

City of Pembroke



Energy Conservation and Demand Management (CDM) Plan Update June 2024

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1.0 Introduction

In 2009, Ontario Regulation (O. Reg.) 397/11 required public agencies in Ontario, including municipalities, to publicly report on energy consumption and associated greenhouse gas (GHG) emissions annually, and publish and implement five-year Energy Conservation and Demand Management (CDM) Plans to monitor progress and update their action plans.

Starting on February 23, 2023, a new regulation was introduced, O. Reg. 25/23, which replaced O. Reg. 507/18. Municipalities are still required to report annually on energy use and GHG emission and to prepare and make public an updated five-year Energy CDM Plans. As such, the City of Pembroke continues to report annually on its energy consumption and associated GHG emissions and continues to develop and implement an Energy Conservation and Demand Management Plan every five years.

Hard copies of the CDM plan are available at City Hall located at 1 Pembroke Street East, Pembroke, and on the City's website www.pembroke.ca.

2.0 Executive Summary

This Energy CDM Plan (hereafter referred to as the Plan) is an updated plan that outlines resources and measures to improve energy efficiency and reduce greenhouse gas (GHG) emissions.

The Plan is comprised of two parts:

1. A description of previous, current and proposed measures for conserving energy and managing demand of the City of Pembroke's operations.
2. A summary of the City's annual energy consumption and GHG emissions for its operations.

This five year Plan (2024-2029) presents a high-level review of the City's facilities and proposes detailed energy management initiatives to reduce energy consumption and GHG emissions in its heated and cooled buildings, as well as in its water and wastewater treatment and pumping facilities. This Plan will serve as a tool for the City of Pembroke to reduce its energy consumption and GHG emissions and a basis to ensure best practices in energy management throughout the City's operations.

The Plan includes an evaluation of past and current energy conservation measures. Additionally, the Plan provides an analysis of the historical energy profile, which offers a better understanding of the energy performance of the City's facility portfolio and operations.

In June 2014, the City of Pembroke prepared, submitted and made available an Energy CDM plan to fulfill the requirements of Ontario Regulation 507/18. The 2014 Plan provided an overview of the City’s operations including a summary of the annual energy consumption and GHG emissions and discussed project upgrades and Energy conservation measures to reduce energy consumption and GHG emissions. The summary of energy and natural gas consumption can be found in Appendix B.

Since 2014, the City of Pembroke has invested in and implemented several energy efficiency projects resulting in energy savings. A list of these projects can be found in Appendix A.

4.0 Energy Conservation Measures

4.1 Previous and Current Measures

Over the period of 2014-2024, the City of Pembroke has been active in implementing energy efficiency projects. Lighting upgrades in multiple facilities and upgrading to LED lights for both streetlighting and traffic signals have decreased energy demand.

Measure	Duration
Implement a comprehensive corporate energy management program to reduce consumption, achieve cost savings, and meet GHG emission targets	Medium term
Improve the energy efficiency of the City’s facilities using best practices to reduce operational costs, energy consumption and GHG emissions	Medium term
Develop and implement sustainable green fleet	Medium term
Create a culture of conservation	Continuous
Electronic timesheets – cut down on paper usage	Completed in 2023

Figure 1: Previous Goals, 2014-2024

4.2 Previous and Current Energy Efficiency Projects

City Asset	Projects	Descriptions
Streetlights	1900 luminaries	Conversion of streetlights to LED

City Asset	Projects	Descriptions
Solar installation project	6	Installed photovoltaic cells at 6 properties
OPP new building	1	High performance new construction program including BAS (Building Automation System), LED lighting, occupancy sensors, high efficiency HVAC
Fire Hall new building	1	High performance new construction program including BAS (Building Automation System), LED lighting, occupancy sensors, high efficiency HVAC
Indoor Recreational facilities	5	Lighting upgrades, occupancy sensors, window replacement, reflecting ceiling, condenser replacement
Water Treatment Plant	5	Lighting upgrades, occupancy sensors, roof replacement, pump upgrades
Sewage Treatment Plant	6	Lighting upgrades, electrical upgrades, digester refurbishment, pump upgrades
Lift Stations	6	Capacity upgrades, pump upgrades, roof replacements, lighting upgrades
Administration buildings	6	roof replacements, HVAC upgrades, window upgrades, occupancy sensors

Figure 2: Previous and Current Energy Efficiency Projects, 2014-2024

4.1.2 Renewable Energy Generation

The City of Pembroke has six locations with photovoltaic assets producing electricity:

- Operations Department Garage
- Quarry Road Garage
- Kiwanis Field House
- Pembroke Water Treatment Plant
- Pembroke and Area Community Centre
- Pembroke Pollution Control Centre

In total, these installations have generated 541,818 kWh of energy between 2014 and May of 2024.

4.2 Future Measures

To support and help inform the City on how to achieve further energy savings, the City will complete a twenty-year Infrastructure Needs Study and Facility Plan. The results of this study will help identify both capital and operational improvements, including energy and capacity improvements and financial analysis for each asset based on implementation cost estimates, energy and operating cost savings.

In 2021, the City of Pembroke joined the Partners for Climate Protection program which is delivered by the Federation of Canadian Municipalities (FCM) and ICLEI-Local Governments for Sustainability. This program supports and guides the City in reducing GHG emissions through the Five Milestone Framework.

The Five Milestones are:

- Milestone 1: Creating a baseline emissions inventory and forecast
- Milestone 2: Set emissions reduction target
- Milestone 3: Develop a local action plan
- Milestone 4: Implement the local action plan
- Milestone 5: Monitor progress and report results

Measure	Duration
Create baseline emission inventory	Complete
Set emissions reduction target	Medium term
Develop local action plan	Medium term
Implement local action plan	Long term

Figure 3: Future Goals 2024-2029

Energy Conservation Measures	Timeframe
Adopt a LEED principals building policy	2024-2029
Establish a Green Team	2024-2029
Departmental Alignment (ensure each department is aware of their energy usage)	2024-2029
Link CDM Plan to other City Plans <ul style="list-style-type: none"> • Facility condition assessments • Procurement plan • Assessment management plan • Resiliency plan • Climate change action plan 	2024-2029
Perform regularly scheduled energy audits	2024-2029
Develop a process for identifying and cataloging energy efficiency improvements	2024-2029
Fleet investment	2024+
Idling policy	2024-2029

Figure 4: Future Energy Efficiency Projects, 2024-2029

5.0 Organizational Measures 2014-2024

The following is a list of organizational measures identified, and completed since 2014:

- Energy Assessment Audit performed on the Kinsmen Pool January 2014
- Complete building condition assessments were performed at the Mackay and Townline lift stations, the Pembroke Memorial Centre, Pembroke and Area Community Centre, Pembroke City Hall, Annex storage Building, Pembroke Fire Hall, Kiwanis Field House, Marina Attendant Building and washrooms, Operations Admin Building and storage garages, Pembroke OPP Station, Water and Sewage Treatment plants, Pembroke Library, Quarry Water Reservoir buildings, Bell Street Water Tower and buildings, Riverside Park buildings, Rotary Park fieldhouse, as well as the 50+ Active Living Centre.
- A procurement Policy was updated in February 2015. Section 2.2(h) stated, “to encourage the procurement of goods and services with due regard to the preservation of the natural environment, vendors may be selected to supply goods made by methods resulting in the least damage to the environment and supply goods incorporating recycled materials where practicable.”
- One of the underlying principals identified in the 2023-2027 Strategic Plan is to utilize a Climate Lens

- The Operations Department began purchasing combination units for snow removal and product application on the roadway. During the winter months, the trucks can plow and apply product simultaneously and, conversely, in the summer months, the same trucks can be utilized for ditching and road construction. Sidewalk plowing equipment change attachments for summer months to complete grass cutting activities. With the inclusion of multi-use vehicles in the fleet, the fleet is reduced and efficiencies are realized
- The Operations Department recycles and reuses 100% of all asphalt removed in resurfacing projects
- The City's IT Department has set all computers to default to printing on both sides of a sheet of paper, reducing paper and energy usage

6.0 Behavioral Measures 2014-2024

The following are the behavioral measures identified, and completed since 2014:

- A tree planting incentive program was implemented in 2014 for residents of Pembroke. The program created awareness in terms of the amount of carbon dioxide that one tree can remove from the atmosphere on an annual basis (26lbs of carbon dioxide = 17,700 km of car emissions). Eligible residents receive up to 50% of their purchase of any tree(s), with a maximum of two trees per property, to a maximum rebate of \$150. In keeping with the tree initiative, in 2015, the City received a donation of 70 trees. A charitable receipt was received in exchange. The trees were planted at various parks in the City as well as residential areas in the east and west ends of the City.
- In 2024, the City supported the 100th anniversary of the Pembroke Horticultural Society by allocating funds to plant 100 trees in the City's parks and greenspaces.

7.0 City of Pembroke Senior Management Approval

This report has been prepared by:

Amanda O'Brien, Civil Technician, City of Pembroke

This report has been approved by:

Brian Lewis, Director of Operations, City of Pembroke

Appendix A

Technical Measures 2014-2024

City Hall – Upgrades

- Generator, lower level repairs, flat roof, window replacements
- New lighting installed, including occupancy sensors

OPP Station – New Facility

- With energy efficient measures installed, incentives were realized with the Save on Energy – High Performance New Construction program. Savings summary of measured installed:
 - Building Automation System
 - LED lighting – interior, exterior and Exit signs
 - Occupancy sensors

Fire Station – New Facility

- With energy efficient measures installed, incentives were realized with the Save on Energy – High Performance New Construction program. Savings summary of measures installed:
 - High envelope thermal insulation
 - LED lighting and lighting controls
 - Radiant floor heating
 - Variable speed drives on fans and pumps
 - Condensing boiler
 - Water-to-water heat pump design
 - Airside heat recovery
 - Full DDC control of all mechanical system to ensure energy consuming systems are scheduled

Fire Hall – Old Facility

- Roof upgrade
 - With the addition of insulation and increased “R-Value”, a heating load reduction of up to 37% could be realized, with an additional 10% reduction in cooling load. Removal of the original roof revealed little to no insulation present

Kinsmen Pool

- Flat Roof upgrade
 - With the addition of insulation and increased “R-Value”, a heating load reduction of up to 37% could be realized with an additional 10% reduction in cooling load

- Boiler replacement
- Pump replacement

Kiwanis Field House

- Roof upgrade
 - With the addition of insulation and increased “R-Value”, a heating load reduction of up to 37% could be realized with an additional 10% reduction in cooling load

Operations Buildings

- Garage Roof upgrades
 - With the addition of insulation and increased “R-Value”, a heating load reduction of up to 37% could be realized with an additional 10% reduction in cooling load
 - Removal of the existing flat roofing system found there was little to no insulation present. Rigid insulation was added as part of the roofing project
- HVAC upgrade
- Lighting upgrade to LED and installation of occupancy sensors

Pembroke and Area Community Centre

- Condenser replacement Glycol System
 - Newer condensing boilers can operate at efficiencies of up to 95%. Typical savings with an upgrade are approximately 10%
- Space heating
 - Gas-fired rooftop space heaters have new efficiencies ranging from 89% to 97%
- Variable frequency drives
 - Installed on motor; realizing energy savings of up to 50%
- Programmable thermostats
 - For every degree Celsius of reduced temperature, savings of 2% are typically recognized
- Lighting upgrades
 - Existing general, ice surface and exterior lighting were replaced with LED lighting. Savings of up to 90% can be realized with LED lighting
- HVAC system upgrade

Pembroke Memorial Centre

- Lighting upgrades
 - Existing general, ice surface and exterior lighting were replaced with LED lighting. Savings of up to 90% can be realized with LED lighting
- Score clock

- Entire score clock was retrofitted with LED lighting
- Electrical transformer condenser water tank replacement

Townline Lift Station

- Roof upgrade
 - With the addition of insulation and increased “R-Value”, a heating load reduction of up to 37% could be realized with an additional 10% reduction in cooling load
- Pump replacement/Soft Start
 - Inefficient pumps can potentially add an additional 20% to energy bills. Soft starts can improve the energy consumption typically associated with powering up machinery
- Lighting upgrades
 - Energy savings can be achieved by replacing older, inefficient lighting with LED lamps. Depending on the lamp type and wattage, savings can range from 30% to 70%
- Heating system replacement
- New stand-by generator

McGee Street Lift Station

- Pump upgrades

Mackay Street Lift Station

- Lighting upgrades
 - Energy savings can be achieved by replacing older, inefficient lighting with LED lamps. Depending on the lamp type and wattage, savings can range from 30% to 70%
- Pump replacement
- New stand-by generator

Water Treatment Plant

- Pump roof replacement
 - Existing insulation was replaced, with overall thickness of the insulation increased, with an increased “R-Value”, heating and cooling load reduction can be realized
- Occupancy sensors/Light harvesting system
 - Typical energy savings realized can range from 5-15%
- Soft start motor for high lift #2 pump
 - Inefficient pumps can potentially add an additional 20% to energy bills. Soft starts can improve the energy consumption typically associated with powering up machinery

- Lighting upgrades
 - Energy savings can be achieved by replacing older, inefficient lighting with LED lamps. Depending on the lamp type and wattage, savings can range from 30% to 70%
- VFD Control High lift
 - Installed on motors, realizing energy savings of up to 50%
- Heating conversion
- Soft start motor for high lift #1 pump
- Space heating
 - Gas-fired space heat units having new efficiencies ranging from 89% to 97%

Pollution Control Centre

- Replacement of metal halide fixtures
 - Savings of close to 77% can be realized when metal halide fixtures are replaced with LED fixtures
- Exterior lighting upgrade
 - Replacing conventional wall packs with LED wall packs can realize a 40% to 60% reduction in energy consumption
- Digester refurbishment
- Blower rehabilitation
- Sludge grinder replacement
- Heat exchanger refurbishment
- Space heating
 - Gas-fired space heat units having new efficiencies ranging from 89% to 97%

Quarry Reservoir

- Pump replacement
- Pump #3 soft start motor

Major Street Light Conversion Project 2015-2016

A major street light conversion took place in the City of Pembroke in 2015 with completion in 2016. Approximately 1823 street lights were retrofitted, changing out the HID (High Intensity Discharge) with LED lamps. A total of 1,158,825 kWh (1.158 GWh) savings were calculated, amounting to substantial cost savings for the City. On average, LED retrofits can reduce energy use by up to 50%. LED lamps help to reduce operating costs as they require less maintenance and last approximately 2 to 5 times longer than traditional lamps.











