



SUBJECT: Corporate Energy and Emissions Management Plan progress report

TO: Environment, Infrastructure & Community Services Cttee.

FROM: Environment and Energy

Report Number: EICS-11-21

Wards Affected: All

File Numbers: 210-01

Date to Committee: July 8, 2021

Date to Council: July 13, 2021

Recommendation:

Submit the relevant content/data in Appendix A of environment, infrastructure and committee services report EICS-11-21 to the Ontario Ministry of Energy and published on Burlington's website in order to encourage energy awareness, conservation and meet the reporting requirements under Ontario Regulation 507/18; and
Approve that the City of Burlington enter into a sole source agreement with QUEST and execute any relevant documents associated with the agreement to perform a deep energy retrofit study under the ReCover program, subject to funding decisions by both NRCan and The Atmospheric Fund (TAF) and the approval of the Executive Director of Legal Services and Corporation Counsel; and
Authorize the Mayor and City Clerk to sign the connection agreement and any related documents with Burlington Hydro for the new solar array at City View Park Pavilion, subject to the approval 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 2020, including a comparison to 2019 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.

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 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.

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 2020 (most recent update report to the CEEMP) City staff have continued implementation and development of several actions within the plan as well energy saving projects including:

Facility Benchmarking

Last year, monthly reports for our major facilities were generated and shared with operational teams to increase awareness and understanding of how energy is used in our facilities. Recently we have created benchmarking reports to accompany those reports to compare our facilities to one another within the same facility category. In addition to that we have also been in discussion with the corporate energy staff at the Town of Oakville to share some data on similar buildings and add those into our monthly benchmarking reports. While it's very useful to compare Burlington owned buildings to each other through a benchmarking process, City staff are very excited at the prospect of seeing how facilities in Oakville compare to our own and assess how higher performing buildings achieve lower energy use.

Energy Project Planning

With such an aggressive target of being net carbon neutral in our operation by 2040, corporate energy staff are working with our asset management team to incorporate low carbon and energy reduction initiatives into the 10-year capital plan. While no deep energy retrofits have taken place yet, careful consideration is taking place to assess which facilities will be first in line for these retrofits.

City facilities fit into three distinct groups, and through master planning and asset management practices, facilities are being divided up as we create a holistic view of the City's building portfolio from an energy standpoint:

1. Those buildings nearing or have passed end of life and need to be replaced with net zero carbon or near net zero carbon facilities.

These facilities, depending on how far out their replacement is, require varying amounts of attention from energy and operations staff. For example, facilities like Skyway Arena require very little attention as their replacement is imminent whereas a high energy user facility like the Roads, Parks and Forestry Operations Centre needs significant attention to keep the facility operating at its optimum conditions until the time for replacement arrives.

2. Facilities that will not be replaced in the next 20 years and need a combination of energy retrofits and facility optimization.

This group of buildings requires the most attention and funding to ensure that City operations meet our net carbon neutral goal by 2040. The lifecycle of these facilities and their systems present opportunities to make drastic reductions to operational emissions. The biggest opportunities for emissions reductions at most facilities are when our space heating systems (natural gas fueled) and building envelope elements are due for replacement. If opportunities like these are missed there is a good chance that piece of equipment or building element may not be replaced until after 2040. It is important to capture these opportunities when they present themselves either through individual upgrades or by incorporating several of them into a deep energy retrofit. To ensure that these opportunities are captured to their full potential, deep energy retrofit studies should be completed 1-2 years before the project is planned to take place to finalize goals and scope, determine disruption to services in the buildings, and adjust budgets if required. City staff have recently applied for funding to the FCM Green Municipal Fund to complete deep energy retrofit studies at Appleby Ice Center, Brant Hills Community Centre, Fire Station 2, and Fire Station 7.

3. The last group of facilities include those that have been replaced or retrofitted.

Staff will need to pay close attention to these facilities throughout their operation to ensure that they run at peak efficiency, are maintained to the highest standard and they have been properly commissioned. High performance buildings are by no means “set and forget” types of facilities. Regular specialized training, systems monitoring, and preventative

maintenance plans will be required to get the most out of our new low carbon systems and facilities.

Lighting and HVAC Upgrades

Fire Station 7 – Recently Fire Station 7 underwent a lighting upgrade that replaced all exterior and interior lighting with LED lighting and added a new state of the art lighting control system to decrease consumption further as well as increase occupant comfort. This lighting installation is the new standard for lighting in our fire stations and later this year similar lighting renovations will take place at Stations 2 and 6.

Mainway Recreation Centre – A project was recently completed to change the remaining fluorescent lighting in the facility over to LED. This facility has now been completely upgraded to LED lighting.

City Hall – The project for the replacement of City Hall’s five major air handling units (AHUs) has taken place over the last year and has just recently wrapped up its final commissioning. While this project didn’t replace any of the boilers or the chiller and will not have a major impact on carbon reduction, these new AHUs are considerably more efficient than their predecessors and will use significantly less electricity.

Appleby Ice Centre – The make-up air unit and exhaust fan that serve the “A side” of the building’s changeroom has been replaced with a Heat Recovery Unit. Rather than exhausting all the conditioned air from the space, this unit reclaims as much heat as possible from the exhaust air and pre-heats the supply air which has resulted in the natural gas capacity of the unit to be reduced by almost half.

Metering Systems

Expansion of the City’s sub metering system to include the Roads, Parks and Forestry Operations Centre is in the process of taking place and will be the first facility to include live natural gas tracking data.

Commissioning

The City is committed to designing our new facilities and renovations to the highest standard in low carbon facilities. However, it is an entirely different process to ensure that those facilities are built properly to meet the design as well as ensure that the facility is operated at their peak efficiency. New commissioning requirements for new buildings are being established with the Skyway Community Centre project and for existing buildings with a retro commissioning project currently taking place at the Roads,

Parks and Forestry Operations Centre. The end goal of both projects is to establish ongoing or monitored based commissioning practices that use both sub-metering and building automation systems to monitor energy use and equipment operation and send alarms if conditions stray from their established peak performance.

Solar Photovoltaic (PV)

This year City staff have retained Paragon Engineering Services to assist in analysis and preparation of a solar capital plan to be incorporated into the overall capital budget in 2022. Through this planning exercise the City's assets will be assessed for their suitability for the installation of renewables. Preliminary design and costing will be performed as well as alignment with capital plans to ensure rooftop solar PV is installed following roof replacements and any other building elements that may be affected by the system. The study is on track to be finished in the early fall of this year.

The City's first net metered solar array will be installed this summer on the City View Park Pavilion. Construction is expected to be complete in August and electricity generated by the array will be used in the building and any excess being exported to the electricity grid. The City still needs to sign a connection agreement with Burlington Hydro to be able to generate power and export any excess power to the grid. This has been listed in the recommendations of this report. The connection agreement ensures that the solar array is connected in accordance with Burlington Hydro requirements.

ReCover Initiative

The ReCover Initiative began as a residential retrofit deep energy retrofit process that involves wrapping the building in a new prefabricated skin and replacing the mechanical systems with smaller, more efficient components. This method is faster and less disruptive than a typical renovation. 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 a selected facility. City staff have selected the Burlington Seniors Centre to enter into the program due to its construction and age of systems and envelope. We are currently awaiting on funding decisions from both The Atmospheric Fund (TAF) and Natural Resources Canada (NRCan). If both funding sources are secured there will be no cost to the City for phase one of the project. It is then up to the City if we wish to proceed with Phase two and implement the findings of the study. The ReCover Initiative is administered by QUEST, a non-government organization that works to accelerate the adoption of efficient and integrated community scale energy systems in Canada.

Electric Vehicle Purchases

Fleet staff continue to review vehicles that are due for replacement and analyze if partially electric or fully electric vehicles are suitable as replacements. Over the past year procurement of low emission vehicles has increased drastically. In 2020, four plug-in hybrid electric vehicles were purchased to replace gas vehicles and seven fully electric vehicles were purchased, four of which will replace gas vehicles.

This past year the City also took delivery of its first electric ice resurfer which is currently in use at Appleby Ice Centre.

Automated Vehicle Locator Project

The City of Burlington has been using Automatic Vehicle Locator (AVL) Technologies for more than 10 years. The recent Provincial Service Review (2019) as well as the Green Fleet Strategy (2008) identified the importance of an AVL solution to optimize use of the overall fleet, track vehicle performance, and reduce greenhouse gas emissions through monitoring and enforcement of best practices. The application and implementation has expanded to include 240 vehicles across 19 service areas in the City to support asset management and sustainable fleet business needs. System functionality will range from simple track and trace real-time reporting to more complex functionality for winter maintenance, vehicle inspections, engine diagnostics, route optimization and service efficiency analyses.

Business Intelligence Fleet Dashboards

Corporate Fleet services is utilizing the City's business intelligence (BI) tools to help support the Green Fleet Strategy. Business Intelligence tools focus on implementing performance metrics to support business units in making data supported decisions that deliver operational efficiencies and reduce operating costs. BI data is sourced from many of the City's software solutions in a consolidated database. This data is then used to help support the greening of our corporate fleet or make recommendations for alternative fuel usage. Business Intelligence tools also benchmark the safe usage of vehicles including idling, driving telematics, kilometers driven, emissions and many other metrics. Burlington leadership will have access to these reports as we progress with projects such as EAMS and AVL.

Corporate Utility Data

Below is consumption data for 2018, 2019 and 2020 for Electricity, Natural Gas and Water. As 2018 is the baseline year for the CEEMP, we have included it to show our year over year progression. 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

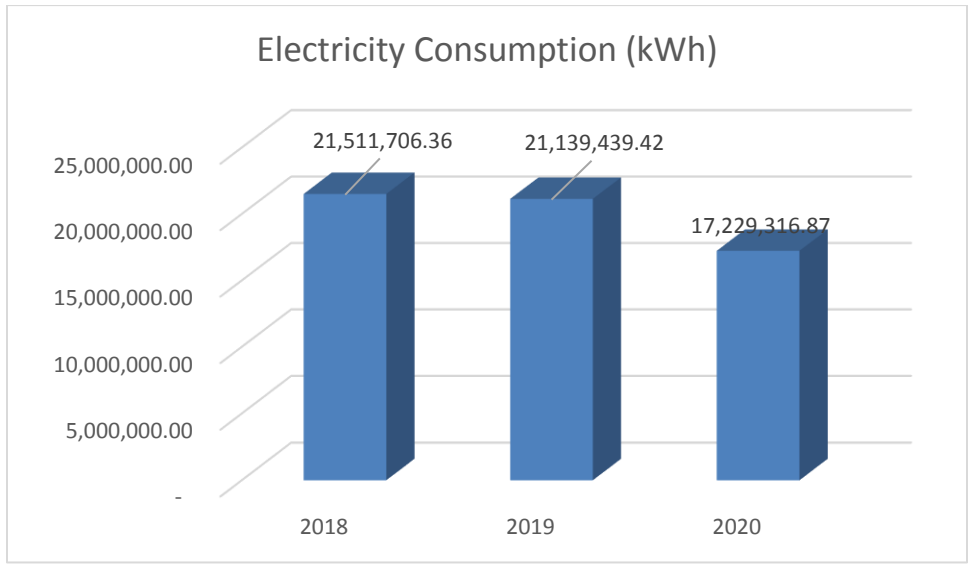


Figure 1

Electricity consumption was greatly reduced from 2019 to 2020 by just over 18% because of COVID-19 facility closures. This is 20% reduction from the CEEMPs 2018 baseline year.

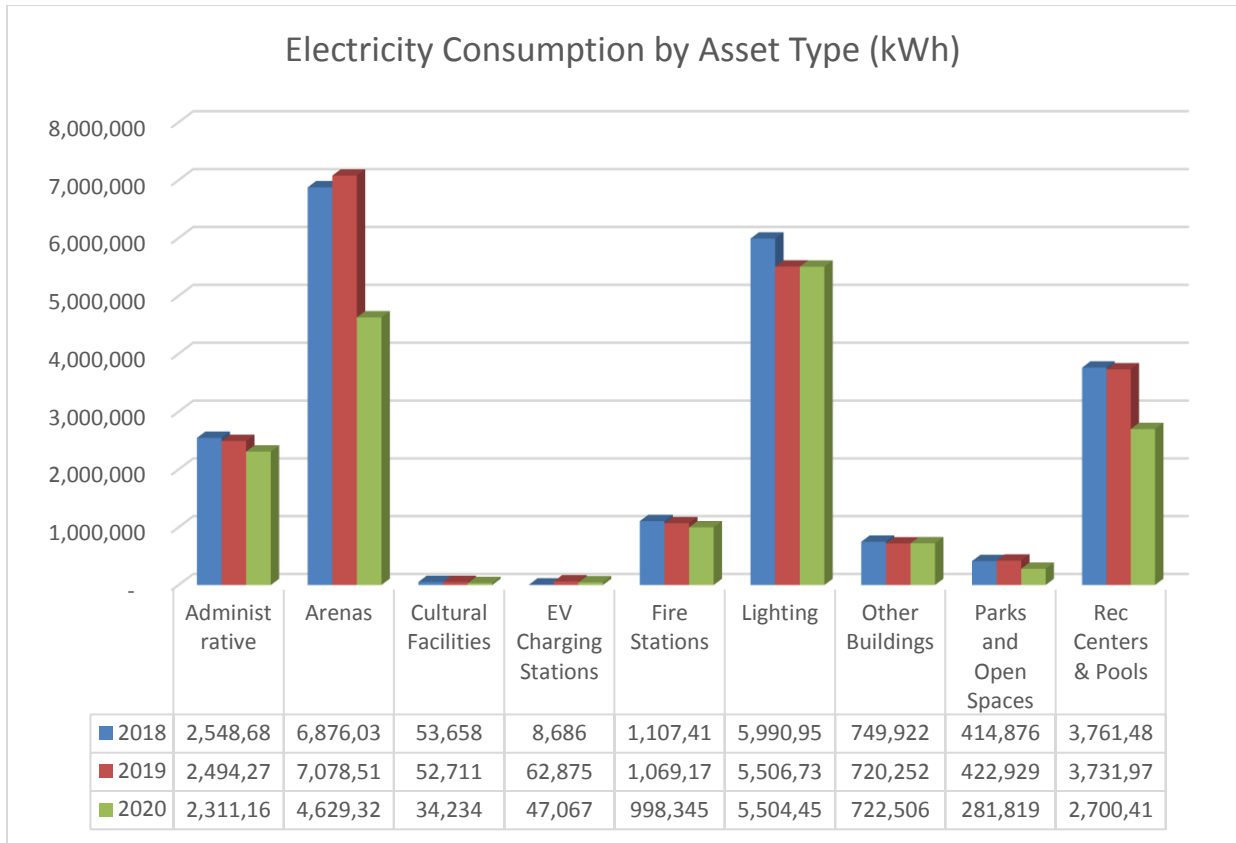


Figure 2

Reductions can be seen across the board in electricity consumption with the smallest reductions coming in items that were unaffected in their operation by COVID-19, including street and traffic lighting, fire stations and some administrative areas which remained open during closures. Larger reductions can be seen at facilities primarily used by the public such as community centers, pools and arenas where operations were impacted by the pandemic.

Natural Gas Consumption

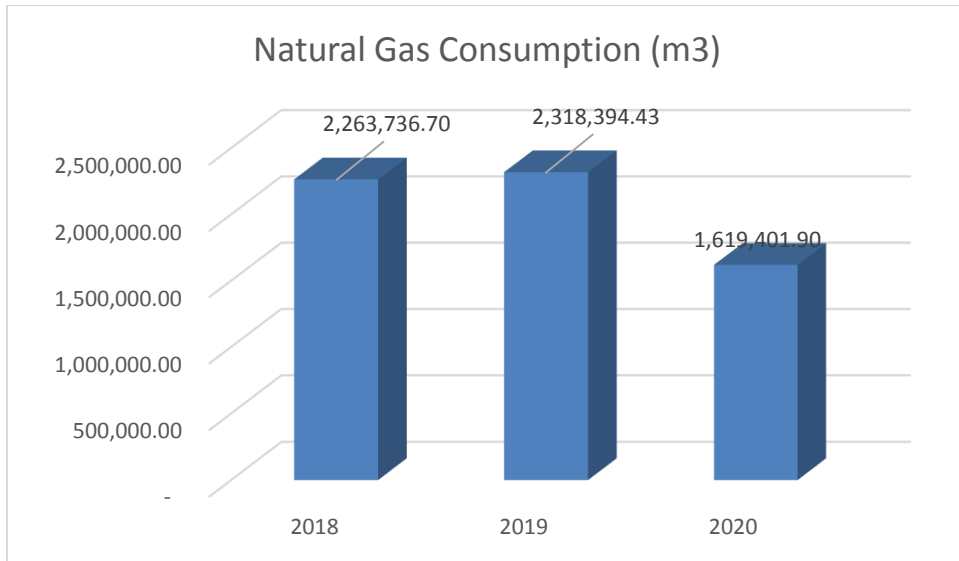


Figure 3

Natural gas consumption was greatly reduced from 2019 to 2020 by 30% because of COVID-19 facility closures. This is a reduction of 28% from the CEEMPs 2018 baseline year.

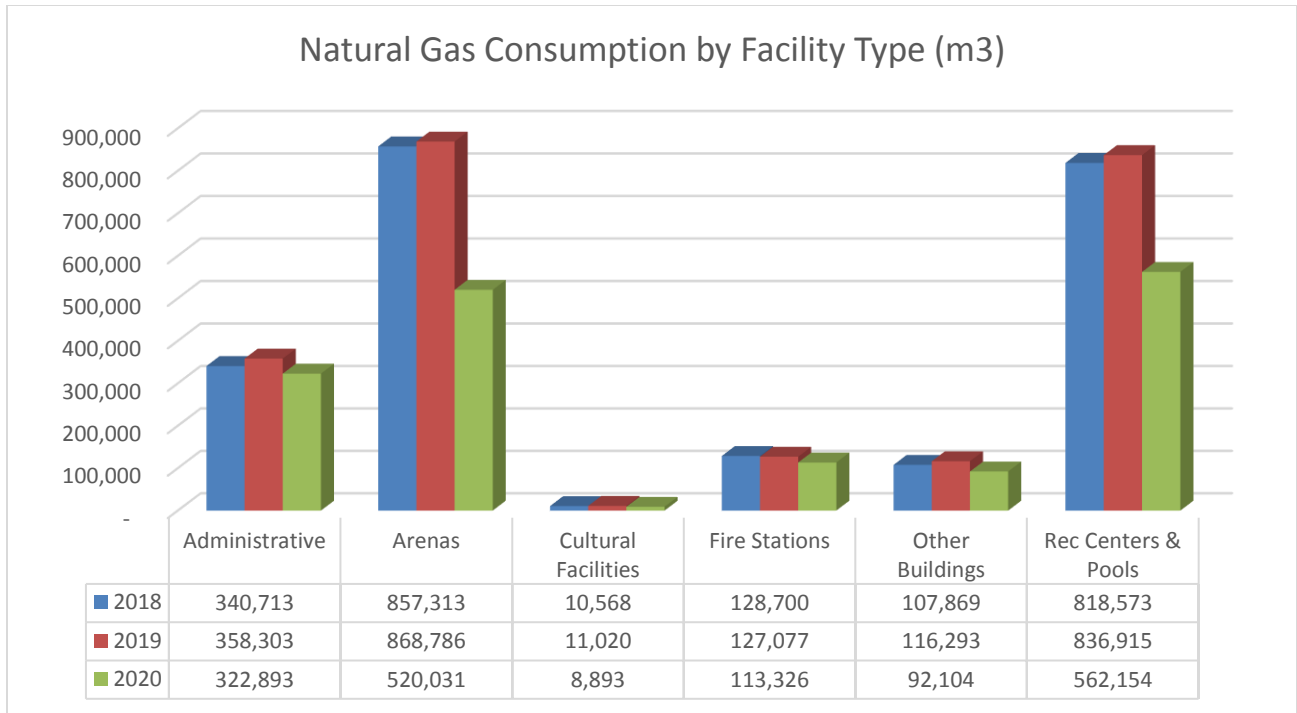


Figure 4

Reductions can be seen across the board in natural gas consumption. Larger reductions can be seen at our facilities primarily used by the public such as community centres, pools and arenas. With smaller reductions happening at Fire Stations and administrative buildings such as City hall. There has also been some difficulty in obtaining accurate gas data for periods in 2020 due to facility closures resulting in a significant amount of estimated meter reads by 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

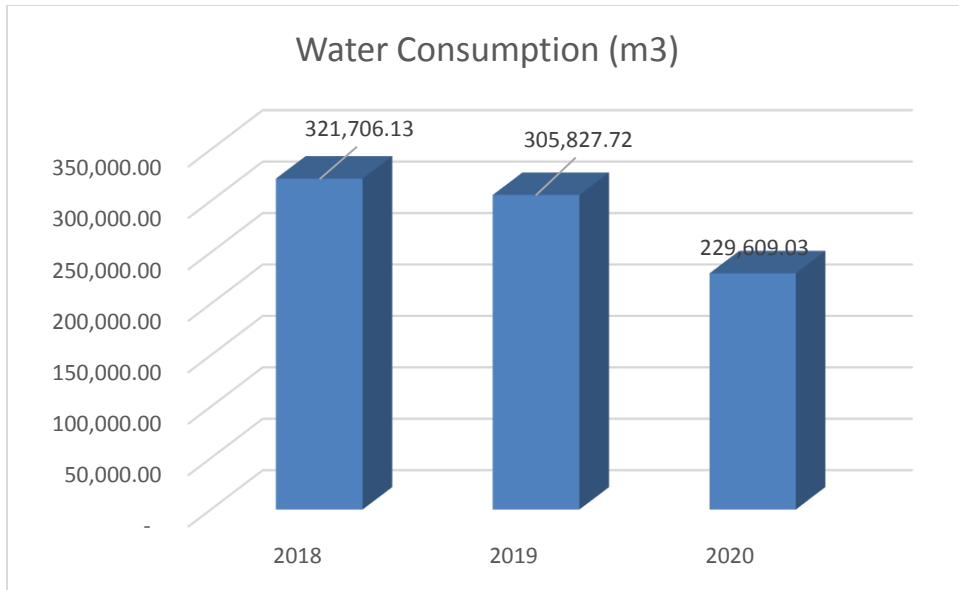


Figure 5

Although there is no water use reduction targets within the CEEMP water use is still actively tracked and reduced where possible. Water consumption was greatly reduced from 2019 to 2020 by 25% because of COVID-19 facility closures. This is a reduction of 28% from the CEEMPs 2018 baseline year.

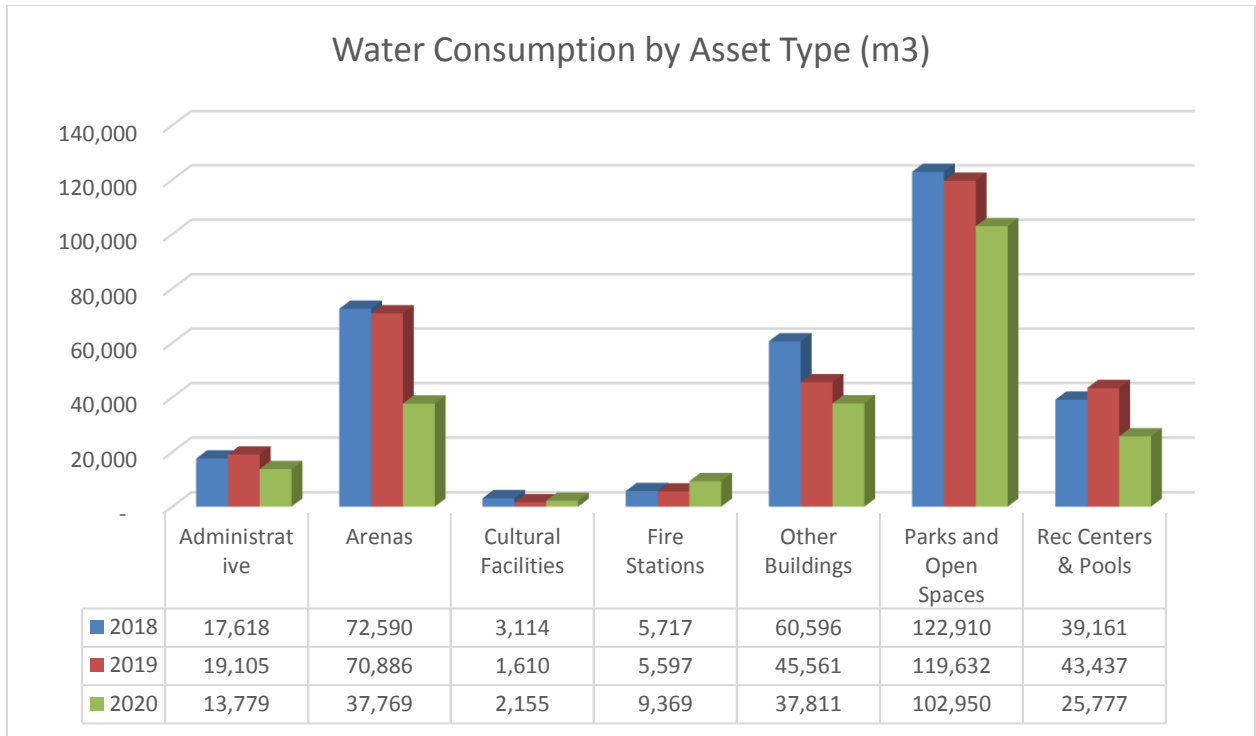
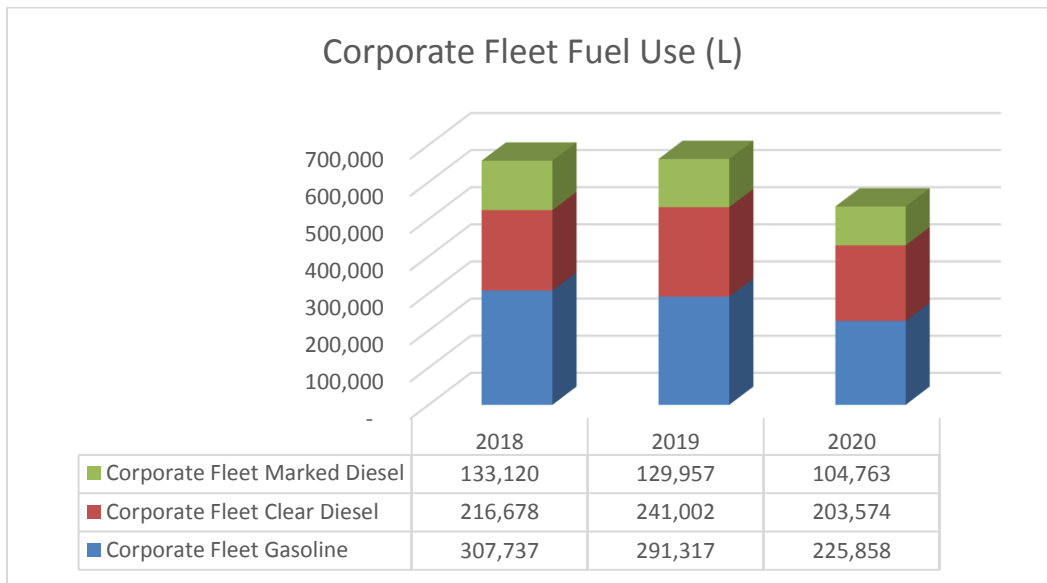
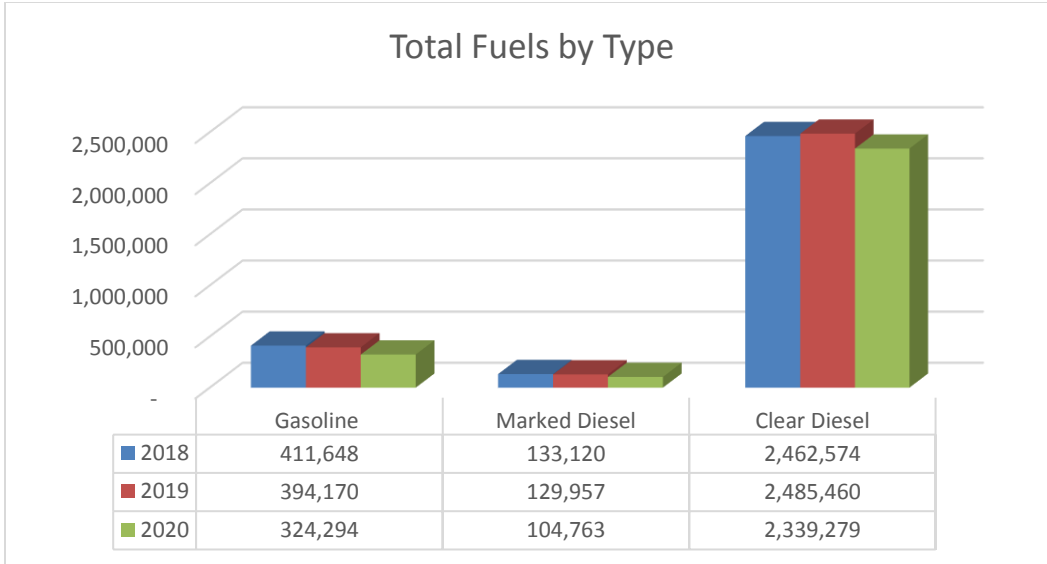


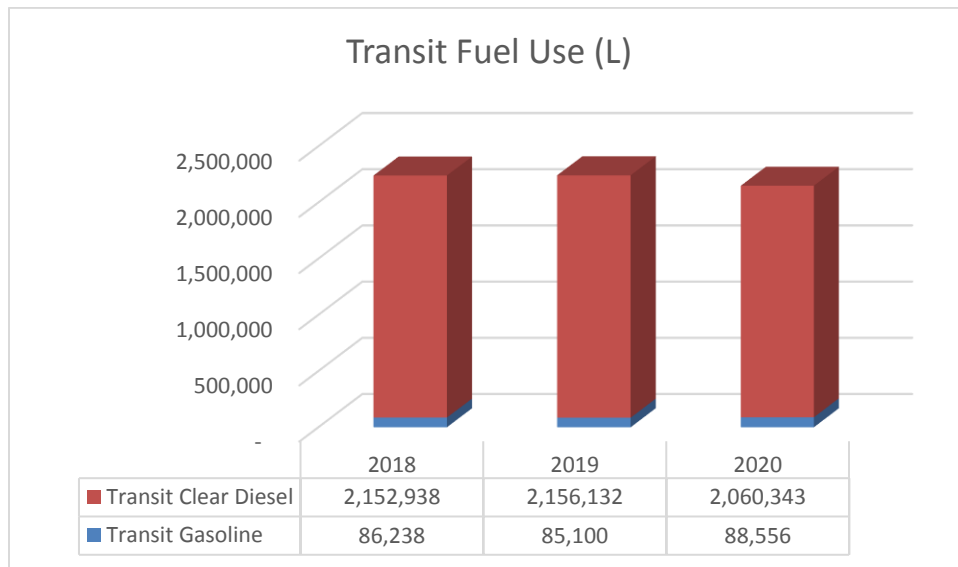
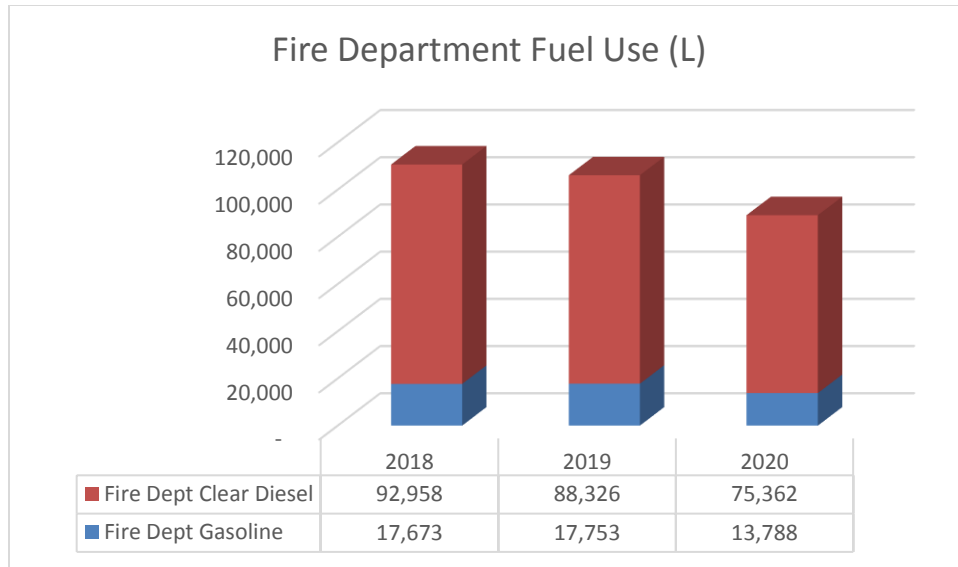
Figure 6

As seen in the other utility consumption numbers, water use has also been drastically reduced in most facilities due to COVID-19 closures. The increase in water usage for our fire facilities can be attributed to significant increases in cleaning of facilities and equipment.

Fleet Fuel Consumption

Total City fuel consumption (Corporate Fleet, Fire Fleet and Transit Fleet) was reduced in 2020 by 9% (241,251L) from 2019 levels primarily due to COVID-19. However, reductions can also be attributed to transitioning several vehicles from fossil fuels to partial or fully electric vehicles. Marked fuel is primarily used in off road equipment.



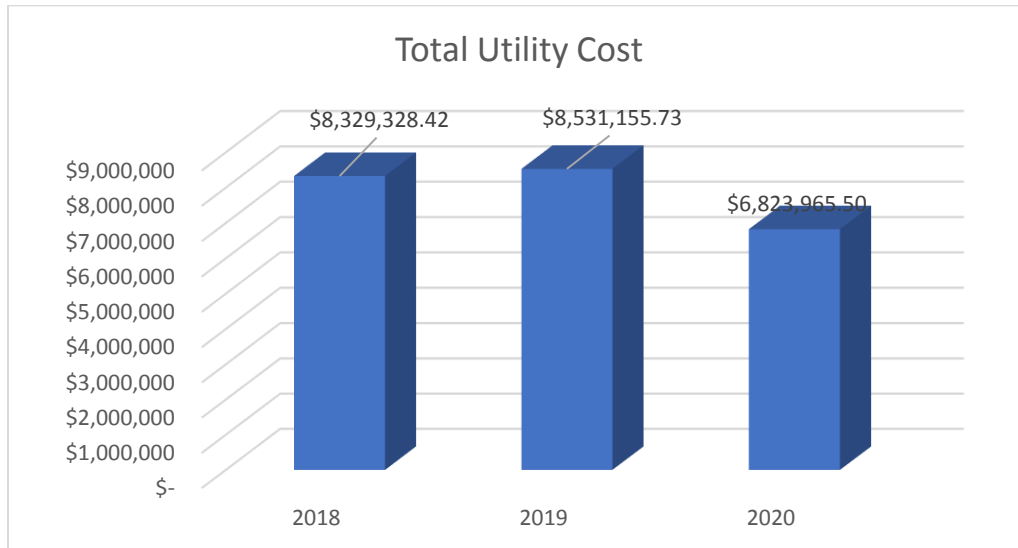


Options Considered

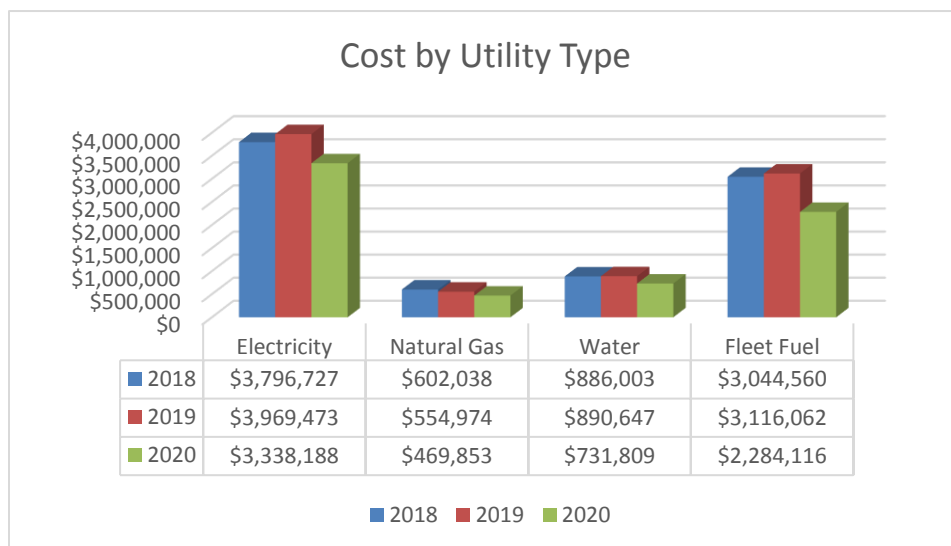
The Corporate Energy and Emissions Management Plan provides a pathway to meet the Burlington target to become a net carbon neutral in our operation by 2040. The measures identified in the plan must be implemented in order to meet this target.

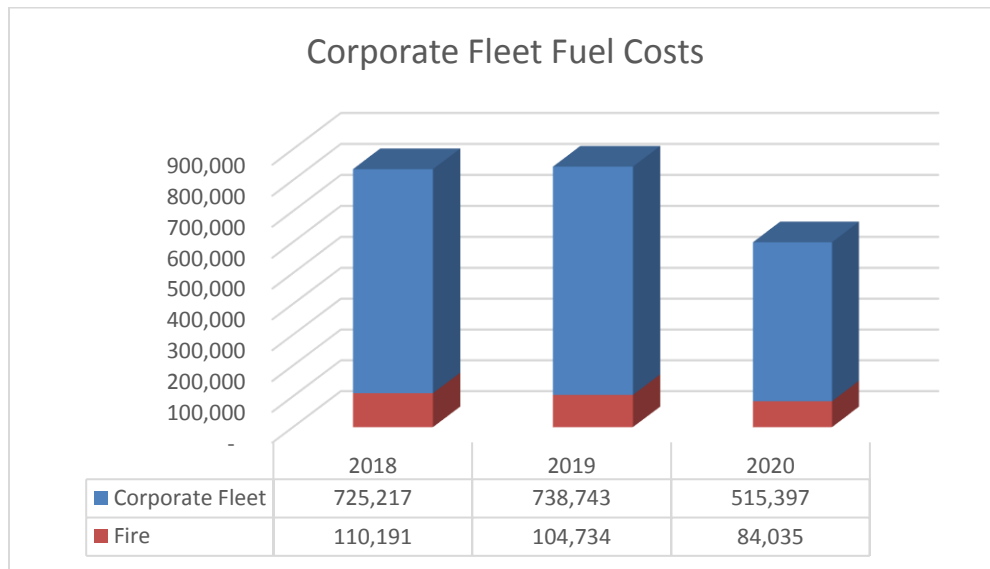
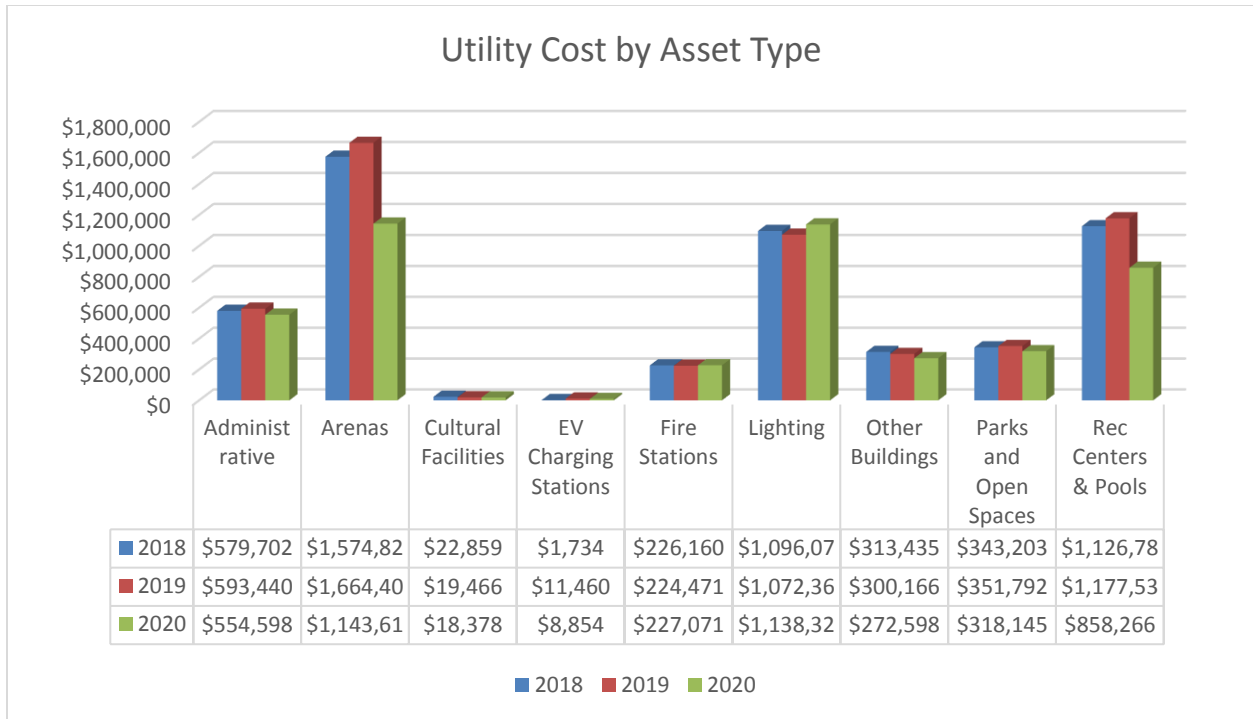
Financial Matters:

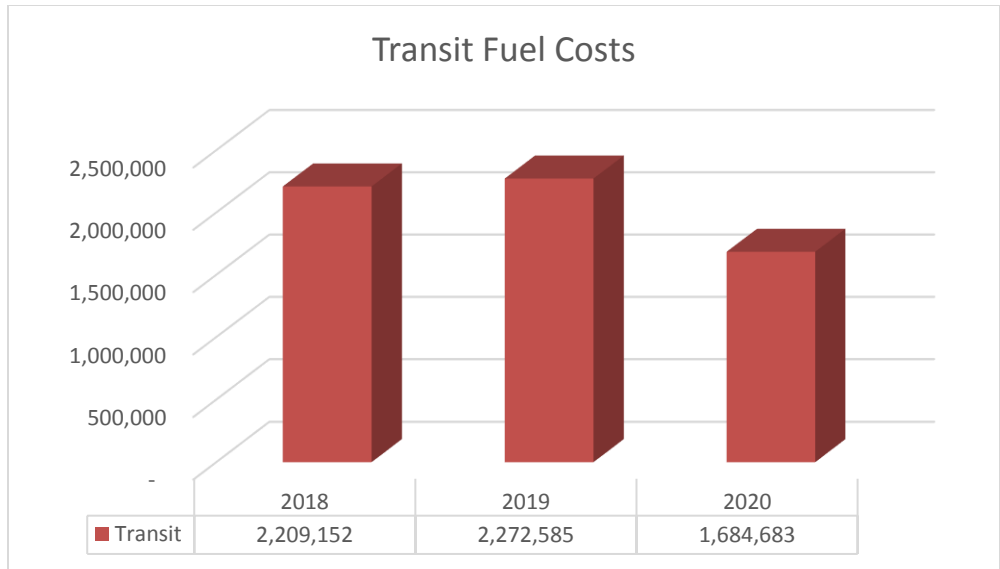
Total cost of Electricity, Natural Gas, Water and Fleet Fuels decreased by 24% from 2019 to 2020.



Reduced costs in utilities can be generally attributed to service reductions and facility closures because of COVID-19. Other factors that may also contribute to a reduction in electricity costs would be significant rate changes for various types of electricity accounts both as forms of Covid relief and changes unrelated to Covid. Additional factors for the decreased costs in Natural Gas can be attributed to the City’s bulk purchasing program administered by Jupiter Energy Advisors as well as the City’s Energy and Procurement staff.

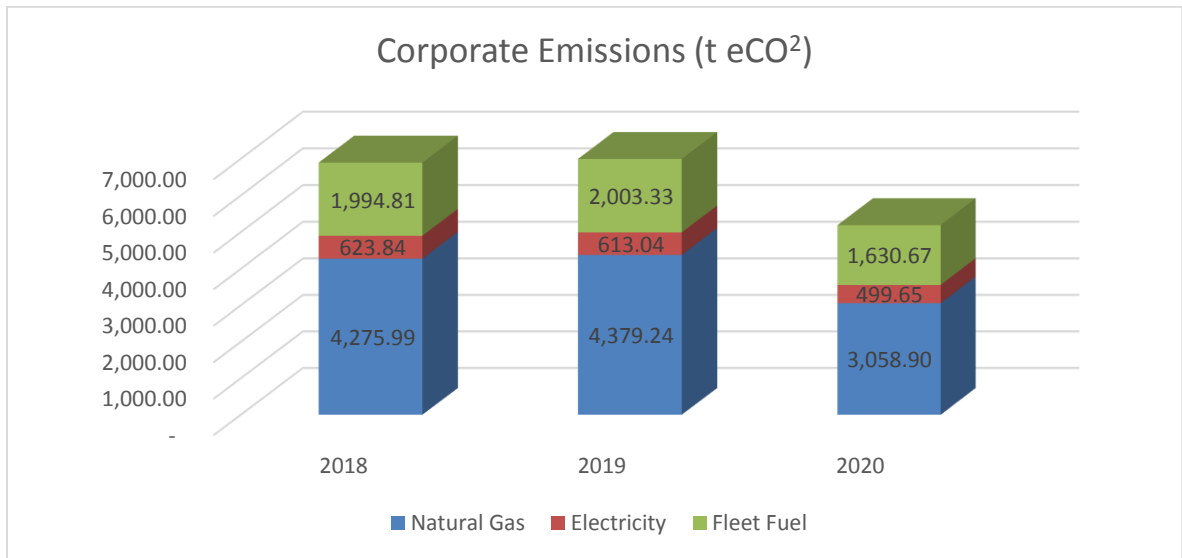


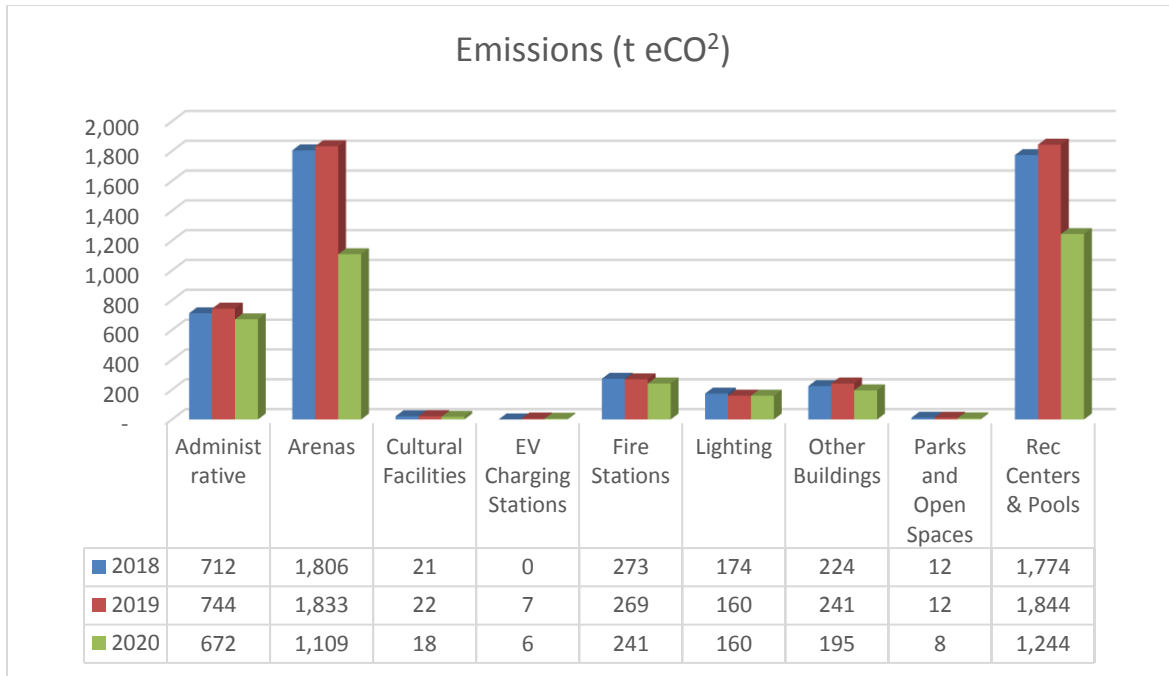




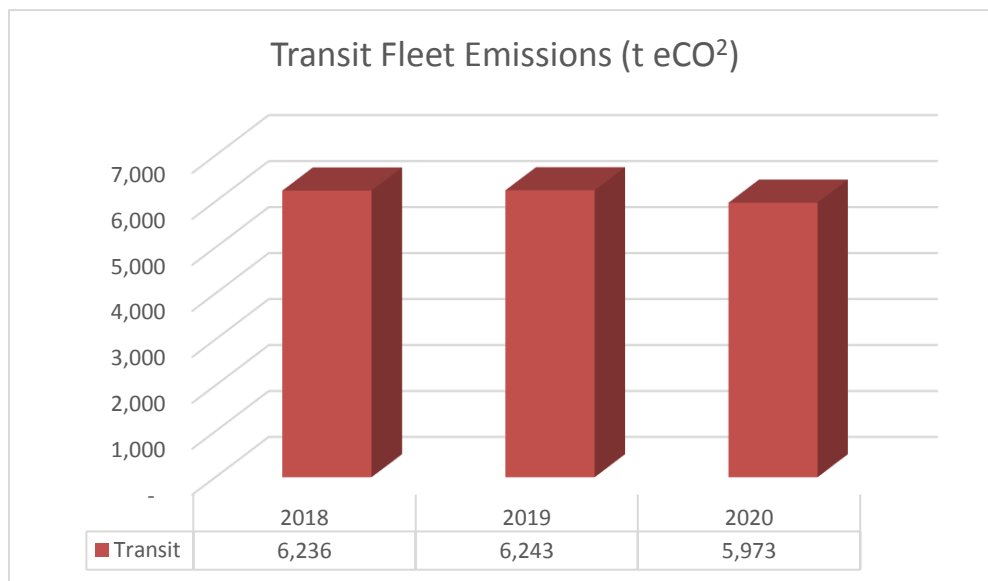
Climate Implications

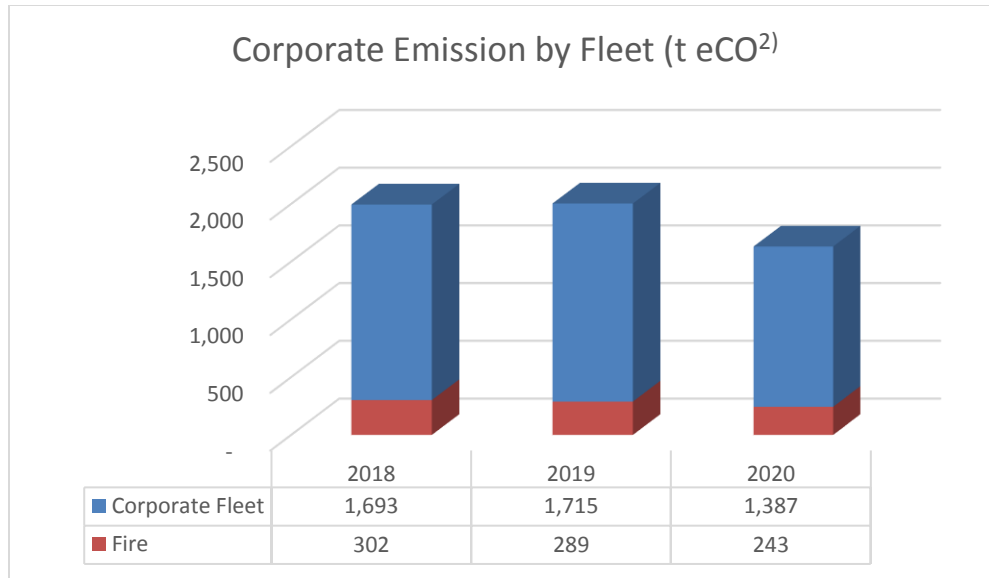
Overall emissions for the City’s facilities corporate emissions decreased by 26% (1,815 tonnes equivalent carbon dioxide – t eCO²) from 2019 to 2020 which can almost entirely be attributed to effects of the COVID-19 pandemic and reduced city services.





Burlington Transit Fleet emissions decreased by 4% (261t) from 2019 to 2020 and the corporate fleet by 19% (374t), these reductions can also be attributed to the effects of COVID-19.





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.

Conclusion:

The City experienced large reductions in energy use and corporate emissions in 2020 due to COVID-19. Facility closures and lack of public use is obviously not the way we want to have consumption reduced. However, there is still much progress to celebrate towards our goal of being net carbon neutral by 2040. Operational teams led the way for reductions by ensuring that facilities were dialed back when they were not being used. There have also been great strides made in project planning for deep energy retrofits and solar PV installations, as well as the installation of the first net metered solar array on a City facility. Continuing with this work and ensuring that opportunities are not missed through capital renewal replacements will keep Burlington operations on the path toward net carbon neutrality.

Respectfully submitted,

Tom Pedlar

Corporate Energy & Emissions Coordinator

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Appendices:

A. Facility Utility Data

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.