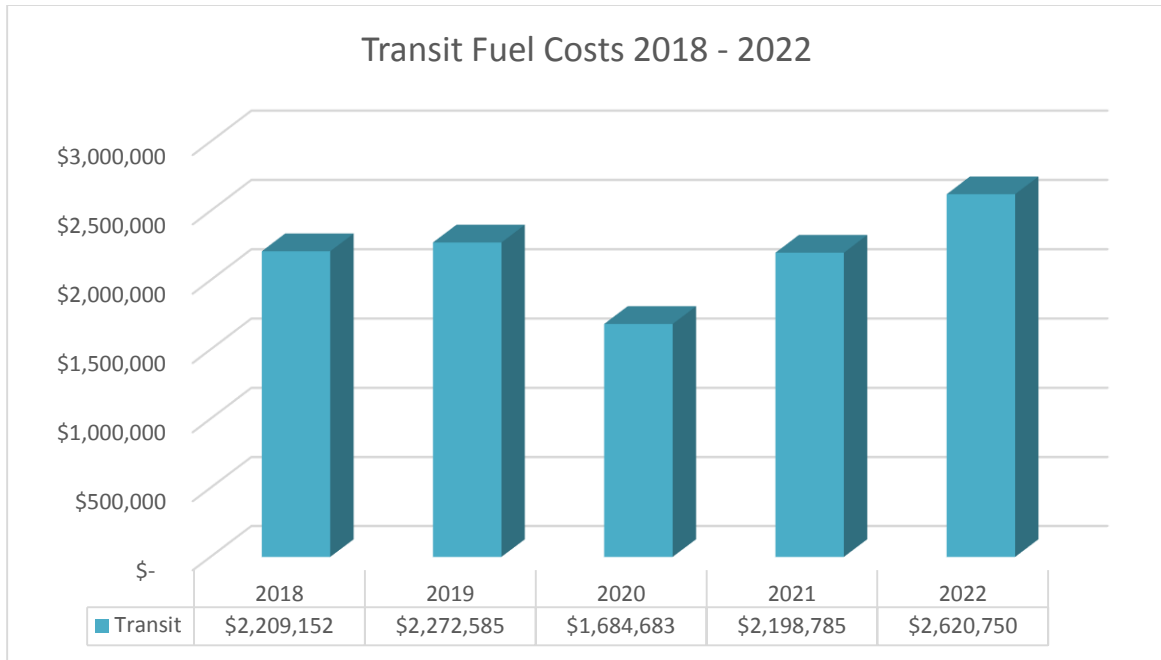
Total cost of electricity, natural gas, water and fleet fuels increased by 16% from 2021 to 2022 which is consistent with increased facility activity and service levels as well as increased commodity costs for fossil fuels.



Increased costs for natural gas can be attributed to increased federal carbon charges and increased commodity cost. The city continues to participate in a natural gas purchasing program administered by Jupiter Energy Advisors as well as the City's Corporate Energy and Procurement staff. This program helps mitigate the cost effects of the rapidly increasing cost of natural gas. Increasing federal carbon charges act as an incentive to decarbonize and transition away from the use of fossil fuels.







Total Financial Impact

Staff are currently working through the capital budget process to incorporate the costs associated with the measures in the Deep Energy Retrofits described in Appendix B. Staff recently applied for the federal government’s Green and Inclusive Community Building Funding for a deep energy retrofit at Brant Hills Community Centre. If successful, this funding would allow the City to begin a construction project in 2024 to complete the measures in the short term retrofit pathway scenario and convert Brant Hills Community Centre into a net carbon neutral facility.

Staff will continue to seek out upper level government funding to offset some of the costs of these projects.

Source of Funding

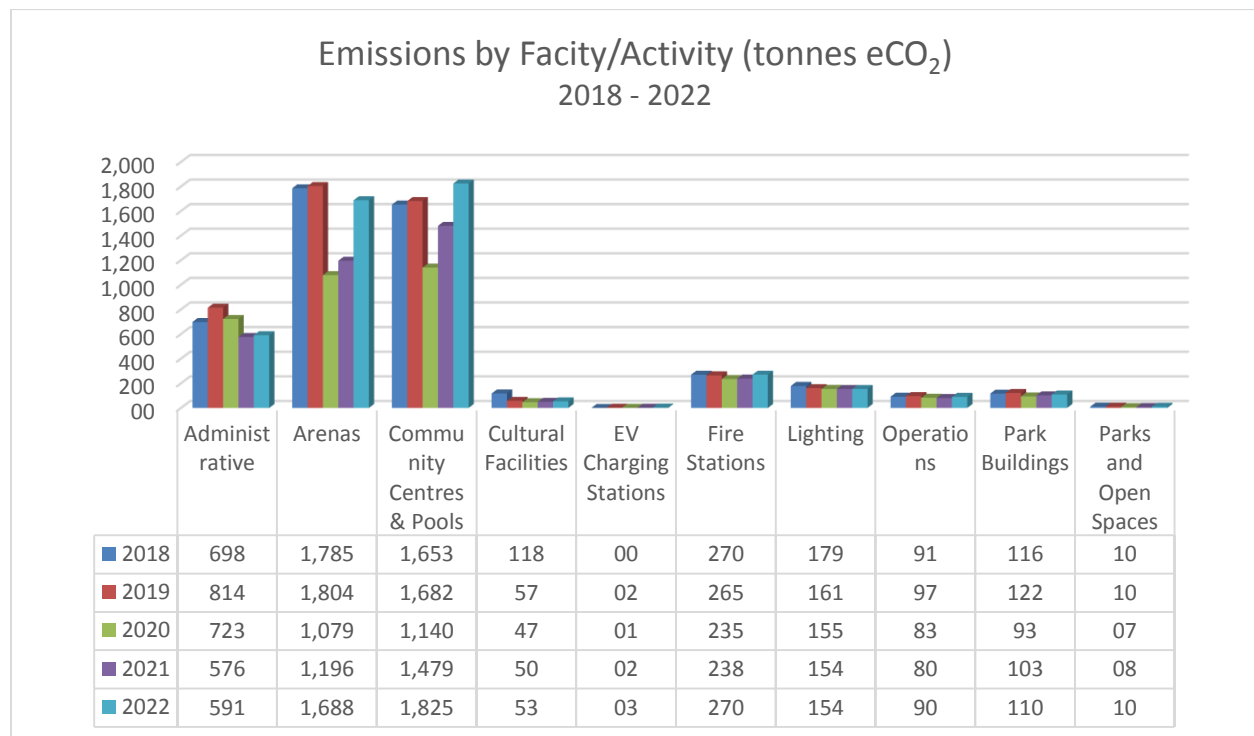
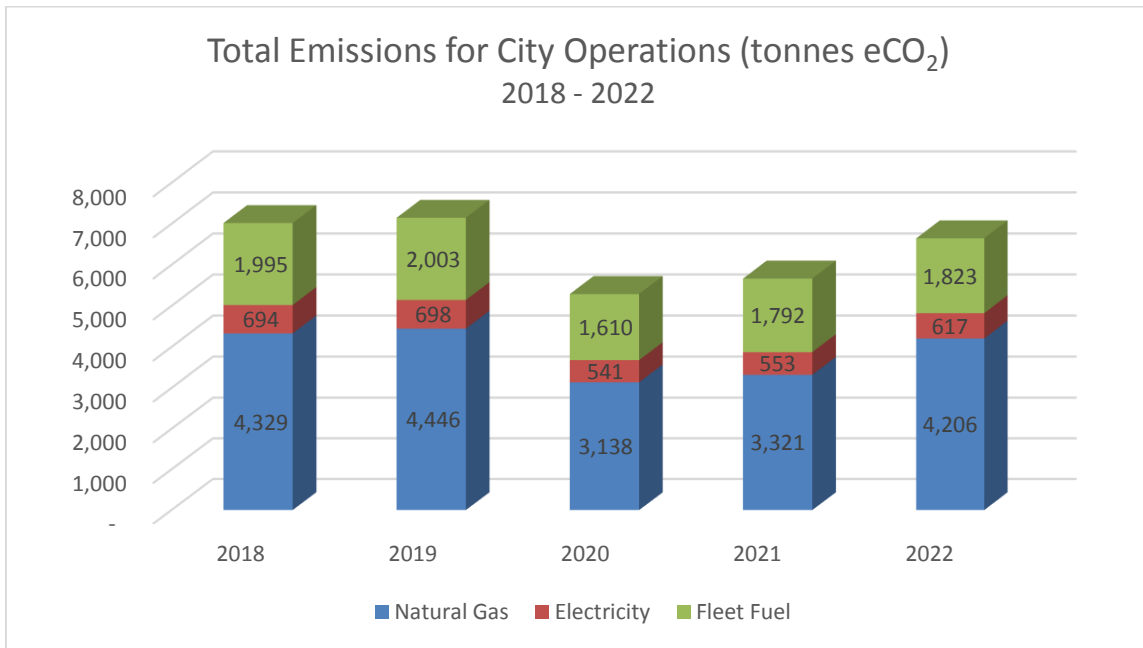
Not Applicable

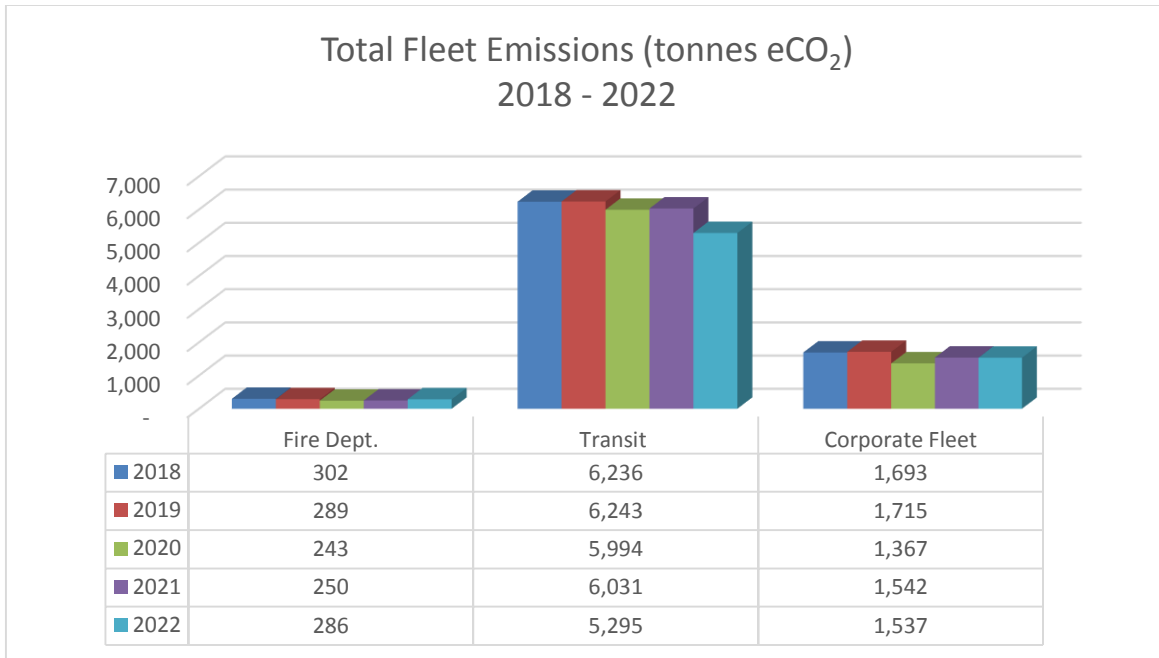
Other Resource Impacts

Not Applicable

Climate Implications

Overall emissions for the City’s facilities corporate emissions increased by 17% (981 tons equivalent carbon dioxide – t eCO²) from 2021 to 2022 but remain 5% (371t eCO²) below 2018 CEEMP baseline levels.





The corporate fleet emissions stayed relatively steady with a 5t eCO₂ decrease from 2021 to 2022. Fire fleet emissions increased by 14% (38t eCO₂) over the past year. Burlington Transit Fleet emissions decreased by 12% (736t eCO₂) from 2021 to 2022

Engagement Matters:

Corporate Energy staff have continued to engage with our operational staff teams through several training sessions and refreshers with various automation systems, sub metering systems and equipment specific training to help them understand their facilities' energy use and resulting emissions from their facilities. The corporate energy team is also actively involved with the Climate Action Plan and provides input on the stakeholder committee as well as any other input needed for studies and program rollout. Members of the Corporate Energy team are also active members in the Municipal Energy Managers Community of Practice which allows energy and environmental staff from various Ontario municipalities to share experiences and project information.

Conclusion:

The City continues to make progress toward our goal of becoming net carbon neutral in our operation by 2040. Completion of the Deep Energy Retrofit Pathway Studies is a major step towards reducing emissions in the City's existing building stock. Exciting progress is beginning to take shape with the introduction of more heat pumps at city facilities and renewable energy installations. The city needs to ensure that the carbon reduction opportunities captured in these studies are not missed and that we begin the next round of studies to identify similar pathways for other existing city facilities.

Respectfully submitted,

Tom Pedlar

Corporate Energy & Emissions Coordinator

X 7354

Appendices:

- A. 2022 Utility Data
- B. Deep Energy Efficiency Retrofit Feasibility Study Summary

Report Approval:

All reports are reviewed and/or approved by Department Director, the Chief Financial Officer, and the Executive Director of Legal Services & Corporation Counsel.