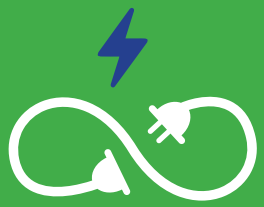
TOWN OF CALEDON
CORPORATE GREENHOUSE GAS REDUCTION FRAMEWORK

2019 – 2024

TOWN OF CALEDON

6311 Old Church Road Caledon, ON L7C 1J6
www.caledon.ca | environment@caledon.ca
T . 905.584.2272 | 1.888.225.3366 | F. 905.584.4325

Energy Achievements 2014 – 2018



140

energy conservation measures complete

$248,039

of utility incentives have been received

from saveONenergy and Enbridge Gas

12.6%

reduction

of facility energy consumption in 2018 compared to 2012 levels

11

energy audits

completed between 2016-2017

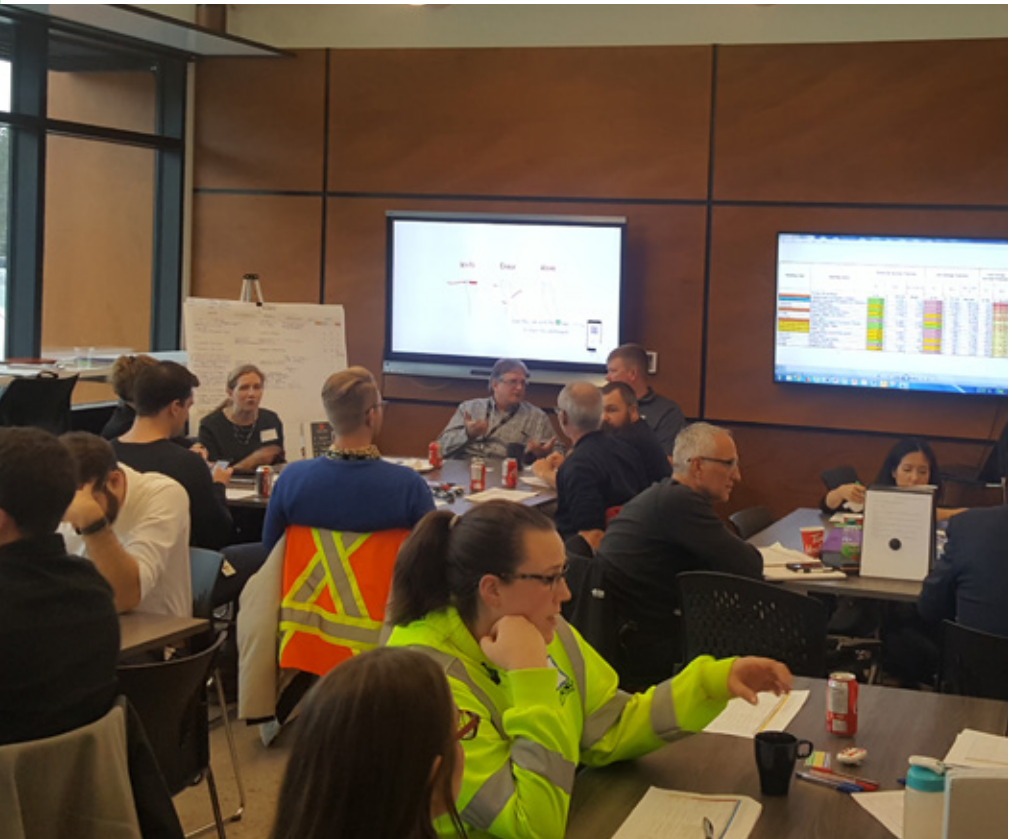
Established a Corporate Energy Revolving Fund and spent

$171,567

on energy retrofits

Established a Corporate Energy Team and held

15 meetings



CORPORATE GREENHOUSE GAS REDUCTION FRAMEWORK

Mayor

Allan Thompson

A message from the Mayor

On behalf of Caledon Council, we are pleased to release the Town's Corporate Greenhouse Gas Reduction Framework. This Framework builds on the Town's longstanding leadership on climate action. We recognize that addressing climate change is a priority for Caledon and we are committed to reducing greenhouse gas (GHG) emissions from our operations, in line with national and international commitments.

This new Framework builds on previous successes of the 2014-2019 Corporate Energy Management Plan to reduce facility energy use by nine per cent below 2012 levels by 2019. We are proud that we were able to achieve a 12.6 per cent reduction, surpassing our target! This was the result of completing over 140 actions by our Corporate Energy Team, often supported by our energy revolving fund, which offsets the cost of energy retrofits from our three solar projects, independent of the tax base.

Following the success of the previous Corporate Energy Management Plan, we are pleased to present a 5-year a framework to manage and reduce GHG emissions emitted by Town operations. This Framework targets emissions from Town facilities, vehicle fleets, waste and water consumption to achieve an overall corporate emissions reduction of 24 per cent by 2024.

Moving forward, we hope to lead by example and inspire the Caledon community to act against climate change.

Mayor Allan Thompson

LIST OF TABLES

LIST OF FIGURES

24 BY 24

The Town is adopting a target of a 24% reduction below 2017 levels in corporate emissions by 2024.

Mayfield Recreation Complex

Introduction and Background

Purpose

The Electricity Act 1998, Ontario Regulation 507/18, requires public sector agencies to submit annual facility energy consumption and greenhouse gas (GHG) emissions data by July 1 of every year to the Provincial Ministry of Energy, Northern Development and Mines; and to prepare by July 1st 2019, an updated five year Energy Conservation and Demand Management Plan (ECDM)[1]. The ECDM shall outline the goals, objectives and specific actions that the public agency will undertake to manage and reduce energy consumption and demand.

The Town is going beyond the requirements of the regulation and has developed a framework to manage and reduce GHG emissions emitted through Town operations. The Framework focuses on four key areas, including corporate energy, fleet, water and waste.

This Framework establishes tangible energy, conservation and emissions reduction goals for the Town, and aligns with the direction of municipalities across Ontario, striving toward steep energy and carbon reduction goals.

Global Climate Change Context

In 2015, Canada along with 195 other countries endorsed the Paris Agreement, a commitment to rapidly accelerate and intensify actions and investments needed 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.

Setting the upper limit of global temperature increases to 2°C is considered to be a 'safe' and lower emissions pathway. While significant climate impacts will still be experienced under a 2°C increase in global temperatures, these impacts become exponentially worse under higher emissions scenarios such as: reduction of groundwater availability; increased sea level rise; increased impacts from heat stress; reduction of agricultural production; and, higher rate of extinction of animal species[2].

In 2018, the Intergovernmental Panel on Climate Change (IPCC), a United Nations body that assesses the science and global progress to address climate change, released a Special Report, *Global Warming of 1.5 degrees Celsius*. The Report outlined that global temperatures is likely to reach 1.5°C between 2030 and 2052 if emissions continue to increase at the current rate. This report also assessed the impacts and risks of an average global temperature increase between 1.5°C and 2°C above pre-industrial levels[3]. The findings concluded that limiting warming to 2°C would not adequately avoid the most severe impacts of climate change, as demonstrated in Figure 1. This had led to government agencies taking more urgent action, including declaring climate emergencies, as risks to human and natural systems are much higher for 2°C warming.

[1] Ontario Regulation 507/18, Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans, s.6.
[2] World Resources Institute. Infographic: Choose your future: 4 possible emissions pathways. 2014. https://www.wri.org/resources/data-visualizations/infographic-choose-your-future-4-possible-emissions-pathways

[3] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. World Meteorological Organization, Geneva, Switzerland, 32 pp.

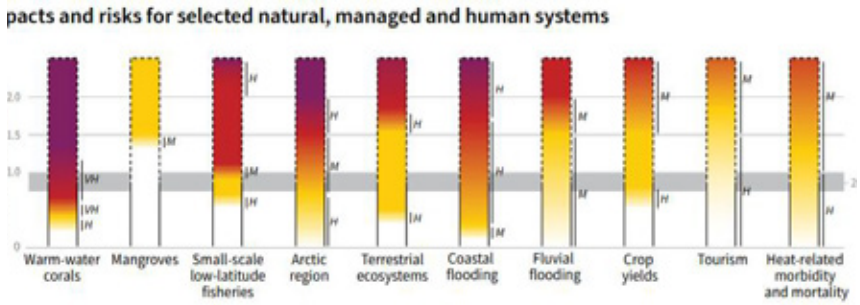


Figure 1: Impacts and risks for selected natural, managed and human systems, as per IPCC Special Report (2018)

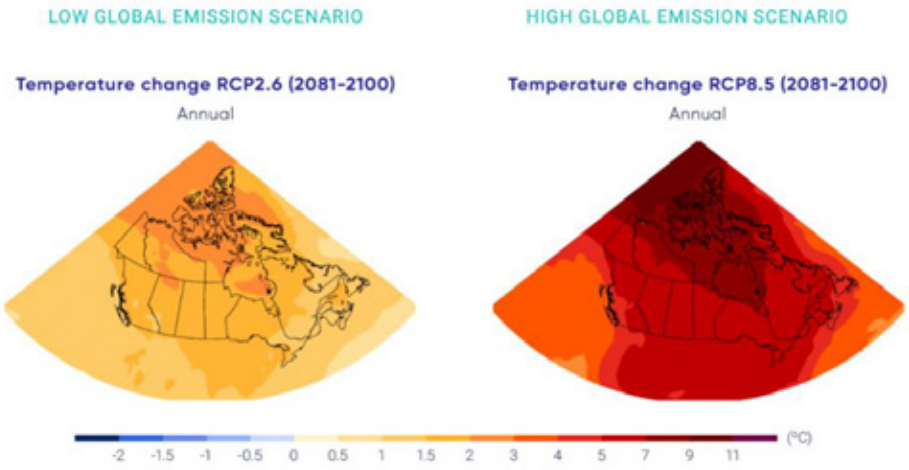


Figure 2: Projected annual temperature change for Canada under a high and low emission scenario

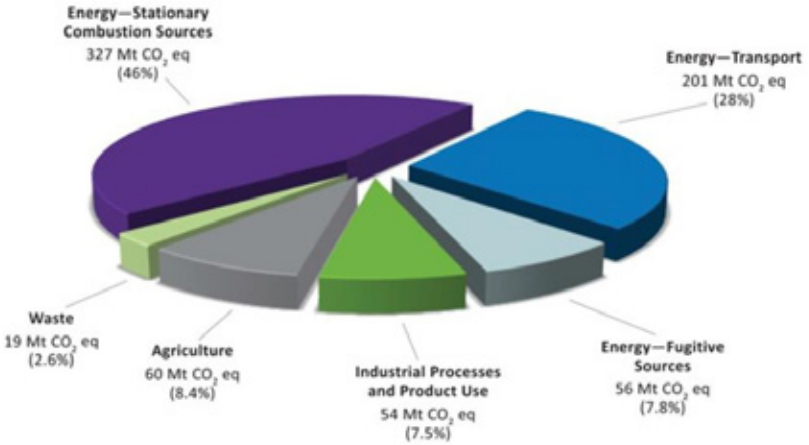


Figure 3: Canada's GHG emissions by IPCC sector (2017)

Climate Change in Canada

In 2019, the Federal Government's *Canada's Changing Climate Report* found that both past and future warming in Canada is, on average, double the magnitude of global warming, displayed in Figure 2.

In response to the Paris Agreement, the Government of Canada released the Pan-Canadian Framework for Clean Growth and Climate Change (PCF) as a strategic plan to meet Canada's 2030 target of a 30% reduction below 2005 GHG emission levels. Through PCF, the Federal Government recognizes the critical role the public sector can play to achieve the Federal and international climate change goals by: (1) setting ambitious targets; (2) cutting emissions from government buildings and fleets; and (3) scaling up clean procurement. A breakdown of Canada's 2017 inventory is shown in Figure 3, totaling 716 Mt CO2e[4].

[4] Government of Canada. Greenhouse gas sources and sinks: executive summary 2019. https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/sources-sinks-executive-summary-2019.html

Caledon's Corporate GHG Emissions

The Town's corporate GHG emissions inventory was completed for the baseline year of 2017 and served as an update to the Town's 2007 GHG inventory.

Following the Federation of Canadian Municipalities (FCM) Partner for Climate Protection (PCP) protocol for quantifying GHG emissions, the Town's total corporate GHG emissions in 2017 amounted to 3,611 tCO2e, a breakdown by sector is shown in Figure 4.In 2017 the Town has realized an overall corporate emissions reduction of 48% or 3,367 tCO2e since 2007. Between 2007 and 2017, trends in the Town's corporate emissions remain similar, with buildings and fleet making up the bulk source of corporate emissions.

In addition to the energy conservation measures implemented by staff outlined in Appendix B, it is important to highlight that the 2017 emissions factor for electricity significantly reduced from 2007 due to the phase out of coal from electricity generation in Ontario, significantly contributing to the Town's emissions reductions. There have also been considerable improvements to data quality since the 2007 GHG inventory.

The objective of the Framework is to continue to reduce the Town's corporate GHG emissions by an additional 24% or 853 tCO2e by 2024, as shown in Figure 5.

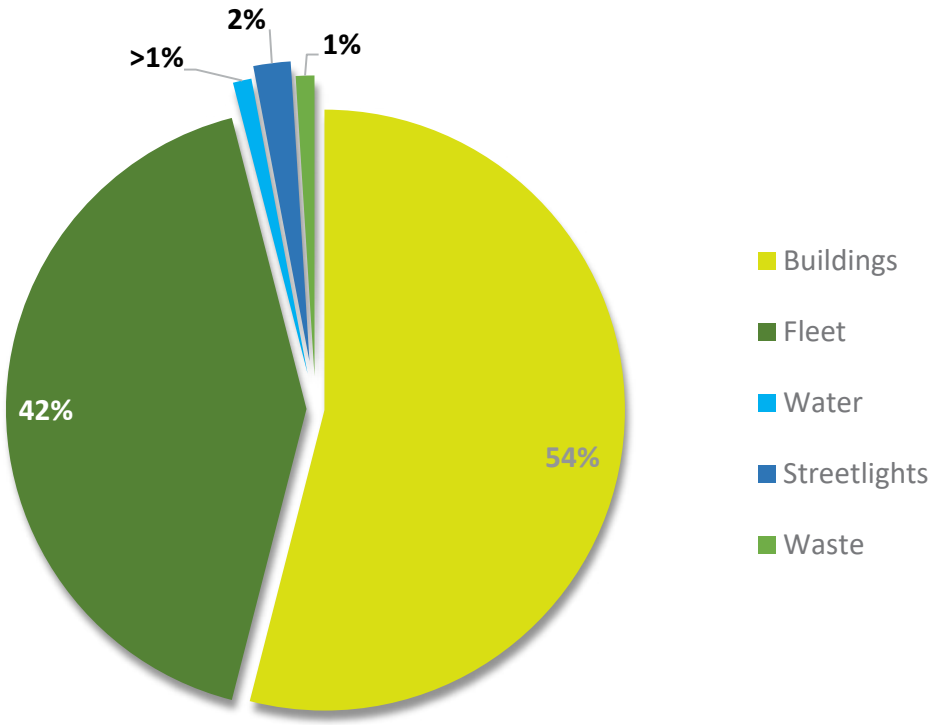


Figure 4: Caledon's corporate GHGs by sector (2017)

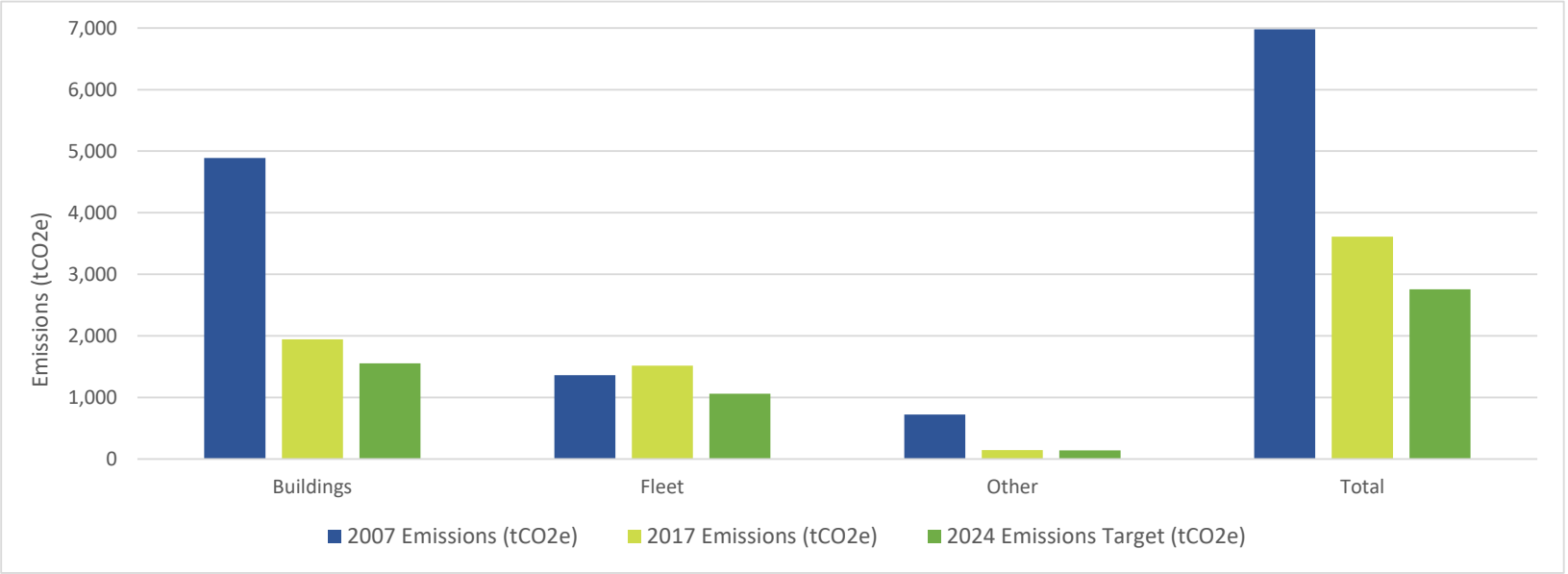
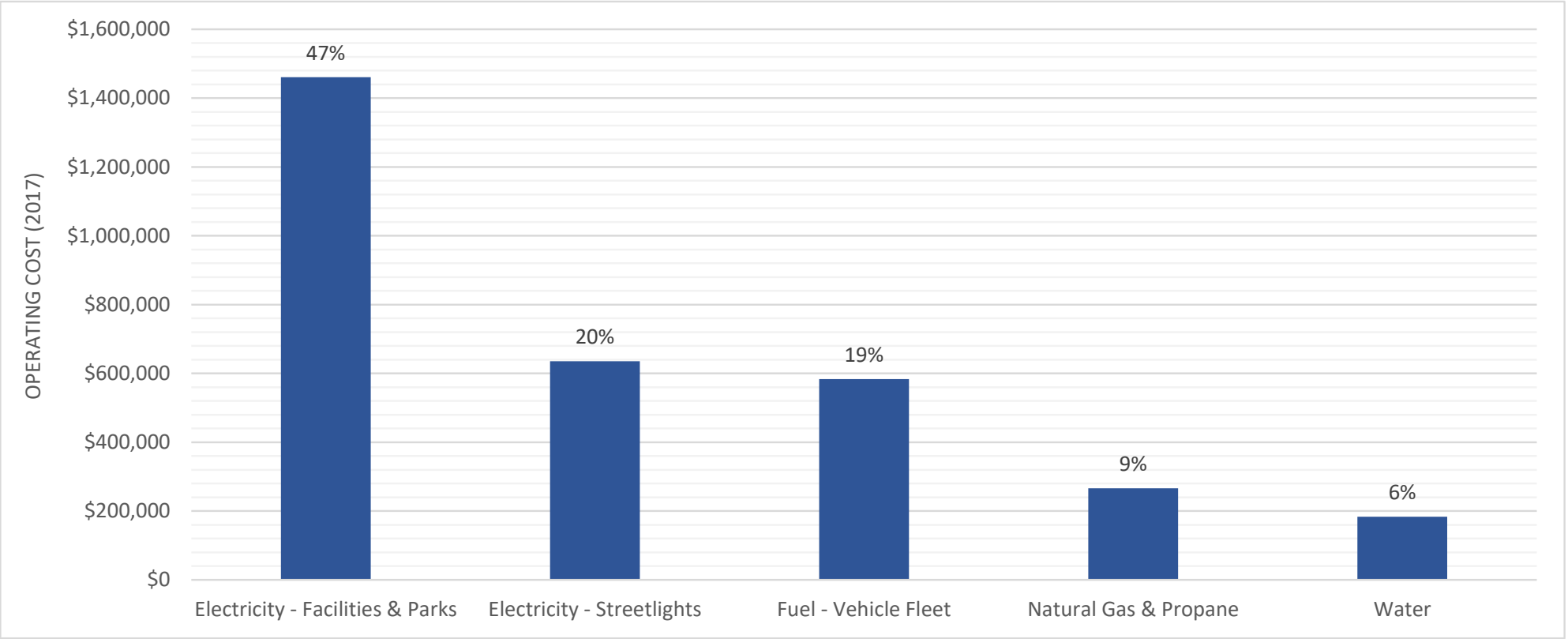


Figure 5: Town of Caledon Corporate Emissions Trends & 2024 Target

Table 1: Corporate GHG Emissions Trends and 2024 Target

Sector	Scope	2007 Emissions (tCO_2e)	2017 Emissions (tCO_2e)	2007 – 2017 % Change	2024 Target (tCO_2e)
Buildings[5]	Use of natural gas and electricity in corporate buildings and facilities	4,891	1,946	-60.23%	1,556
Fleet[6]	Combustion of fuels (i.e. gasoline) for corporate fleet and equipment.	1,364	1,519	+11.36%	1,063
Streetlights[7]	Use of electricity for streetlights, traffic signals and other types of outdoor public lighting such as parks.	723	85	-88.24%	85
Water[8]	Use of electricity and natural gas by municipal water and wastewater treatment infrastructure for the treatment of water consumed by the Town. This represents the Town's downstream contribution to Region of Peel's water and wastewater treatment plants through use of water consumed in Town facilities and parks.	0	4.4	N/A	4.1
Waste[9]	Amount of solid waste collected from corporate-owned buildings and parks and resulting methane emissions released due to landfill decomposition.	0	57	N/A	51
Total		**6,978**	**3,611**	**-48.25%**	**2,758**

[5] 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.
[6] 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.
[7] In 2015 the Town retrofit 2,000 cobrahead streetlights to LED. Streetlights and outdoor park lights' source of energy is electricity only, so this sector would have been heavily influenced by the change in electricity emission factor from 2007 to 2017.
[8] 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.
[9] In the 2007 GHG inventory, quantifying emissions from waste was not included in the scope of the inventory.



[10] **Figure 6: Operating Costs by Commodity and Use (2017)**

Operating Costs

Figure 6 above shows the costs associated with fuel and water consumption. As demonstrated above, electricity consumed in facilities and parks (46%) had the highest operating costs in 2017.

From a climate change mitigation perspective, the challenge associated with electricity's high operating costs are its inverse relationship with its contribution to GHG emissions. As described further in the energy chapter of the Framework, Ontario's electricity grid is considered to be clean and has a low emissions factor. The Framework presents strategies to achieve savings from GHG emissions intensive fuels, despite the challenging business case of lower commodity costs.

[10] Due to data quality, the 2018 streetlights electricity operating costs were used

Potential Risks & Uncertainty

Implementing a five-year strategic plan that forecasts target savings and strategies poses risks to implementation, because future conditions (i.e political, funding) are unknown. The table below provides potential risks and management strategies to implementing the to ensure successful implementation.

Table 2: Potential Implementation Risks and Management Approaches	
Potential Risk	**Risk Management**
Staff capacity	▪ Develop a workplan for Energy & Environment staff that align with the timelines of the strategies proposed in this Framework ▪ Evaluate opportunity to expand staff resources in the Energy & Environment division ▪ Leverage partnership opportunities with educational institutions and seasonal internship positions
Uncertainty of future energy costs	▪ Energy management and conservation can help the Town to reduce risk associated with volatile energy market costs ▪ Work with energy market specialists to assist the Town in forecasting changes in utility prices ▪ Correspond with municipal colleagues through the Corporate Energy Managers Community of Practice group to enhance utility forecasting approaches
Loss of incentives or grants	▪ Participate in utility incentive programs, to reduce risk of program cancellation ▪ Develop the business case for energy projects without the influence of utility program incentives or grants, that can be cancelled at any time
Changes in upper-level government policies	▪ Implement and develop policies that are beneficial and tailored to the needs of the Town
Loss of buy-in	▪ Communicate the energy, environment and economic benefits of energy management ▪ Align the strategies of the Framework with the strategic goals of other Town departments

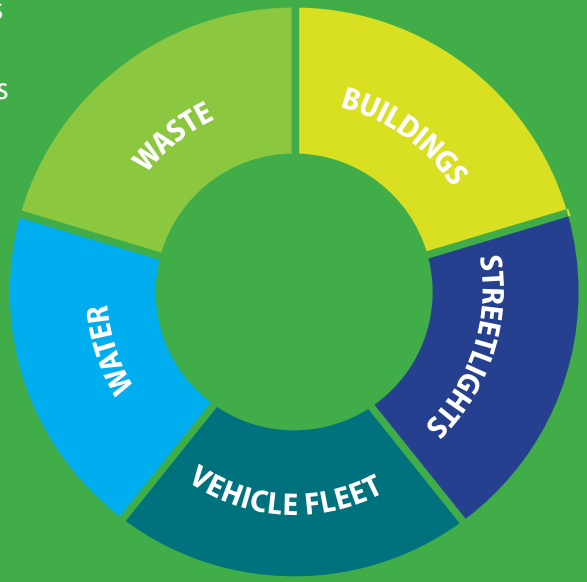
Caledon East Community Complex

FRAMEWORK DEVELOPMENT

Scope and Scale of the Framework

The Town's Corporate Greenhouse Gas Reduction Framework was developed over the course of 10 months (July 2018 – May 2019) with support from Enerlife Consulting Inc. and involved the participation of Town staff representing various divisions, stakeholders from the utility companies, staff from the Region of Peel, and Toronto and Region Conservation Authority.

The Framework addresses reducing corporate greenhouse gas emissions generated by waste, fleet, buildings, streetlights and water and energy consumption.



Through the development of this Framework, the Town established a revised 5-year corporate energy and GHG emissions reduction targets and strategies to achieve the target for the 2019 to 2024 reporting period.

Stakeholders

The Framework was developed in partnership with various Town divisions and external stakeholders:

- **Town Energy & Environment staff:** responsible for addressing climate change, energy management and sustainable operation practices;
- **Town Facilities staff:** staff responsible for the operations and maintenance and management of Town facilities;
- **Town Roads & Fleet staff:** responsible for purchasing Town vehicles and the maintenance and operations of fleet;
- **Town Parks staff:** responsible for the maintenance and design of the Town's parks, including splash pads and large sports fields;
- **Town Purchasing & Risk Management staff:** responsible for overseeing the purchasing of goods and services for the Town;
- **Town Asset Management staff:** responsible for managing the inventory of the Town's assets and maintaining the Town's asset management program;
- **Local Utilities:** the local utility companies that service the Town are Hydro One and Enbridge Gas;
- **Region of Peel:** staff from the Region of Peel's water, waste and fleet divisions were engaged during the development of the Framework;
- **Toronto & Region Conservation Authority (TRCA):** staff from the TRCA's Sustainable Technology Evaluation Program (STEP) were engaged throughout the development of the Framework.

Framework Development Process

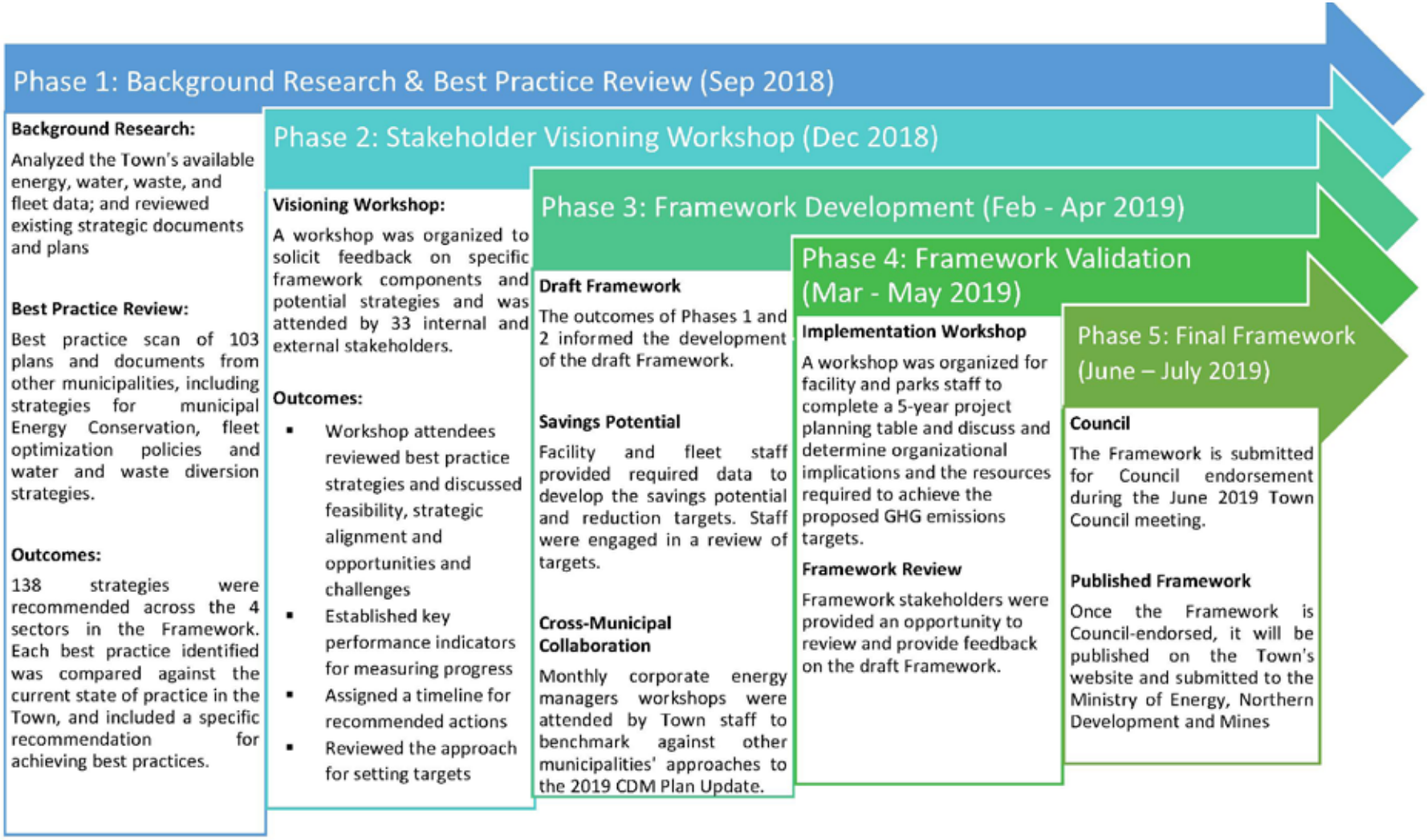


Figure 7: Framework Development Process

Target Development & Methodology

Table 3 below provides a high-level summary of the target description, methodology and monitoring strategies for all four sectors included in this Framework and the overall GHG reduction target. For a detailed methodology, please see Appendix A.

Table 3: High-level summary of the target setting methodology

Sector	Target Description	Methodology	Monitoring Strategy
Energy	% of Equivalent kilowatt hour (ekWh) savings	▪ Targets based on a comparison of Town facilities with top quartile energy use of similar public sector building types, adjusting for amenities, usage profile, current year weather conditions and energy sources	▪ Building portfolio monitoring using RETScreen Expert
Fleet	Emissions avoided (tCO_2e)	▪ Aligned with Region of Peel target	▪ Annual fuel consumption through Roads & Fleet's transaction reports ▪ Potential to monitor using RETScreen Expert
Water	Volume of water saved (L)	▪ Targets set based on comparing Town consumption with top quartile water use of similar building types; fire stations excluded due to the unpredictable nature of water consumption for emergency purposes.	▪ Monitoring water consumption through Region of Peel data ▪ Potential to monitor using RETScreen Expert and energy management software
Waste	Waste Diversion Rate (kg)	▪ Aligned with the Province of Ontario's target of 30% diversion rate by 2030	▪ Annual waste monitoring data from ROP ▪ Potential to monitor using RETScreen Expert
Corporate GHG Target	% GHG reduction target (CO_2e)	▪ Sum of energy, fleet, water and waste targets in CO_2e compared to the 2017 baseline year	▪ Monitoring annual reductions and CO_2e for all 4 sectors listed above

How to read the Framework

Each chapter of the Framework contains the following sections:

- **Scope:** Describes the specific areas within the Town's operations in which strategies are proposed;
- **Climate Change Impact:** Defines the sector in the context of climate change
- **Strategic Alignment:** Aligns each sector with relevant policies or strategic plans at the Provincial or Regional government level
- **Target & Vision:** Defines the emissions reduction target to achieve by 2024 below the 2017 reference year
- **Evaluation:** Each sector has been assigned a level assessment to evaluate its practices within the Plan's timeframe of 2014 – 2019 (see Figure 8). This evaluation was completed by Enerlife Consulting Inc.
- **Baseline numbers:** Contains graphs that illustrate the GHG emissions and resource intensity of the sector

The strategies proposed for each sector contain the following elements:

- **Tasks:** Provides details on specific tasks to accomplish each strategy
- **Implementation Details:** Provides details as to which Town divisions or external stakeholders will be involved, estimated timeline and which tools have been identified to implement the strategy. The implementation timeline is as follows:
    - Immediate = 2019 – 2020
    - Medium = 2021 – 2022
    - Long term = 2023 - 2024
- **Key Performance Indicators (KPIs):** KPIs are critical indicators of progress toward the intended result, and provide a basis for the Town to measure progress of the overall Plan.
- **Co-Benefits:** Outlines the direct and indirect benefits of implementing the proposed strategy

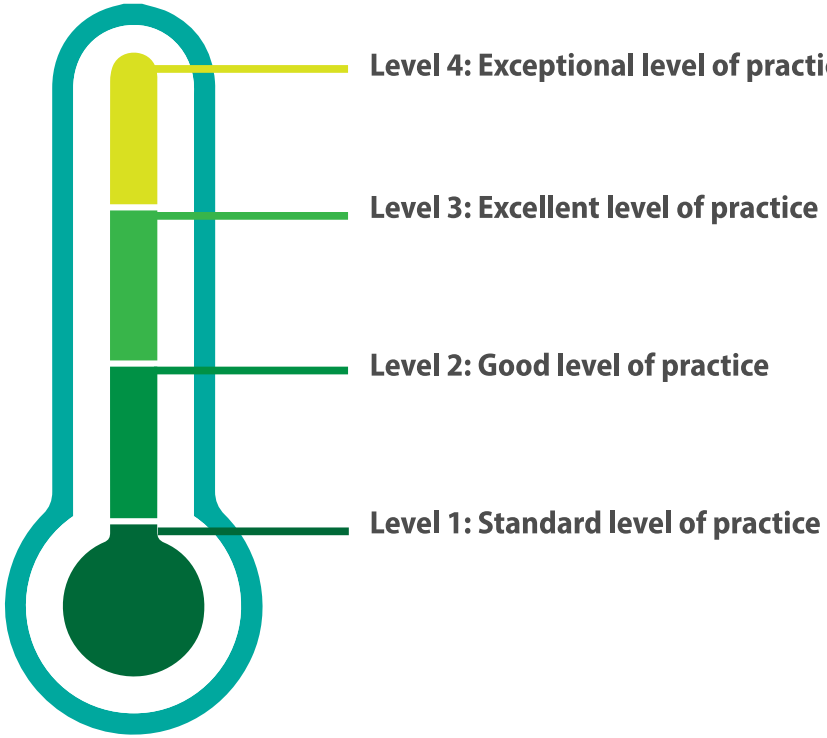


Figure 8: Level Assessment Description


Caledon Centre for Recreation & Wellness

Framework Governance

To successfully implement the Framework over the next 5 years, key roles and responsibilities of staff have been identified:

Energy & Environment

Energy and Environment staff, within the Finance and Infrastructure Services Department, play a crucial role in facilitating the actions outlined in the Framework. Specifically, this group has the role of assisting with compiling research on different initiatives to determine feasibility and help frame the business case for future actions. Additionally, staff will work with various departments to identify gaps in energy related knowledge and processes to inform the development of programs and policies to address these. Energy and Environment staff also manage the Town's Energy Management Software, to deliver and communicate insights on Facility energy consumption to facilities staff. Lastly, their role is to ensure momentum within the Corporate Energy Team by developing agendas, scheduling meetings and recording progress on initiatives to update all staff and the community on the status of the Plan.

Corporate Energy Team

The Corporate Energy Team will manage the implementation of the Framework, meeting quarterly to ensure that the goals, objectives and targets within the Framework are being met.

The positions and roles of the members of the Corporate Energy Team are outlined in Table 4 below:

Table 4: Corporate Energy Team members & associated roles

Position	Role
Specialist, Energy & Environment	Primary contact, create and circulate agenda and minutes, Chair.
Manager, Energy & Environment	Co-chair, environmental implications of energy conservation
Manager, Facilities	Overview of energy use and projects in Civic facilities
Manager, Recreation Facilities	Overview of energy use and projects in Recreation facilities
Supervisors, Recreation Facilities	Energy use, conservation and technical retrofits in the Bolton, Mayfield and Caledon East family facilities
Supervisor, Facility Operations	Energy use, conservation and technical retrofits at Civic facilities with a specific focus on Town Hall
Coordinators of Facility Operations	Energy use, conservation and technical retrofits at the Fire Halls, Work Yards, OPP Detachment and 6211 administration building.
Recreation Coordinators, Operations	Energy use, conservation and technical Retrofits at recreation complexes and satellite facilities
Facility Lead Hands and Facility Maintenance II	Updates regarding operation practices in recreation facilities and satellite facilities

Strategic energy and GHG emissions management is a shared responsibility that impacts all Town staff. Since there are many staff, facilities and functions within the Municipality, it is important to have formal discussions on activities occurring throughout various departments and buildings, specific to how they relate to energy consumption and GHG emissions conservation. The implementation team is outlined in Table 5 below.

Table 5: Internal Framework Implementation Team, Role & Strategic Alignment

Stakeholder	Role within the Framework	Strategic Alignment
Town Roads & Fleet staff	▪ Work closely with Energy & Environment staff to implement the strategies proposed ▪ Meet with Energy & Environment staff to provide progress updates and data when strategies have been completed ▪ Provide support on the development of a Green Fleet Strategy	▪ Idling ByLaw
Town Parks staff	▪ Meet on an annual basis with Energy & Environment staff to provide updates on the strategy implementation outlined in this Framework ▪ Align parks development and retrofit projects with the strategies contained in this Framework	▪ Facility Needs Assessment Study ▪ Recreation & Parks Master Plan
Town Asset Management staff	▪ Work with Energy & Environment staff to avoid duplication in asset management record keeping and embed low emission technology into asset renewal programs. ▪ Provide access to asset management data to Energy & Environment staff to support the strategies proposed in this Framework	▪ Ontario Regulation 588/17 ▪ Town's Asset Management Plan (2018)
Town Purchasing & Risk Management staff	▪ Work with Energy & Environment staff when updating purchasing policies or bylaws that align with the pillars of this Framework	▪ Purchasing ByLaw ▪ Corporate Purchasing Procedure ▪ Green Procurement Guidelines
Senior Management & Council	▪ Continue to attend 1 Corporate Energy Team meeting per year to deliver the internal Corporate Energy Awards ▪ Energy & Environment staff to update senior management and Council on Framework implementation progress on an annual basis	▪ Council Work Plan (2018 – 2022)

External Capacity Enhancement

This Framework strategically aligns with entities external to the Town, that will enhance staff capacity to deliver on the strategies contained within this Framework. Staff will collaborate with the Region of Peel, local utilities, local conservation authorities, and participate in working groups such as:

- **Municipal Energy Managers Community of Practice:** A forum to help municipal staff with energy management responsibilities to improve their effectiveness through peer knowledge sharing
- **Mayor's Megawatt Challenge:** non-profit that accelerates energy, water and utility cost savings and emissions reductions across the municipal sector. Identifies, validates and shares operational best practices, retrofits, design solutions and management practices which can be used by municipalities to achieve and sustain a high standard of energy and water efficiency.
- **Clean Air Partnership:** charitable environmental organization whose mission is to help municipalities become sustainable, resilient, vibrant communities through research, knowledge transfer, and by fostering collaboration among all orders of government, academia, NGOs and a range of additional stakeholders.
- **Independent Electricity Systems Operator (IESO) Energy Managers Hub:** Provides an online hub, peer knowledge sharing and training for energy managers
- **Region of Peel Waste Municipal Partners Group:** Working group with staff from the Region and its member municipalities to discuss and implement waste initiatives
- **Partners in Project Green (PPG)**: The Town will participate in relevant PPG initiatives such as recycling collection drives
- **Local Authority Services:** The Town will participate in relevant programs, training events and working groups

15%

The Town is adopting a target to conserve 15% or 2,306,555 ekWh of facility energy use by 2024 below 2017 levels.

Energy

Scope

This section highlights strategies and initiatives that the Town will undertake to reduce and optimize energy use within Town-owned facilities, streetlights and parks.

Climate Change Impact

According to the Town's 2017 Corporate GHG Emissions Inventory, energy consumption in Town facilities produces just over 50% of the Corporation's emissions or 1,946 tCO2e representing the largest source of emissions. Natural gas contributes most to building emissions from energy consumption, representing 91% of the total. While off-peak electricity in Ontario is considered to be 96% emissions free[11], consumption of electricity during on-peak hours includes some natural gas generation plants and associated emissions.

Since 1990 emissions from the building sector in Ontario have grown steadily and are anticipated to keep increasing[12]. According to the Province's most recent GHG inventory, the buildings sector is responsible for 19% of total GHGs in 2013. Actions to reduce energy consumption in existing buildings and the construction of low carbon new facilities will be essential to meeting local, national and international GHG reduction targets.

Strategic Alignment

The Region of Peel has a target of reducing corporate GHG emissions to 45% below 2010 levels by 2030 as part of their corporate climate change strategy and established a community greenhouse gas reduction target of 80% below 1990 levels by 2050 as part of the Peel Climate Change Strategy, of which the Town is a member.
The Town's existing Community Climate Change Action Plan, which will be updated in 2020, contains actions to conserve energy in the industrial, commercial and institutional sectors. While corporate and community energy conservation initiatives are undertaken separately, actions undertaken by the Town will contribute to the overall community GHG reduction goals.

Target

The Town is adopting a target to conserve 15% or 2,306,555 ekWh of facility energy use by 2024 below 2017 levels.

New builds and facility expansions will have high-performance energy targets set at the start of the development process and savings will be monitored and verified. For streetlighting and parks, the Town will continue with additional LED retrofits.

[11] Environmental Commissioner of Ontario, 2018 Energy Conservation Progress Report, p.7.
[12] Ministry of the Environment, Conservation and Parks. Ontario's Climate Change Update 2014. https://www.ontario.ca/page/ontarios-climate-change-update-2014

Vision (desired state)

The Town aims to improve building energy performance of facilities by:

- 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.

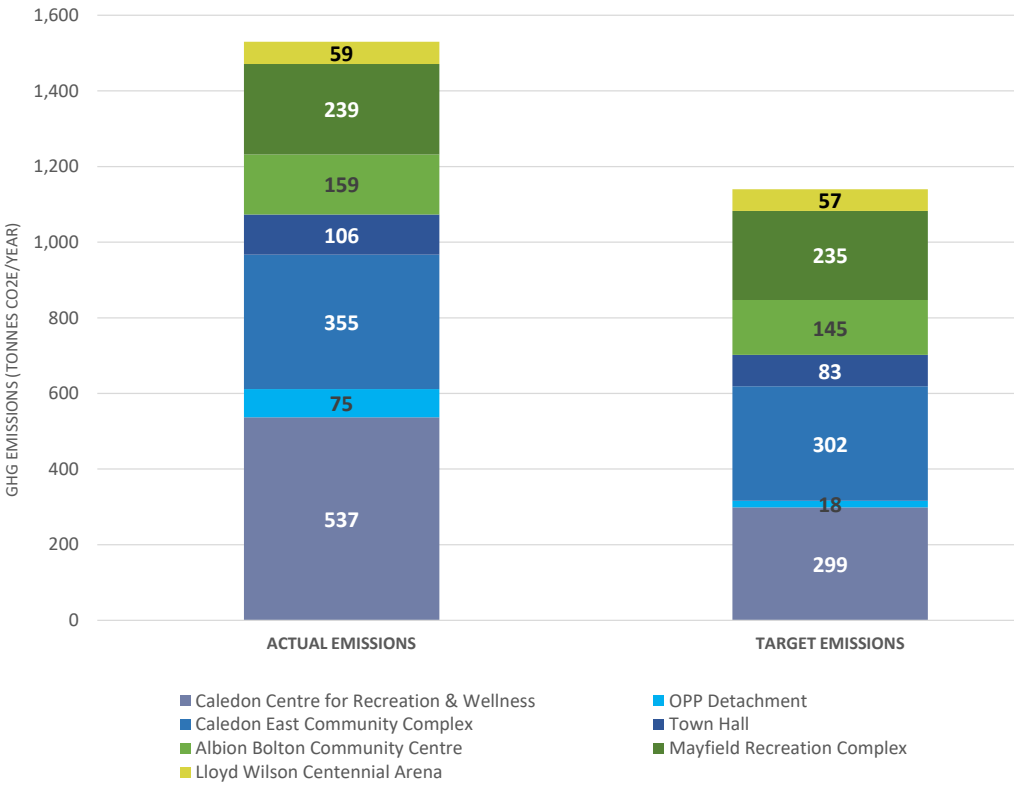


Figure 9: Caledon's Big 7 Actual and Target Building Emissions (2017 – 2024)

Evaluation of 2014-2019 Results

The Town's Corporate Energy Management Plan (2014-2019) (CEMP) was successful at embedding a culture of energy management across the Corporation through the cross-departmental Corporate Energy Team and the Energy Revolving Fund. A detailed list of corporate energy achievements is provided in Appendix B.

Current practices put in place during this period have been assessed between Level 1 (standard level of practice) and Level 4 (exceptional practice) under five categories. The levels have been assigned by Enerlife as qualitative assessments of current practices based on experience with other municipalities.

1. Energy Management and Performance Tracking – Level 3
2. Retrofit, Renewal and Greenhouse Gas Reduction – Level 1
3. Facility Operation and Maintenance – Level 2
4. Purchasing, Procurement & Policies – Level 2
5. Education and Engagement – Level 4

The Town achieved a 12.46% or 2,430,561 ekWh reduction in energy use in 2018 compared to the 2012 baseline, shown in Figure 10. This exceeds the 9% energy reduction target established in the previous Plan, largely due to 140 energy conservation measures that were completed between 2014 – 2018.

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 a software provided by Natural Resources Canada, a Department within the Government of Canada, and allows for a true comparison of how energy is consumed in facilities normalizing for factors that staff are unable to control such as the weather.

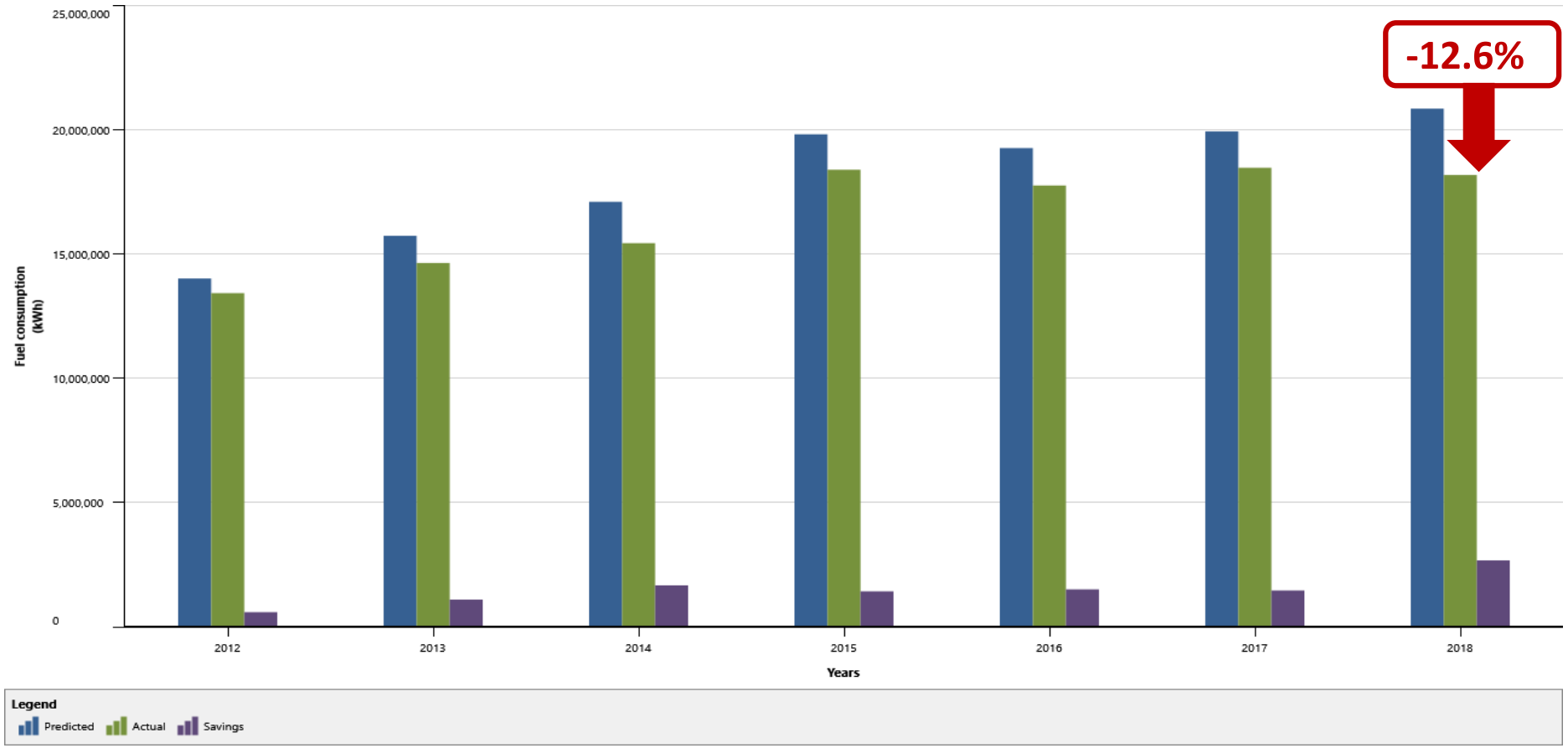


Figure 10: 2012-2018 Performance Analysis of the Town's Building Portfolio

Baseline Numbers

The Town's total facility energy consumption is organized by building type of similar facility uses and characteristics, as shown in Figure 11.

This data directed actions within the previous CEMP to reduce energy consumption and improve the management of energy use amongst high use facilities. Town staff prioritize its top 7 energy consuming facilities, which accounted for 82% of the Town's building portfolio energy use in 2017. Over half of the Top 7 facilities are recreation facilities, due to the high energy use intensity of the equipment.

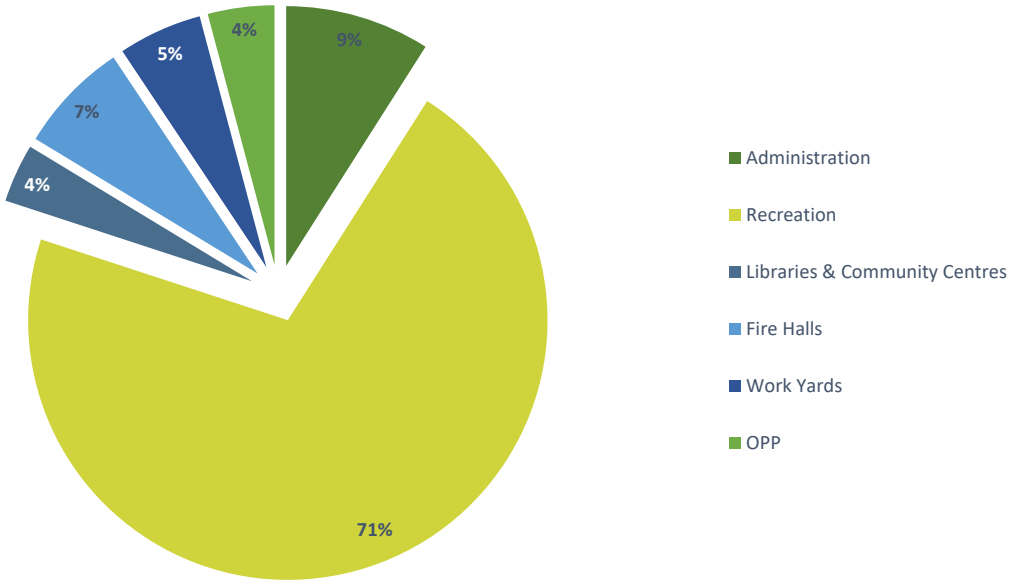


Figure 11: Total Energy Consumption by Facility Type (2017)

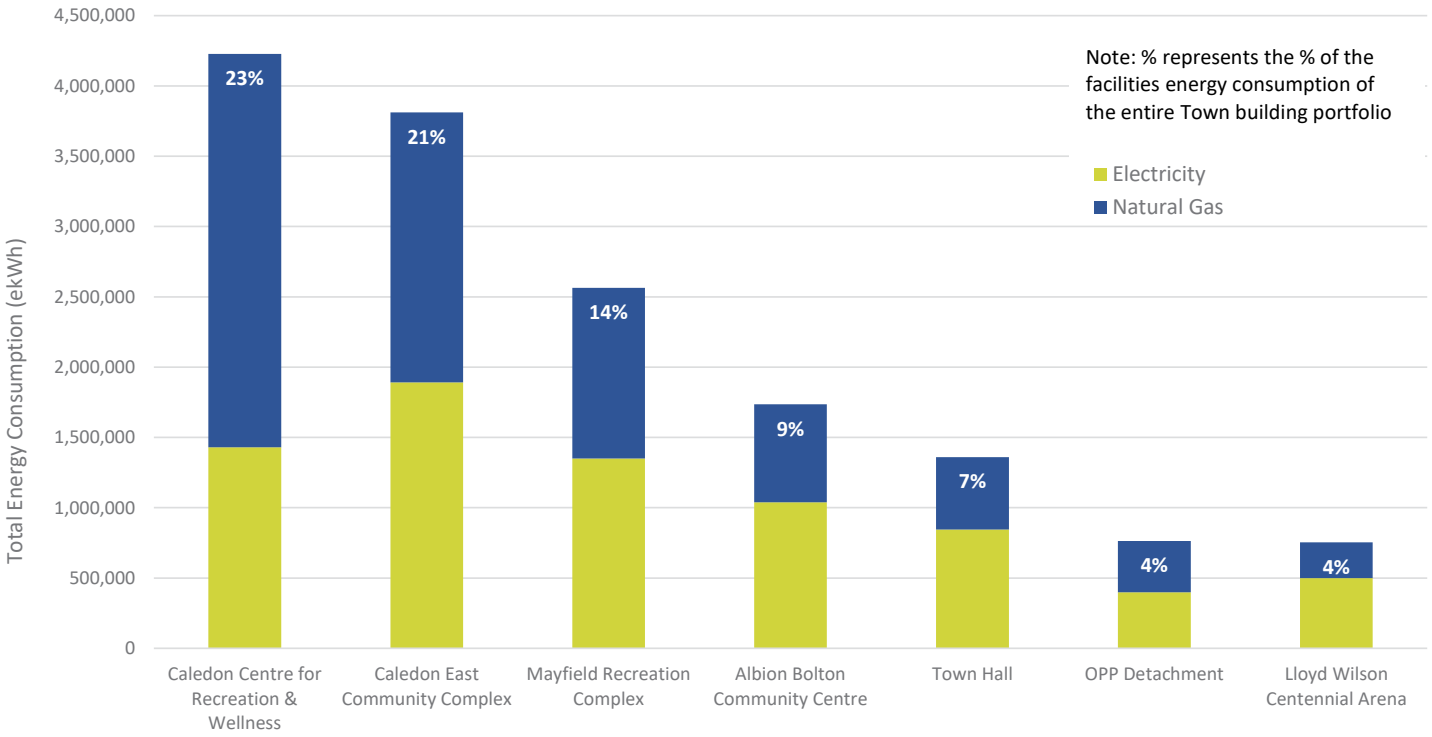


Figure 12: Caledon's 'Big 7' Energy Use Breakdown

Figure 13 displays a breakdown of the Town's total electricity consumption across buildings, streetlights and parks.

Renewable Energy

The Town has 3 ground-mount solar microFIT projects located at the Victoria Parks Community Centre, Caledon Village Fire Hall and Inglewood Community Centre generating approximately 44,232.30 kWh annually. The Mayfield Recreation Complex has a solar wall system that was constructed in 2010 and is estimated to save 9,257 m3 of natural gas annually. The Caledon OPP Detachment facility is equipped with 17 ground-source heat pumps designed to extract 1,523,629 btu annually.

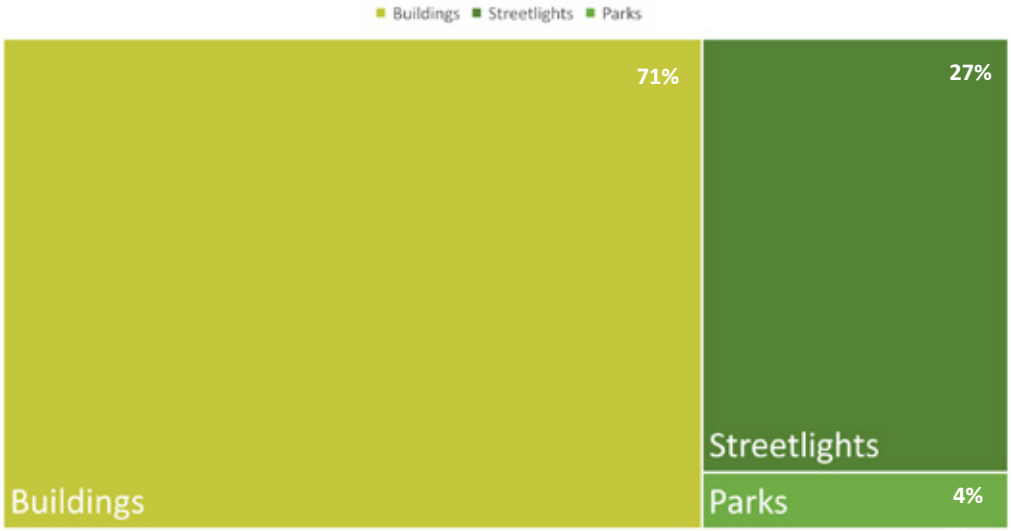


Figure 13: Total Electricity Consumption Breakdown by Asset (2017)

Energy Management & Performance Tracking

This section provides strategies to monitor and benchmark energy consumption data to track the progress of energy management strategies.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Continue to track and monitor monthly energy bills	▪ Continue to monitor monthly energy consumption in Town facilities to respond to consumption irregularities (i.e. high energy consumption)	▪ Energy & Environment ▪ Finance staff ▪ Facility staff	Ongoing	▪ Energy Management Software ▪ Corporate Energy Team	▪ Number of billing flags responded to ▪ kWh or m^3 avoided ▪ Cost savings	▪ Increased awareness of energy consumption and energy spikes ▪ Identification and resolution of billing errors ▪ Improved tracking of utility budgets
Update and maintain facility energy performance analyses using RETScreen Expert and monitor progress towards energy reduction target	▪ Establish energy models for each facility using the new baseline year of 2017 and maintain these models on a quarterly basis ▪ Develop energy models in RETScreen Expert for new facilities ▪ Monitor progress towards 2024 energy reduction target on an annual basis	▪ Energy & Environment ▪ Facility staff	Immediate	▪ RETScreen Expert ▪ Energy management software ▪ Corporate Energy Team	▪ Number of facility energy models updated ▪ Annual tracking of progress towards target	▪ Quantification of avoided energy and GHG emissions ▪ Advanced energy literacy of staff ▪ Knowledge of energy drivers and trends ▪ Benchmarking of historical performance ▪ Awareness of progress towards 2024 target
Monitor electricity generation of the Town's 3 solar microFIT sites	▪ In near real-time, monitor the electricity generation of the Town's 3 solar microFIT sites through a web-based solar monitoring software	▪ Energy & Environment	Ongoing	▪ Solar monitoring software	▪ Solar microFIT sites being tracked (y/n) ▪ $ of revenue generated ▪ kWh of electricity generated	▪ Optimal performance of solar panels ▪ Immediate remediation to potential equipment failures ▪ Optimized Energy Revolving Fund base

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Energy sub-metering and real-time monitoring	▪ Consider submetering to monitor the energy consumption of facility additions ▪ Consider real-time monitoring of electricity and gas for high-savings potential buildings and buildings over 50,000 ft^2	▪ Energy & Environment ▪ Facility staff	Medium	▪ Energy management software ▪ Corporate Green Building Standard Update ▪ Corporate Energy Team ▪ Energy Revolving Fund (potential)	▪ Number of facilities with sub-metering ▪ Number of new facilities or major renovations with sub-meters	▪ More effective and efficient management of energy use ▪ Performance assessment against comparable buildings
Annual reporting to Council on facility energy reduction	▪ Continue to report to Council annually to provide updates on the Town's energy management progress ▪ Continue to track energy conservation measures implemented to inform annual reports	▪ Energy & Environment ▪ Senior Management ▪ Council	Ongoing	▪ Ontario Regulation 507/18	▪ Annual progress updates provided to Council (y/n)	▪ Senior Management and Council support of the Town's corporate energy strategy ▪ Increased Senior Management and Council awareness of corporate energy consumption and GHG emissions reduction
External benchmarking against best in class facilities from other municipalities	▪ Monitor energy component performance in facilities, (i.e. electric baseload) to identify conservation opportunities	▪ Energy & Environment ▪ Mayors Megawatt Challenge	Ongoing	▪ Mayors Megawatt Challenge	▪ Number of facilities tracked ▪ Best practice ranking	▪ Enhanced performance tracking of facilities ▪ Awareness of how well facilities are performing compared to peers

Retrofit, Renewal & GHG Reduction

This section provides strategies for prioritizing and implementing facility retrofit and renewal projects and improving the management of Town assets.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Equipment Asset Management	▪ Maintain and update inventory of building systems and facility equipment ▪ Explore potential to consider lifecycle costing in asset management program	▪ Asset Management ▪ Energy & Environment ▪ Facility staff	Medium - Long-term	▪ Asset Management Program (2019) ▪ Building Condition Assessments ▪ Energy Audits	▪ Percent of facility equipment kept up to date	▪ Better planning of equipment replacement and alternative low-carbon technologies ▪ Support for building the business case for energy retrofit projects ▪ Improved understanding of the lifecycle cost of equipment
Whole systems approach to scoping projects	▪ Consider building envelope, building automation and lighting upgrades as part of mechanical and other major system renewal projects	▪ Energy & Environment ▪ Facility staff	Immediate	▪ Corporate Green Building Standard Update ▪ Corporate Energy Team	▪ Number of projects implemented considering whole system approach ▪ Avoided energy and associated GHGs and costs	▪ Enhance opportunities to identify alternative low-carbon technologies for equipment replacement ▪ Reduction in natural gas consumption and associated GHGs
Commissioning and performance verification	▪ Implement commissioning process to verify design standards of new facilities and major renovations ▪ Undertake remedial action where necessary	▪ Energy & Environment ▪ Facility staff ▪ Purchasing & Risk Management	Medium	▪ Scope of work documentation	▪ Documented process being consistently followed ▪ Avoided energy consumption and costs	▪ Equipment performing at optimal levels ▪ Improved facility energy performance ▪ Improved occupancy comfort

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
	▪ Incorporate energy and operational outcomes					
Energy audits and system testing	▪ Consider an energy savings potential approach for energy audits (for baseload, heating and cooling) and prioritize actions to reduce GHG emissions ▪ Conduct audits beginning with high savings potential buildings	▪ Energy & Environment ▪ Facility Staff	Medium: updated every 5 years	▪ Existing energy audit reports (2016-2017) ▪ Energy management software ▪ Corporate Energy Team	▪ Number of energy audits conducted (y/n) ▪ Number of recommended measures implemented ▪ Target energy, cost and GHG savings	▪ Increased awareness of facility operations ▪ Identification of inefficiencies and potential equipment upgrades in facilities ▪ Library of prioritized potential projects to undertake in facilities
Thermal Energy Conservation	▪ Consider building envelope improvements such as insulation upgrades, air sealing and green or white roofs to reduce the thermal load in facilities ▪ Explore thermal imaging audits in facilities with known heat loss and thermal retention issues to identify opportunities	▪ Energy & Environment ▪ Facility staff	Medium	▪ Corporate Energy Team ▪ Energy Revolving Fund ▪ Enbridge Gas incentive programs	▪ Number of thermal audits completed ▪ Number of building envelope improvements made	▪ Improved occupancy comfort ▪ Reduced natural gas consumption and associated GHGs ▪ Operational savings
Lighting Conservation	▪ Continue to retrofit fluorescent lighting in facilities to LED ▪ Explore opportunities to retrofit lighting in Parks to LED	▪ Energy & Environment ▪ Facility staff ▪ Parks staff	Ongoing - Medium	▪ Energy Revolving Fund ▪ Incentive programs (2020)	▪ Number of parks retrofit to LED ▪ Number of facilities retrofit to LED	▪ Reduced electricity consumption ▪ Improved energy efficiency ▪ Reduced electricity operating costs

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
	▪ Consider lighting controls to further reduce wasted electricity				▪ kWh of electricity and cost savings	▪ Reduced use of electricity during times of inoccupancy
Conduct monitoring and verification (M&V) for energy retrofit projects	Implement a 2-pronged approach: ▪ For new technologies verify actual energy savings and compare to the target to inform future business cases for other facilities ▪ Implement M&V techniques (i.e. BAS review and investigation) for equipment retrofit projects	▪ Energy & Environment ▪ Facility staff	Immediate	▪ Energy Revolving Fund	▪ Number of M&V studies completed ▪ Manufacturer claimed savings vs verified savings ▪ Avoided energy consumption and associated cost and GHG	▪ Improved understanding of the performance of new technologies ▪ Improved operation and education on new equipment used in Town facilities ▪ Business case justification to expand proven new technologies across the Town's building portfolio
Renewable energy strategy	▪ Develop a comprehensive renewable energy strategy that takes into account current energy use, areas of greatest opportunity, feasibility studies, and new construction targets ▪ Consider a study to highlight the investment and business case pathways for retrofitting facilities to achieve net zero emissions	▪ Energy & Environment ▪ Corporate Energy Team	Long-term	▪ Solar Feasibility Studies ▪ Energy audits ▪ Building Condition Assessments	▪ Number of renewable energy projects implemented ▪ Number of facilities included in strategy ▪ kWh of renewable energy generated	▪ Renewable energy integrated into new construction design specifications ▪ Reduced GHG emissions ▪ Energy independence ▪ Reduced energy operating costs

Facility Operations and Maintenance

This section provides strategies for the day-to-day operations and maintenance in facilities as they pertain to the energy performance.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Preventative Maintenance	▪ Build upon existing energy efficient operations checklists and customize related to each building's energy savings potential ▪ Record actions taken in new asset management program and resulting savings to verify effectiveness	▪ Energy & Environment ▪ Facility staff ▪ Asset Management	Immediate	▪ Corporate Energy Team ▪ Existing operations/ maintenance checklists ▪ Asset Management Program (2019)	▪ Verify impact of preventative maintenance using RETScreen Expert ▪ Avoided energy consumption, associated cost and GHG emissions savings	▪ Actionable, evidence-based operational measures ▪ Enhanced staff energy literacy ▪ Optimized equipment life ▪ Enhanced equipment maintenance tracking in asset management program ▪ Assess opportunities for bulk purchasing of equipment replacement across Town facilities ▪ Accurate representation of average annual maintenance and replacements investment costs ▪ Indirectly feeds into the levels of service for facilities
Scheduling and set-points	▪ Consider the development of a formal system of operating schedules and temperature and humidity set-points for all corporate facilities ▪ Consider Council approval of the Operation Guidelines	▪ Facility staff ▪ Energy & Environment ▪ Communications	Immediate	▪ Corporate Energy Team	▪ Number of facilities following recommended set points ▪ Avoided energy consumption and associated cost and GHG savings	▪ Improved occupancy comfort ▪ Improved facility operations ▪ Optimized equipment life ▪ Improved community and staff energy literacy ▪ Facility energy performance improvements

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Building Automation Systems and Smart Thermostats	▪ Prepare BAS installation standard for each building type ▪ Prepare business case to expand BAS to additional buildings ▪ Develop service contract and staff training standards ▪ Standardize thermostats in small community centres and facilities without a BAS	▪ Energy & Environment ▪ Facility staff	Immediate	▪ Corporate Energy Team ▪ Energy Revolving Fund	▪ Proportion of buildings, floor area and energy use under BAS control (y/n) ▪ Number of facilities with standardized thermostat	▪ Better management of HVAC equipment and occupant comfort ▪ Reduction in energy use and costs ▪ Enhanced facility operations and staff training

Purchasing, Procurement & Standards

This section outlines strategies to enhance procurement standards and financial mechanisms to improve existing and new facility energy consumption.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Corporate Green Building Standard Update	Update the Town's Corporate Green Building Standard and consider: ▪ Standards for equipment and building systems including right-sizing and power density ▪ High facility energy performance	▪ Energy & Environment ▪ Facility staff ▪ Project management staff	Immediate	▪ Existing Corporate Green Building Standard ▪ Corporate Energy Team ▪ Clean Air Partnership resources ▪ Municipal Energy Managers Group	▪ Number of facilities built to new standard ▪ Avoided energy consumption and associated costs and GHGs savings	▪ Meeting and exceeding exceptional energy performance standards in every new building ▪ Reduced low carbon footprint in new facilities ▪ Increased comfort and health for occupants ▪ Resiliency to weather, climate and energy prices

Purchasing, Procurement & Standards

This section outlines strategies to enhance procurement standards and financial mechanisms to improve existing and new facility energy consumption.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
	▪ Renewable energy options to offset greenhouse gas emissions ▪ Design for high-performance operations					▪ Improved facility operations
Corporate Energy Revolving Fund	▪ Continue to manage the Energy Revolving Fund and recommend projects to Council ▪ Explore opportunities to expand the parameters of the Energy Revolving Fund business case to better support GHG reduction projects	▪ Energy & Environment ▪ Facility staff ▪ Purchasing & Risk Management ▪ Finance ▪ Senior Management ▪ Council	Immediate	▪ Corporate Energy Team ▪ Energy incentive ▪ Solar microFIT sites	▪ Number of natural gas projects funded through the Energy Revolving Fund ▪ Total amount of Energy Revolving Funds dispersed and associated energy savings	▪ Energy projects funded independent of the tax-base ▪ Demonstrated value of renewable energy projects and Corporate Energy Team ▪ Energy and GHG savings associated with projects ▪ Enhanced staff skill-set to prepare business cases for potential projects
Energy efficiency recommendations for purchases under $50,000	▪ Develop supportive documentation for staff purchasing equipment under $50,000 with energy efficiency recommendations. This should consider guidelines for tendering, evaluation and selection of products	▪ Energy & Environment ▪ Purchasing & Risk Management ▪ Facility staff	Immediate	▪ Purchasing Bylaw ▪ Green Procurement Policy and Guidelines ▪ Corporate Energy Team	▪ Number of training sessions delivered ▪ kWh or m^3 avoided ▪ Number of energy efficient equipment purchased	▪ Energy savings and associated GHG and cost avoidance ▪ Performance consistency ▪ Streamlined procurement ▪ Ease of operations

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Energy Procurement	▪ Continue to enhance internal energy supply knowledge through energy market research and awareness ▪ Develop energy procurement strategies to reduce the Town's risk to increasingly volatile energy markets due to external influences	▪ Energy & Environment ▪ Finance ▪ Facility staff	Ongoing	▪ Energy management software ▪ Corporate Energy Team ▪ Municipal Energy Managers Group ▪ RETScreen Expert energy models	▪ Percent variation of forecasted energy budget vs actual	▪ Responsibly manage and optimize operating utility budget ▪ Remain knowledgeable of current conditions impacting the price of energy
Energy Incentives	▪ Maintain and continue tracking energy incentive database ▪ Facilities staff to work with Energy & Environment staff to identify available energy incentives for projects	▪ Energy & Environment ▪ Facility staff ▪ Local utilities ▪ Independent Electricity Systems Operator (IESO)	Ongoing	▪ Incentive tracking spreadsheet ▪ Corporate Energy Team ▪ Energy Revolving Fund	▪ Number of incentives applied for ▪ Amount of incentives received	▪ Offsetting premium costs associated with energy efficient equipment options ▪ Increase financial capacity of the Energy Revolving Fund ▪ Increased awareness of building renewal and capital projects in facilities
Design standards	▪ Adopt formal standards for new equipment and systems including right-sizing and power density metrics ▪ Utilize existing BAS standards for renewal projects ▪ Incorporate Design Standards into the	▪ Energy & Environment ▪ Facility staff ▪ Project management staff	Immediate	▪ Corporate Green Building Standard Update ▪ Corporate Energy Team	▪ Documented standards ▪ Number of equipment replaced following design standards ▪ Number of low carbon alternative	▪ Reduced energy consumption and associated GHGs and costs ▪ Meeting and exceeding whole-building energy targets

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
	Corporate Green Building Standard Update				equipment installed	

Education & Engagement

This section provides strategies for engaging with Town staff and coordinating energy-specific training workshops.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Energy performance reports to facility staff	▪ Provide energy performance reports for facility staff on a quarterly basis using RETScreen Expert ▪ Incorporate elements of utility budget tracking in performance reports ▪ Continuously seek opportunities to enhance reports with information that provides value to facility staff	▪ Energy & Environment ▪ Facility staff	Ongoing	▪ Corporate Energy Team ▪ RETScreen Expert ▪ Energy Management Software	▪ Consistency of performance results (y/n) ▪ Number of performance reports provided to facility staff (y/n)	▪ Increased staff awareness of facility energy performance ▪ Better identification of energy savings opportunities ▪ Informed progress tracking towards reduction targets

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Corporate Energy Team	▪ Continue to coordinate quarterly Corporate Energy Team meetings ▪ Dedicate at least one meeting each year to energy-operational training and education ▪ Continue to identify opportunities to enhance Corporate Energy Team meetings to meet staff needs ▪ Seek opportunities for further knowledge-sharing such as a shared resource database ▪ Seek opportunities for further sharing of initiatives and practices across individual facilities	▪ Energy & Environment ▪ Facility staff	Ongoing	▪ Corporate Energy Team ▪ Municipal Energy Managers Group ▪ Third party guest speakers	▪ Number of Corporate Energy Team meetings held ▪ Number of staff training events	▪ Increased staff engagement and energy literacy ▪ Positive work environment and increased uptake in the Town's Corporate Energy program
Energy reduction competitions	▪ Formalize ongoing competitions for operations staff to foster learning and improve the operations of facilities	▪ Energy & Environment ▪ Facility staff ▪ Communications	Long-term	▪ RETScreen Expert ▪ Corporate Energy Team ▪ Corporate energy awards program	▪ kWh or m^3 savings and associated cost and GHGs ▪ Number of facilities involved in competition	▪ Energy savings and associated GHG and cost avoidance ▪ Continuous learning and staff satisfaction ▪ Staff recognition

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Corporate Energy Awards	▪ Continue to coordinate internal Corporate Energy Awards that will be distributed to facility staff on an annual basis	▪ Energy & Environment ▪ Communications	Ongoing	▪ RETScreen Expert ▪ Existing Corporate Energy Awards template and streams ▪ Corporate Energy Team 'Watts Going on Roundtable'	▪ Number of Corporate Energy Awards distributed	▪ Reinforcement of commitment ▪ Staff pride and motivation ▪ Senior management involvement ▪ Sharing back corporate energy achievements and successes with Town staff
Facility energy savings communication campaigns	▪ Explore opportunities to communicate energy retrofit projects and energy performance to the community and with Town staff, such as energy dashboards, energy comment boxes and through the Town's existing communication networks	▪ Energy & Environment ▪ Facility staff ▪ Communications	Medium	▪ Town's communication channels such as the internal intranet page ▪ RETScreen Expert	▪ Number of communication campaigns implemented ▪ Engagement on social media posts	▪ Community awareness of the Town's energy and GHG efforts ▪ Demonstrated value of the Corporate Energy Team

CO_2e

35%

Transportation is the largest contributor to the province's emissions, representing 35% or 65 megatonnes of CO2e in 2013

- Province of Ontario

Fleet

Scope

The Town of Caledon uses a range of fleet vehicles to provide services to residents, such as snow plowing, emergency response, ice resurfacing and park maintenance. This framework highlights strategies for the Town to reduce the use of high emission fuels, optimize Town vehicle use and reduce the impact of employee travel.

Climate Change Impact

According to the Province of Ontario's most recent GHG inventory, transportation is the largest contributor to the Province's emissions, representing 35% or 65 megatonnes of CO2e in 2013[13]. 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. A breakdown of Town vehicle types is provided in Figure 17 below.

GHG emissions are released from vehicles during the combustion of fuel, producing tailpipe emissions that consist of GHG emissions such as carbon dioxide, methane and nitrous oxide. Producing and distributing fuels involves extracting and refining oil into gasoline and transporting the gasoline to service stations, all producing GHG emissions[14].

Strategic Alignment

In 2018, the Region of Peel passed a Green Fleet Strategy with a short-term target of reducing fleet emissions by 30% from 2017 levels by 2023. This target will be achieved through the procurement of battery electric vehicles, and a long-term transition to other alternative fuels such as compressed and renewable natural gas.

In 2015 the transportation sector accounted for nearly 24% of Canada's emissions[15]. The Federal Government's strategies to reduce emissions from transportation as part of the Pan-Canadian Framework on Clean Growth and Climate Change include: improving emission standards for vehicles; establishing retrofit requirements for heavy-duty vehicles; zero-emission vehicle strategy; electric vehicle charging and alternative fuel infrastructure.

The Federal Clean Fuel Standard (anticipated completion by 2021), is a performance-based approach to incent the use of a broad range of low carbon fuels, energy sources and technologies such as electricity, hydrogen and renewable fuels, with the objective to achieve 30 megatonnes of annual reductions in GHG emissions by 2030[16].

[13] Province of Ontario. Greenhouse gas emissions by sector, 2015 NIR. https://www.ontario.ca/data/greenhouse-gas-emissions-sector
[14] Environmental Protection Agency. Green Vehicle Guide. https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle
[15] Government of Canada. Pan-Canadian Framework on Clean Growth and Climate Change first annual report: complementary actions to reduce emissions. https://www.canada.ca/en/environment-climate-change/services/climate-change/pan-canadian-framework-reports/first-annual-report/complementary-actions-reduce-emissions.html
[16] Government of Canada. Clean Fuel Standard. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-standard.html

The Province of Ontario will set new minimum requirements for bio- based diesel and the amount of ethanol in gasoline through amendments to Regulations 535/05 and 97/14 to reduce GHGs in fuel and support emerging renewable fuel technologies, beginning in 2020[17].

Target

The Town is adopting a target to reduce 30% or 456 tCO2e of fleet emissions by 2024 from 2017 levels (consistent with the Region of Peel's target[18]).

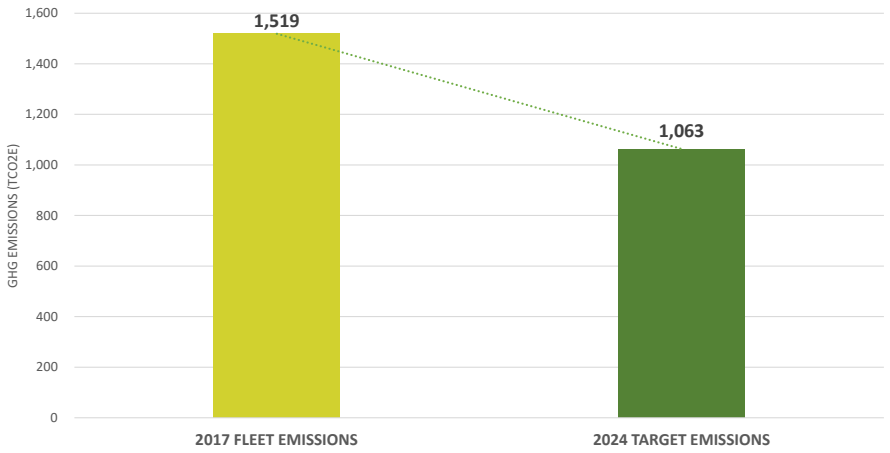


Figure 14: Fleet 2017 emissions and 2024 target

Vision (desired state)

The Town is seeking to lower emissions and improve fuel economy within its fleet by 2024. 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 Vehicle Strategy. The Town will continue to promote lower emission commuting options to staff.

Evaluation of 2014-2019 Approach

The Town's existing efforts to green its vehicle fleet have been assessed at a Level 3 due to the following initiatives:

- Purchased 6 plug-in hybrid electric vehicles (PHEV) for staff operations;
- Purchased an electric ice resurfacer for its dual-pad facility at Caledon East Community Complex;
- Expanded its EV charging network to 13 stations;
- Implemented an Automatic Vehicle Location (AVL) system;
- Plans to conduct a Life Cycle Analysis of Fleet (2019); and,
- Ongoing efforts to promote sustainable travel options to Town staff.

[17] Environmental Registry of Ontario. Low Carbon Transportation Fuels in Ontario. https://ero.ontario.ca/notice/013-1929

[18] Regional Municipality of Peel, Council REVISED AGENDA, May 24, 2018, pg 153. http://www.peelregion.ca/council/agendas/2018/2018-05-24-revised-rc- agenda.pdf#page=153

Baseline Numbers

In 2017 the Town consumed 589,726 litres of fuel, as shown in Figure 15. The Town uses a blend of 5% biodiesel (B5) fuel in its heavy-duty vehicle fleet, in addition to conventional diesel fuel (see Figure 18 for an overview of the Town's fuel mix).

Biodiesel is a diesel fuel substitute used in diesel engines made from renewable materials such as plant oils, animal fats and cellulosic feedstock[19]. As demonstrated in Figure 16 below, the emission factor (2017) for biodiesel compared to conventional diesel fuels is slightly lower, as it is made from renewable resources and reduces tailpipe emissions such as particulate matter, hydrocarbon and carbon monoxide compared to conventional diesel engines[20].

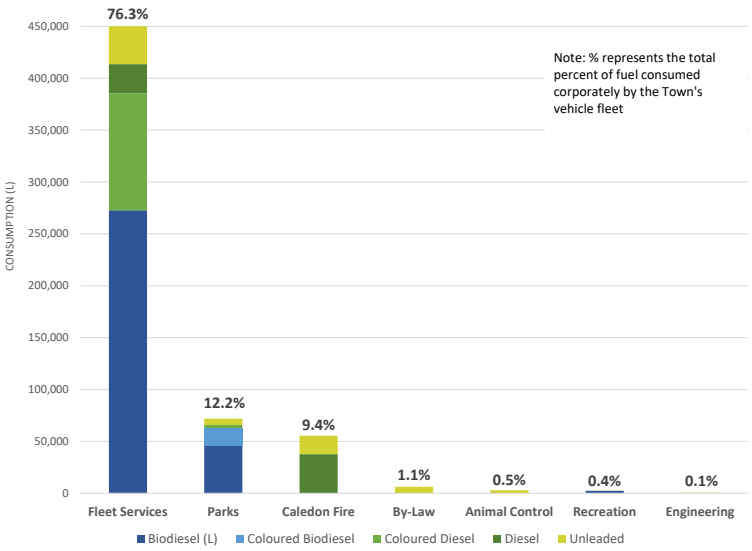


Figure 15: Litres of Fuel Consumed by Division (2017

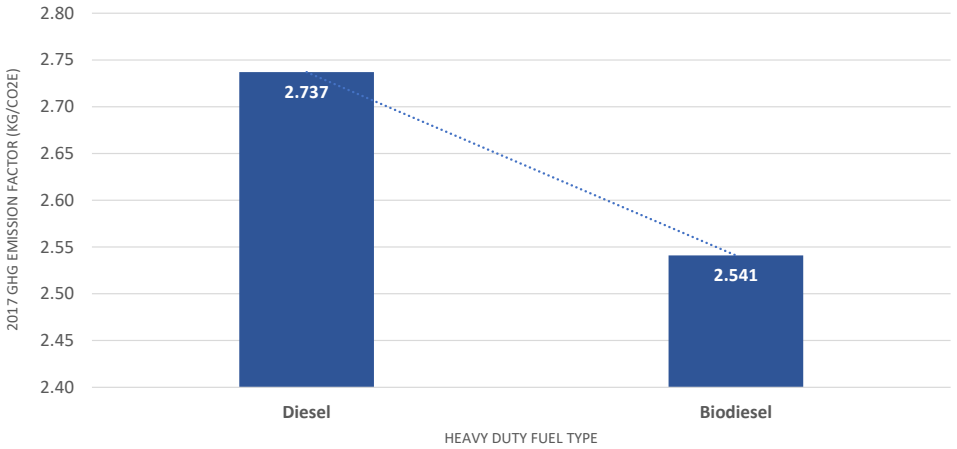


Figure 16: Heavy Duty Fuel Emission Factor Comparison (2017

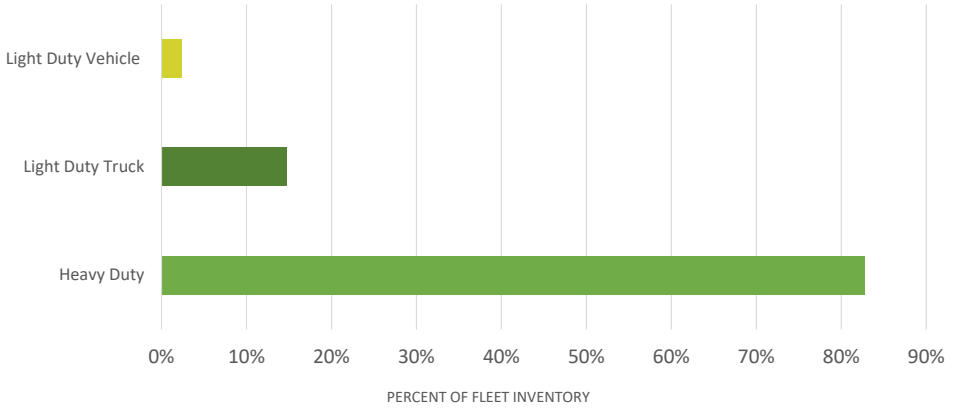


Figure 17: Inventory of Fleet Vehicles by Mode (2017)

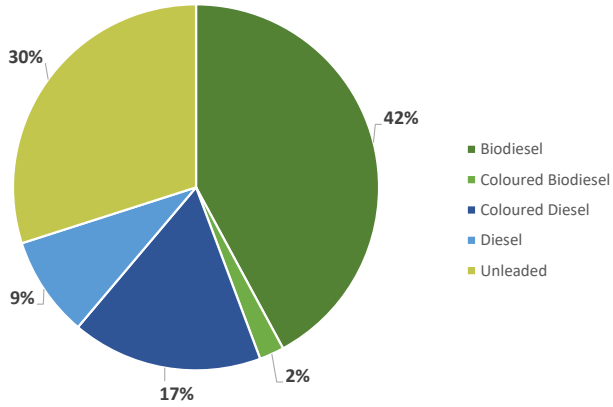


Figure 18: Fuel Types Consumed by Fleet (2017)

[19] Natural Resources Canada. Energy efficiency for transportation and alternative fuels, Biodiesel. https://www.nrcan.gc.ca/energy/alternative-fuels/fuel-facts/biodiesel/3509

Fleet Data Management, Analysis & Reporting

This section provides strategies to better track and analyze the Town's fleet data and vehicle inventory.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Explore opportunities for the Town's Automatic Vehicle Location (AVL) system to track fuel consumption and identify opportunities for route optimization	▪ Monitor fuel consumption on an annual basis ▪ Explore potential of inputting consumption data into RETScreen Expert ▪ Explore opportunities to provide fuel benchmarking reports to Fleet staff ▪ Evaluate idling within fleet operations ▪ Consider route optimization software to inform the potential to eliminate trips	▪ Roads & Fleet ▪ Energy & Environment	Immediate	▪ RETScreen Expert ▪ Fleet Transaction Reports ▪ AVL Data ▪ Idling Bylaw	▪ Tracking fuel (y/n) ▪ AVL data reviewed (y/n) ▪ Number of opportunities identified ▪ Number of routes optimized	▪ Improved monitoring and understanding of corporate fuel consumption and associated GHGs ▪ Enable ability to conduct analyses of year-over-year fuel consumption and trends ▪ Reduce vehicle kilometres traveled ▪ Reduced fuel consumed through excessive idling
Centralize and maintain inventory of all vehicles and equipment	▪ Build upon existing vehicle list to include all fuel-based and non-fuel based equipment and vehicles.	▪ Energy & Environment ▪ Roads & Fleet ▪ Asset Management	Medium – Long-term	▪ Asset Management Program (2019)	▪ Inventory expanded to include all vehicles and equipment (y/n) ▪ Align with fuel reduction strategy (y/n) ▪ Percent of fuel consumed by vehicles and by equipment	▪ More organized and coordinated approach to fleet asset management approach to identifying and prioritizing vehicle and equipment retrofit and/or replacement opportunities

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Track employee travel for Town business	▪ Track employee work travel fuel use to establish baseline ▪ Evaluate data to inform and assess program potential (i.e. low-carbon carshare vehicle)	▪ Energy & Environment ▪ Roads & Fleet	Medium	▪ Operating budget lines ▪ Expense claims	▪ Fuel consumption (L)	▪ Informed employee fuel use reduction targets and ongoing tracking

Fleet Retrofit, Replacement & GHG Reduction

This section provides strategies to explore green fleet renewal criteria, fleet fuel conversion to determine the best low emission solutions for current fleet, parks and facility maintenance equipment and opportunities to expand the Town's electric vehicle charging station network.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Develop a Green Fleet and Fuel Reduction Strategy	▪ Develop and adopt a Green Fleet Strategy, including purchasing criteria, life cycle analysis of fleet, right-sizing vehicles and low-carbon options ▪ Hold a collaborative stakeholder consultation process prior to Fleet Standardization report to consider purchasing, operational, training, and maintenance implications in a Green Fleet Strategy	▪ Energy & Environment ▪ Roads & Fleet ▪ Fire & Emergency Services ▪ Recreation ▪ Bylaw ▪ Parks ▪ Purchasing & Risk Management ▪ Region of Peel ▪ Enbridge Gas	Immediate	▪ Fleet Standardization Report ▪ Region of Peel's Green Fleet Strategy ▪ FCM Green Municipal Fund (potential) ▪ Clean Air Partnership Resources ▪ Findings from Life Cycle Analysis (2019)	▪ Green Fleet Purchasing criteria developed and implemented in Fleet Standardization Report (y/n) ▪ Green Fleet stakeholder consultation process (y/n)	▪ Consistent consideration given to green vehicle options and life cycle analysis of fleet ▪ Consistent approach to reducing high emissions fossil fuel use ▪ Avoid duplication and learn from ROP research ▪ Explore group purchasing and partnership opportunities

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Review current fleet and equipment fuel use and identify low-carbon fleet fuel conversion options	▪ Review fuel mixes and conversion options and determine viable low-carbon options for current fleet vehicles ▪ Identify fuel-using equipment and identify viable electric or low-carbon fuel options ▪ Identify potential for aftermarket technologies ▪ Identify required user maintenance training and investments required for alternative fuel types.	▪ Energy & Environment ▪ Roads & Fleet ▪ Facility staff ▪ Parks ▪ Local utilities ▪ Region of Peel	Medium	▪ Green Fleet Strategy (upcoming) ▪ Fleet Transaction Reports ▪ FCM Green Municipal Fund (potential)	▪ Number of converted vehicles to low-carbon options ▪ Number of low-carbon or electric equipment	▪ Reduced fuel consumption and GHGs ▪ Reduced load on HVAC equipment for fleet or equipment used indoors ▪ Partnership with the Region to explore technologies (anti-idle, hybrid conversions, etc.)
Continue to expand electric vehicle (EV) charging station network at Town-owned facilities	▪ Continue to pursue the installation of more EV charging stations at Town-owned facilities ▪ Add inventory of EV charging stations in Asset Management Program	▪ Energy & Environment ▪ Roads & Fleet ▪ Facility staff ▪ Asset Management	Ongoing	▪ Peel Climate Change Strategy- Low Emissions Vehicle Strategy ▪ Third-party funding opportunities	▪ Number of EV charging stations ▪ Number of facilities with EV charging stations	▪ Increased access to EV charging infrastructure for Town vehicles and the community ▪ Supported transition to EV adoption ▪ Expanded EV network and closing gaps of EV infrastructure ▪ Maintain EV Charging station inventory and tracking repairs and maintenance in Asset Management program

Fleet Operations & Maintenance

This section provides strategies to optimize the fuel used in vehicles through improved maintenance procedures and operator driving behaviours.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Fleet Preventative Maintenance Program	Identify opportunities to enhance scheduled vehicle maintenance to optimize vehicle fuel usage (i.e. tires inflated, etc.)	▪ Roads & Fleet ▪ Asset Management ▪ Energy & Environment	Long-term	▪ Asset Management Program (2019)	▪ % of fuel-based and non-fuel based vehicles and equipment undergoing maintenance and replacements every year ▪ % of types of fuel-based and non-fuel based vehicles undergoing maintenance and repairs each year	▪ Ensure vehicle safety efficient vehicle performance ▪ Better understanding of the performance of the Town's fleet and informed investment decisions ▪ Forecasted maintenance and rehabilitation timeline through the Asset Management program ▪ Risk-based decisions when replacing vehicles or equipment
Green Fleet Driver Training Program	Update green fleet driver training program with Fleet staff periodically	▪ Energy & Environment ▪ Fleet staff	Medium	▪ Existing fleet driver training ▪ Potential third party partner/trainer	▪ Green fleet driver training program updated (y/n) ▪ Number of staff trained	▪ Reduced fuel consumption ▪ Improved asset lifespan ▪ Reduced maintenance and/or repair costs ▪ Renewed and up-to-date fleet driver training program


to R.J.A Potts Memorial Park

Water

Scope

This section highlights opportunities for the Town to conserve the use of water in parks (irrigation and outdoor splash pads), vehicle washing and indoor use in Town-owned facilities. The Region of Peel provides water and wastewater services for the Town of Caledon.

Climate Change Impact

The connection between energy and water is referred to as the water-energy nexus. According to the former Environmental Commissioner of Ontario's Report Every Drop Counts, municipal water and wastewater systems account for 32% of reported municipal GHG emissions (see Figure 19)[21]. Water can also be viewed as a liquid form of energy, providing services such as hydronic heating.

The Region's largest electricity consumers are its water and wastewater facilities[22]. Conserving water in Town facilities will reduce the energy demands of Regional water and wastewater facilities and contribute to the reduction of GHG emissions. According to the Town's corporate GHG inventory for 2017, the water consumed in facilities and parks accounts for 4.4. tCO2e of the Town's downstream emissions.

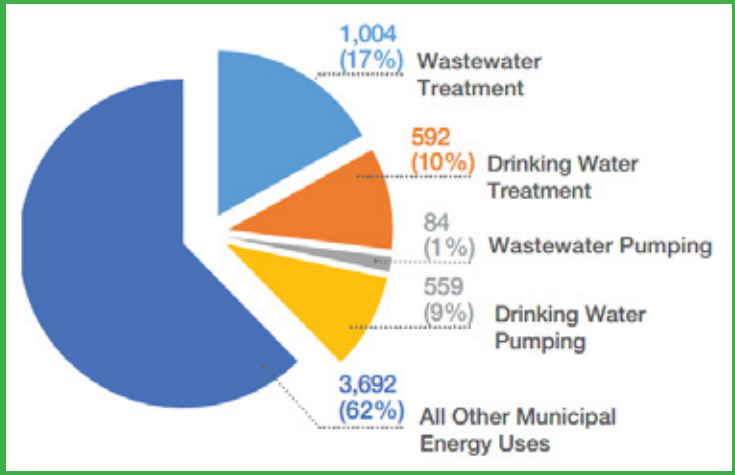


Figure 19: Ontario municipal energy consumption by facility type (eGWh)[23]

Strategic Alignment

The Town is aligning with the Region's Water Efficiency Strategy[24] and will continue to participate in water conservation and incentive program offerings. Through this Strategy, the Region seeks to reduce GHG emissions and energy consumption by treating and pumping less water and wastewater. As a result, the Region has implemented several water efficiency measures and programs such as indoor water audits and incentives for efficient water equipment replacement.

Target

The Town is adopting a target to conserve 6% or 6,224,640 litres of total water use in facilities and parks by 2024.

[21,3] Environmental Commissioner of Ontario (ECO). Every Drop Counts: Reducing the Energy and Climate Footprint of Ontario's Water Use, Environmental Commissioner of Ontario Annual Energy Conservation Progress Report 2016/2017. http://docs.assets.eco.on.ca/reports/energy/2016-2017/Every-Drop-Counts.pdf

[22] Region of Peel. Energy Conservation and Demand Management Plan. 2014, p. 3. http://www.peelregion.ca/climate-energy/pdf/Energy-Conservation-and-Demand-Management_Plan.pdf

[24] Region of Peel. Water Efficiency Strategy Update. 2012. http://www.peelregion.ca/watersmartpeel/pdfs/2012-Water-Efficiency-Strategy.pdf

Vision (desired state)

The Town is seeking to consume water more efficiently in its facilities and parks over the next five years. To achieve this, 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.

Evaluation of 2014-2019 Practices

Currently, the Town's Finance division receives and stores water bills from the Region of Peel where costs are monitored against annual operating budgets. There is currently no formal policy in place requiring that equipment replacement decisions consider water conservation, although this is taking place informally. Within Parks, there are some smart controllers in place to monitor water and control water consumed in parks and recreational fields. However, as identified in 2017 irrigation audits, some opportunities exist to improve their efficiency.

Water consumption in facilities have been analyzed as part of energy audits conducted at 11 facilities between 2016 – 2017.
The Town's corporate water efficiency practices have been assessed at a Level 1 (standard level of practice), as the Town does not currently have a formal water conservation strategy.

Baseline Numbers

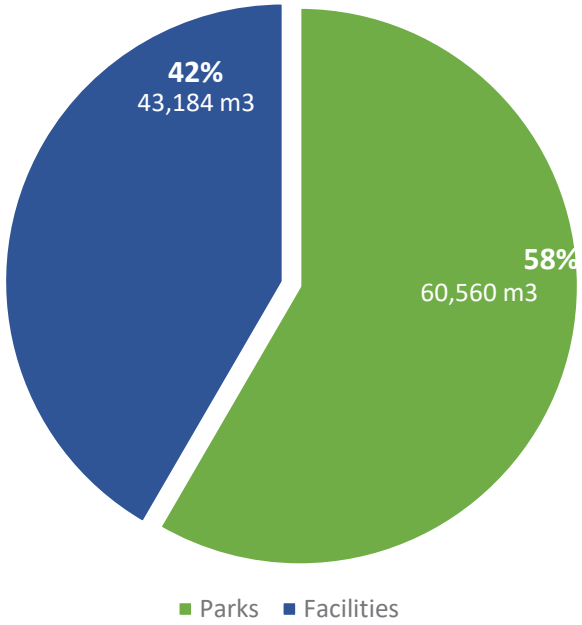


Figure 20: Total Corporate Water Consumption (2017)

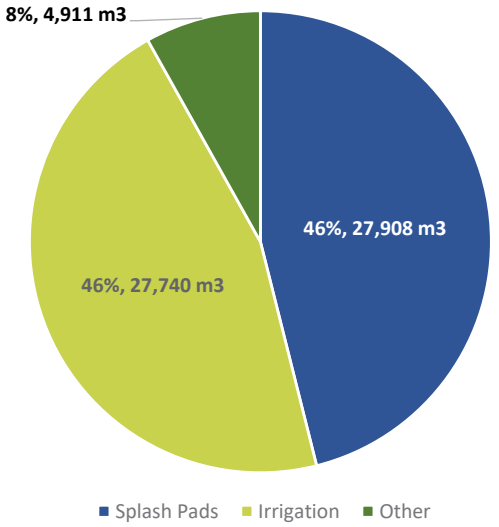


Figure 21: Parks Water Consumption (2017)

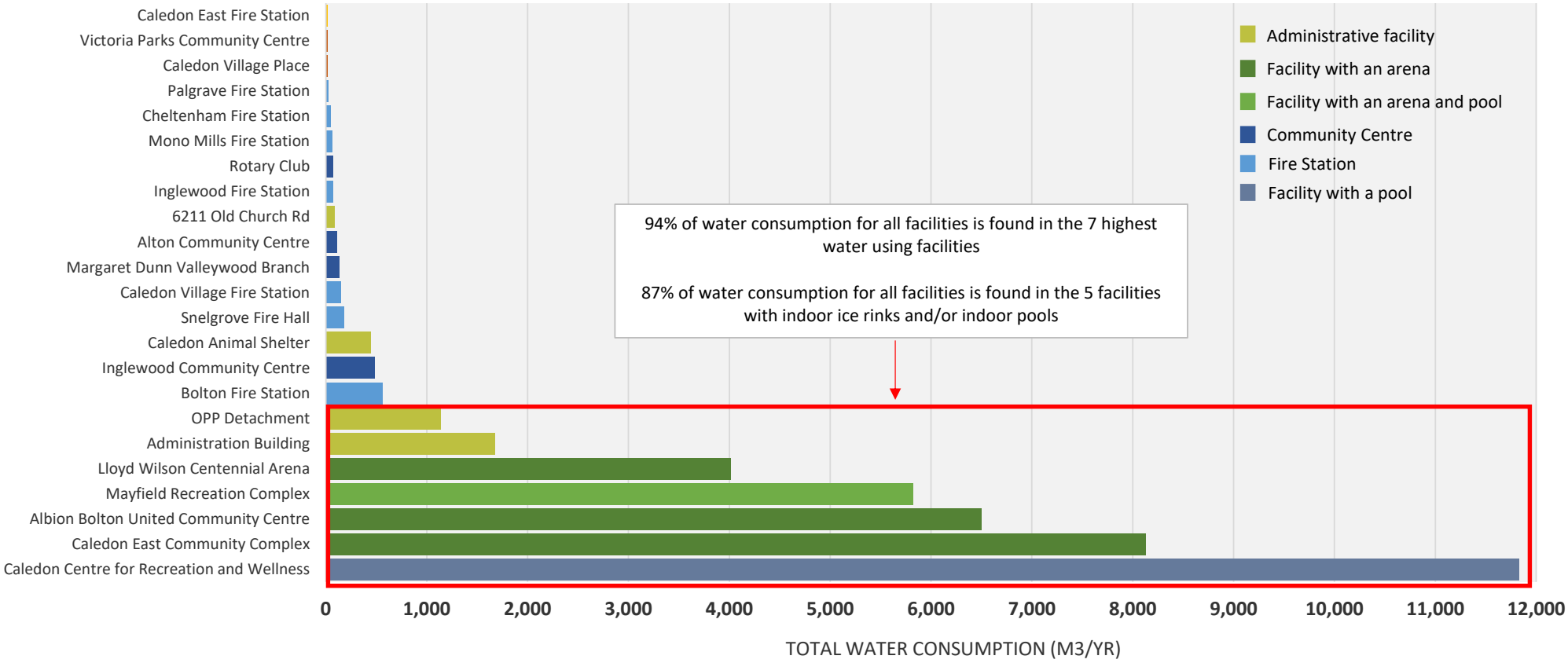


Figure 22: Facilities Total Water Consumption (2017)

Water Data Management, Reporting & Performance Tracking

This section provides strategies to better analyze, monitor and benchmark water consumption data for Town assets.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Water data tracking, benchmarking and reporting	▪ Assess opportunities to track water data in the Town's energy management software or RETScreen ▪ Include water consumption in facility Energy Performance Reports distributed to Corporate Energy Team members annually ▪ Investigate opportunities to expand reporting to Parks staff for outdoor water consumption ▪ Monitor progress towards water targets and conservation potential	▪ Energy & Environment ▪ Facility staff ▪ Parks ▪ Finance ▪ Region of Peel	Immediate	▪ Energy management software ▪ RETScreen Expert ▪ Region of Peel water data	▪ Tracking water data (y/n) ▪ Water added to current reporting structure (y/n)	▪ More effective and efficient management of water within facilities and parks ▪ Improved tracking of water utility budgets ▪ Better understanding of facility water use compared to other facilities of the same type ▪ Improved response time to water leaks and maintenance
Establish inventory of all water-using equipment and fixtures	▪ Build upon existing equipment list to establish detailed inventory of all water-using equipment and fixtures in both indoor facilities and Parks	▪ Energy & Environment ▪ Facility staff ▪ Parks ▪ Asset Management	Medium	▪ Asset Management program ▪ Building Condition Assessments	▪ Inventory established (y/n) ▪ Aligned with water-efficient replacement policy (y/n)	▪ More organized and coordinated approach to identifying and prioritizing the replacement of Town water equipment and fixtures ▪ Improved understanding and accuracy of the state of Town assets
Monitoring & Verification strategy for water retrofits	▪ Determine the effectiveness of water saving projects after implementation using water	▪ Energy & Environment ▪ Facility staff	Immediate	▪ Region of Peel water data, indoor	▪ M&V process established (y/n)	▪ Improved understanding of the impact of water conservation investments

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
	savings at the meter (data provided by the Region of Peel)	▪ Parks ▪ Region of Peel		water assessments and WSIP ▪ RETScreen Expert		▪ Ability to measure and report on the results of water conservation projects
Install Smart/Advanced Water Metering	▪ Install additional metering, where applicable, to major equipment at facilities and parks (i.e. ice rinks, pools and splash pads) to better understand water consumption trends and ensure that equipment is operating at optimal efficiency	▪ Energy & Environment ▪ Facility staff ▪ Parks	Long-term	▪ ROP water data ▪ ROP water audits and WSIP ▪ Corporate Green Building Standard Update	▪ Smart meters installed (y/n) ▪ Number of leaks fixed	▪ Improved understanding of equipment water use ▪ Improved monitoring of water use and trends ▪ Better identification of equipment in need of maintenance or repairs ▪ Expanded staff engagement and knowledge in water conservation efforts ▪ Improved ability to detect and respond to leaks
Conduct water audits of high water savings potential facilities and park splash pads	▪ Conduct water audits beginning with the Lloyd Wilson Centennial Arena, Inglewood Community Centre and OPP Detachment and other Town facilities ▪ Conduct water audits of splash pads ▪ Include the following scope: o Cooling towers o Greywater harvesting opportunities o Water reuse opportunities	▪ Energy & Environment ▪ Region of Peel ▪ Facility staff ▪ Parks	Immediate (facilities) Long-term (splash pads)	▪ Water Smart Peel Indoor Water Assessments ▪ Region of Peel outdoor irrigation audits	▪ Number of water audits conducted ▪ Additional conservation opportunities included in the scope of audits (y/n)	▪ Improved understanding and direction of water savings opportunities ▪ Reduction in water use and operating costs ▪ Understanding of greywater harvesting and reuse opportunities

Water Equipment Optimization, Maintenance and Re-Use

This section provides strategies for better controls of water using equipment, and exploring opportunities to recycle and reuse water and strategies to improve building operations and encourage proactive maintenance of equipment to detect leaks and maintain performance

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Install 'Smart Controllers' on irrigation systems	▪ Install and/or upgrade 'Smart Controllers' on irrigation systems starting at Caledon East soccer fields and Edelweiss Park	▪ Energy & Environment ▪ Parks	Immediate	▪ Region of Peel WSIP program ▪ Parks capital budget	▪ Number of smart controllers installed	▪ Reduced water consumption and cost ▪ Improved staff efficiency of maintaining irrigated fields
Water re-use technologies/practices in facilities	▪ Evaluate the feasibility of water re-use for ice resurfacing machines, heat recovery from pool drainage water and using recycled water for making ice	▪ Energy & Environment ▪ Facility staff	Long-term	▪ Corporate Energy Team ▪ Region of Peel WSIP program ▪ Energy Revolving Fund	▪ Feasibility study conducted (y/n)	▪ Understanding of water re-use opportunities ▪ Innovation in facilities ▪ Water conservation and associated operating budget savings
Implement efficient water-using equipment practices	▪ Implement a regular boiler maintenance schedule, including checking for/repairing leaks ▪ Implement efficient cooling tower practices: check water flow rates; check VSD operation and cycle water use	▪ Energy & Environment ▪ Facility staff ▪ Parks ▪ Asset Management ▪ Purchasing & Risk Management	Medium	▪ Corporate Energy Team ▪ Asset Management program	▪ Practices established (y/n) ▪ Volume of water saved (m3)	▪ Reduced water use and cost ▪ Improved equipment lifespan ▪ Inform asset management maintenance tracking that will help manage and direct funds accordingly

Water Equipment Purchasing

This section provides strategies for establishing minimum water efficiency standards in equipment replacement and renewal.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Explore opportunities for rainwater harvesting for vehicle washing	▪ Document existing schedule for vehicle washing (starting at Fire Halls and Works Yards) ▪ Document underlying requirements for vehicle washing if applicable	▪ Energy & Environment ▪ Facility staff ▪ Fire & Emergency Services ▪ Roads & Fleet	Long-term		▪ Operating practice established (y/n)	▪ Reduced water use and cost

Water Education & Communications

This section contains strategies to expand staff and public knowledge of water conservation practices and behaviours. This section provides strategies for establishing minimum water efficiency standards in equipment replacement and renewal.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Water Equipment Replacement with low consumption fixtures when replacing equipment (i.e. 'WaterSense')	▪ Explore potential to develop a water efficiency equipment replacement policy ▪ Develop a purchasing guideline for staff to consider water efficient equipment when replacing equipment ▪ Provide education and awareness to staff about water efficient equipment	▪ Energy & Environment ▪ Asset Management ▪ Purchasing & Risk Management ▪ Facility staff ▪ Parks	Medium	▪ Green Procurement Policy ▪ Asset Management program ▪ Corporate Energy Team	▪ Water efficiency replacement policy developed (y/n) ▪ Number of equipment replaced under policy	▪ Consistent approach to replacing equipment ▪ Water use and associated cost savings ▪ Improved tracking in asset management program such as costs associated with replacement, install and maintenance, and equipment lifespan

Water Education & Communications

This section contains strategies to expand staff and public knowledge of water conservation practices and behaviours.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Explore staff training opportunities	▪ Identify facility-specific training opportunities to reduce water waste ▪ Explore Town certification programs and encourage the use of Vendors that have water efficiency certifications	▪ Energy & Environment ▪ Facility staff ▪ Parks	Long-term	▪ Corporate Energy Team	▪ Number of facility training workshops delivered	▪ Reduced water use and associated operating costs ▪ Improved knowledge and literacy amongst staff
Explore devices and educational mechanisms that will help encourage facility and parks users to conserve water	▪ Pilot the installation of shower timers in high savings potential recreational facilities ▪ Explore targeted water conservation signage in facilities and parks	▪ Energy & Environment ▪ Facility staff ▪ Parks ▪ Communications	Long-term	▪ Corporate Energy Team ▪ ROP Water Efficiency Staff	▪ Number of facilities with timers installed ▪ Number of facilities/parks with water conservation signage ▪ Volume of water saved (m3)	▪ Reduced water use and associated operating costs ▪ Improved public water conservation behaviours

90%

Landfills produce 90% of all GHG emissions from Ontario's waste sector.

– Province of Ontario

Twin Creeks Landfill, Watford, Ontario (where Caledon's waste goes)

Waste

Scope

This section highlights opportunities for the Town to improve corporate waste data collection and analysis; reduce the generation of waste through purchasing practices; improve diversion rates; and, expand staff training, education and communication.

Climate Change Impact

Landfills produce 90% of all GHG emissions from Ontario's waste sector[25]. Decomposing waste in landfills produces methane, a potent GHG that has a global warming potential 25 times greater than carbon dioxide, which significantly contributes to climate change[26]. Energy is consumed in the waste sector through the collection and transportation of waste, operation of waste disposal, recycling and composting facilities, and the treatment of hazardous waste. Since the Region of Peel provides waste management services for the Town of Caledon, the Town's GHG emissions associated with waste is limited to other third-party services that collect, transport and dispose of corporate waste, and through its ability to improve landfill diversion of waste generated by staff and corporate operations.

[25] Environmental Commissioner of Ontario, Beyond the Blue Box: Ontario's Fresh Start on Waste Diversion and the Circular Economy, p.8.
[26] ECO, Beyond the Blue Box, p.16.
[27] Province of Ontario, Waste-Free Ontario Act, 2016, S.O. 2016, c.12, - Bill 151.
[28] Region of Peel, Roadmap to a Circular Economy in the Region of Peel, https://www.peelregion.ca/staticfiles/Peel%20Region/Waste%20Management/roadmap-circular-economy.pdf

Strategic Alignment

The circular economy is a waste management approach where waste is seen as a resource that can be recovered, reused and reintegrated into the production of products. The Provincial *Waste-Free Ontario Act*[27] promotes a circular economy by encouraging producers to turn their waste into new products further reducing GHG emissions by reusing, recycling or composting materials that would otherwise go to landfill. The Province of Ontario has a waste reduction target of 30% by 2020 and 50% by 2030.

The Region of Peel's Roadmap to a Circular Economy includes objectives to minimize waste generation and maximize resource recovery to meet the Region's target of 75% diversion rate by 2034[28].

Target

Aligning closely with the Province, the Town has adopted a target to divert 30% of waste by 2024.

Based on the Town's 2017 volume of waste, a 30% diversion rate would translate to 81,421 kg of recycling and compost collected. This will reduce emissions associated with the generation of waste by 7 tCO2e.

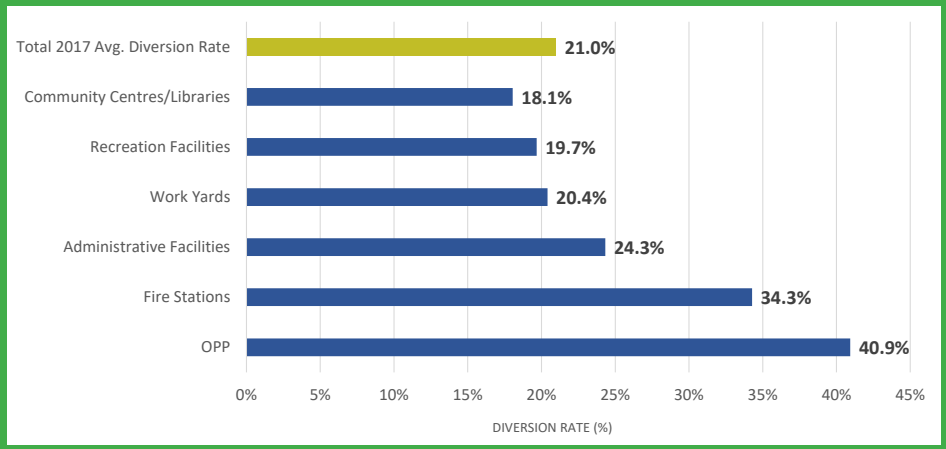


Figure 23: Average diversion rate by facility type (2017)

Vision (desired state)

The Town is seeking to reduce waste-to-landfill 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.

Evaluation of 2014-2019 Practices

In 2017, the Town undertook a waste retrofit pilot project at Town Hall and Mayfield Recreation Complex (MRC), to understand current waste behaviours and improve overall diversion through education and improved infrastructure. The waste retrofit pilot project involved undertaking a pre and post-project facility waste audit, and development of facility-specific waste stream signage and retrofit waste bins. The waste retrofit pilot project was successful, resulting in an increased diversion rate in both facilities as a result of this project (see Table 6 below).

Table 6: Waste Retrofit Pilot Project diversion rate results

	Pre-Project Diversion Rate	Post-project Diversion Rate	% change
Town Hall	82.1%	92.4%	+10.3
MRC	20.2%	47.6%	+27.4

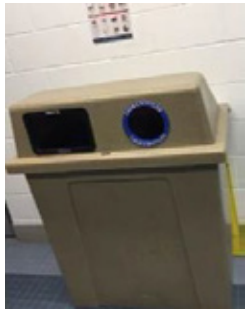


Figure 24: Mayfield Recreation Complex pre-project waste bins

Figure 25: Mayfield Recreation Complex retrofit waste bins

The Town's Parks Division recovers the waste generated from maintaining trees on Town property and utilizes wood chips as landscape mulch.

In addition, the Town also embeds waste management considerations through its Green Procurement Policy, that is responsible for 10% of a vendor's score and includes considerations for waste reduction strategy (i.e. product packaging) and recycling programs. The Town however lacks an overall corporate waste management strategy. As a result, the Town's corporate waste management practices have been assessed at a Level 2 (good level of practice).

Baseline Numbers

Figure 26 demonstrates the quantity and type of waste being collected from Town facilities by the Region of Peel. Figure 27 shows the quantity of waste being collected by facility type. It is important to note that only two Town facilities have an organics collection program, and the Town's parks waste, (which currently do not have a waste diversion program), is included in the Work Yards.

In 2017, 56,267kg of recycling and composting was collected from Town facilities and 271,403kg of waste went to the landfill, resulting in 57 tCO2e (see Figure 28).

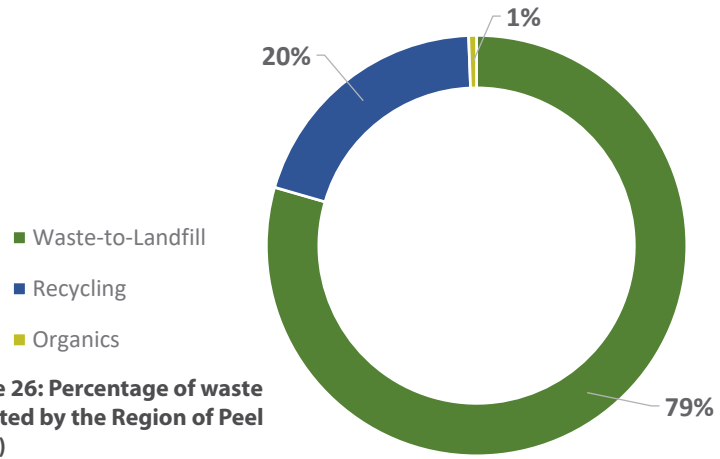


Figure 26: Percentage of waste collected by the Region of Peel (2017)

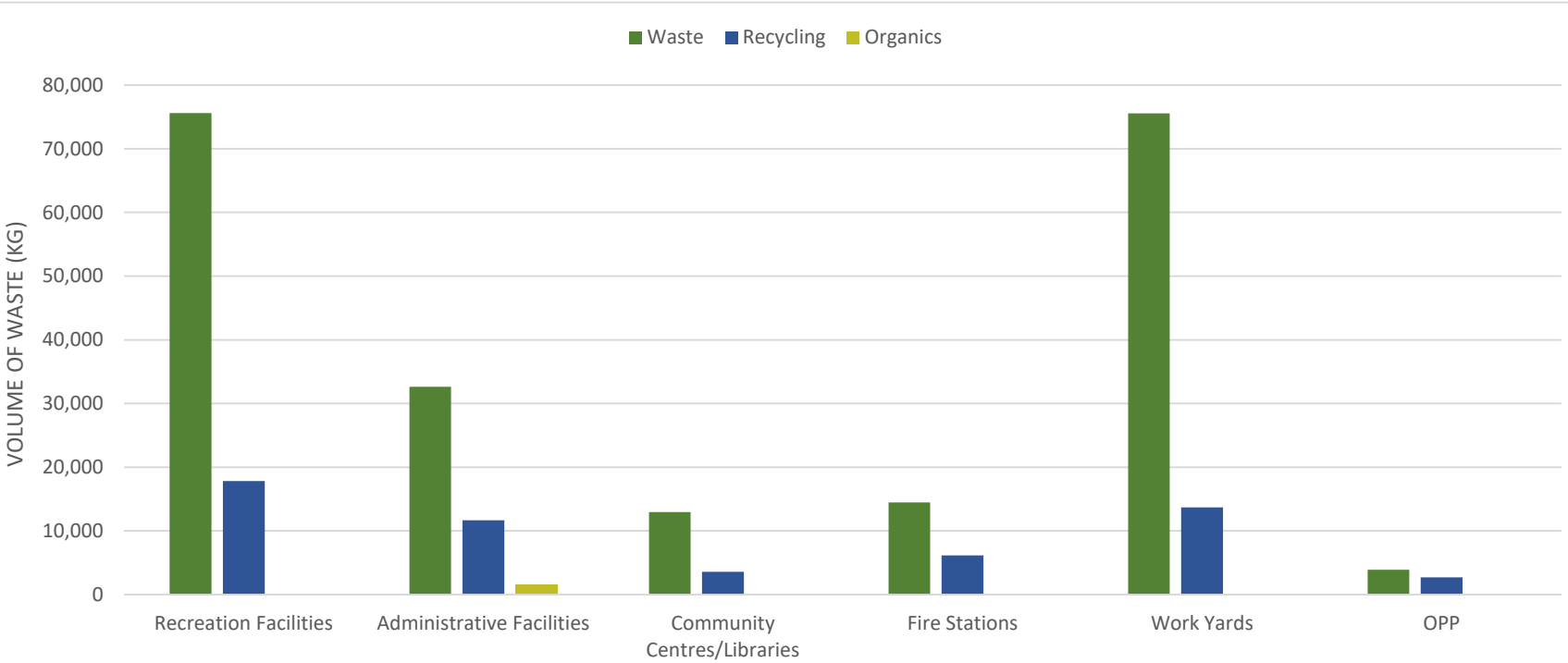


Figure 27: Waste collection by facility type (2017)

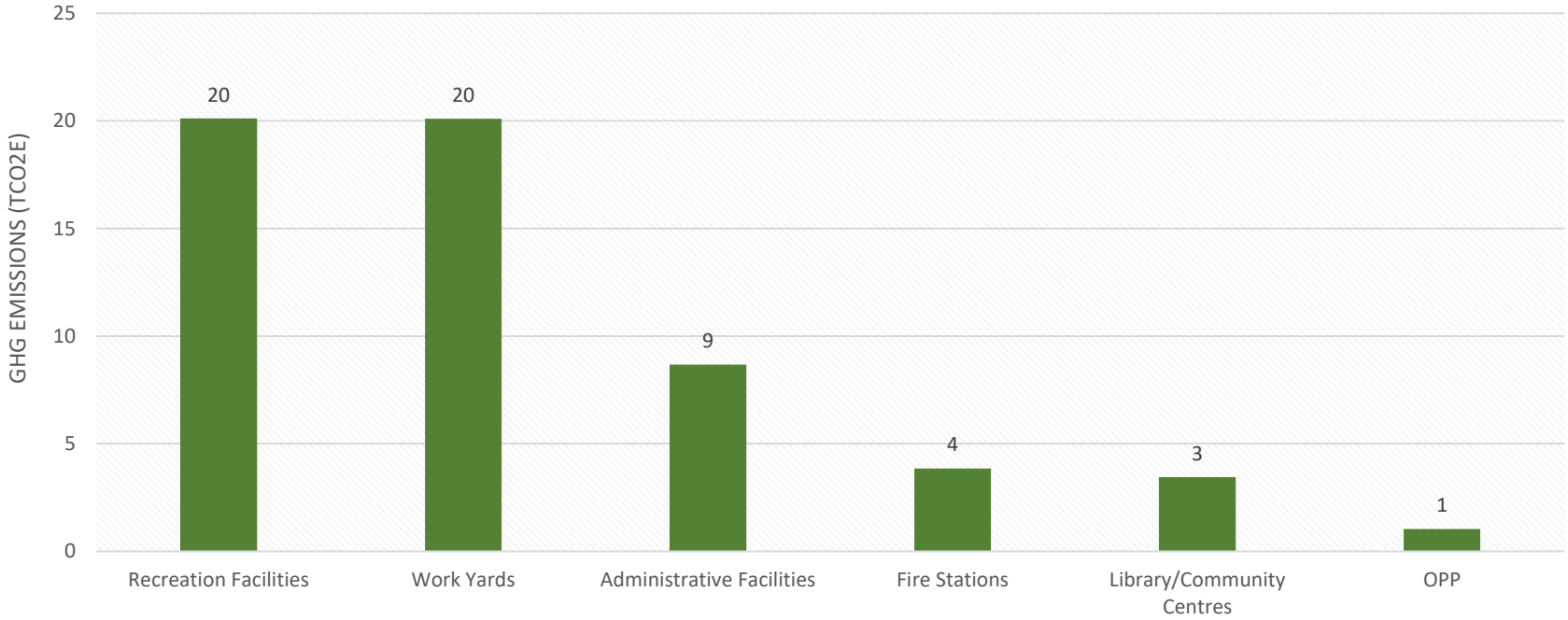


Figure 28: Town of Caledon Corporate Waste GHG emissions by facility type (2017)

Waste Data, Reporting and Performance Analysis

This section provides strategies to better analyze, monitor and benchmark waste consumption data for Town facilities and parks.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Waste data analysis, benchmarking and reporting	▪ Measure and track total waste collected for all Town facilities and parks on a quarterly basis ▪ Determine a methodology for tracking and reporting on corporate-wide waste performance	▪ Energy & Environment ▪ Facility staff ▪ Finance ▪ Region of Peel	Medium	▪ Region radio frequency identification tags (RFID) ▪ Waste audit data ▪ RETScreen Expert	▪ Tracking waste data in all facilities (y/n) ▪ Tracking waste data in Parks (y/n) ▪ Methodology developed for tracking corporate wide waste performance (y/n)	▪ Better understanding of waste generated in parks and facilities ▪ More effective and efficient management of waste within facilities and parks ▪ Improved correspondence with staff, Region of Peel and third-party companies ▪ Better understanding of facility waste generation rates compared to other facilities of the same type
Continue to conduct waste audits at Town-owned facilities	▪ Conduct waste audits in facilities and consider using a representative sample for each building type ▪ Prioritize waste audits at facilities with low diversion rates and large percentage of total waste generated (Fire Station #303, Work Yard 1, Caledon East CC and the Caledon Animal Shelter)	▪ Energy & Environment ▪ Facility staff ▪ Region of Peel	Ongoing	▪ Region RFID tags ▪ Waste audit data	▪ Number of waste audits conducted	▪ Understanding of waste reduction opportunities in multiple building types ▪ Identify opportunities to expand waste collection programs ▪ Identify opportunities for operational improvements

Waste Purchasing & Policies

This section provides strategies to embed waste considerations into existing purchasing policies that align with acceptable materials in the Region of Peel's diversion programs.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Identify opportunities to align product purchasing with acceptable materials in the Region's diversion programs	▪ Explore policies and guidelines to increase the amount of recyclable and compostable materials purchased by the Town ▪ Provide guidelines for Town staff purchasing products that take the entire product lifecycle into account (including products with recycled content and minimal packaging) ▪ Explore potential to pre-select office supplies available for Town staff purchases that align with this strategy	▪ Energy & Environment ▪ Purchasing & Risk Management ▪ Broader staff engagement	Medium	▪ Green Procurement Policy ▪ Region of Peel Special Events Policy	▪ Waste policy developed (y/n) ▪ Products purchased align with the Region of Peel (y/n)	▪ Coordinated approach to purchasing materials ▪ Reduced waste to landfill ▪ Reduced use of single-use plastics ▪ Support of the circular economy
Reduce waste generated during the process of construction of new Town facilities	▪ Develop and implement a policy for reducing and diverting construction waste from landfill. Explore the inclusion of packaging of construction goods	▪ Energy & Environment ▪ Project management staff ▪ Purchasing & Risk Management	Long-term	▪ Corporate Green Building Standard Update	▪ Policy developed (y/n) ▪ Kg of reduced waste to landfill	▪ Reduced construction waste to landfill ▪ Increased recycling rates ▪ Reduced packaging of construction goods

Waste Reduction and Diversion

This section provides strategies to reduce the amount of waste that is generated in Town facilities and parks and enhancing waste diversion efforts.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Paper reduction strategy	▪ Install hand-dryers in washrooms and remove paper towel dispensers or provide organics bins in washrooms at additional facilities (subject to approval by the Region of Peel) ▪ Explore potential to reduce paper use in Recreation and Parks where there are electronic alternatives (i.e. timesheets, report cards, etc.)	▪ Energy & Environment ▪ Facility staff ▪ Parks ▪ Asset Management ▪ Recreation ▪ Region of Peel	Medium	▪ Waste audits ▪ Asset Management program ▪ Recreation program software	▪ Number of hand dryers installed ▪ Number of facilities with an organics program ▪ Number of programs moved from paper to electronic	▪ Reduced use of paper ▪ Reduced waste to landfill ▪ Reduced materials for recycling ▪ Reduced weight of organics
Increase collection of organics	▪ Expand organics collection to Town facilities, subject to approval by the Region of Peel ▪ Explore feasibility for an in-house solution to expand organics collection across Town-owned facilities (i.e. shared organics program across	▪ Energy & Environment ▪ Facility staff ▪ Town Health & Safety coordinator ▪ Region of Peel	Long-term	▪ Waste audits ▪ Region of Peel organics collection program ▪ Existing on-site equipment	▪ Number of facilities with an organics program ▪ Diversion rates (%)	▪ Increased organics collection ▪ Reduced waste to landfill ▪ Reduced contamination rates ▪ Improved diversion rates ▪ Reduced GHG emissions

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
	facilities in close proximity)					
Expand battery collection	▪ Expand battery collection across Town facilities	▪ Energy & Environment ▪ Facility staff ▪ Region of Peel	Medium	▪ Raw Materials Company battery collection program	▪ Number of facilities with battery recycling ▪ kg of batteries collected	▪ Reduced hazardous waste from the landfill ▪ Diversion rate (%) increase
Reduce use of single-use plastics	▪ Develop a strategy to reduce the quantity of single-use plastics purchased by the Town ▪ Explore the potential to expand the plastic water bottle ban to facilities that have water refill stations	▪ Energy & Environment ▪ Facility staff ▪ Purchasing & Risk Management	Medium to Long-term	▪ Waste audits ▪ Region of Peel Waste Working Group ▪ Vending machine contracts (2019)	▪ Number of facilities with plastic water bottle ban	▪ Reduction in single-use plastics ▪ Reduced weight of recycling collection ▪ Reduced contamination ▪ Potential to influence community waste knowledge and behaviours
Design diversion program for Parks	▪ Consider opportunities to expand waste material collection streams in Parks such as animal waste bins	▪ Parks ▪ Energy & Environment ▪ Purchasing & Risk Management	Long-term	▪ Region of Peel Waste Working Group	▪ Number of Parks with diversion program ▪ Number of waste streams in parks	▪ Reduced waste to landfill ▪ Reduced contamination ▪ Improved public waste education and behaviours

Facility Operations, Education & Communications

This section provides strategies to enhance operations and maintenance practices to ensure proper waste disposal; improving staff education regarding acceptable and unacceptable waste materials consistent with the Region of Peel; and, ensuring adequate signage across Town facilities and parks.

Strategy	Tasks	Responsibility	Timeline	Tools	Key Performance Indicators	Co-Benefits
Waste stream signage	▪ Place appropriate and consistent waste signage for all waste bins in facilities and in parks	▪ Energy & Environment ▪ Communications ▪ Facility staff ▪ Parks	Ongoing	▪ Town waste signage ▪ Waste audits	▪ Number of facilities with new signage	▪ Reduced contamination rates ▪ Improved staff and public waste education
Facility operations staff training	▪ Provide ongoing education to facility staff to ensure waste is managed in the correct stream (i.e. organics) ▪ Explore potential to develop a waste disposal procedure that outlines specifications for waste collection bags and waste bin infrastructure and signage	▪ Energy & Environment ▪ Facility staff ▪ Region of Peel	Immediate	▪ Waste audit communication materials ▪ Region of Peel waste education materials	▪ Number of facilities and staff engaged ▪ Number of facilities with consistent signage and bags	▪ Improved waste diversion ▪ Reduced waste contamination in Regional waste collection bins
Broader staff education and engagement	▪ Organize annual staff education workshops and communication campaigns to provide training on how to properly dispose of waste ▪ Participate in textile and electronics collection events	▪ Energy & Environment ▪ Region of Peel ▪ Town staff ▪ Guest speakers	Ongoing	▪ Waste Reduction Week ▪ Waste audit communication materials ▪ Region of Peel waste education materials	▪ Number of annual communication campaigns ▪ Number of staff engaged in events ▪ kg of textiles and electronics collected	▪ Consistent messaging and waste disposal across facilities ▪ Reduced waste to landfill ▪ Improved staff and public education

Appendix A Target Setting Methodology

Targets were developed for all sectors included in the scope of this Framework. The target development process involved the collection of data including: energy and fuel consumption, Town asset inventories, and water and waste volume. Fleet and waste targets were determined by aligning with the Region of Peel's targets. A more detailed methodology is provided below to describe the approach for determining the facility energy and water targets.

Facility Energy Savings Potential and Reduction Target

Building energy models were developed using the principles of performance-based conservation. This data-driven approach relies on benchmarking large data sets of comparable buildings to identify the most energy efficient buildings of each type. The energy intensity of the top energy performers establishes evidence-based performance standards, which are used to set facility-specific energy targets and determine the savings potential for each of the facilities.

A top-quartile (top 25th) energy performance standard (i.e. target) was adopted for each of the facility types (recreation, administration, fire halls, etc.), from a 2012 dataset of 79 recreational facilities in the Greater Toronto Area (GTA). Larger and/or less energy efficient buildings have the greatest potential for savings and are the initial focus of attention.

The total energy target is sub-divided into five components: base electricity (year-round); cooling electricity (additional electricity used in the summer); heating electricity (additional electricity used for heating in the winter); base thermal (year-round); heating thermal (additional gas used for heating in the winter).Normalization is limited to material factors which are determined to account for 5% or more of electricity use, or more than 10% of thermal energy use.

The top quartile component energy targets for each facility type are provided in the table below:

Table 7: Top quartile component energy targets by facility type

Base Targets	Rec. Centres	Fire Halls	Admin.	Work Yards	Library
Energy use component	(e)kWh/ft^2	(e)kWh/ft^2	(e)kWh/ft^2	(e)kWh/ft^2	(e)kWh/ft^2
Electric Baseload	9.21	7.40	10.92	12.60	9.97
Electric Cooling	0.77	0.50	0.69	0.50	1.02
Electric Heating	0.25	0.60	0.34	2.30	0.51
Gas Baseload	1.83	1.70	1.01	2.10	0.15
Gas Heating	9.71	14.70	7.15	31.30	7.14
Total Energy	**21.77**	**24.90**	**20.12**	**48.80**	**18.78**

These standard component energy targets for each individual facility for a given year are normalized for its amenities, usage profile, current year weather conditions and energy sources. Thus, the target for each facility is different, depending on use of spaces (indoor ice rinks, indoor pools etc.) and variances in climate and heating systems. Normalization is limited to material factors which are determined to account for 5% or more of electricity use, or more than 10% of thermal energy use.

Town facilities' energy (ekWh) savings potential is the difference between its 2017 actual energy use intensity (baseline year) and target energy use. Each energy component relates to specific energy systems, pointing to where savings are to be found.

Figure 29: Performance-based conservation approach

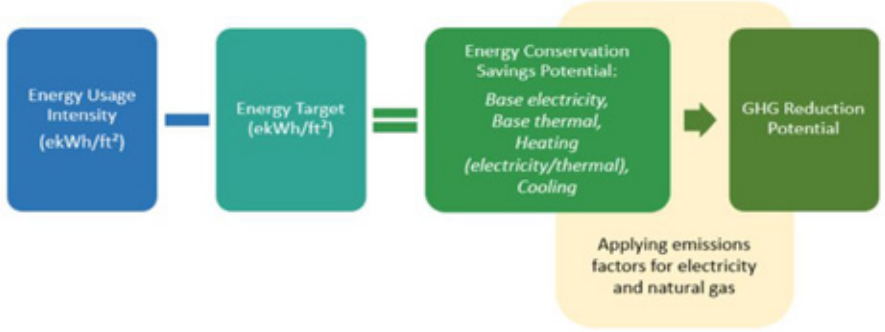
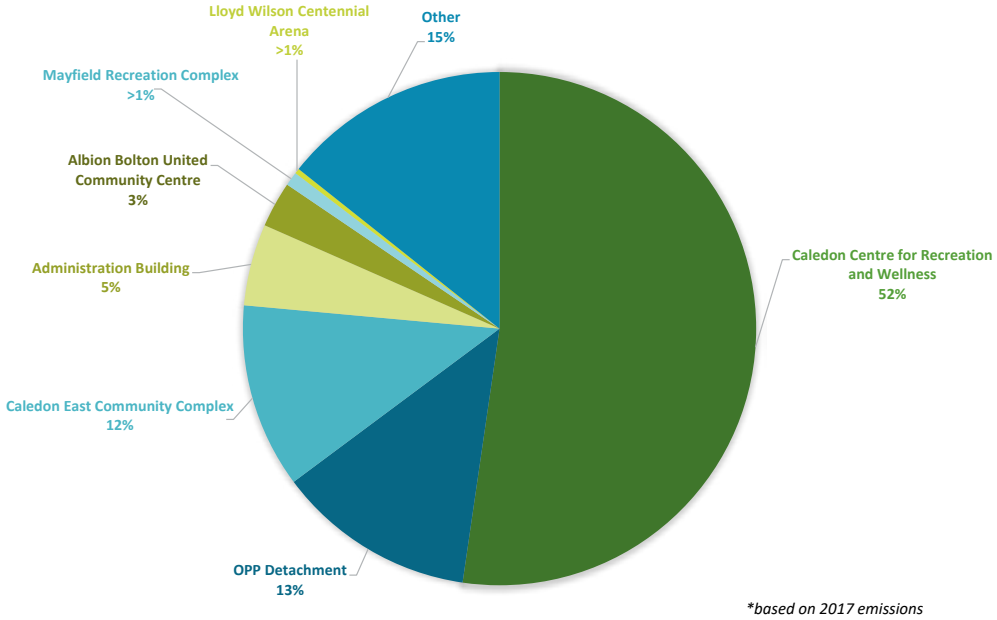


Table 9: High GHG Reduction Potential Facilities

Facility	Electricity Intensity (kWh/ft²)	Thermal Intensity (ekWh/ft²)	Total Energy Intensity (ekWh/ft²)	Total Energy Savings Potential (%)	GHG Reduction Potential (%)	% of total savings
CCRW	15.88	30.19	46.07	31%	42%	51.4%
OPP	16.95	15.34	32.29	49%	71%	12.6%
CECC	18.38	18.94	37.31	9%	14%	11.5%
Town Hall	15.40	8.80	24.21	10%	19%	5.1%
ABUCC	15.93	9.82	25.75	5%	8%	3%
MRC	21.61	18.47	40.08	1%	2%	0.9%
LWA	21.99	10.69	32.67	9%	4%	0.6%
					Total	85.1%

Outcomes

Seven of the Town's 28 facilities account for 85.4% of total GHG savings potential and 70% total cost savings potential.



*based on 2017 emissions

Figure 30: Avoidable GHG Emissions: High-Potential Facilities

Water Targets

To determine water targets, water consumption data in Town facilities in 2017 was obtained. This included 23 facilities that are serviced by the Region of Peel, as other facilities in the Town's building portfolio's water supply is from groundwater sources.

Similar to the methodology described above for energy, the water savings potential for facilities was calculated by determining the water-use intensity (litres per square foot) for each facility.

A dataset of water consumed in facilities of similar characteristics across the GTA was used as the benchmark to determine a water-use intensity target (Table 9). Town facilities' water savings potential is the difference between its 2017 (baseline year) actual water use intensity and target water use.

Table 8: Top quartile water targets by facility type in litres per square foot

Fire Halls	Admin.	Community Centre	Library	Arena	Arena & Pool	Pool
8.5	34.0	6.8	17.6	89.3	93.0	129.0

TOWN OF CALEDON

6311 Old Church Road Caledon, ON L7C 1J6
www.caledon.ca | environment@caledon.ca
T . 905.584.2272 | 1.888.225.3366 | F. 905.584.4325