



**SUBJECT: Corporate Energy & Emissions Management Plan progress report**

**TO: Environment, Infrastructure & Community Services Cttee.**

**FROM: Environment and Energy**

Report Number: EICS-06-22

Wards Affected: All

File Numbers: 210-01

Date to Committee: June 9, 2022

Date to Council: June 21, 2022

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**Recommendation:**

Authorize the submission of relevant content/data in Appendix A of report EICS-06-22 be submitted 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; and

Authorize the Mayor and City Clerk to execute the necessary agreements and other related documents or by-laws between the City of Burlington and the Government of Canada, in relation to the Low Carbon Economy Challenge Fund – Champions Stream, should our application for the Robert Bateman High School Revitalization be successful, to the satisfaction of the Executive Director of Legal Services and Corporation Counsel; and

Authorize the Mayor and City Clerk to execute the necessary agreements and other related documents or by-laws between the City of Burlington and the Government of Canada, in relation to the Low Carbon Economy Challenge Fund – Champions Stream, should our application for the Brant Hills Community Centre – Deep Energy Retrofit be successful, to the satisfaction of the Executive Director of Legal Services and Corporation Counsel; and

Authorize the Mayor and City Clerk to execute the necessary agreements and other related documents or by-laws between the City of Burlington and, The Toronto Atmospheric Fund, operating as The Atmospheric Fund, ("TAF") in relation to the,

GTHA EV Charging Fund, to the satisfaction of the Executive Director of Legal Services and Corporation Counsel.

## **PURPOSE:**

### **Vision to Focus Alignment:**

- Support sustainable infrastructure and a resilient environment
  - Deliver customer centric services with a focus on efficiency and technology transformation
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### **Executive Summary:**

This report presents data on energy and greenhouse gas emissions from corporate operations in 2021, including a comparison to 2020 and 2018 (baseline). 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.

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### **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.

In 2009, the Green Energy Act and Green Economy Act (GEGEA) directed the broader public sector (municipalities, universities, schools, and hospitals) to develop and report their energy conservation and demand management plans. Specifically, Ontario Regulation 397/11 – Energy Conservation and Demand Management Plans enacted in August 2011, mandated:

- Completion, publication and submission to the Minister of Energy of Burlington's corporate energy consumption and greenhouse gas emission template for one year of operation (Jan 2011 to Dec 2011) by July 1, 2013 and annually thereafter (completed Mar 2013 CSI-06-13);
- Development and publication of a detailed energy conservation and demand management plan with targets approved by senior management by July 1, 2014 (completed Apr 2013 CSI-09-13); and

- By July 1, 2019 and every five years thereafter publish an update to the original plan that reviews measures implemented, their actual results and forecasted impacts of planned measures, and any changes made to achieve our targets.

In 2018, the Ontario government repealed the Green Energy Act and Green Economy Act and, in the process, moved Ontario Regulation 507/18 – Energy Conservation and Demand Management Plans to the Electricity Act. The wording of the regulation is the same as the above-mentioned Regulation 397/11 with updated dates for the next five-year period to 2024.

Energy conservation typically means reducing the total amount of energy consumed (kWh of electricity and m<sup>3</sup> 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.

The City of Burlington has a significant energy and environmental impact associated with its own operation. This was identified in the City's Strategic Plan with a goal of having the City's operations become net carbon neutral by 2040 which was adopted in 2016. The 2019 Corporate Energy and Emissions Management Plan meets the objectives identified in Ontario Regulation 507/18 as well as aligns and defines the City's carbon reduction target of 2040.

### **Strategy/process**

The City's 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 July 2021 (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 including:

### **Deep Energy Retrofit Studies**

While many City facilities will be replaced with new low carbon facilities prior to reaching 2040, most of the City's current building stock will be in operation long after 2040 and will require significant planning and investment over their lifecycle in order to be converted to low or zero carbon facilities.

In the past energy audits were performed on City buildings in order to identify areas where efficiency and cost savings could be gained through upgrades to various systems or changes to operational processes throughout the building. While these audits are still useful in identifying energy saving projects, they do not make much progress toward moving our facilities toward being low/zero carbon facilities.

In order to do this, we need to take a more holistic look at the buildings envelope, its systems, and its programming or end uses through undertaking a deep energy retrofit study.

In June of 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.

The goal of these studies is to identify and plan for the proper path to get these four facilities to a minimum of 80% carbon reduction.

Through the involvement of staff from energy, asset management, project management, operations and finance teams, City staff will work with our consultants, DIALOG Design, to work through the process laid out in the program guidelines which includes the following steps;

### **Step 1 – Site and Energy System Investigation**

In this stage staff will work with consultants to gather and assess all relevant documentation on the facilities including utility data, drawings, equipment information, system trends and sequences, construction details for envelope and building systems and also conduct interviews with operations staff to gain knowledge on day to day operations as any existing building issues.

### **Step 2 – Calibrated Energy Model of the Existing Facilities**

The next phase of the work involves taking all the data gathered in the first step of the project and creating a calibrated energy model of the facility. The model is then calibrated against historical utility data to ensure that our assumptions on schedules and construction and run times is all correct. This calibrated energy model becomes the starting point for our carbon reduction measures and pathways.

### **Step 3 – Integrated Design Workshop**

The Integrated Design Workshop is a very important step in the process and one that is critical to ensure success of the project. In this workshop, City staff from all teams and departments will meet with our consultants to review the goals and outcomes the study is trying to achieve as well as possible measures that could be part of the solution to help us meet our carbon reduction targets. These measures are discussed by the stakeholders involved in the project to ensure that they will work from an operational, construction, financial, asset management and energy management perspective.

### **Step 4 – Measure Level Analysis**

Once measures have been screened the consulting team can begin the detailed analysis of the measures including implementation, costing, GHG reductions and

many other factors and requirements. These changes are then presented back to the project team for review and comment.

### **Step 5 – GHG Reduction Pathway Scenarios and Package Analysis**

Once measures have been analyzed they are grouped into various pathway scenarios and analyzed again. These scenarios will include:

- 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.
- A “short-term deep retrofit” scenario: This includes the same GHG reduction measures as scenario 1, except that all measures are implemented in the first two to five years.
- A “maximum site potential” scenario: This targets the greatest reduction potential possible, independent of capital considerations
- An “optimized outcome” scenario: This considers cost-per-ton-tCO<sub>2</sub>e targets, GHG reduction targets and other qualitative and quantitative impacts optimized according to project objectives.

### **Step 6 – Decision Making Workshop**

Once all pathways have been provided to the City a final decision workshop is held to decide on which pathway best suits the City’s needs. For our four buildings this could end up being four completely different pathways to suit the needs of our capital plan and the facilities themselves.

### **Step 7 – Final Report and Presentation**

Preparation of a final report will be the last step of the project outlining the details of the selected pathway for each of our four facilities in the project.

At the completion of this project City staff hope to embark on more deep energy studies for the next buildings up for major renewal in our asset management plan.

Staff recently received approval to proceed to the detailed application phase of the federal government’s Low Carbon Economy Challenge Fund 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 low carbon facility.

### **Burlington Seniors Centre ReCover Project**

Last year staff advised of an application to the ReCover Initiative, which is administered by QUEST, a non-government organization that works to accelerate the adoption of efficient and integrated community scale energy systems in Canada. We are happy to

announce that Quest’s funding application was approved, and this project is now proceeding. The ReCover initiative originated in Europe as a residential deep energy retrofit process that involves wrapping the building in a new prefabricated insulated skin and replacing the mechanical systems with smaller, more efficient components. Burlington along with a few other municipalities across Canada (including Oakville) have been invited to participate in the expansion of the program to include municipal facilities. Phase one of the program is to perform a feasibility study for the project at the Burlington Seniors Centre.

This project is similar to our Deep Energy Retrofit project above but assumes that the entire building will be re-clad to increase the thermal efficiency of the building and then review and redesign mechanical systems to suit the new envelope.

### Solar PV Planning

This past year staff completed a solar PV (photovoltaic) capital plan study to review the viability of installing systems at various City assets. This study included analysis of shading, potential system sizing, financial calculations, electrical infrastructure review both within facilities and preliminary discussions with Burlington Hydro to assess if local grid connections are feasible. Staff are currently incorporating these installations into the capital budget coordinating with roof replacements on the facilities to maximize lifecycle of the array and minimize disruption to the facilities. Within the next five years the following facilities will have their roofs replaced and Energy staff will be working to install systems on these newly installed roofs pending budget approval:

Facility	System Size (kW)	Annual kWh Generated	Offset from total electricity at facility	Estimated Year of Installation
Fire Station 5	30	33,000	112%	2023
Fire Station 1	90	108,000	30%	2025
Brant Hills Community Centre	132	159,000	76%	2024
Nelson Rec Centre	274	302,000	80%	2025
Appleby Ice Centre	978	1,152,000	30%	2027

While not included in the list above, staff are reviewing the feasibility of installing solar on the new Skyway Arena after its construction completion and on Robert Bateman High School as part of the renovation project.

The City currently owns one 30kW solar PV array on the new City View Park Pavilion.

While they are not City owned, the City also earns income by leasing roof space at Burlington Transit Headquarters, Roads Parks and Forestry Operations Centre and Mountainside Recreation centre for externally owned solar arrays. The revenue generated from these lease agreements are to be used for other energy saving capital projects.

### **Metering Systems**

Expansion of the City's real time sub metering system continued this past year with installation in the Roads, Parks and Forestry Operations Centre, City Hall and Brant Hills Community Centre. Installation of these systems will provide vast amounts of data on the operation and performance of City facilities that will assist our operations teams in managing energy as well as provide valuable insight if and when deep energy retrofit studies are planned for these facilities.

The system installed in our Roads, Parks and Forestry Operations Centre is our first system that tracks water and natural gas consumption in real time. This system has just been commissioned, but Energy staff are excited to review the data and the possible expansion of this portion of the system.

Metering systems have now been installed in nine City facilities providing staff with minute by minute data on 240 loads in those buildings.

### **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:

#### **Burlington Transit Terminal – Hybrid Air Source Heat Pump Installation**

This past year staff installed the City's first hybrid air source heat pump at the downtown transit terminal. The system uses a cold climate heat pump in combination with a high efficiency gas furnace to strike a balance between operating costs and carbon reduction. Since the heat pump will become less efficient as the outdoor air temperature gets colder, staff can adjust the temperature at which the system will engage the gas heat. Staff are currently monitoring the results and investigating other City facilities where this technology may be effective.

#### **Fire Stations 2 and 6 Lighting Upgrades**

A complete lighting replacement is currently underway at Fire Stations 2 and 6. The new lighting systems will replace the existing fluorescent lighting with new LED fixtures and a wireless lighting control system that combines occupancy measures with scheduled programs to ensure the facility uses lighting only when necessary.

### **Nelson Rec Centre Lighting Upgrades.**

A lighting retrofit is currently in design and will be implemented this fall at Nelson Recreation Centre. The project will replace all remaining fluorescent fixtures in the facility with LED fixtures. New dimming controls will also be included for the rink space to ensure appropriate lighting levels for various activities in the facility.

### **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**

City View Park Pavilion recently wrapped up construction and is the City's first facility that will achieve net carbon neutrality in its operation on site. The facility includes occupancy-based HVAC (heating, ventilation and air conditioning) and lighting control systems as well as a 30kWAC net metered solar array which is designed to produce the same amount of electricity as the facility will use over the course of the year. Staff are finalizing commissioning on the project as well as actively monitoring the building's performance to ensure that it is operating and producing electricity as per its design.

#### **Skyway Arena**

The Skyway Arena and Community Centre is now out for tender and is designed to be a low carbon facility that uses no fossil fuels in its operation. The building is designed to maximize heat recovery and reduce waste heat as well as utilize a geothermal loop to provide additional heating and cooling to the building. Energy staff will be heavily involved in the construction and commissioning and will continue to work with Recreation, Community and Culture operations staff to ensure that the building functions as it was designed.

#### **Robert Bateman High School Renovation**

With the recent approval to purchase Robert Bateman High School comes one of the larger challenges along our path to net carbon neutrality. The 212,000 square foot facility will become the City's largest facility and needs a major renovation to many aspects of the building including all its major building systems. While the design for this facility is in its early stages, staff are trying to identify the best path forward while keeping capital cost and carbon reductions in mind. There will be significant challenges to convert this facility to a low carbon building, due to its age, its massive square footage and low efficiency envelope. While not included in the renovation project itself, the portion of the building that is currently Centennial Pool also poses a large challenge to include in the plan for the site to achieve a low



carbon footprint due to the very high heating load that the portion of the building creates.

Staff recently received approval to proceed to the detailed application phase of the federal government's Low Carbon Economy Challenge Fund for the Robert Bateman High School Renovation project. If successful, this funding would allow the City to add items like a geothermal system and building envelope improvements to the scope of the project. Final decisions on funding are expected in the fall of 2022.

## **Fleet Management**

### **AVL System Update**

The new AVL (Automatic Vehicle Locator) system has been rolled out across the corporate fleet. Training has been completed for Supervisor and Superusers on the system and its functionality.

The next steps in the project will be to implement Focus ELD (electronic logging devices), an electronic system to log hours of service and driver vehicle inspection reports. Training of this new system will be provided by Fleet Services over the course of the summer/fall.

KPI (key performance indicator) and dashboard development will begin mid-summer. These metrics will allow us to measure vehicle efficiencies using the new AVL software.

### **Green Fleet Strategy**

A scope of work has been finalized for a Green Fleet Consultant Tender to be issued in May. The goal is to provide a report from the Consultant by the end of 2022 for Council approval.

### **Green Vehicle and Equipment Growth**

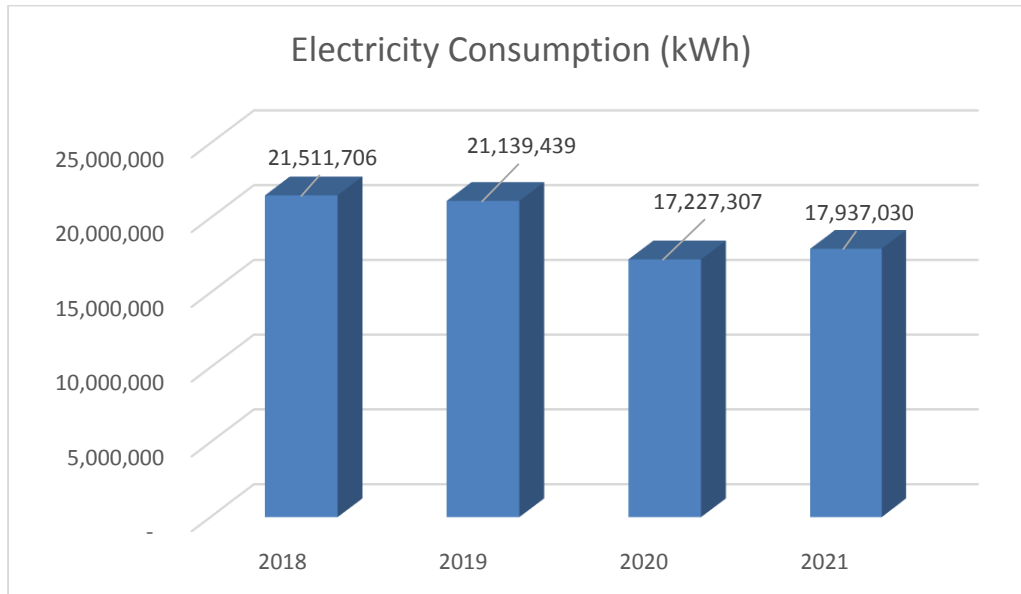
Fleet Services has increased the green vehicle fleet in 2021 by adding 6 Plug-in Hybrid Electric Vehicles (PHEV) and 11 Battery Electric Vehicles (BEV).

In addition, the green equipment fleet has grown with the addition of battery powered leaf blowers, trimmers and chainsaws. Fleet Services plans to procure over 15 green vehicles in 2022 (hybrid, PHEV, BEV). The update to the Green Fleet Strategy will expedite green vehicle purchases in 2023.

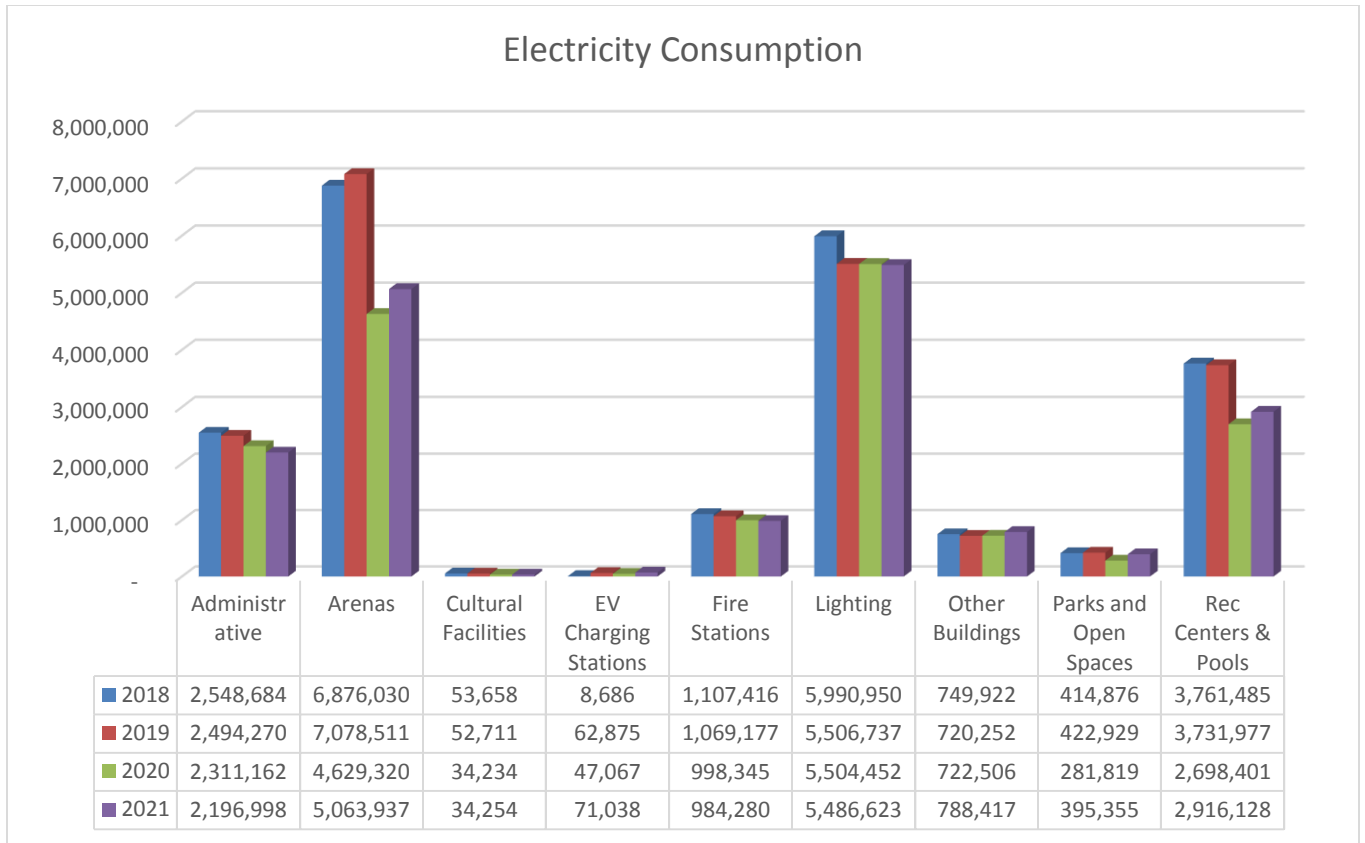
### Corporate Utility Data

Below is consumption data for 2018, 2019, 2020 and 2021 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 the Corporate Fleet, Burlington Fire Fleet as well as the Burlington Transit Fleet.

### Electricity Consumption

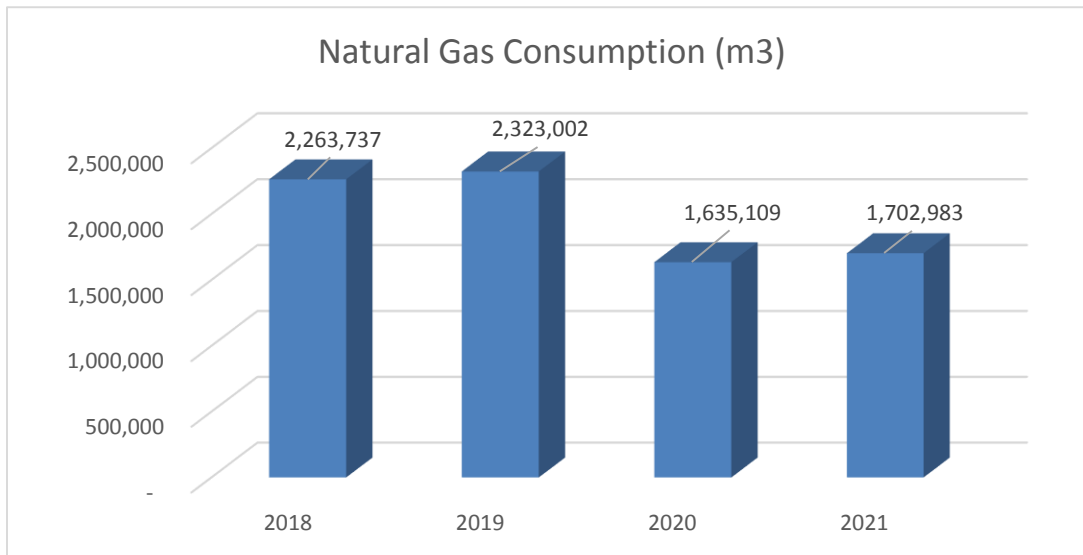


Electricity consumption increased slightly from 2020 to 2021, by just under 4% which can be attributed to shorter lockdown periods in 2021 than in 2020. This is a 17% reduction from the 2018 CEEMP baseline consumption data across City assets.

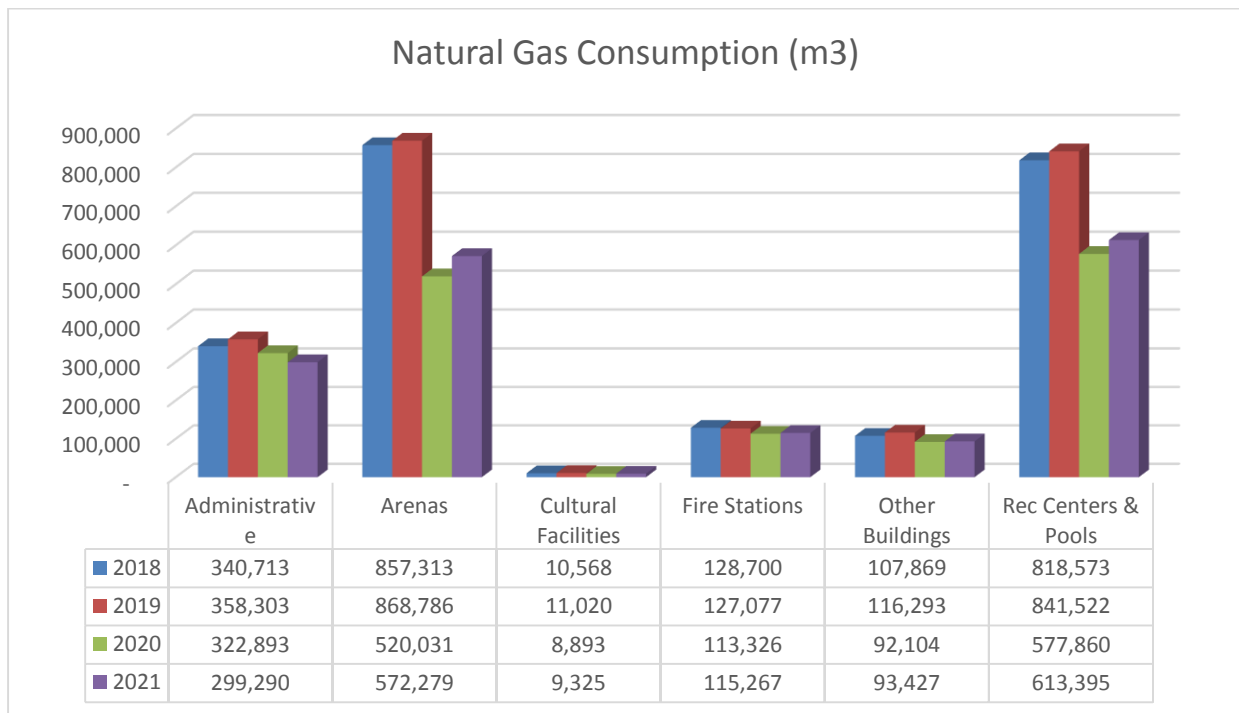


Increases in electricity consumption can be seen in most asset groupings relating to spaces used by the public due to increases in availability of facilities in 2021 compared to 2020. Administrative areas continued to experience a reduction from 2020 to 2021 due to the continuation of remote work. Some areas of operation remain unaffected in their operation by COVID-19, including street and traffic lighting, and fire stations.

### Natural Gas



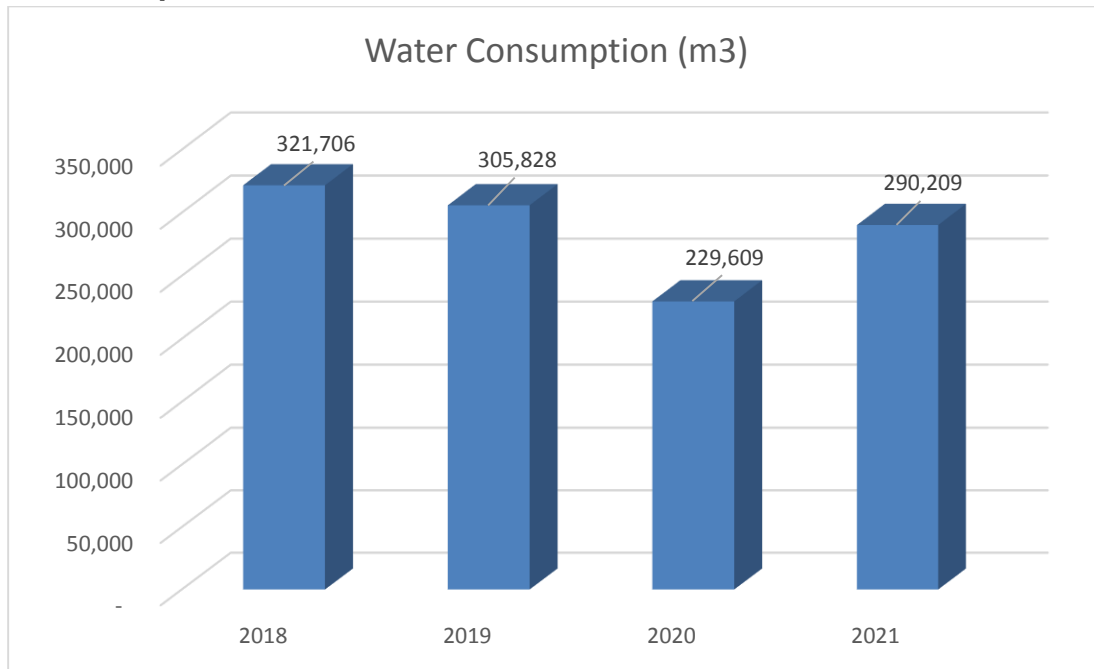
Natural Gas consumption increased slightly from 2020 to 2021, by just over 4% which can be attributed to shorter lockdown periods in 2021 than in 2020. This is a 25% reduction from the 2018 CEEMP baseline consumption data across City facilities.



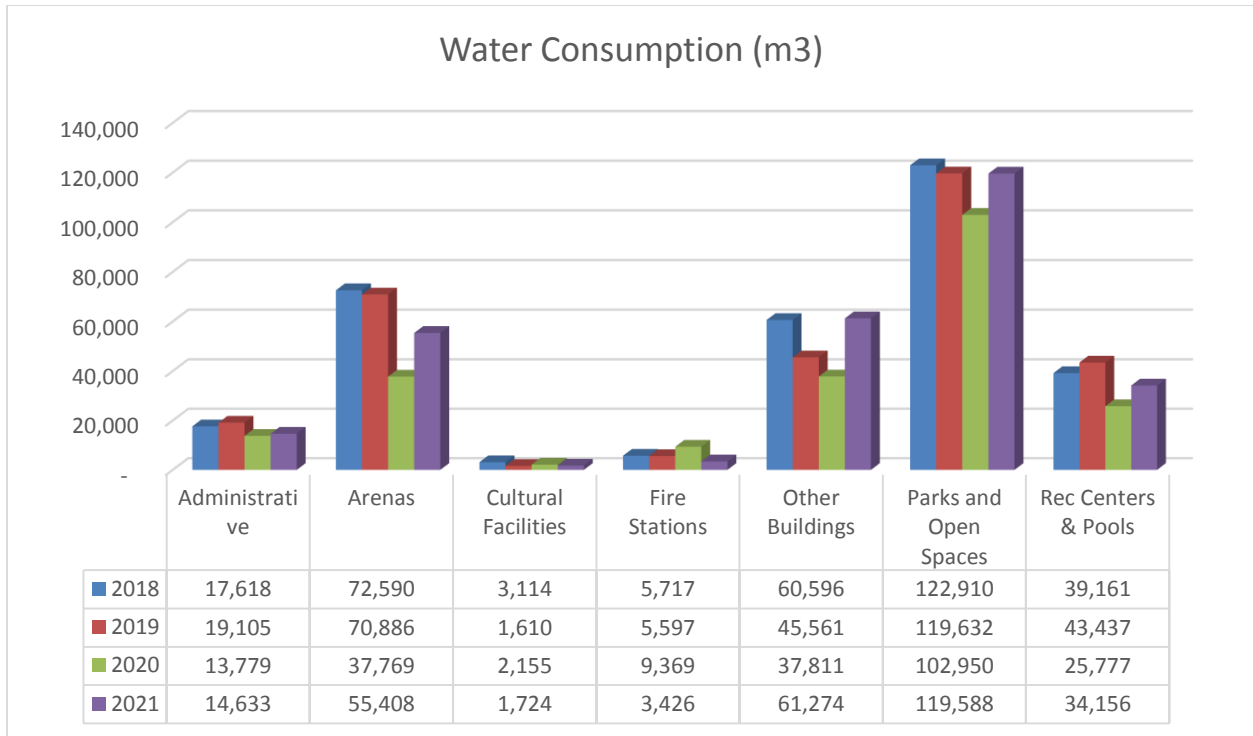
Increases in natural gas consumption can be seen in most Arenas, Community Centres and Pool facilities due to increases in availability and programming in 2021.

Administrative areas continued to experience a reduction from 2020 to 2021 due to the continuation of remote work. Similar consumption can be seen from 2020 to 2021 across fire stations, cultural facilities and the other building categories due to minimal changes in operation. There has also been some difficulty in obtaining accurate gas data for periods in 2020 from Enbridge. Burlington is not alone in this issue; other municipalities have had similar issues and are in discussion with Enbridge on how to address this matter in the future.

### Water Consumption



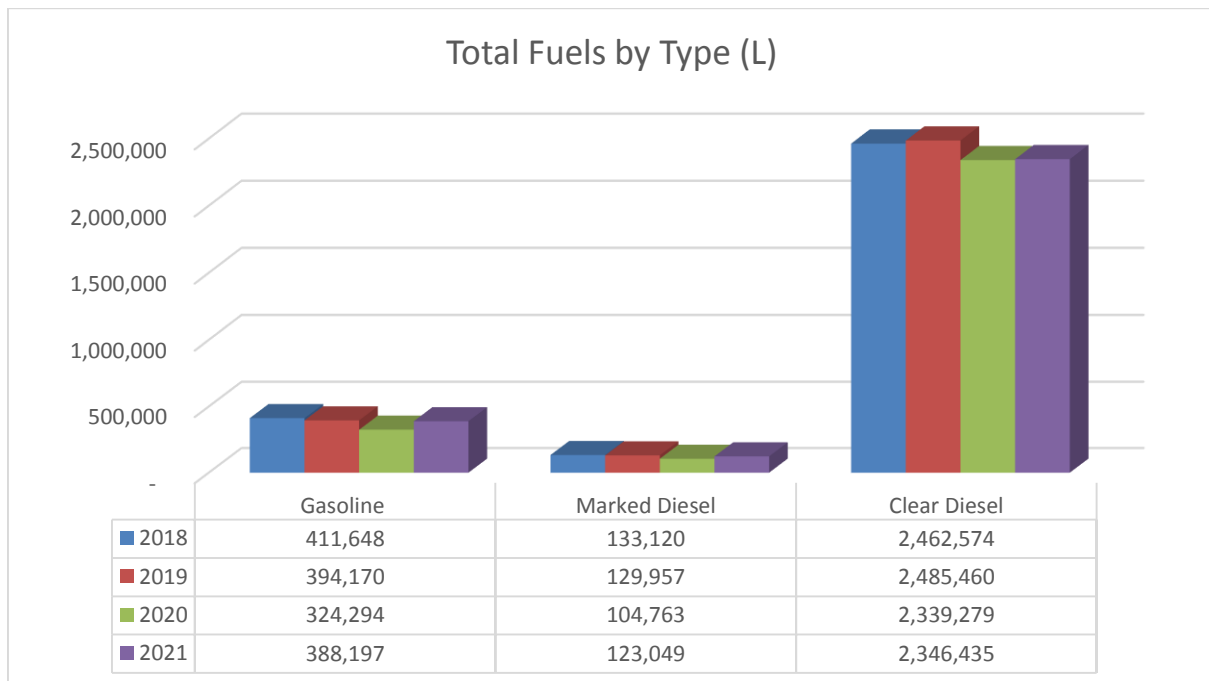
Water consumption has increased from 2020 to 2021 by 21% due to increased usage of facilities and outdoor amenities such as splash pads, although remains below 2018 CEEMP baseline levels by 10%.



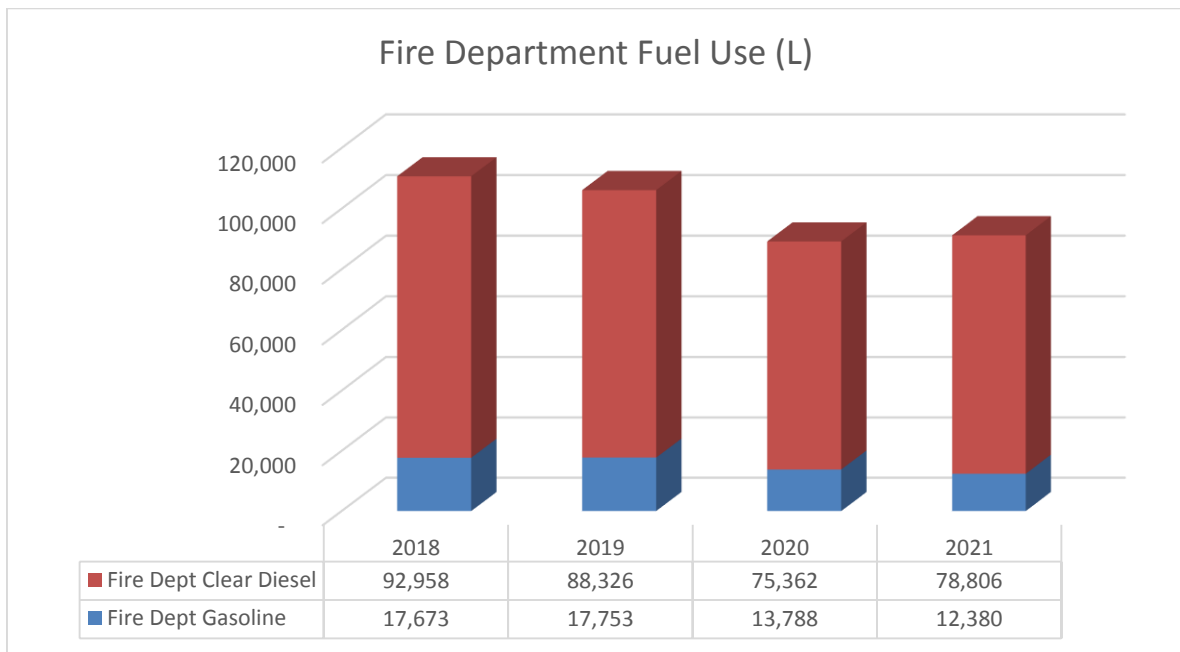
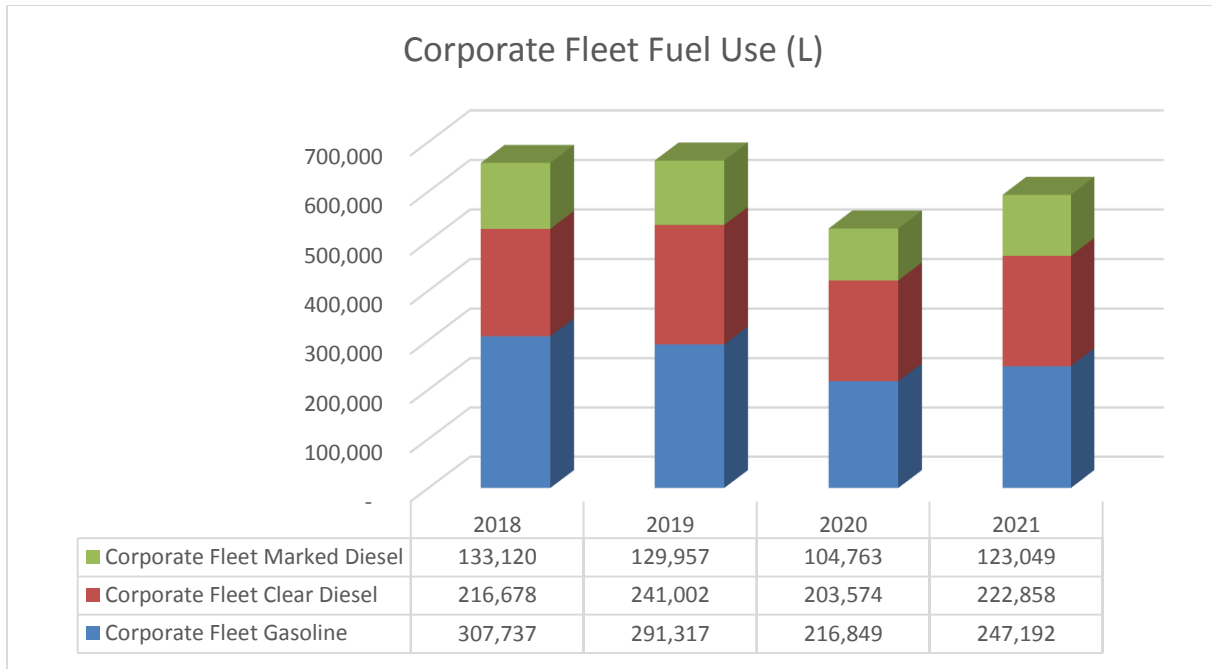
Increases can be seen in almost every asset category from 2020 to 2021 due to re-opening of facilities and increased use of parks and open spaces.

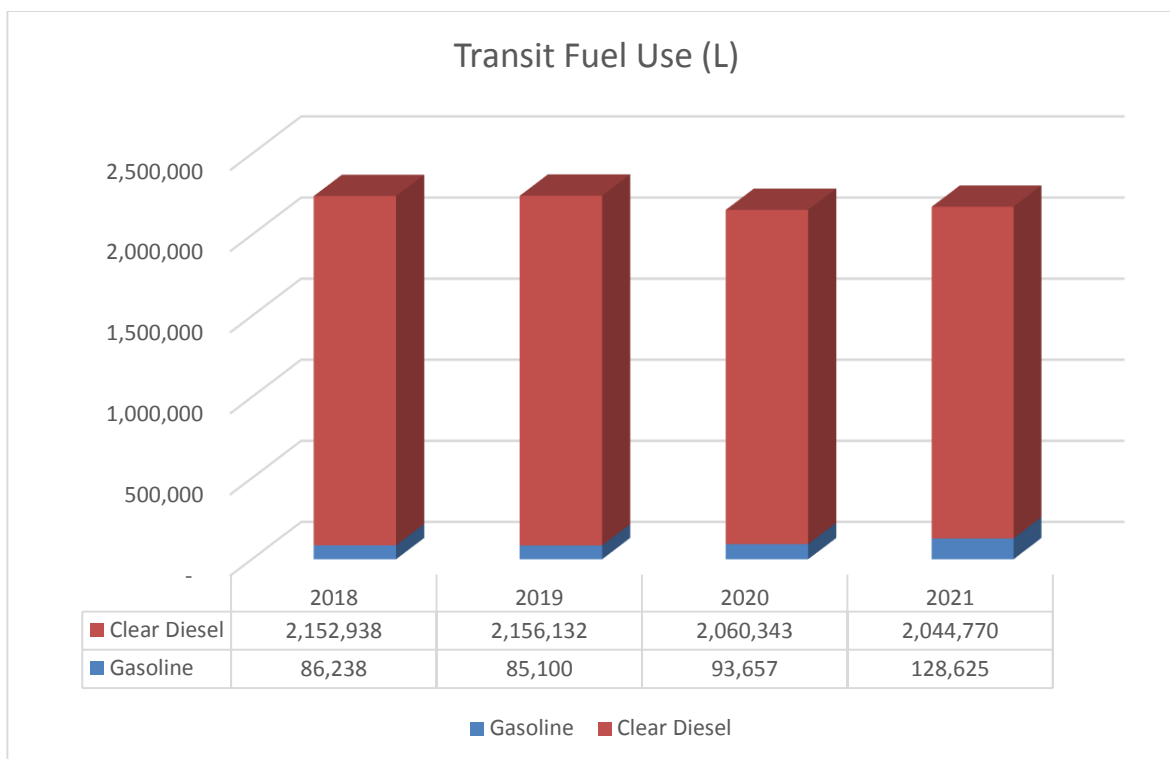
### Fleet Fuel Consumption

Total City fuel consumption (Corporate Fleet, Fire Fleet and Transit Fleet) increased in 2021 by 3% (89,345L) from 2020 levels primarily due to increased service levels in 2021. Marked fuel is primarily used in off road equipment.



Below are consumption graphs by fuel type for the Corporate Fleet (all vehicles and equipment not included in Fire and Transit), Fire Fleet and Transit Fleet.





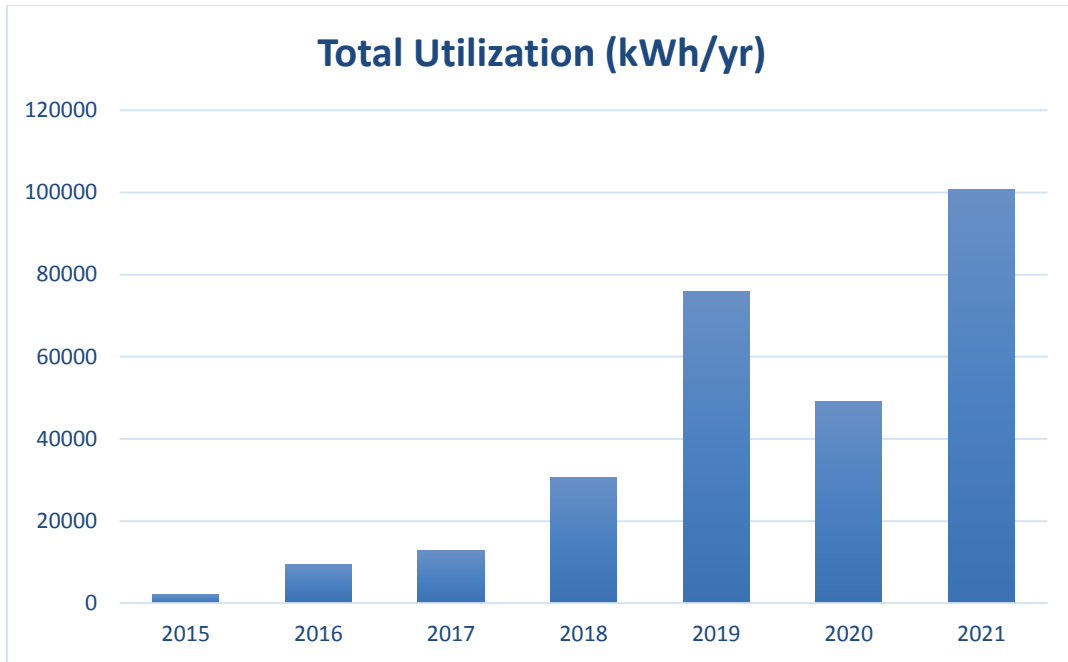
### EV Charging Update

Since the last EV (electric vehicle) Charging update report (EICS-01-21), additional charging infrastructure has been installed for both public and corporate use at various City facilities. The City's total EV Charging infrastructure currently consists of 52 charging ports at a total of 16 different locations throughout the City. The majority of charging infrastructure is in the downtown core, but further installations are in the works for a number of community centres around Burlington as well as a Level 3 (fast) charger in the downtown. Please refer to Appendix B for locations and planned locations for all City owned charging assets. As the City continues to increase EV charging infrastructure on city property to meet increasing demand, consideration must be given to the resources required to administer, operate and monitor this infrastructure.

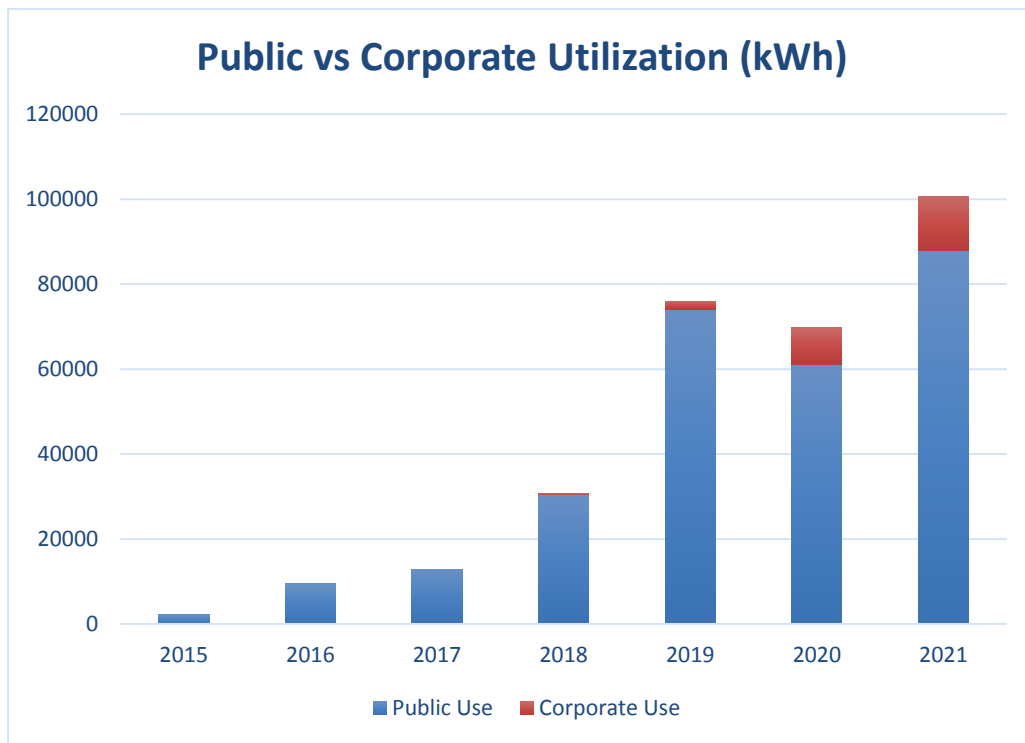
Staff have recently been approved for an \$80,000 grant through The Atmospheric Fund's Electric Vehicle Station Fund which will offset 50% of the cost of the chargers that will be installed at community facilities this year, allowing city staff to further expand the City's EV Charging network with the funds remaining

Staff are unable to collect data at this time from three of the City's chargers as they are unable to connect to the City's ChargePoint network. Staff will investigate data collection from these sites through other means. The following data is exclusive of these three stations.

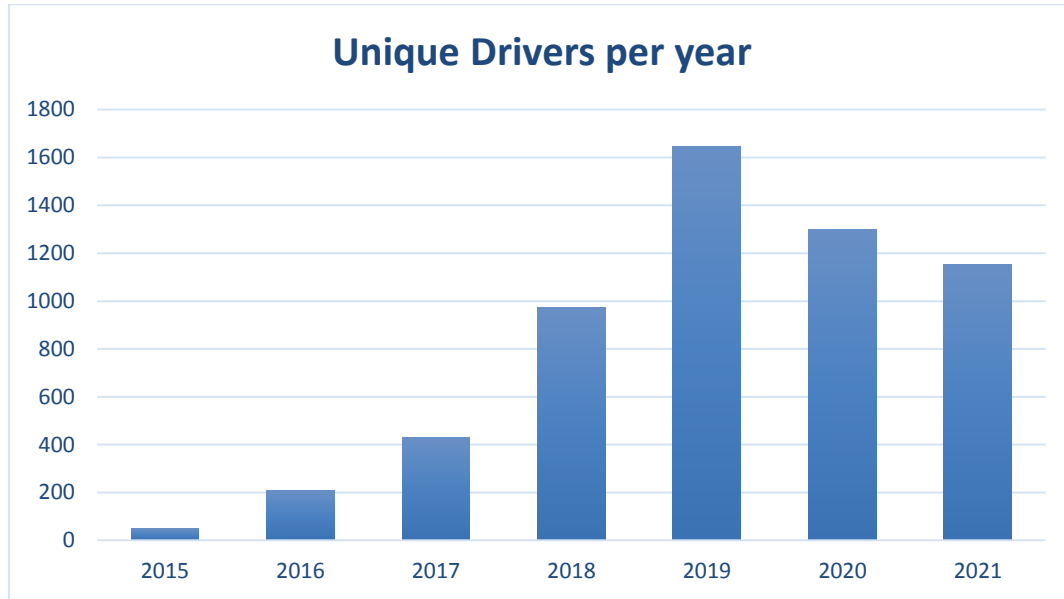




Although City owned chargers saw a large decrease in utilization numbers in 2020, dropping by 35%, utilization has increased over 2021 and surpassed 2019 numbers by 24%.



Several of the City’s chargers are available only for corporate fleet use. Despite the lower overall utilization in 2020, corporate utilization continues to grow as the City’s PHEV and EV assets increase.



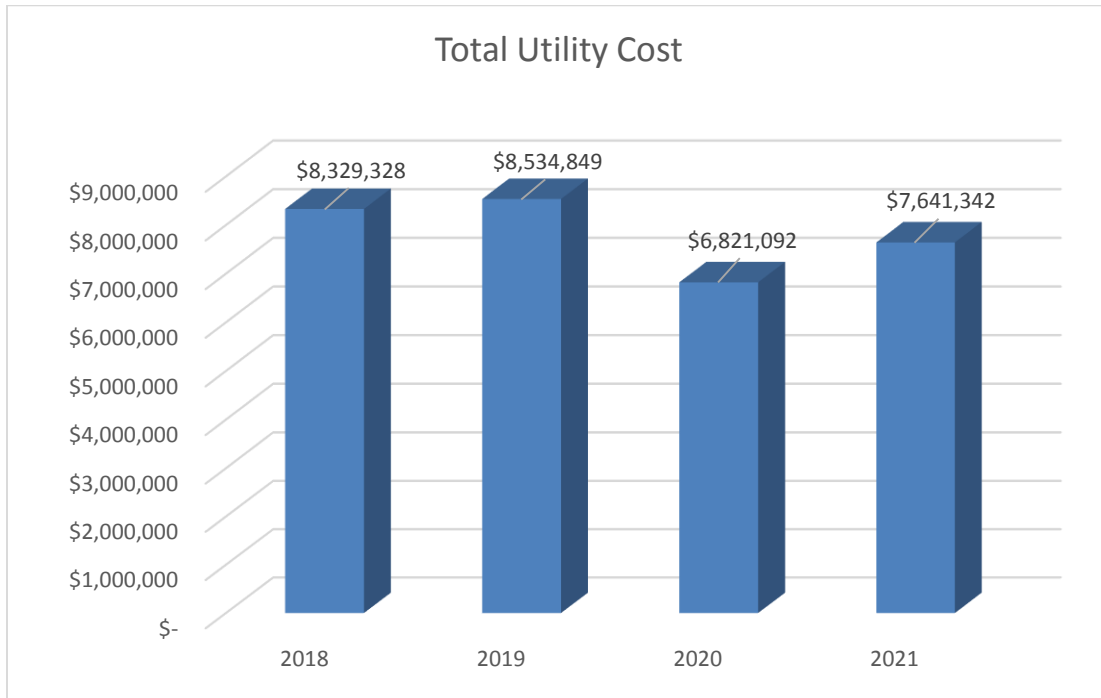
Through our charging platform staff are able to identify how many “unique drivers” plug-in each year, meaning how many different drivers charged at our stations each year. This past year saw a continual decrease in unique drivers per year, when compared with the utilization data in the previous graph we can see that stations are being used more by the same vehicles. This could partially be due to the pandemic and people travelling less into Burlington, as well as a reflection of the difficulty in purchasing new vehicles due to supply chain issues.

### **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 in order 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 taking action on climate change.

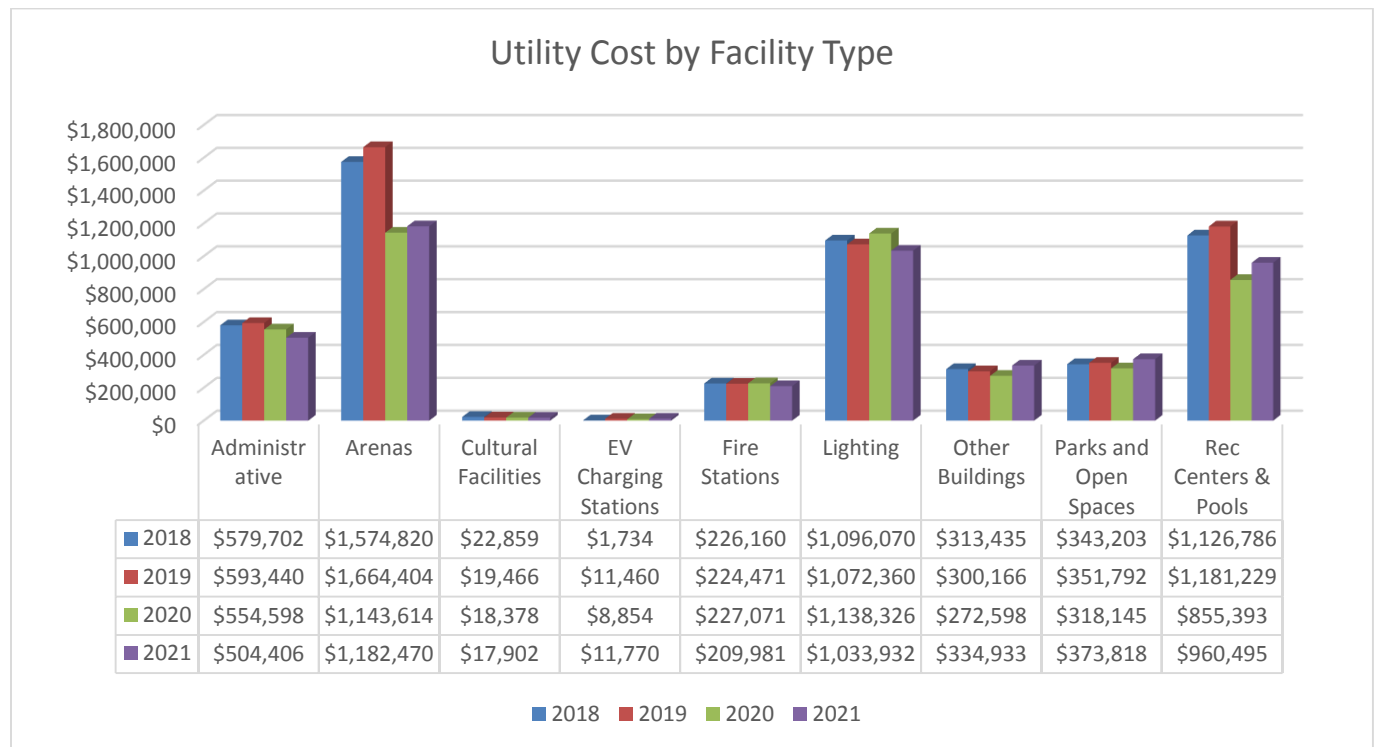
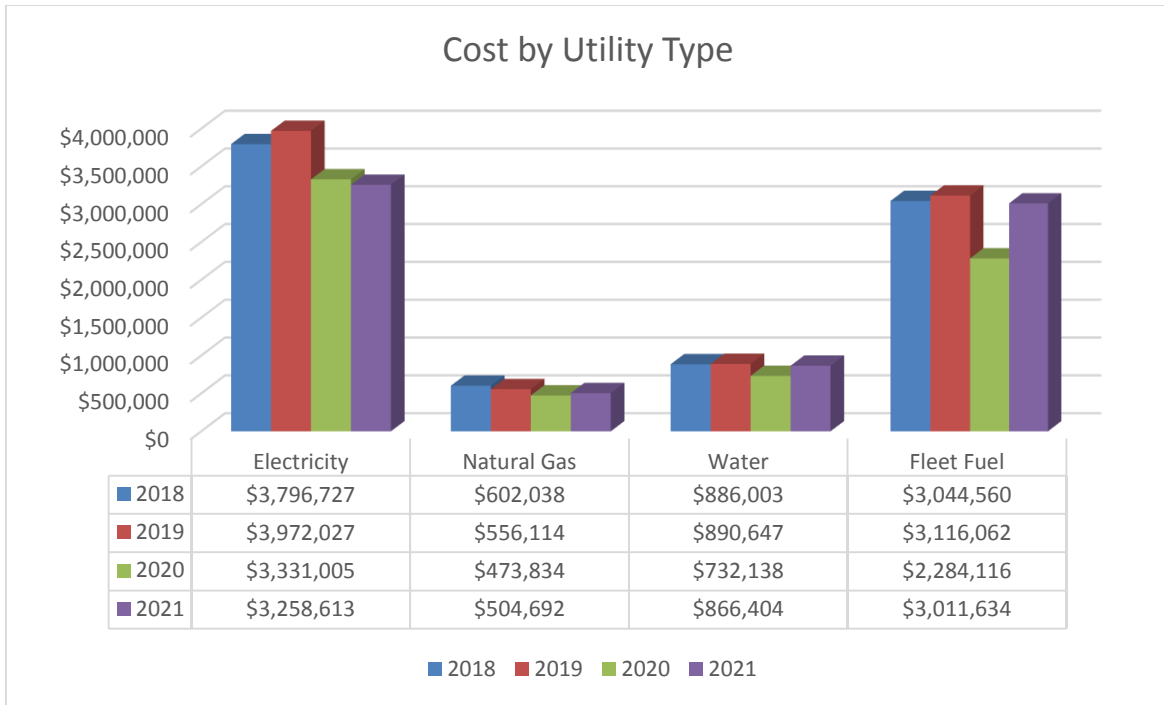
### Financial Matters:

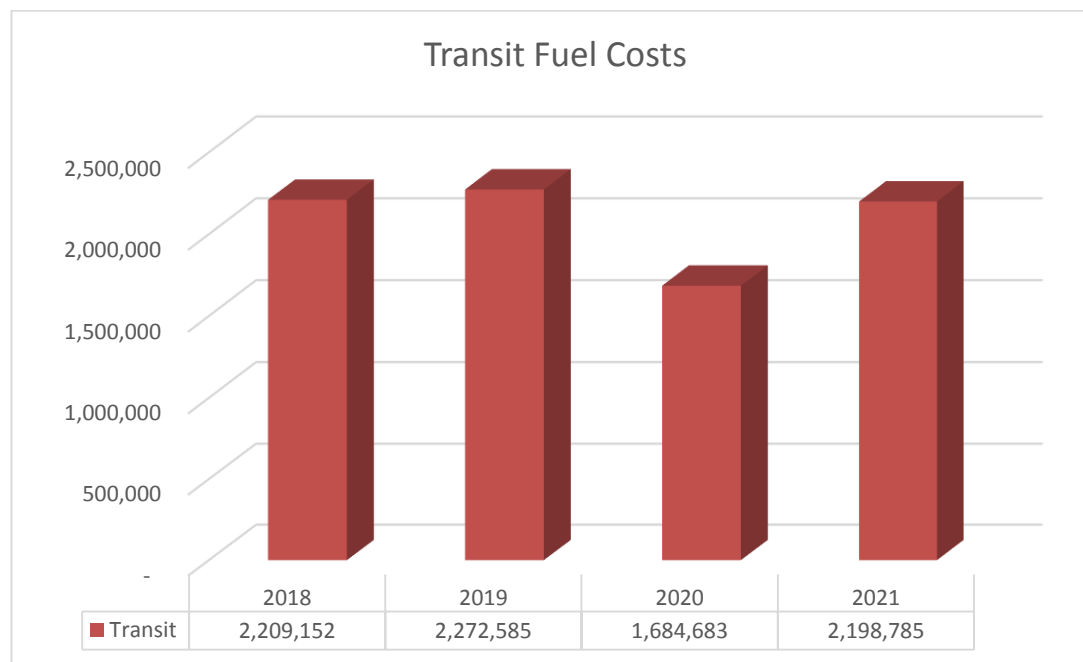
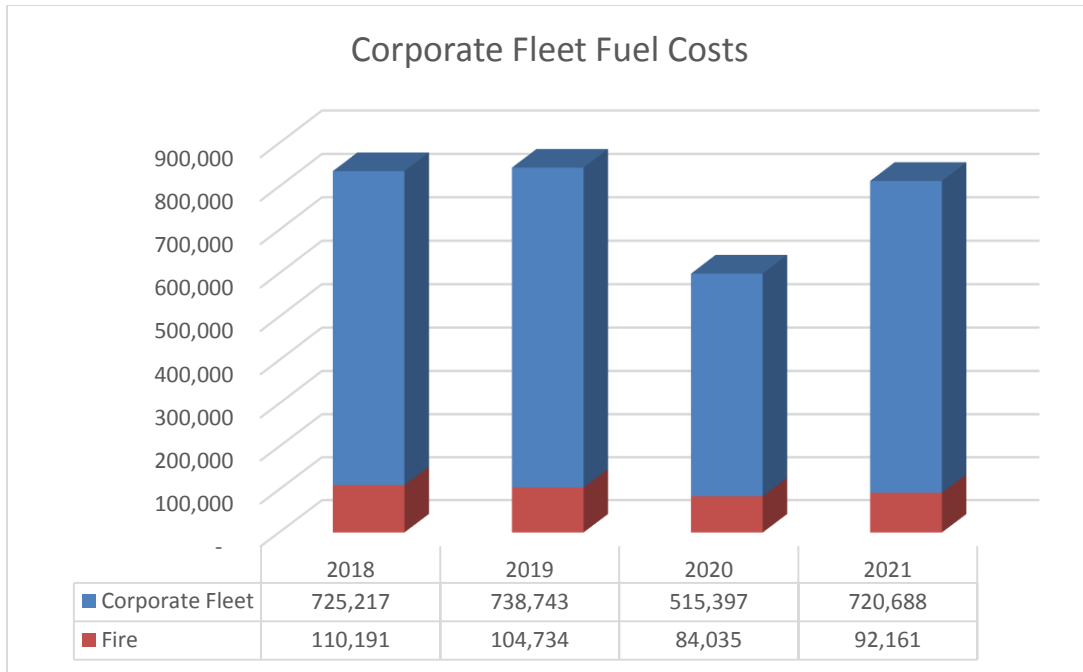
Total cost of Electricity, Natural Gas, Water and Fleet Fuels increased by 11% from 2020 to 2021 corresponding with increased facility activity and service levels.



Reduced costs in electricity can be generally attributed to significant rate changes for various types of electricity accounts.

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.





**Total Financial Impact**

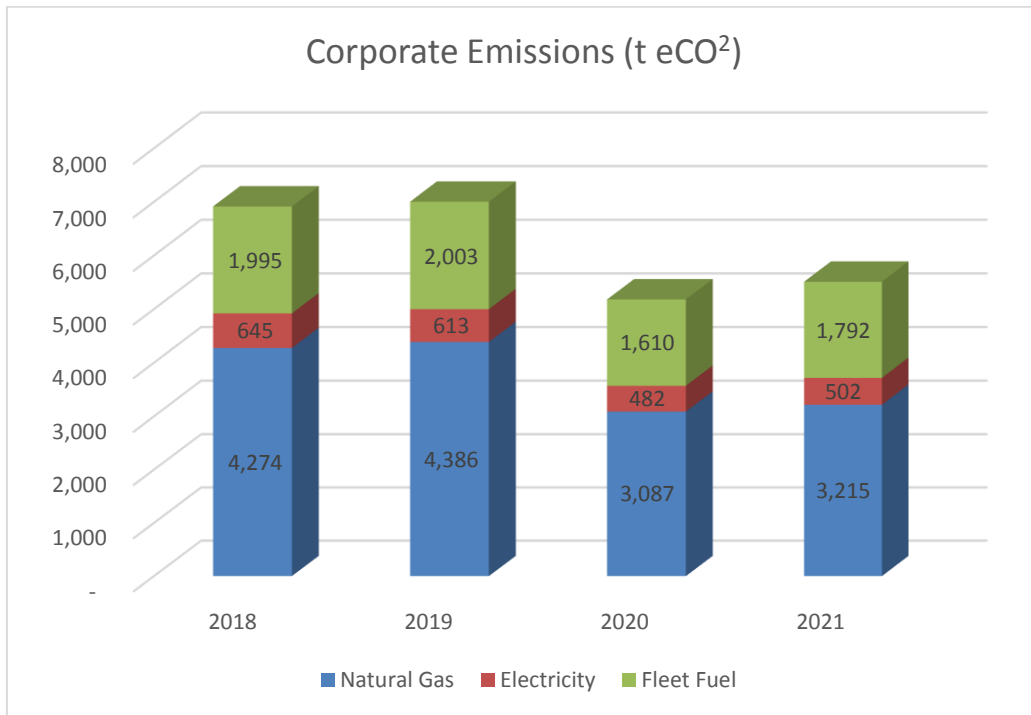
Not Applicable

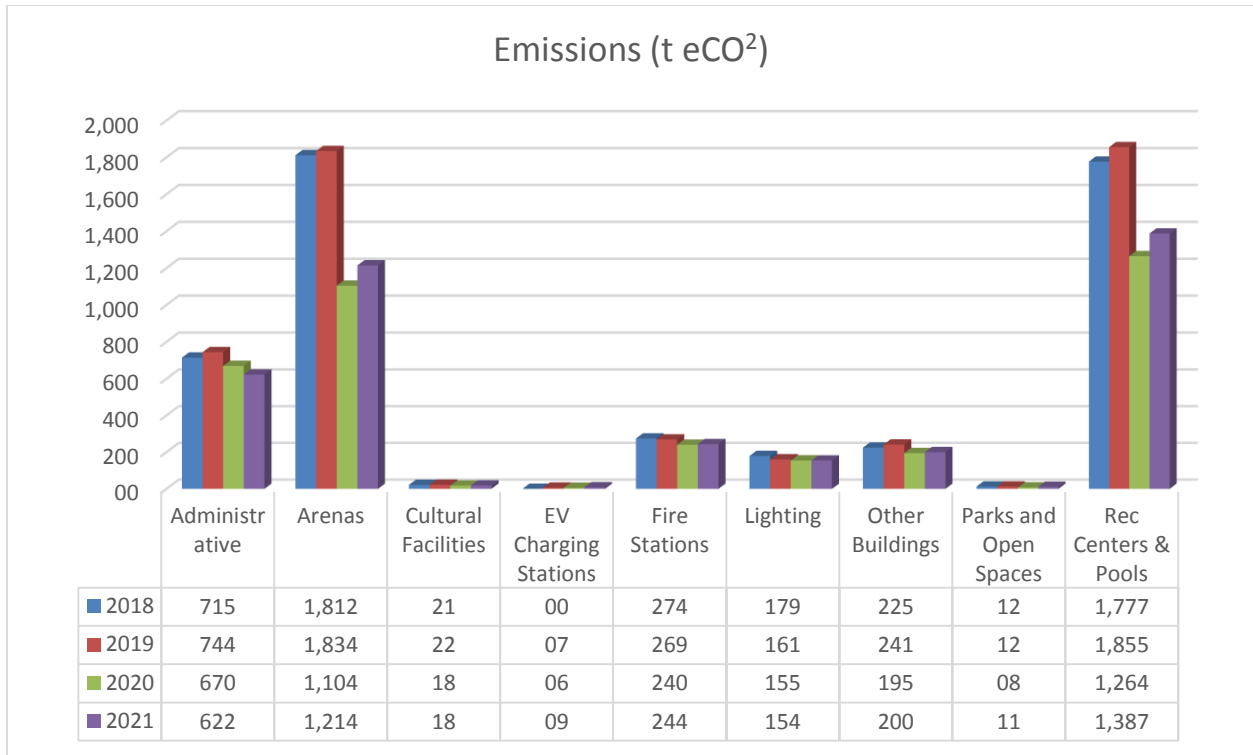
**Other Resource Impacts**

Not Applicable

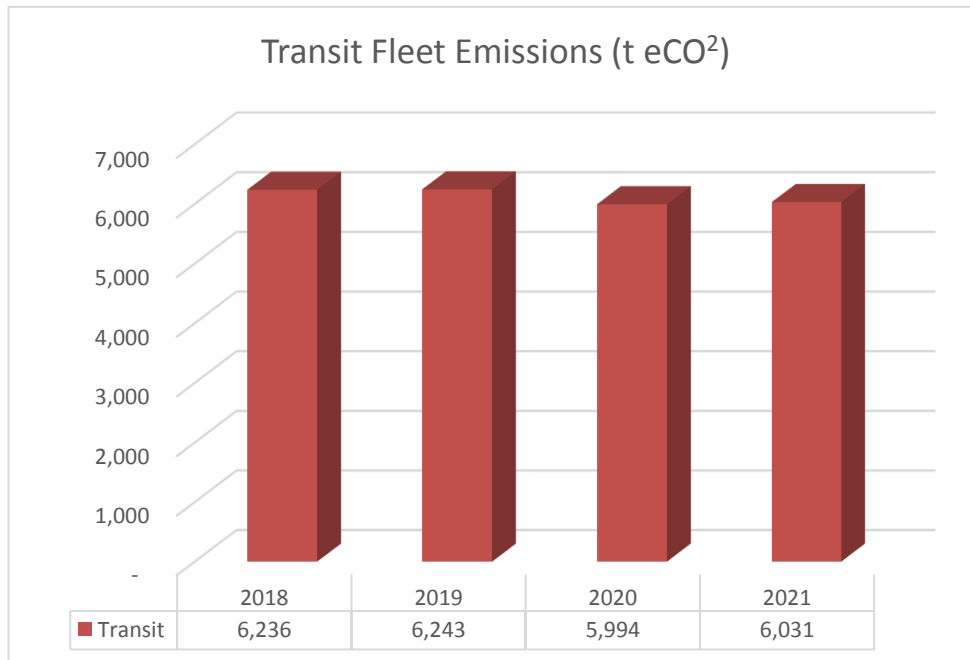
## Climate Implications

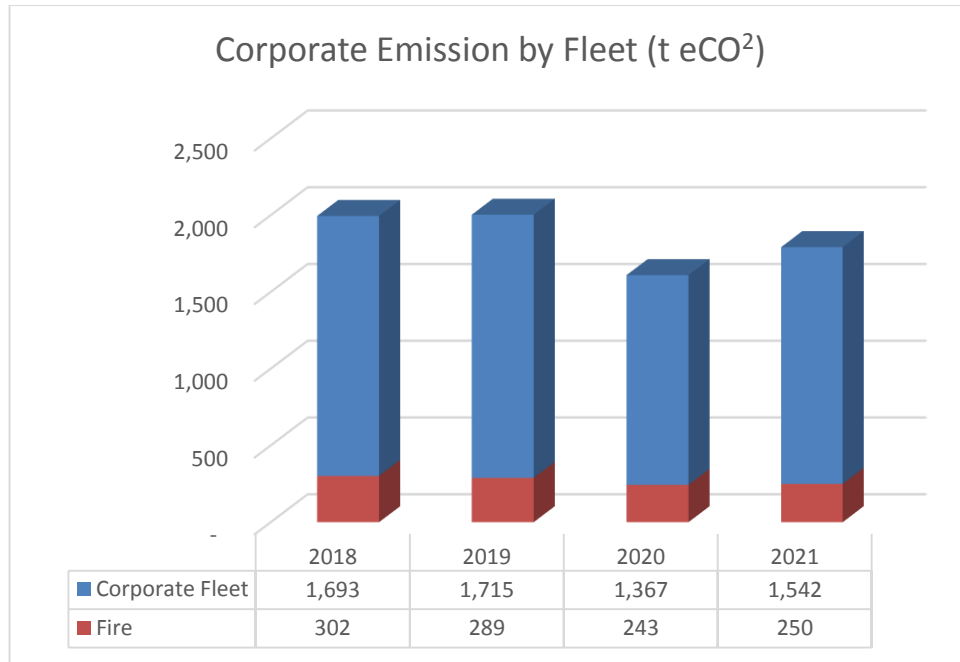
Overall emissions for the City's facilities corporate emissions increased by 6% (330 tonnes equivalent carbon dioxide – t eCO<sup>2</sup>) from 2020 to 2021 but remain 20% (1405t eCO<sup>2</sup>) below 2018 CEEMP baseline levels.





Burlington Transit Fleet emissions increased by less than 1% (37t eCO<sup>2</sup>) from 2020 to 2021 and the corporate fleet by 10% (182t eCO<sup>2</sup>).





### **Engagement Matters:**

In the past year engagement performed by corporate energy staff has been somewhat limited due to COVID-19. However, we have continued to engage with our operational staff teams through several virtual 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, such as the community based Electric Mobility Strategy and the Renewable Energy best practices research by McMaster University.

### **Conclusion:**

We have seen large reductions in energy and emissions levels over the past two years through the impacts of the pandemic. In 2022 and 2023 we expect these levels to climb back to or exceed those set in 2019 as programming resumes and the square footage of the City's facility portfolio increases. That being said, the City continues to make progress toward our goal of becoming net carbon neutral in our operation by 2040 with the completion of City View Pavilion, construction beginning on Skyway Arena, and the addition of green vehicles and equipment in our corporate fleet. Continuing with



planning of deep energy retrofits for existing buildings, installation of renewables and ensuring that opportunities are not missed through capital renewal replacements will keep Burlington operations on the path toward net carbon neutrality.

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Respectfully submitted,

Tom Pedlar

Corporate Energy & Emissions Coordinator

X 7354

**Appendices:**

- A. 2021 Utility Data
- B. EV Charging Infrastructure Inventory

**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.