SUBJECT: Corporate energy and emissions management plan progress report

TO: Environment, Infrastructure & Community Services Cttee.

FROM: Environment, Infrastructure and Community Services

Report Number: EICS-06-20

Wards Affected: All

File Numbers: 210-01

Date to Committee: July 6, 2020

Date to Council: July 13, 2020

Recommendation:

Receive and file environment, infrastructure and community services report EICS-06-20 regarding the corporate energy and emissions annual update and submit relevant content/data in Appendix A to the Ontario Ministry of Energy and publish on Burlington's website in order to encourage energy awareness, conservation and meet the reporting requirements under Ontario Regulation 507/18.

PURPOSE:

Vision to Focus Alignment:

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

Executive Summary:

This report presents data on corporate energy and greenhouse gas emissions from corporate operations in 2019. The report includes detailed facility energy emissions data for 2019 compared to 2018. The method of presenting the data is consistent with Ontario Regulation 507/18 which requires municipalities to report and publish energy

consumption data and greenhouse gas emissions. Also included is an update to the measures identified in the Corporate Energy and Emissions Management Plan 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 m^3 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 the adoption of the plan in July 2019 city staff have begun implementation and development of several actions within the plan as well energy saving projects including:

Operational Staff Engagement – Since the approval of the Energy and Emissions Management Plan staff have developed a series of monthly reports provided to each operational team giving them updates on their facility performance. Each operational team was engaged to identify both operational measures and capital projects that could be implemented to manage energy consumption at each of the facilities. Through this engagement process city operations staff have been able to see the effects of weather, operational decisions, and capital improvements at their facility to better understand how their buildings respond to these factors of influence. So far 46 of the city's facilities are receiving monthly reports and energy staff are planning to add more soon. A sample facility report has been included as Appendix B

Energy Project Planning – In the Corporate Energy and Emissions Management Plan a scenario was prepared showing a pathway for city operations to become net carbon neutral by 2040 by using geothermal energy at every facility and offsetting electricity use with city owned Solar PV systems. Recognizing the challenge of achieving this scenario, due to the complexity and variety of our building types staff have begun detailed planning of energy conservation measures and deep energy retrofits at various city facilities. This information is being entered into a long-term model to more accurately forecast cost and emissions impacts from now until 2040. Audits have been completed at 7 facilities and a second round of facilities is expected to begin in late summer 2020.

Lighting Upgrades - have been completed at Appleby Ice Centre as well as Brant Hills Community Centre and are currently in design for Burlington Seniors Centre, Nelson Recreation Centre and Mainway Recreation Centre.

HVAC Upgrades - Installation of a new energy recovery unit at Appleby Ice Centre has been designed and tendered and is awaiting installation once the unit is available. The unit will significantly reduce Natural Gas usage in the older "A side" of the facility through recovering heat from exhaust air resulting in a large reduction in on site emissions.

Sub Metering Systems - Expansion of the city's real time utility sub metering system to include city hall has now been completed so operations and energy management staff can see up to the minute information on the facility's performance.

Next steps

City View Park Pavilion – City View Park Pavilion has been designed as the city's first net carbon neutral facility and is scheduled to start construction later this year. The facility includes lighting and HVAC controls to reduce load, no fossil fuel use in the facility and the City's first net metered solar array, which will use all the electricity generated within the facility and any excess will be transferred to the grid.

Emissions Analysis – Currently the City and most other municipalities use average emissions factors applied to all electricity usage to generate our total corporate greenhouse gas emissions. Ontario's electricity grid is a very "green" grid meaning that a minimum of fossil fuels is used to generate electricity, mostly at peak demand times during the day. City staff will begin to look at more granular ways to account for emissions associated with electricity use to take advantage of peak shifting projects and battery storage systems.

Solar PV Strategy – Some solar PV systems have been worked into the capital budget already but staff will begin to review all city assets to identify additional opportunities for PV installations and coordinate installations to coincide with major roof replacements and major renovations.

Central Park Community Energy System Study – Currently a team of researchers from McMaster University is performing a detailed analysis of the City's Central Park Campus as a potential site for their Integrated Community Energy (ICE) Harvest design. The system will be able to reduce energy use and emissions at the site by sharing energy waste energy between buildings. More information will be shared with senior staff as the analysis progresses.

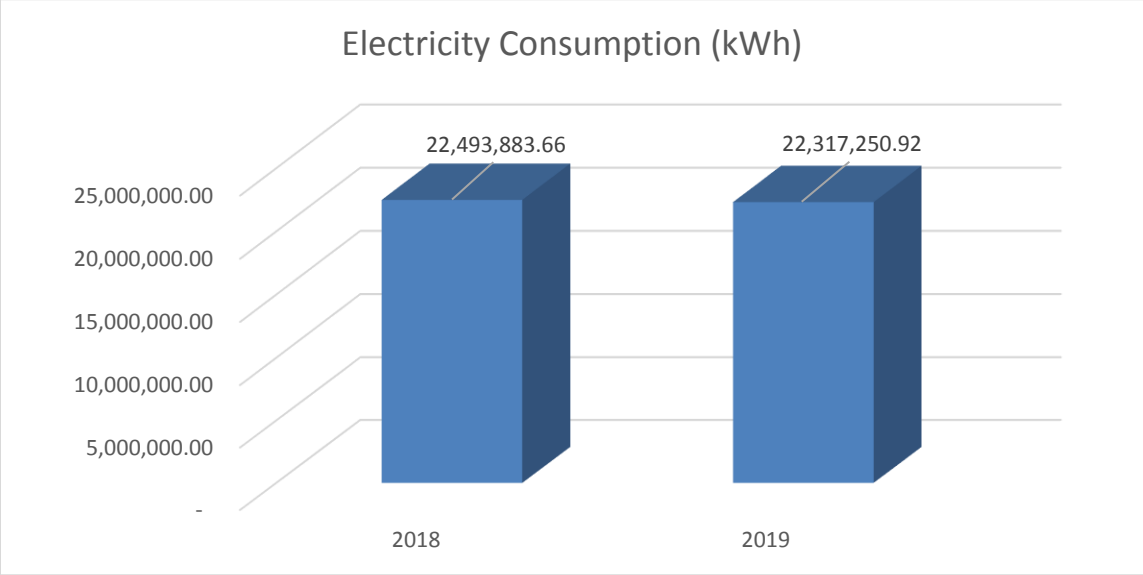
Skyway Arena – Skyway arena is currently in design and will be a showcase for low carbon arenas. The design currently incorporates a geothermal system as well as heat recovery from the ice making equipment that is used to heat the facility. Currently the design uses no natural gas and although it will not have Solar PV in the base design the facility has been designed both structurally and electrically to accommodate it in future years.

Options Considered

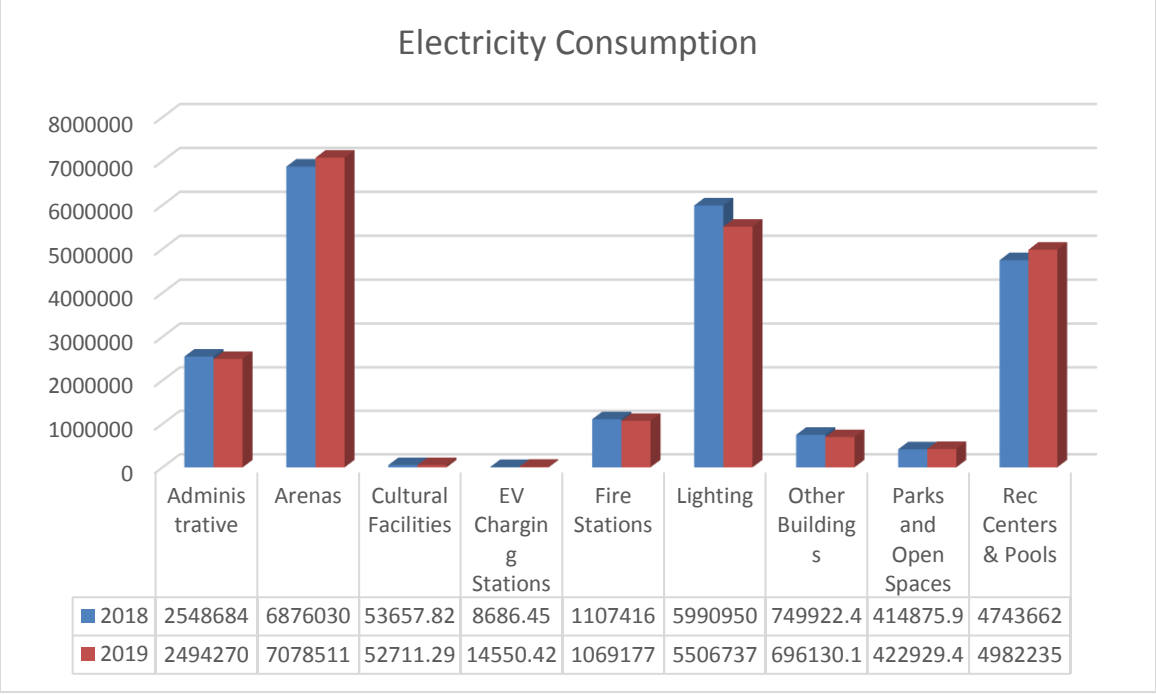
Below is consumption data for 2018 vs 2019 for Electricity, Natural Gas and Water. Additional data on a building by building basis can be found in Appendix A. Also included below is fuel consumption data for the Corporate Fleet, Burlington Fire Fleet as well as the Burlington Transit Fleet.

Electricity Consumption

Overall Corporate electricity consumption has decreased by 1% from 2018 to 2019.



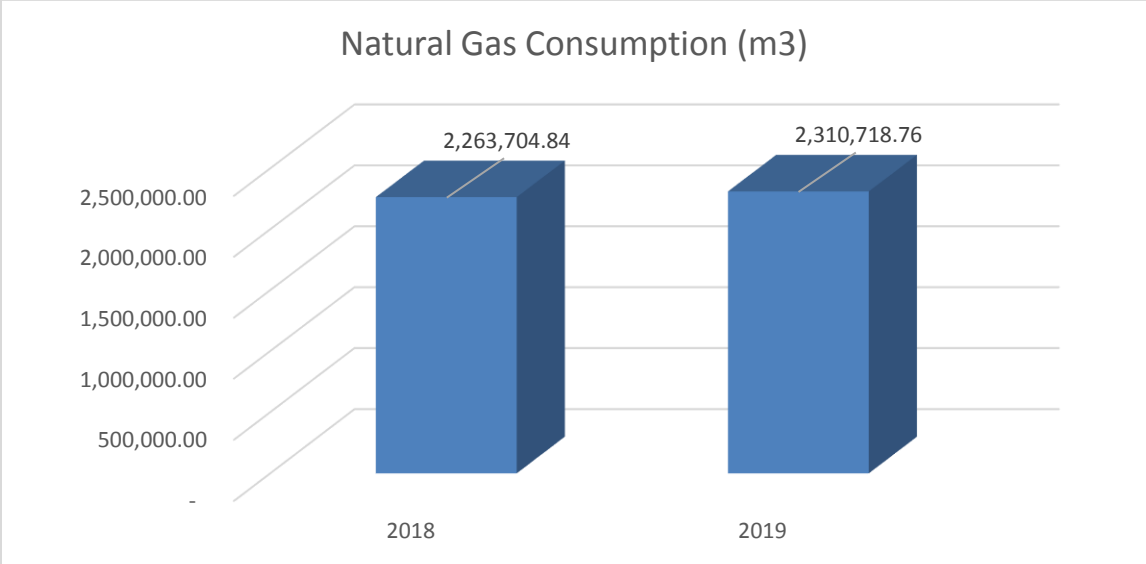
Decreases in almost all Building Types can be seen with the exception of Recreation Centers and Arenas, these increases are due to more programming in both types of facilities. An increase in Electric Vehicle charging of almost 70% can also be seen in the chart below



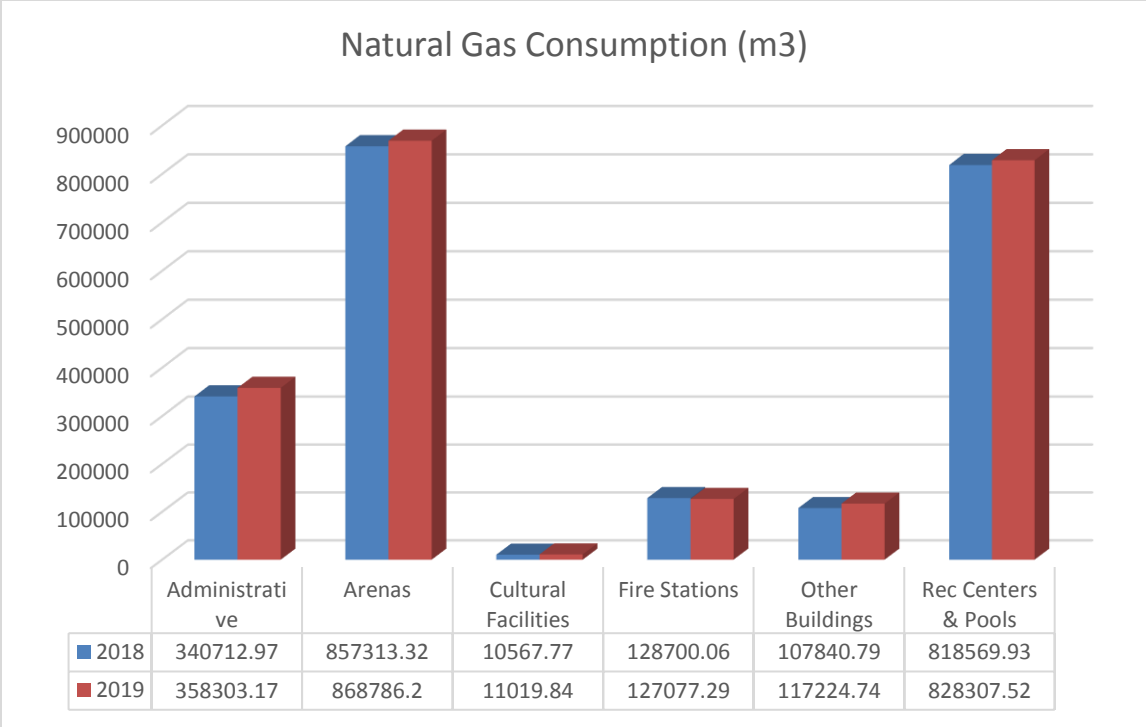
	Administrative	Arenas	Cultural Facilities	EV Charging Stations	Fire Stations	Lighting	Other Buildings	Parks and Open Spaces	Rec Centers & Pools
2018	2548684	6876030	53657.82	8686.45	1107416	5990950	749922.4	414875.9	4743662
2019	2494270	7078511	52711.29	14550.42	1069177	5506737	696130.1	422929.4	4982235

Natural Gas Consumption

Overall corporate natural gas usage increased slightly by 1% from 2018 to 2019. This increase can largely be attributed to more heating days during the winter and shoulder seasons as well as the increased programming levels noted in the electricity consumption section.

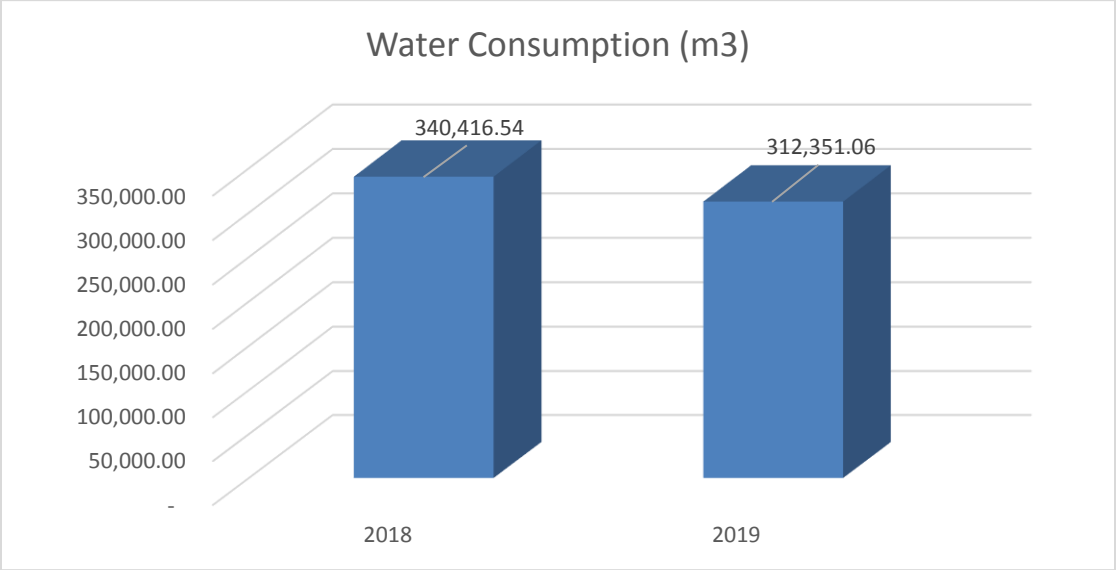


Below increases across almost all building types can be seen, however it should be noted that despite colder temperatures Fire Station usage was lowered by operational changes and improvements to schedules and setpoints in their facilities.

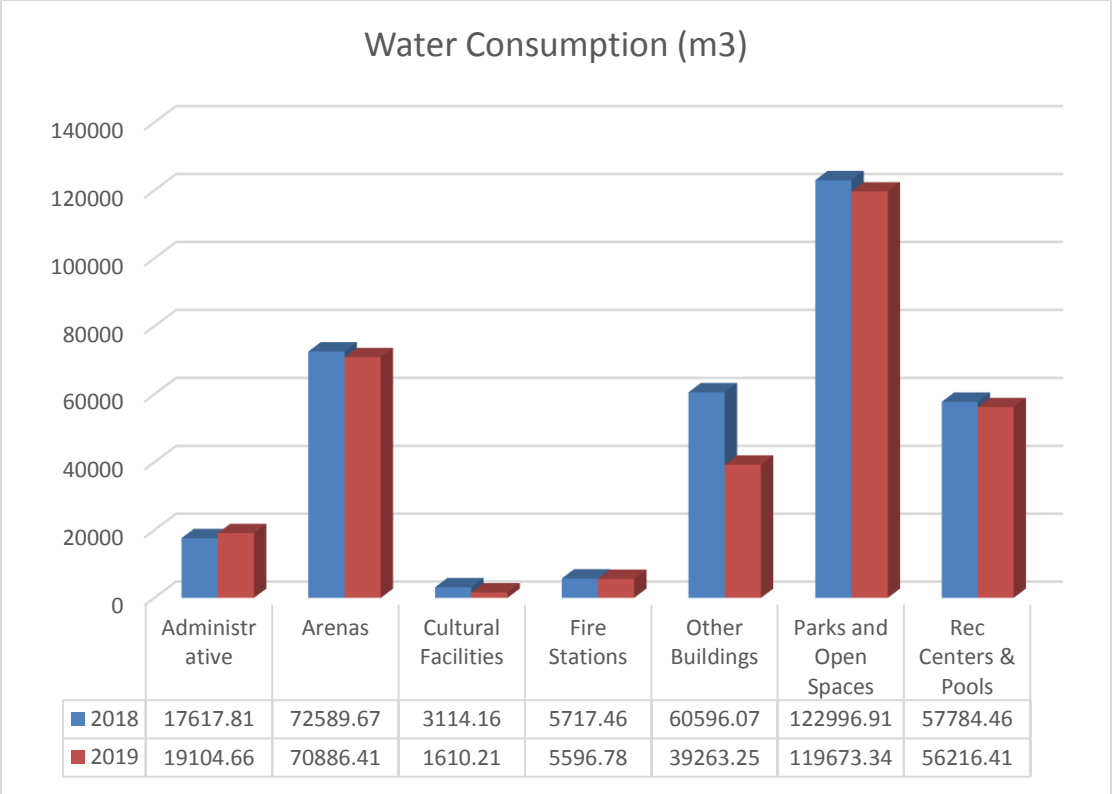


Water Consumption

Water consumption decreased by 8% from 2018 to 2019.

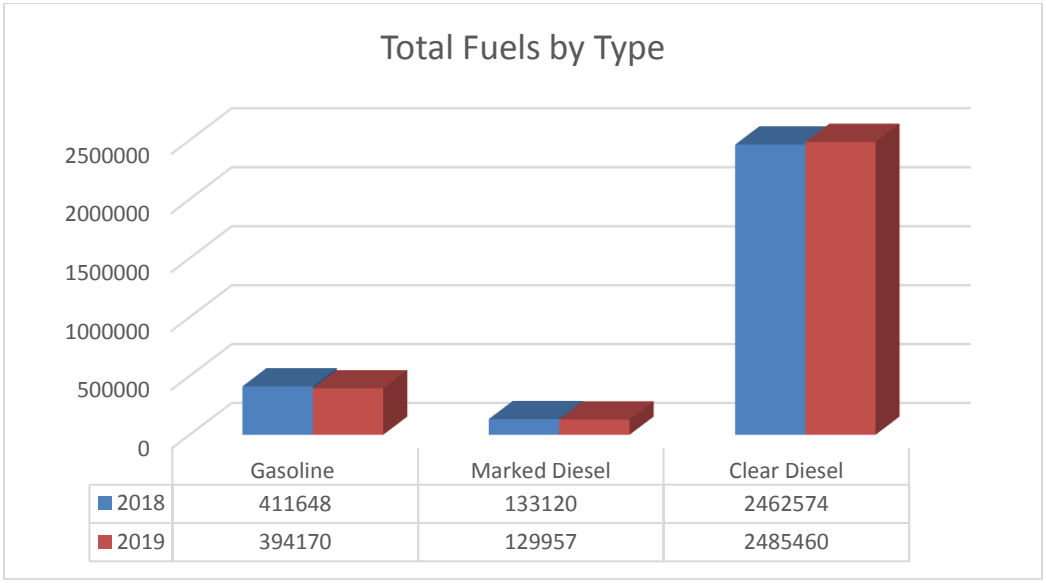


Slight decreases in water usage can be seen in almost all facility types, the largest of which is “Other Buildings” which includes several of the City’s splash pads that are connected to park facilities. Lower usage at these splash pads can be seen in some months in 2019.



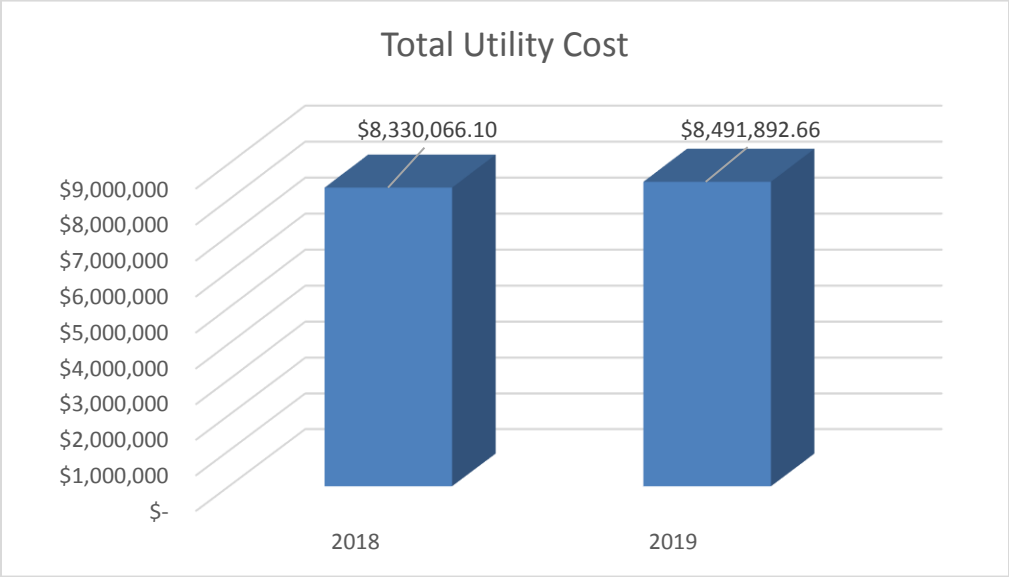
Fleet Fuel Consumption

Overall fuel consumption for all fleets (Corporate, Fire & Transit) increased by 0.01% from 2018 to 2019. Below illustrates the differences across fuel types showing reductions of 4.3% in gasoline and 2.4% in marked diesel and a 0.9% increase in clear diesel.

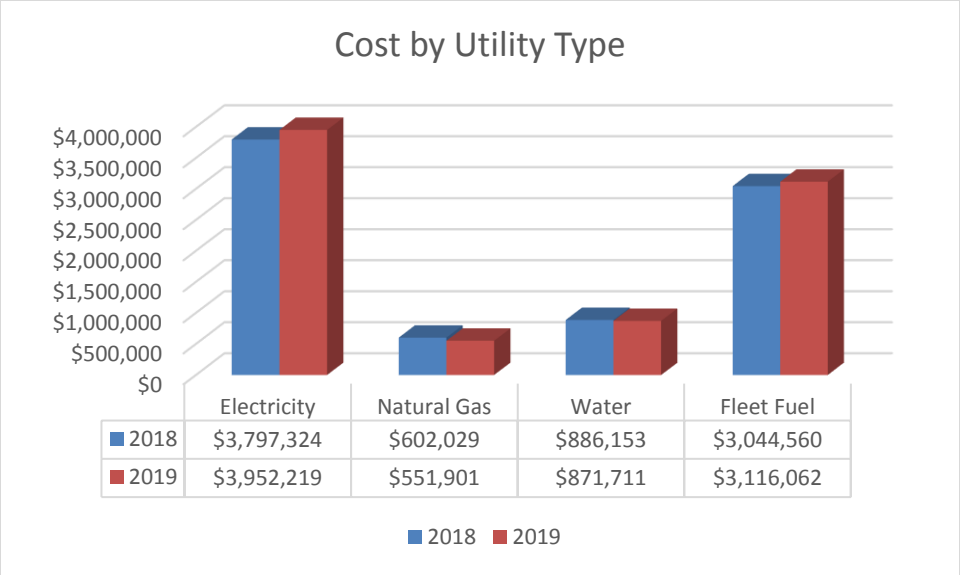


Financial Matters:

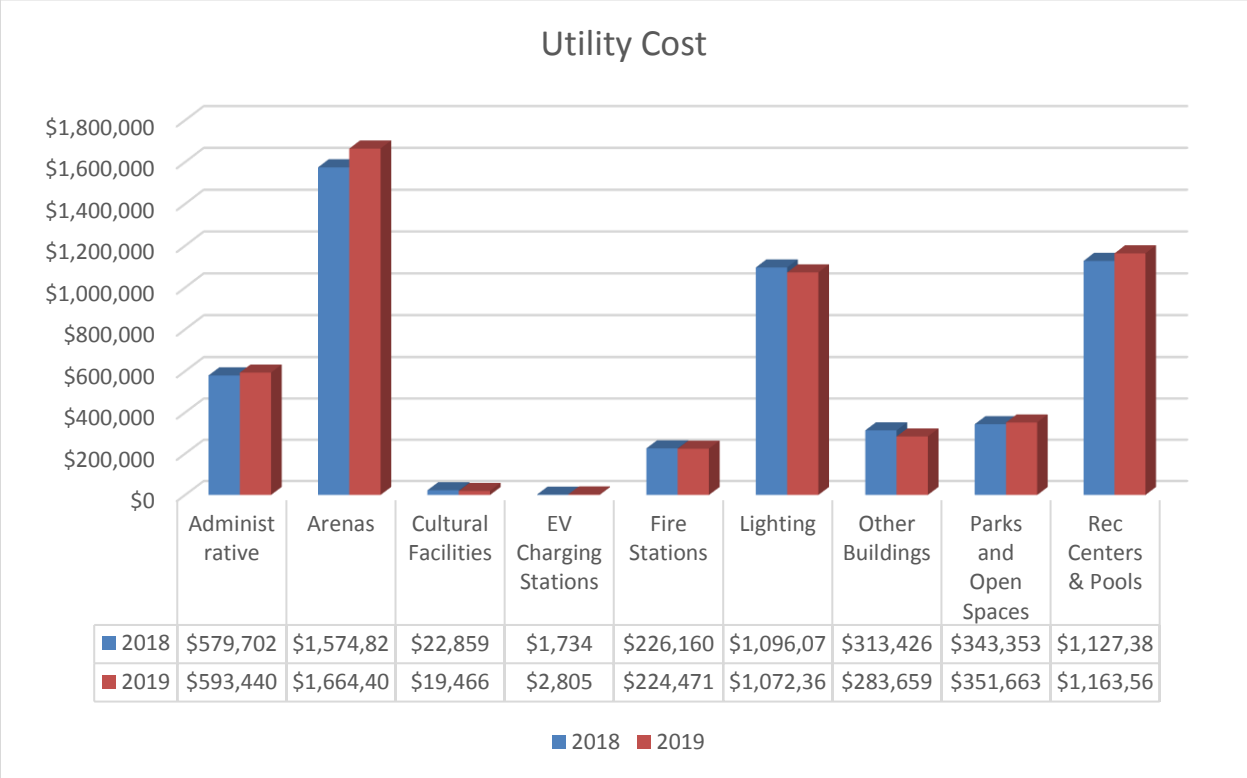
Total cost of Electricity, Natural Gas, Water and Fleet Fuels increased by 1.9% from 2018 to 2019.



Increases in electricity costs can be attrtibuted to increased cost in “Class B” or Large commercial accounts which are associated with all of the City’s large facilities. 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. Decreases in water costs can be attributed to lower usage although there were increases on a per m3 basis.

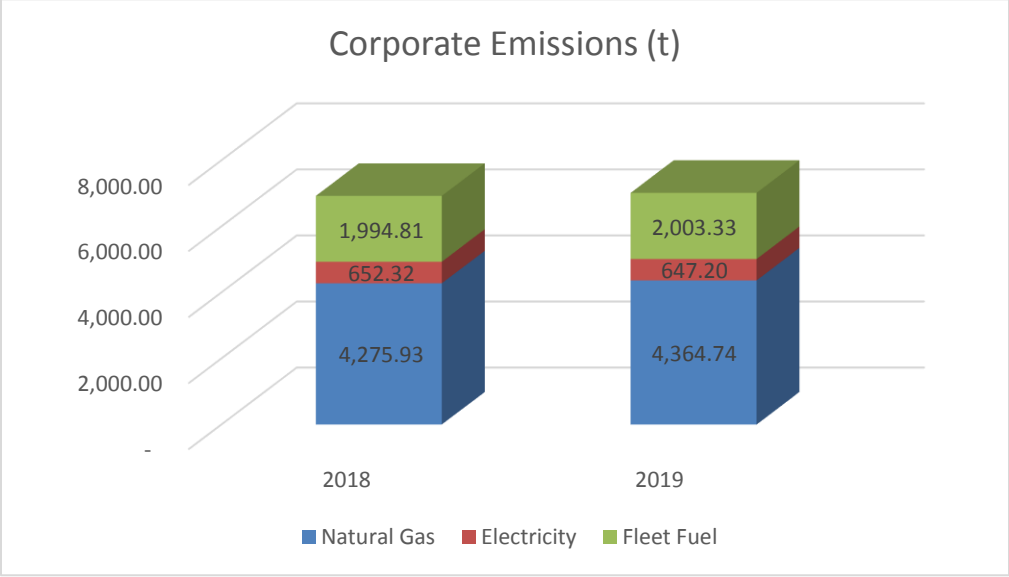


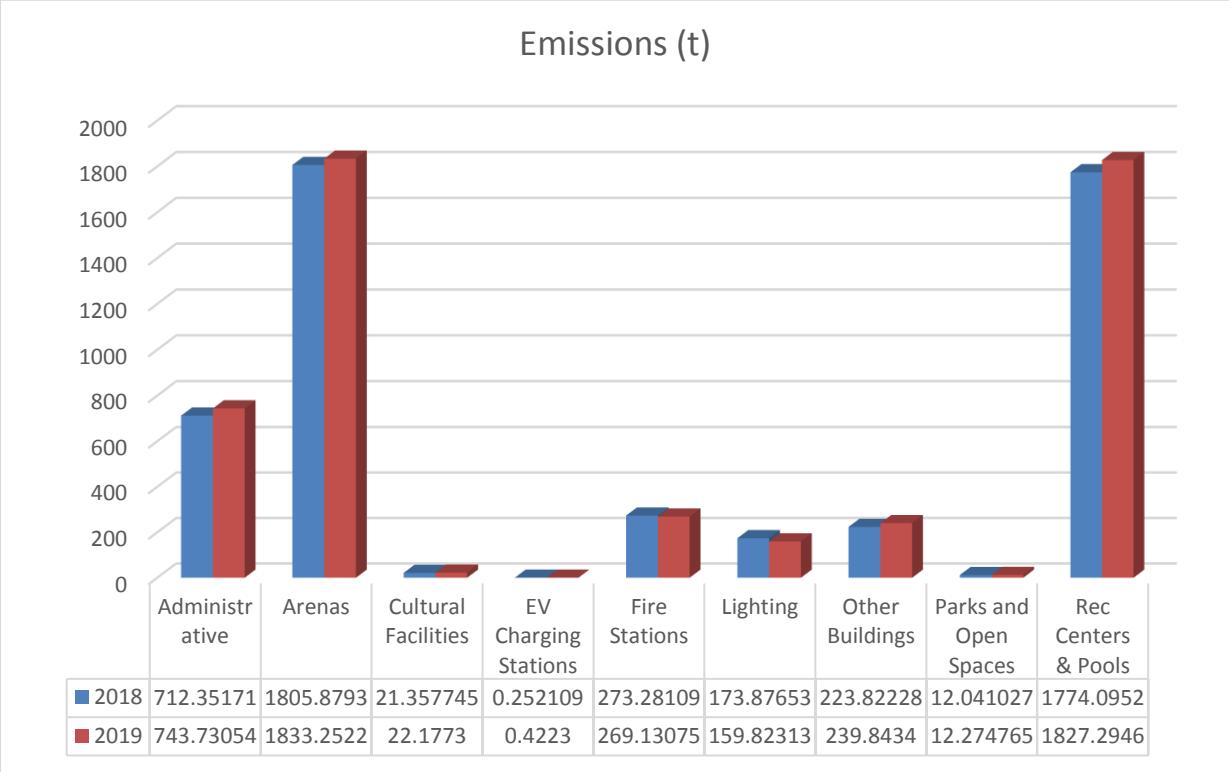
Decreased costs in utilities across most facility types can be seen below although increases in costs for Arenas and Recreation Centers can be attributed to increased programming as detailed in the electricity consumption portion of the report.



Climate Implications

Overall emissions for the city's facilities increased slightly from 2018 to 2019 by approximately 1.3%. This can largely be attributed to cooler temperatures in the heating season resulting in an increase in natural gas usage and programming increases described in the sections above. Please note the fleet emissions below do not include transit fuel emissions to align with the Corporate Energy and Emissions Management Plan and the Climate Action Plan.





	Administrative	Arenas	Cultural Facilities	EV Charging Stations	Fire Stations	Lighting	Other Buildings	Parks and Open Spaces	Rec Centers & Pools
2018	712.35171	1805.8793	21.357745	0.252109	273.28109	173.87653	223.82228	12.041027	1774.0952
2019	743.73054	1833.2522	22.1773	0.4223	269.13075	159.82313	239.8434	12.274765	1827.2946

Engagement Matters:

In the past year Environment and Energy staff have prepared and presented at various community events and hosted several internal training and information sessions including:

Staff Open House – at this event staff were engaged and asking lots of questions on climate change. Almost all staff that visited the climate change booth were looking for more information on various topics from understanding climate change to the effect of projects on their homes and the city's building stock. From these comments and questions that were asked staff developed a series of lunch and learns for all city staff to attend.

Climate Action Lunch and Learns – The Climate Action Lunch and Learn Series was developed by Environment and Energy staff to raise staff awareness and provide information that staff can use both in the workplace and at home. Topics for the events include;

- *Demystify your Energy Bills* – A step by step walkthrough of how to understand your electricity, natural gas and water bills and all of their components.
- *Put a LID on it!* – A presentation from the Conservation Authority on Low Impact Development at your home and how to protect against flooding and control stormwater.
- *Everything you need to know about purchasing an Electric Vehicle* – A panel of staff members who own EVs had volunteered to answer questions from staff with questions about the upfront and operating cost of EVs as well as anything else they would like to know.
- *Tips to reduce your energy bills at home* – A walk through of small measures as well as an introduction to deep energy retrofits, what is involved in them and how various types of technology works.
- *E-Bikes* – Similar to the EV lunch and learn staff who own and ride e-bikes to work volunteered to speak to other staff and answer any questions they might have about owning an E-bike.

Unfortunately, only the first two events were held before facilities were closed due to COVID-19. Staff expect to reboot the series once restrictions have been lifted and events are able to occur.

Operational Staff Training – Various sessions of training have been held with operation staff for operation of equipment in their facilities as well as their Building Automation Systems.

Conclusion:

Although there was an increase in usage in some areas, this can generally be attributed to weather factors and an increase in service to the public. Decreases in consumption can be seen across various facilities through operational and capital measures and is resulting in progress being made toward the goals and targets of the City's Corporate Energy and Emissions Management Plan. Through implementation of energy efficiency measures, training and awareness programs and future project planning city staff continue to work towards creating an energy and environmental conscious work culture.

Respectfully submitted,

Tom Pedlar

Corporate Energy and Emissions Coordinator

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Appendices: (if none delete section)

A. Energy and Emissions Data Summary 2019

B. Sample Facility Monthly Report

Report Approval:

All reports are reviewed and/or approved by Department Director, the Chief Financial Officer and the Executive Director of Legal Services & Corporation Council. Final approval is by the City Manager.