

Staff Report 2019-73

Meeting Date: Tuesday, June 18, 2019

Subject: 2019 - 2024 Corporate Greenhouse Gas Reduction Framework and Annual Reporting

Submitted By: Cristina Guido, Energy & Environment Specialist, Finance and Infrastructure Services

RECOMMENDATION

That the Town's 2017 Energy Consumption and Greenhouse Gas Emissions Report, as attached as Schedule A to Staff Report 2019-73, be submitted to the Ontario Ministry of Energy, Northern Development and Mines in accordance with the *Electricity Act 1998*, *Ontario Regulation 507/18*; and

That the Corporate Greenhouse Gas Reduction Framework (2019 – 2024), and associated corporate greenhouse gas reduction targets, attached as Schedule B to Staff Report 2019-73 be approved.

REPORT HIGHLIGHTS

- As required by the *Electricity Act, 1998 Ontario Regulation 507/18*, by July 1, 2019, the Town, and all public agencies, must submit 2017 data on their facility energy consumption and associated greenhouse gas (GHG) emissions to the Ontario Ministry of Energy, Northern Development and Mines, attached as Schedule A to Staff Report 2019-73.
- The Town's Corporate Energy Management Plan (2014 – 2019) will expire on July 1, 2019. As required by *Ontario Regulation 507/18*, all public agencies must report on the progress of their existing Plans and develop updated five-year energy conservation and demand management plans. As of December 31st, 2018 the Town reduced its facility energy consumption by 12.6% (normalized) or 2,611,200 ekWh below 2012 levels, exceeding its 9% target established in the 2014-2019 Corporate Energy Management Plan.
- In compliance with *Ontario Regulation 507/18*, staff created a Corporate GHG Reduction Framework (2019 – 2024) containing actions to reduce corporate-wide GHG emissions by 24% or 853 tonnes of CO₂e by 2024. To achieve this target, the Town will undertake actions to reduce emissions associated with fleet and buildings, reduce water consumption and improve waste diversion.

DISCUSSION

The *Electricity Act, 1998, Ontario Regulation 507/18* requires that all public agencies must:

1. Provide a summary of the public agency's annual energy consumption and GHG emissions for its operations for the 2017 reporting year to the Provincial Ministry of Energy, Northern Development and Mines;
2. Provide a description of the public agencies previous measures for conserving the amount of energy consumed by the public agency's buildings and for managing the demand for energy; and,
3. Prepare, publicly publish, and implement a five-year energy conservation and demand management plan that includes the current and proposed measures for conserving energy and a forecast of the expected results of the proposed measures.

This Staff Report will provide an overview of the Town's compliance with *O. Reg 507/18* to the requirements, outlined above.

O. Reg. 507/18 Requirement #1: Facility Energy Consumption and GHG Emissions Reporting (2017)

The Town is required to report on its annual energy consumption for facilities that have a heating and/or cooling load and is responsible for its energy utility costs. A summary of the Town's 2012 – 2017 reporting of facility energy consumption and associated GHG emissions are provided in Table 1 below. The Town's 2017 report (attached as Schedule A) will be submitted to the Ontario Provincial Ministry of Energy, Northern Development and Mines upon Council approval.

Table 1: Summary of the Town of Caledon's Annual Provincial Energy Reporting							
Year	Electricity (kWh)	Natural Gas (m³)	Fuel Oil (L)	Propane (L)	Total equivalent kWh (ekWh)	O. Reg 507/18 GHG Emissions tCO₂e	Absolute Energy % Change from the 2012 Baseline Year
2012	9,271,334	999,861	5,777		19,959,900	2,797	--
2013	9,961,325	1,069,915	7,725		21,415,396	2,801	+7.24
2014	8,481,855	1,048,558	8,455		19,716,714	2,345	-1.22%
2015	8,637,382	957,150	2,138		18,832,802	2,161	-5.65%
2016	8,459,874	935,430	3,606	3,556	18,478,481	2,085	-7.42%
2017	8,507,939	933,002		2,570	18,441,741	1,915	-7.61%

In 2017, the Town's corporate facilities used 7.61% less energy (non-weather normalized) compared to the 2012 baseline.

Staff have identified and prioritized the top energy consuming buildings as the 'Big 7', outlined in Figure 1 below. These facilities are responsible for 82% of the Town's building energy portfolio and have been subject to energy audits and associated retrofits.

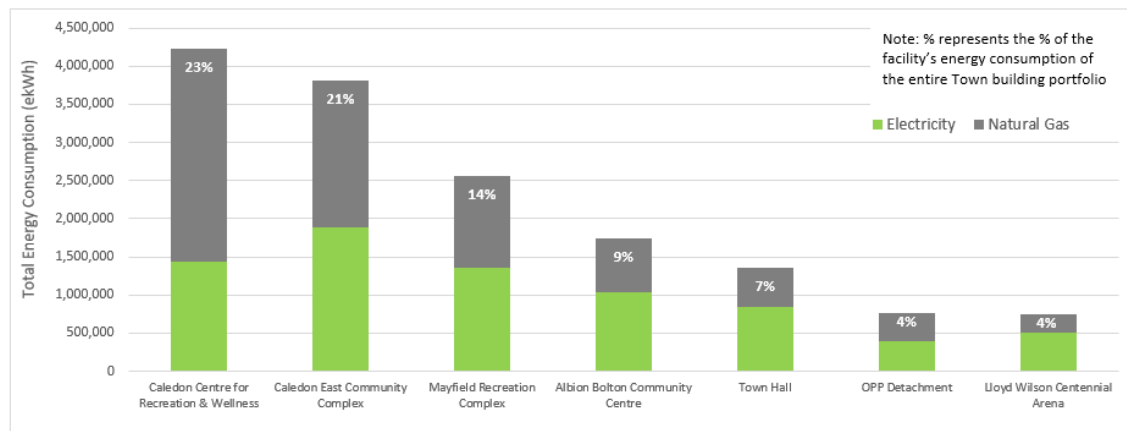


Figure 1: Caledon's 'Big 7' Energy Use Breakdown

2017 Energy Performance Monitoring

Town staff have developed a comprehensive understanding of the energy consumed in facilities through an energy performance analysis software called RETScreen Expert ('RETScreen'). RETScreen is managed under the CanmetENERGY Varennes Research Centre of Natural Resources Canada, a Department within the Government of Canada. RETScreen allows for a true comparison of how energy is being consumed in facilities without the influence of factors that staff are unable to control such as the weather.

Outlined in Figure 2 below are the results of the energy performance analysis of the 28 facilities that the Town reports to the Province. Based on the energy performance analysis, the Town has realized an estimated 7.32% or 1,461,284 ekWh avoided energy consumption in 2017 compared to the 2012 baseline year.

There is an increase in energy consumption in the RETScreen model (figure 2) due to the number of facilities included in the analysis over the years (as outlined in Table 2). A description is provided below to outline the facilities with a baseline year alternative to 2012.

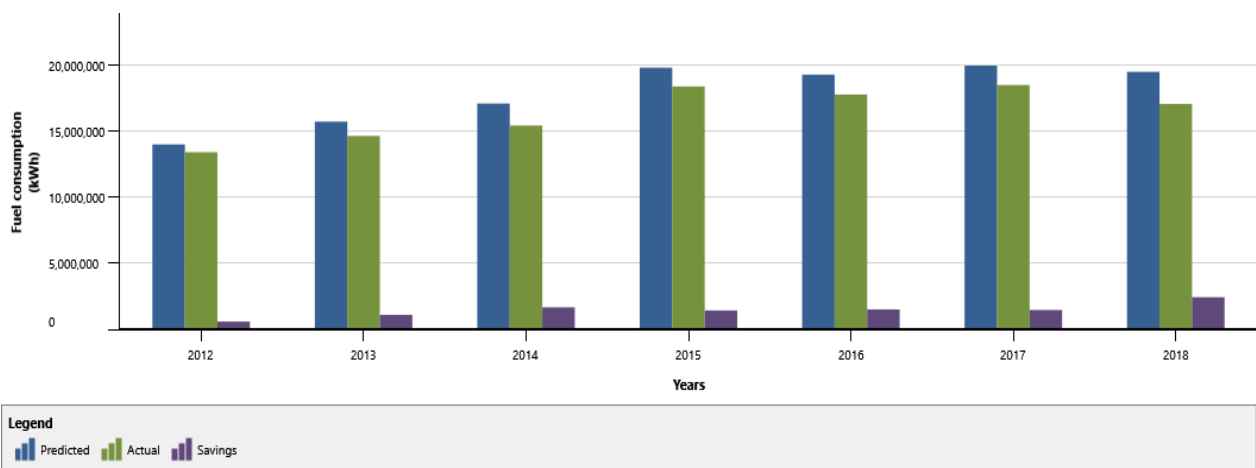


Figure 2: 2012-2018 Performance Analysis of the Town's Building Portfolio

Table 2: Annual Energy Performance Analysis

	2012	2013	2014	2015	2016	2017	2018
Facilities included	20	21	24	26	27	28	28
Actual Energy Consumption (ekWh)*	13,415,214	14,638,936	15,435,003	18,389,581	17,780,199	18,501,897	18,108,410
Predicted Energy Consumption (ekWh)	14,001,568	15,730,965	17,100,284	19,814,609	19,285,473	19,963,181	20,719,610
Savings (ekWh)	586,354	1,092,029	1,665,281	1,425,029	1,505,273	1,461,284	2,611,200
Savings (%)	4.2%	6.9%	9.7%	7.2%	7.8%	7.3%	12.6%

* The total actual energy consumption indicated above contains totals that differ from the annual consumption table provided in Table 1. This is due to the exclusion of some facilities as described below and alternative methodologies for calendarizing the utility billing data.

It is important to note adjustments made to the energy performance models baseline years. The bulk of the Town's 28 facilities have been modeled against a 2012 baseline year, consistent with the CEMP baseline, however some facilities required modelling against an alternate baseline year due to poor data quality (Work Yard 2, Alton Community Centre); facility renovations (Work Yard 1, Snelgrove Fire Hall #307); and, major changes in mechanical equipment operations (Mayfield Recreation Complex, OPP Detachment, 6211 Fire Administration). Belfountain Community Centre's energy model excludes heating fuel (propane) from the analysis due to a lack of correlation with energy variables, as fuel for this facility is purchased in bulk.

Despite an increase the number of facilities included in the Town's RETScreen model (figure 2 above), on an absolute basis (non-weather normalized) energy has reduced by 7.61% in 2017 compared to the 2012 baseline year.

O. Reg. 507/18 Requirement #2: Accomplishments of the Existing Corporate Energy Management Plan (2014-2019)

The CEMP (2014-2019) had an energy reduction target of 9% by 2019, based on the building and energy consumption profile in 2012. As of 2018, the Town exceeded this target, realizing an estimated 12.6% or 2,611,200 ekWh energy reduction (normalized) below the 2012 baseline (see Figure 2 and Table 2). The increased savings realized in 2018 is due to Town Hall's HVAC renovation, optimized temperature and humidity setpoints at the Caledon East Community Complex, ice plant controls at the Albion Bolton Community Centre, smart thermostats for better space temperature control at Work Yard 2, and other energy conservation measures completed as described in Schedule C. Significant highlights from the Town's existing Plan are outlined below:

CEMP Highlight #1: Corporate Energy Team (CET)

The CEMP established a CET to govern the implementation of the CEMP, meeting quarterly to ensure that the goals, objectives and targets of the Plan were met. Between 2014 – 2018, fifteen (15) CET meetings were held, covering various topics including energy retrofit technology, training on the Town's energy management software, and

presentations from other municipalities including the Cities of Hamilton and Barrie. Each meeting dedicated time to sharing energy-related updates in facilities and promote learning from operations best practices in other Town facilities.

In 2018, 16 CET members and additional facility staff completed an Energy Efficient Building Operations all-day training, administered by the Local Authority Services (LAS). The objective of the training was to empower and educate facility staff to identify and implement operational energy saving opportunities in their facilities.

Lastly, an internal energy awards program was also established to recognize the CET's efforts to conserve energy in their facilities. The energy awards program is administered by Energy and Environment staff, and the awards are distributed by Senior Management which provides an opportunity to share corporate energy successes.

CEMP Highlight #2 Energy Revolving Fund

In 2015, the CET established an independent funding mechanism to support the implementation of energy efficiency retrofits, called the Corporate Energy Revolving Fund (CER Fund). The revenue from the Town's three solar microFIT contracts, energy incentives received and a percentage of energy savings from the projects implemented sustain the CER Fund.

Since 2015, \$171,567 has been spent through the Corporate Energy Revolving Fund, independent of the tax base, to support various energy efficiency retrofit projects, as outlined in Table 3. It is anticipated that these projects will save approximately 228,582 kWh annually.

Table 3: CER Fund Project Summary (2015 – 2018)						
Year	Project Description	Actual Project Spend	Anticipated Energy Savings (ekWh)	Anticipated Energy Savings (\$)	Simple Payback	Incentive Received
2015	Mayfield Recreation Complex: Refrigeration Plant Controls	\$34,412	79,000	\$11,060	3.11	\$8,430
2016	Albion Bolton Community Centre: Refrigeration Plant Controls	\$35,463	49,040	\$5,885	6.03	\$6,521
2017	Caledon Animal Shelter: LED retrofit	\$2,500	2,312	\$278	9.0	\$760
2017	Mayfield Recreation Complex LED Retrofit	\$8,754	16,967	\$2,749	3.18	\$1,040
2017	CCRW: Squash Courts LED Retrofit	\$11,854	9,935	\$1,432	8.28	\$1,700
2018	Town Hall: LED Retrofit	\$6,274	5,157	\$722	8.69	\$240
2018	Work Yard 2: LED Retrofit	\$37,706	38,521	\$5,393	6.99	\$2,880
2018	Cheltenham Fire Station: LED Retrofit	\$16,923	13,975	\$1,956	8.65	\$1,407
2018	Mayfield Recreation Complex: LED Retrofit	\$17,681	13,675	\$1,915	9.24	\$995
Total		\$171,567	228,582	\$31,390	5.478	\$23,973

Between 2014 – 2018, \$248,039 of utility incentives have been received from saveONenergy and Enbridge Gas as a result of implementing energy efficiency retrofits in facilities, energy audits and training programs (note: not all incentives are included in Table 3 above). The utility incentives that the Town receives sustain and helps grow the CER Fund. Of the total utility incentives received between 2014 – 2018 was a \$150,571 incentive for retrofitting cobrahead streetlights to LED on Town-owned roads, however this incentive was used to offset the capital costs of the project. For a full description of energy retrofit projects that took place between 2014-2018 see Schedule C.

CEMP Highlight #3: Data Management, Analysis and Benchmarking

In 2018 the Town migrated to a new energy management software that automates receiving, storing and analyzing electricity and natural gas bills, allowing staff to easily access both historical and current utility bills. The energy management software is integrated with the Town's accounts payable system which streamlines the bill payment process. Energy and Environment, Finance, Facilities, Recreation and Parks staff have access to the energy management software with the ability to view energy consumption

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and costs for Town assets. This enhances staff ability to respond quickly to fluctuations in energy use.

Between 2016 – 2018, eleven (11) energy audit reports were completed, including the Town's top seven (7) consuming facilities, identifying energy conservation measures for prioritization and action.

Lastly, in 2017, Energy and Environment staff developed energy performance reports for each facility using the RETScreen Expert software. The energy performance reports are prepared for facility staff and are distributed during CET meetings. These reports provide staff with graphs that show annual energy consumption and savings, trends in electricity and natural gas consumption, and the utility operating cost impact of energy savings or increases.

CEMP Highlight #4: Awards and Recognition

The Town's corporate energy program has received a number of awards from organizations, focusing on leadership in energy management operations and reductions. The awards received includes three (3) from the Mayor's Megawatt Challenge recognizing energy saving reductions at Town Hall, Caledon Centre for Recreation and Wellness and the Mayfield Recreation Complex. Town Hall was recognized for a second time for achieving a 20% energy reduction in 2015 through Civic Action's Race to Reduce awards. Three (3) Town staff and CET members were awarded the Don Harrison Energy Champion Award between 2015 – 2018 by the Ontario Recreation Facilities Association (ORFA) for their outstanding efforts to conserve energy in their facilities. Lastly, in 2018 the Town received the Energy Innovation for MUSH (Municipal, University, School, Hospital) award through saveONenergy for its incentive applications.

The Town's use of RETScreen was recognized by Natural Resources Canada through a publication that was distributed to approximately 560,000 global clients. Staff have also presented on the Town's benchmarking work at a RETScreen Expert Certification course in 2017 and on a national webinar by the Federation of Canadian Municipalities (FCM) in 2019. Staff continue to field inquiries regarding the Town's use of RETScreen from staff in other municipal jurisdictions.

O. Reg. 507/18 Requirement #3: 2019 – 2024 Energy Conservation and Demand Management Plan

The Town is required to update its CEMP by July 1st, 2019 and must include the following information:

- Goals, objectives and proposed measures for conserving, reducing and managing the demand for energy;
- Cost and saving estimates for its proposed measures;

- Renewable energy generated by the Town; and,
- Confirmation that the plan has been approved by Senior Management.

In accordance with the Regulation, the Town developed a Corporate Greenhouse Gas Reduction Framework (2019 – 2024) to outline its proposed strategies to reduce energy consumption. The scope of the Framework goes beyond the requirements of the Regulation by including assets that have a carbon footprint associated with their operations and proposes strategies to manage and reduce emissions.

Greenhouse Gas Emissions Inventory Update

The Town's corporate GHG emissions inventory was updated for 2017, in partnership with Masters Students from Western University, to identify the GHG impact of assets within the Town's operational control and served as an update to the Town's 2007 GHG inventory. The corporate GHG inventory update followed the Federation of Canadian Municipalities and ICLEI Canada's PCP Protocol for municipal GHG emissions accounting.

The Town's total corporate GHG emissions in 2017 amounted to 3,611 tCO₂e, resulting in a 3,367 tCO₂e or a 48% reduction in corporate GHG emissions since 2007, shown in Table 4 below. It is important to highlight that 2017 emissions factor for electricity significantly reduced from 2007 as a result of the phase out of coal from electricity generation, significantly contributing to the Town's GHG emissions reductions. There have also been considerable improvements to data quality since the 2007 inventory.

Table 4: Corporate GHG Emissions Inventory Trends & 2024 Target					
Sector	Scope	2007 Emissions (tCO ₂ e)	2017 Emissions (tCO ₂ e)	2007 – 2017 % Change	2024 Target (tCO ₂ e)
Buildings ¹	Use of natural gas, propane and electricity in corporate buildings and facilities	4,891	1,946	-60.21%	1,556
Fleet ²	Combustion of fuels (i.e. gasoline) for corporate fleet and equipment.	1,364	1,519	+11.36%	1,063
Streetlights ³	Use of electricity for streetlights, traffic signals and other types of outdoor public lighting such as parks.	723	85	-88.24%	85
Waste ⁴	Amount of solid waste collected from corporate-owned buildings and parks and resulting methane emissions released due to landfill decomposition.	N/A	57	N/A	51
Water ⁵	Use of electricity and natural gas by municipal water and wastewater	N/A	4.4	N/A	4.1

¹ The 2007 GHG inventory for buildings included the Caledon Central Pool that was closed in 2014, and therefore not included in the 2017 GHG inventory. The total emissions for buildings as per O. Reg 507/18 reporting differs from the emissions quantified in the Town's 2017 corporate GHG inventory due to the use of slightly different emissions factors.

² In 2007 the Town's fleet fuel use included mixes of B10 and B20 fuels. Due to operational challenges, in 2017 the Town used a blend of B5 fuels which has a higher emissions factor when compared to the fuels with a larger biodiesel blend.

³ Between 2015 – 2017 the Town retrofit 2,000 cobrahead streetlights to LED

⁴ In the 2007 GHG inventory, quantifying emissions from waste was not included in the scope of the inventory.

⁵ In 2007 the downstream emissions from water transmission and treatment was not included in the scope of the GHG inventory, as allowed by the PCP protocol for GHG inventories.

Sector	Scope	2007 Emissions (tCO ₂ e)	2017 Emissions (tCO ₂ e)	2007 – 2017 % Change	2024 Target (tCO ₂ e)
	treatment infrastructure for the treatment of water consumed by the Town.				
Total		6,978	3,611	-48.25%	2,758

Corporate GHG Reduction Framework Overview

The objective of the Framework is to continue to reduce the Town's corporate GHG emissions by an additional 24% or 853 tCO₂e (equal to 3,611 – 2,758 noted in Table 4, above) by 2024. This is further summarized in Figure 3 and Table 5, below. Staff acknowledge that this is an ambitious target and have outlined risks in the Framework that may impact the Town's ability to reach the target. Staff will also evaluate staff capacity against the strategies proposed in the Framework.

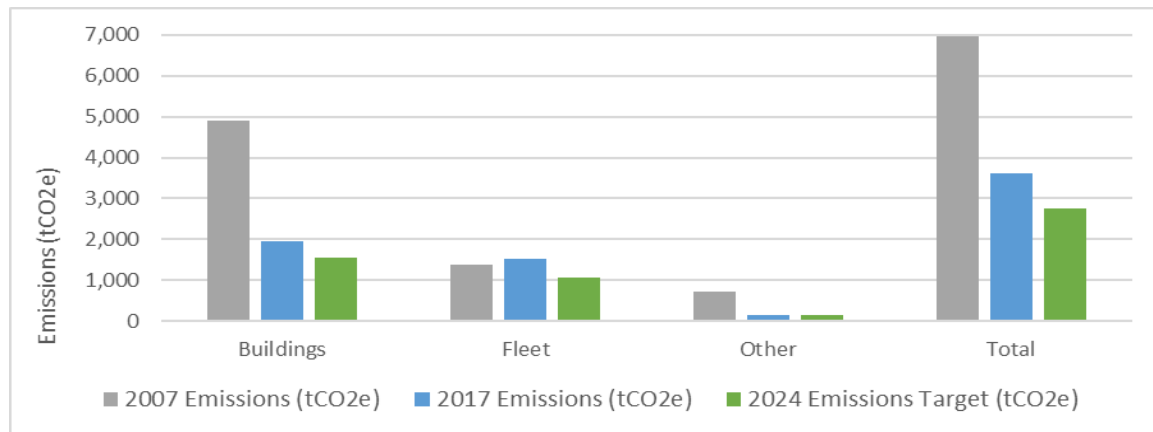


Figure 5: Town of Caledon's Corporate GHG Emissions Inventories and Target

The Framework contains 60 strategies across four (4) priority areas of energy, fleet, waste and water that are proposed to reach their associated reduction targets.

Energy

According to the Town's 2017 Corporate GHG Emissions Inventory, energy consumption in Town facilities is responsible for the largest source of corporate emissions (54%). The combustion of natural gas for space and water heating in facilities contributes the most GHG emissions.

The Town is adopting a target to conserve 15% or 2,306,555 ekWh of facility energy use by 2024 below 2017 levels and to continue retrofitting outdoor parks lights and streetlights to LED. This energy reduction will result in an approximate reduction of 390 tonnes of CO₂e and an estimated utility operating budget savings of \$81,179 by 2024.

The energy chapter of the Framework proposes strategies to reach this target (see Schedule B), such as:

- Growing organizational capacity and sustaining portfolio-wide standards of energy efficiency;
- Considering lower carbon options for building renewal and capital projects; and,
- Adopting high-performance design standards for new facility construction and renovations.

Fleet

According to the Town's 2017 GHG inventory, fuel consumed in the Town's fleet accounts for the second largest source of corporate emissions, representing 42% or 1,519 tCO₂e of total corporate emissions.

The Town is adopting a target, aligned with the Region of Peel, to reduce 30% of fleet emissions or 456 tCO₂e by 2024 from 2017, consistent with the Region of Peel's reduction target. To achieve this, the Town will monitor and track fuel use in fleet vehicles and equipment, identify fuel switching and fuel saving opportunities, and develop a Green Fleet Strategy. The Town will also continue to promote lower emission commuting options to staff. A full description of fleet strategies is contained in Schedule B.

Waste

Waste generated in facilities and parks was responsible for 57 tCO₂e of the Town's corporate emissions in 2017. The Town is aligning with the Provincial waste reduction target (30% by 2020), to divert 30% of waste generated corporately by 2024, an improvement of 9%, from the Town's corporate waste diversion rate in 2017 of 21%. This will avoid an approximate 7 tonnes (or 7,000 kg) of CO₂e.

Staff propose to reach this target by measuring and tracking the waste generated in facilities and parks, conducting waste audits to identify opportunities, and purchasing materials with reduced packaging that are acceptable in the Region of Peel's waste diversion programs.

Water

Water consumed in the Town's facilities and parks contribute to the Region's consumption of energy and associated GHGs from water distribution and treatment plants, accounting for the Region's largest source of electricity consumption.

Corporately, the Town consumed 103,744,000 litres of water, with 43,184,000 litres consumed in facilities and 60,560,000 litres consumed in parks in 2017, amounting to an operating budget cost of \$183,612. This is responsible for 4.4 tCO₂e of downstream GHG emissions.

By 2024, the Town is seeking to conserve 6% or 6,224,640 litres of water consumed in facilities and parks by 2024. To achieve the target, the Town will strive to monitor, and track water use in all facilities and parks, identify high water savings potential opportunities standardize water-efficient equipment and fixtures and enhance water

maintenance and operations procedures. A full description of the strategies proposed for water conservation are contained in Schedule B.

A summary of the proposed 2024 reduction targets are provided in Table 5 below.

Table 5: 2024 Targets and Equivalencies Summarized				
Sector	2024 Reduction Target (%)	Unit Measurement Equivalent	2024 GHG Reduction Equivalent (tCO₂e)	2024 Cost Avoidance equivalence
Energy	15%	2,306,555 ekWh	390	\$81,179
Fleet	30%	tCO ₂ e saved	456	N/A*
Waste	30%	81,421 kg of waste	7	N/A*
Water	6%	6,224,640 litres	0.26	\$16,246
Total			853	\$97,425

* Cost avoidance is unknown for fleet, as the emissions reductions are uncertain which fuel type and associated costs will be reduced. There are no direct operating costs associated with waste as the Region of Peel provides this service.

Climate Change Context

The Town is seeking to reduce GHG emissions associated with its corporate operations, to align with reduction targets of upper levels of government.

In 2015 the Government of Canada, along with 195 other countries, ratified the Paris Agreement, a global commitment to rapidly accelerate and intensify actions to limit global average temperature rise to well below 2°C above pre-industrial levels, and to pursue efforts to limit the increase to 1.5 °C. In response to the Paris Agreement, the Federal government developed the Pan-Canadian Framework for Clean Growth and Climate Change with a target of 30% reduction below 2005 GHG emission levels by 2030.

In 2019 the Government of Canada released Canada's Changing Climate Report and found that both past and future warming in Canada is on average, double the magnitude of global warming. On May 15th, 2019 carbon dioxide levels were measured in Earth's atmosphere at 415 parts per million (ppm), being the highest point of 800,000 years of data, and are anticipated to continue growing unless urgent and steep actions are taken to reduce the burning of fossil fuels. This demonstrates the need for local governments to display strong action to rapidly reduce GHG emissions, demonstrating leadership throughout the community to also take action.

Next Steps

Upon Council approval, the Town will be submitting *O. Reg. 507/18* annual energy and associated GHG reporting to the Provincial Ministry of Energy, Northern Development and Mines and will make the Corporate GHG Reduction Framework publicly available through the Town's website. Staff will also be working with a graphic artist to design the final framework.

Staff will be leading the implementation of the immediate priority actions identified in the Framework, including an update to the Town's Corporate Green Building Standard, a waste audit and retrofit at the Caledon Centre for Recreation and Wellness, and coordinating two more Corporate Energy Team meetings by the end of the year.

FINANCIAL IMPLICATIONS

There are no immediate financial implications associated with this report.

COUNCIL WORK PLAN

Connected Community – Develop a five-year Corporate Greenhouse Gas Reduction Framework

ATTACHMENTS

Schedule A – Corporate Energy and Greenhouse Gas Emissions Reporting (2017)
Schedule B – Corporate GHG Reduction Framework (2019 – 2024)
Schedule C – CEM Plan (2014 – 2018) Accomplishments
Schedule D - Building Energy Management, Commissioning and Maintenance
Implementation Estimated Costs & Savings for 7 High Potential Buildings