



CORPORATE FACILITIES MEMORANDUM

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TO: DEPUTY MAYOR, B. WARD AND MEMBERS OF COUNCIL

FROM: A. MCMULLIN, MANAGER OF ENERGY MANAGEMENT, EXT. 5097

NOTED: R. PEWS, P.ENG., DIRECTOR OF CORPORATE FACILITIES

D. MCALPINE, GENERAL MANAGER OF COMMUNITY AND CORPORATE SERVICES

M. PROWSE, CHIEF ADMINISTRATIVE OFFICER

RE: ENERGY MANAGEMENT 2021 YEAR-END REPORTING, ALL WARDS

DATE: APRIL 25, 2022

The purpose of this Memorandum is to provide an members of Council with an update on corporate energy performance and energy management initiatives during the 2021 fiscal year.

Energy Management Mandate

The Energy Management (EM) Branch mandate is focused on reducing utility consumption and associated costs for all City owned and operated infrastructure. Utility costs are comprised of electricity, natural gas, propane and water that are used to service our facilities, water and wastewater infrastructure, parks, street lighting and traffic signals.

The EM Branch has expanded its mandate to include action aimed at reducing community and corporate greenhouse gas emissions driven by Council's emergency climate declaration issued in the fall of 2019.

Cost Savings & Impacts

The pandemic continued to impact City services in 2021. The temporary shuttering of facilities and changes in service hours and operations throughout the year reduced the consumption and demand for energy. The EM Branch operations were impacted from the COVID disruption, as typical capital project delivery, facility optimization efforts and staff engagement activities were limited. With these restrictions, the EM Branch pivoted to focus on expanding efforts relating to infrastructure renewal and capital planning, specifically analyzing projects utilizing a 'climate lens'. This approach considers the life-cycle impacts and recommends options to reduce greenhouse gas emissions while still prioritizing energy efficiency and minimizing operational costs.

The following summarizes the energy, utility budget and other economic impacts realized in 2021, from both EM action and COVID related influence on City operations :

- 1) A favourable utility budget variance of \$1,287,500 (14%);
- 2) An annual utility cost avoidance of \$1,131,908;
- 3) Obtained \$67,776 in incentive revenue; and
- 4) Invested \$62,964 in capital funding which is estimated to generate an annual cost avoidance of \$61,284.



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Table 1 summarizes the annual utility expense for the City from 2014 – 2021.

Year	Actual Cost	Difference from previous year (%)	Difference from previous year (\$)
2014	\$ 9,760,442		
2015	\$ 9,844,380	0.9%	\$ 83,938
2016	\$ 10,030,166	1.9%	\$ 185,786
2017	\$ 9,238,589	-7.9%	\$ (791,577)
2018	\$ 8,977,351	-2.8%	\$ (261,238)
2019	\$ 8,620,747	-4.0%	\$ (356,604)
2020	\$ 7,847,289	-9.0%	\$ (773,458)
2021	\$ 7,852,429	0.1%	\$ 5,140

Capital Program Investment Summary and Impact

In 2021, the EM Branch invested \$62,964 in capital funding to implement conservation initiatives achieving a minimum rate of return of 10% over the lifetime of the asset. These activities focused on lighting retrofits, HVAC and control system optimization, and enhanced investment in equipment renewal projects.

Table 2 provides a summary of the projects completed and the associated energy savings, cost avoidance and estimated incentives.

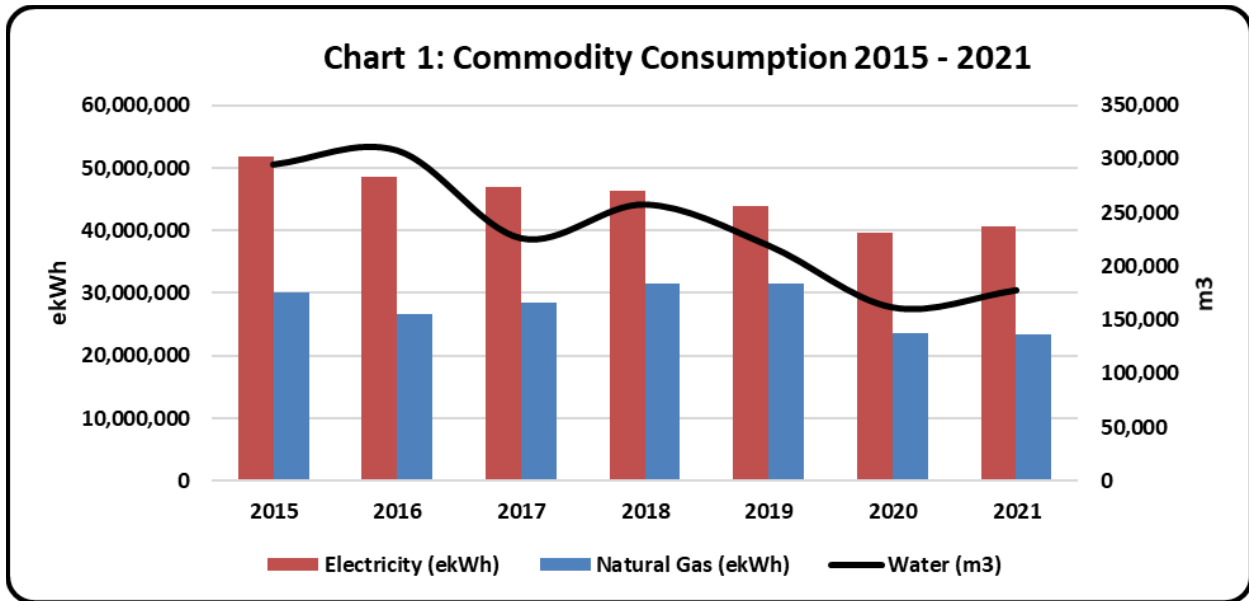
Project	Facility	Energy Management Investment	Energy Savings (ekWh)	Cost Avoidance (\$)	Estimated Incentive (\$)	Simple Payback (Years)
Lighting Retrofit - Parking Lot	Sadlon Arena	\$ 5,853	82,667	\$ 12,400	\$ 5,163	0.1
Condenser Optimization	Circle At The Centre	\$ 7,067	30,930	\$ 952	\$ 595	6.8
Garage Space HVAC Optimization	Surface Water Treatment Facility	\$ 50,044	1,398,080	\$ 47,933	\$ 27,394	0.5
Total:		\$ 62,964	1,511,676	\$ 61,284	\$ 33,152	0.5

This investment is estimated to pay back within six months, generate \$33,152 in incentive revenue and produce a cost avoidance of \$61,284 annually.

Energy & Water Consumption Summary - 2021

In 2021, City operations realized a modest 2% increase in energy usage compared the previous year. This increase was driven by the reduction in pandemic lock down events in 2021 compared to 2020.

Chart 1 summarizes the consumption trend for these commodities since 2015.



Key Performance Indicators (KPI)

The EM Branch utilizes four key performance indicators to measure the efficiency for City operations. Two of these track the energy efficiency associated with water and wastewater operations, whereby the total energy consumed is compared to the volume of potable water produced or wastewater that is processed. For all other building operations, a KPI that measures the energy consumed for all facilities compared to the total combined facility footprint (on a square footage basis) provides a benchmark for evaluation. Finally, an economic KPI, cost avoidance, is used to measure the annual value associated with energy conservation. Cost avoidance refers to any action that avoids having to incur costs in the future, and represents potential costs that are averted through specific preemptive actions. For energy management purposes, reducing utility consumption means not having to pay for that energy in the future. However, actual costs can still increase because of inflation impact. Table 3 summarizes the EM branch KPI results for 2021.

Key Performance Indicator	2019 Actual	2020 Actual	2021 Plan	2021 Actual
Facility Energy Consumption per Square Foot (ekWh/ft ²)	30.04	22.6	28.8	23.7
Cost Avoidance (Annual)	\$390,337	\$1,181,021	\$457,115	\$1,131,908
Wastewater Energy Consumption per Megalitre (ekWh/mL)	396	396	391	403
Water Energy Consumption per Megalitre (ekWh/mL)	1,177	1,024	1,119	1,013

Cost avoidance and facility energy consumption KPIs were heavily impacted by the pandemic's effect on service levels and are not reflective of typical operation. Wastewater operations slightly exceeded the KPI target as a result of operational improvements that reduced the run-time of the co-generation system. Water operations exceeded the KPI target by 9%, driven by a reduction in natural gas consumption at the surface water treatment plant. This reduction is attributed to the optimization of the HVAC system and building automation control improvements.

2021 Highlights:

The following items highlight the successes achieved within the Energy Management program in 2021.

Community Energy and Greenhouse Gas Emission Reduction Plan

With funding support of from the Ministry of Energy, Northern Development and Mines, the EM Branch completed the plan, titled 'Inspiring Climate Action in Barrie' which was endorsed by Council in March 2022. The plan establishes emission reduction targets for the community, and identifies actions and strategies to achieve these reductions. The plan was developed and supported by a number of community partners and stakeholders and moving forward, the EM Branch will be initiating the implementation phase of the plan.

Electric Vehicle Charge Station Partnership

The City partnered with Alectra and other municipalities to successfully apply for the Zero Emission Vehicle Infrastructure Program (ZEVIP) administered through Natural Resources Canada (NRCAN) to facilitate the deployment of electric vehicle charging infrastructure throughout Canada.

Through this partnership, EV charge stations have been installed at the following recreation centres:

- 171 Mapleton Ave. - Holly Community Centre (2 charge stations);
- 80 Livingstone St. E - East Bayfield Community Centre (2 charge stations);
- 190 Bayview Dr. - Allandale Recreation Centre (2 charge stations); and
- 555 Bayview Dr. – Sadlon Arena (4 charge stations).

As part of the Alectra operating agreement and ZEVIP grant, the City has not incurred any capital costs to install the charge stations and all future operational costs, including electricity, are covered by Alectra.

This partnership with Alectra provides an enhanced service for residents and visitors, promotes environmental stewardship through the reduction of greenhouse gas emissions while requiring no significant capital and operational investment by the City.

The EV stations are currently operational, with a full formal launch expected in the summer of 2022.

Home Energy Retrofit Feasibility Analysis

The Federation of Canadian Municipalities (FCM) has recently launched a Community Efficiency Financing (CEF) program with funding from the federal government to help Canadian municipalities plan, implement and scale up innovative financing models for residential energy projects.

The City has partnered with the Clean Air Partnership (CAP) and a cohort of other Ontario municipalities to successfully apply to the FCM CEF Feasibility Stream to undertake energy and building analysis of municipal residential building stock to identify the building archetypes and opportunities for energy efficiency reductions. There is no cost to participate outside of in-kind staff time to collect data, secure data sharing agreements, review workplan and project outputs. Undertaking this work will enable the municipality to meet the requirements that FCM has for applying to the capitalization and grant fund for program delivery that was launched in March of 2020. The study will provide insight into the opportunity and potential framework of a CEF program and position the City to access available grant funding to support a future program.



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The initial residential housing characterization analysis has been completed and further investigation regarding the potential structure of a program and resourcing needs are being undertaken as part of the feasibility work. It is anticipated that the project will be completed by year end.

Electric Vehicle Charge Station Usage Summary

In 2021, the City operated 48 public electric vehicle charge stations at four locations. These include the library, parkade, heritage park and marina. Table 4 provides a summary of the annual consumption and cost of electricity associated with the use of these charge stations.

Table 4: EV Charge Station Usage Summary 2018 - 2021

Year	Usage (kWh)	Cost (\$)
2018	17,413	\$2,308
2019	56,662	\$8,022
2020	8,141	\$1,202
2021	79,987	\$10,464

Pandemic restrictions related to waterfront parking that were imposed in 2020 were lifted in 2021, resulting in a rebound in utilization of electric vehicle charge stations that align with 2019 consumption figures.

Moving Forward

Energy Management staff are focusing on the following activities in 2022:

- Initiate the implementation of the community energy and greenhouse gas emission reduction plan;
- Development a corporate carbon neutrality strategy;
- Implementation of energy conservation capital projects;
- 2023 utility budgeting and capital plan development; and
- Conducting net zero emissions studies and analysis.

Should you have any questions about the activities of the branch or the contents of this memo please do not hesitate to contact me at extension 5097.