TOWNSHIP OF
PUSLINCH
EST. 1850

Energy Conservation and Demand Management Plan 2024-2029

Corporation of the Township of Puslinch

,

Blue Sky
ENERGY ENGINEERING
& CONSULTING INC.

LAS

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1. Introduction

1.1 Background

This report presents the 2024 – 2029 Energy Conservation and Demand Management Plan (ECDMP) for the Township of Puslinch (the Township). Energy management at the Township has become increasingly important as the cost of energy continues to rise and our commitment to reducing our environmental impact increases. The Township is committed to the energy conservation journey to ensure municipal funds are used wisely, and the impact of the Township's services on greenhouse gas (GHG) production is minimized.

As part of this commitment, Regulation 25/23 of the Electricity Act requires all municipalities across Ontario to develop and publish an Energy Conservation and Demand Management Plan (ECDMP) every five years.

The plan includes the following key elements:

- Our commitment - a corporate vision and policy that includes objectives, targets and strategic priorities,
- A summary of past conservation improvements and successes,
- Our energy baseline and detailed energy metrics summarizing our progress towards targets; and,
- Specific and actionable inventory of energy conservation projects planned for the next five (5) years.

Over the last 5 year period, the Township has been successful in reducing energy consumption by over 22%, and GHG emissions by close to 40% through our conservation efforts and will continue to seek to improve through the implementation of this new plan.

The plan has been developed to support, focus, communicate and celebrate our energy conservation efforts. The Township intends on revisiting and updating the ECDMP every five years as required under the regulation.

1.2 Ontario Regulation 25/23 of the Electricity Act

In 2008, Ontario's 445 municipalities spent $680 million on electricity, equating to 4.3% of Ontario's consumption (Power Application Group 2008). In response, Ontario's Green Act was created to expand renewable energy generation, encourage energy conservation and promote the creation of green energy jobs (Ministry of Energy 2014).

Under the Green Energy Act, Ontario Regulation 397/11 was introduced for public agencies-municipalities, municipal service boards, universities, colleges, hospitals and school boards to apply the Act's principles. This Regulation is now part of the Electricity Act, Ontario Regulation 25/23.

Under this Regulation, public agencies must report annual energy consumption and GHG emissions for buildings that have heating and cooling and for operations related to water and sewer services. Public agencies must also create an ECDMP, which requires updating every five years.

1.3 Facilities Included in the Plan

The Regulation states that energy use and GHG emissions must be reported for buildings or facilities the Township owns or leases.

The full list of facilities included in the ECDMP can be found in Table 1.1 below. In addition to the mandatory facilities required by the regulation, the Township has also included Streetlighting and the following smaller locations: Outdoor Tennis Court, Morriston Meadows Baseball Diamond, Old Morriston Baseball Diamond, Aberfoyle Baseball Diamond and the Railway Crossing.

Table 1.1: Puslinch Facilities and Infrastructure included in the ECDMP

Name	Address	Use	Area (m^2)
MANDATORY FACILITIES			
Optimist Recreation Centre	23 Brock Road South	Outdoor Arena and Gymnasium	1,152
Puslinch Community Centre	23 Brock Road South	Community Centre	777
Puslinch Community Centre Shed	23 Brock Road South	Storage Facility	140
Puslinch Fire Hall	7404 Wellington Road 34	Fire Station	245
Public Works Shop	7404 Wellington Road 34	Equipment/Vehicle Maintenance	961
Public Works Storage Shed	7404 Wellington Road 34	Storage Facility	465
Municipal Complex	7404 Wellington Road 34	Administrative Office	407
ADDITIONAL LOCATIONS			
Old Morriston Baseball Diamond	11 Main Street	Recreation	N/A
Aberfoyle Baseball Diamond	23 Brock Road South	Recreation	N/A
Tennis Courts	23 Brock Road South	Recreation	N/A
Morriston Meadows Baseball Diamond	Currie Drive	Recreation	N/A
Railway Crossing	Watson Road South	Roads and Transportation	N/A
STREETLIGHTS			
Streetlights	Various	Other	N/A

2. Our Commitment to Energy Conservation

Declaration of Commitment

The Township commits to the allocation of the necessary resources to implement the ECDMP.

Vision

The Township's vision is to be as energy efficient as possible by leveraging our organization and by using new and efficient technology wherever it is cost effective to do so. We will wisely and continually seek to reduce energy consumption while maintaining an effective level of service to our customers and the general public.

Objectives and Goals

- Create a culture of conservation across Township operations
- Increase the visibility of facility energy consumption data to the senior management team through enhanced monitoring and tracking
- Finish retrofitting all lighting fixtures with high efficiency lighting technologies
- Incorporate energy efficiency criteria into capital equipment purchasing practices.

Energy Conservation Target

Our target is to reduce our consumption of fuels and electricity in all Township operations by 3% (31.6 eMWh) by 2029 compared to the 2023 annual energy consumption of 1,052 eMWh.

3. Responsibility for Energy Conservation

The team, described below, will be responsible for delivering this plan's objectives and goals as well as maintaining the Township's focus on energy management in the years to come.

Responsibilities:

The role of Finance is to provide clear guidance and support to the energy conservation team on internal and external funding mechanisms, and to include the senior leadership team in relevant decision-making and budget discussions. Finance is also responsible for providing the energy consumption data to the Director of Public Works, Parks and Facilities and Council for review.

The Director of Public Works, Parks and Facilities and facilities staff will have direct knowledge of the Township's major energy-using facilities and assets and are responsible for developing and maintaining the focus on energy conservation. This team will ensure the delivery of energy conservation measures in each of the facilities. As such, they will be tasked with reviewing facility energy consumption data and managing energy issues as required.

4. Current Energy Consumption at the Township

4.1. Energy Baseline

In order to track progress, an energy baseline was established from which annual energy consumption can be compared. Energy consumption data was provided through the Local Authority Service's (LAS) Energy Planning Tool (EPT) system which currently tracks both electricity and natural gas for each of the Township's buildings.

The resulting dataset represents the Township's baseline and current level of energy performance. Table 4.1 below presents the Township's 2023 energy data by fuel type expressed in equivalent kilowatt hours (ekWh), compared to the baseline year of 2013 and midterm year 2019.

Table 4.1: Puslinch Energy Consumption Compared to Baseline

Account Centre	Energy Type	2013[2]	2019	2023	% Change vs 2019	% Change vs 2013
Facilities	Natural Gas (m^3)	64,865	80,916	64,644	-20.1%	-0.3%
	Electricity (kWh)	436,220	325,050	334,981	3.1%	-23.2%
	Subtotal Energy (ekWh)[1]	1,106,275	1,160,917	1,002,753	-13.6%	-9.4%
Streetlights	Electricity (kWh)	247,386	104,891	49,335	-53.0%	-80.1%
Total Energy	**(ekWh)**	**1,353,661**	**1,265,808**	**1,052,088**	-16.9%	-22.3%
Total GHG Emissions	**(tCO2e)**	**225.5**	**167.9**	**135.7**	-19.2%	-39.8%

Note 1: ekWh (equivalent kWh) is a calculated value using Natural Gas's thermal content to convert consumption in volume units to "equivalent" kWh for comparison.

Note 2: The baseline of 2013 was selected instead of the standard 2012 because Streetlighting data was unavailable.

Table 4.1 above illustrates that the Township has reduced its overall energy use by over 22% and reduced GHG emissions by almost 40%. This is a significant achievement by the Township team.

Although the baseline year for ultimate comparison is 2013, for the purposes of this report, 2029 targets will be set against the 2023 consumption levels.

4.2. Historical Energy Breakdown

This section outlines the energy consumption picture at the Township over the last decade and provides a detailed breakdown of the current 2023 results.

Figure 4.1 below illustrates energy consumed by the Township broken down by fuel type for 2023.

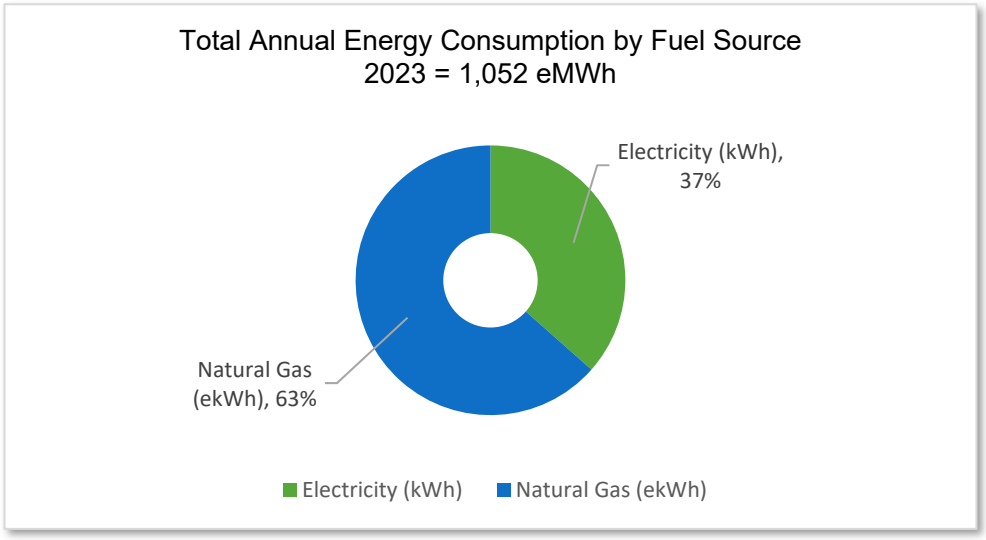

Figure 4.1: Total Township Energy Consumption Breakdown by Fuel Source 2023

Figure 4.2 below illustrates the total energy consumed (ekWh) at the Township each year between 2013 and 2023. The graph shows the significant reduction (22%) in energy consumption over the period, mainly the result of the successful change in streetlighting technology to LED.

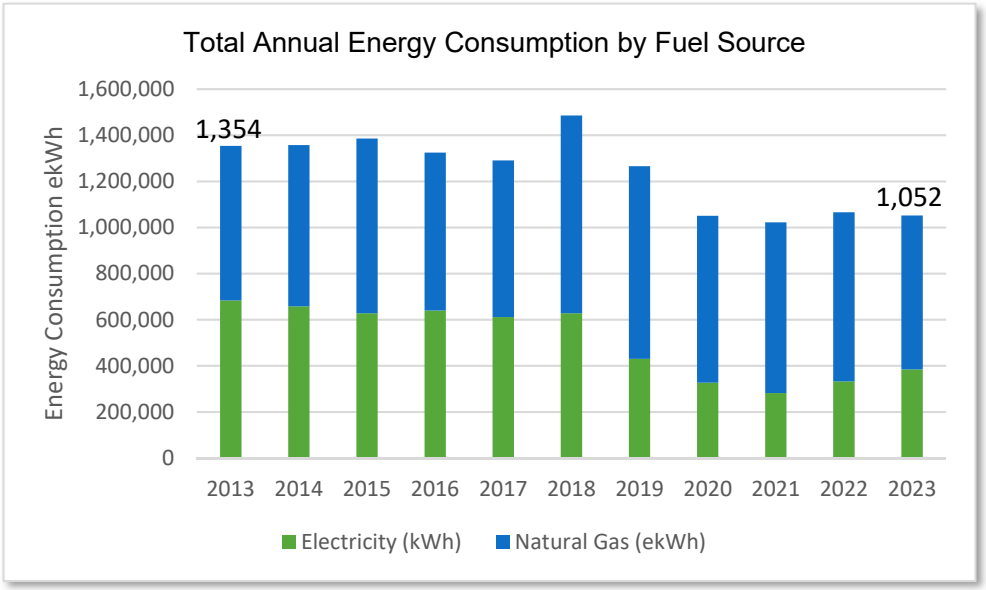

Figure 4.2: Total Annual Energy Consumption (ekWh) 2013 - 2023

Electricity:

Figure 4.3 below shows the electricity consumed in 2023 by facility, and Figure 4.4 shows consumption at the Township over time (from 2013-2023) by division. The highest electricity consumers in the Township are the Optimist Recreation Centre, the Puslinch Community Centre and the streetlights.

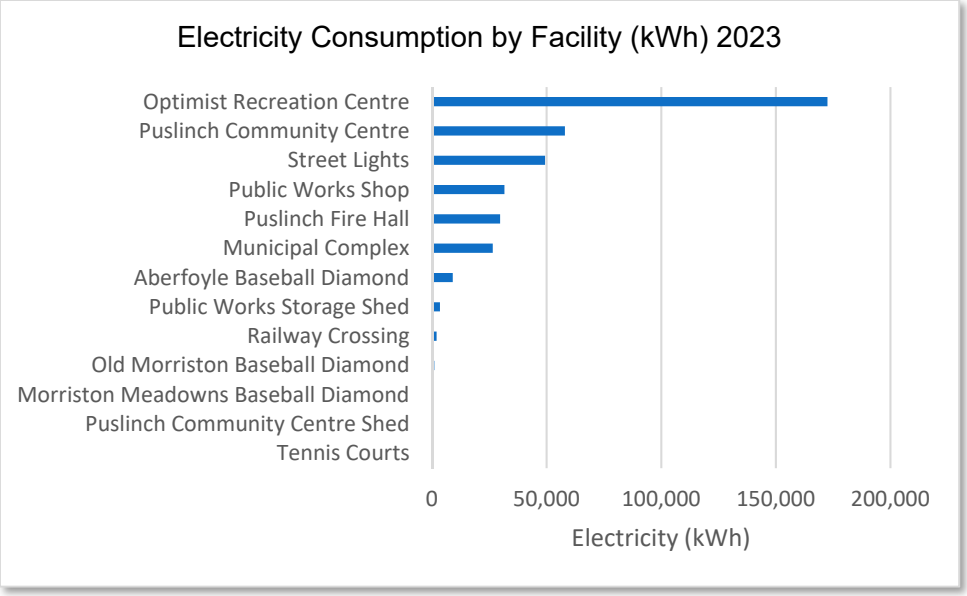

Figure 4.3 2023 Electricity Consumption by Facility

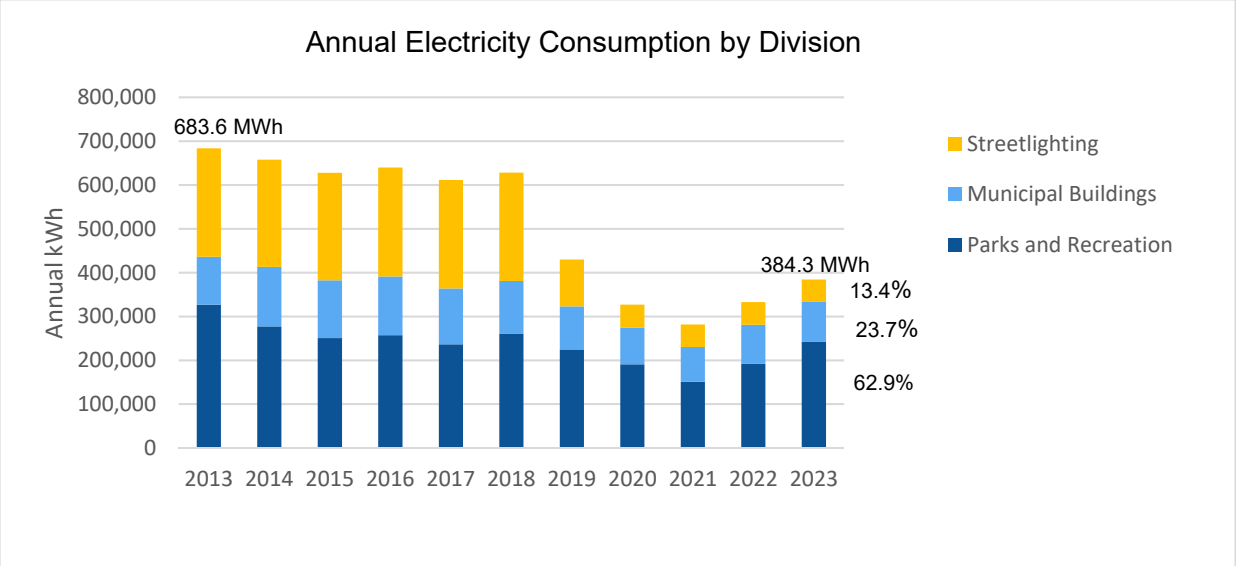

Figure 4.4 Annual Electricity Consumption by Division

Figure 4.4 above, shows a significant improvement in electricity consumption between 2013 and 2023. The 44% (300 MWh/hour) improvement was due primarily to the streetlighting upgrade to LED and the energy conservation efforts of Township staff.

Natural Gas:

Figures 4.5 and 4.6 below show the consumption of natural gas by Township facilities. The first illustration shows the natural gas consumption in order of greatest use, for 2023. The second figure trends this consumption by facility from 2013 to 2023.

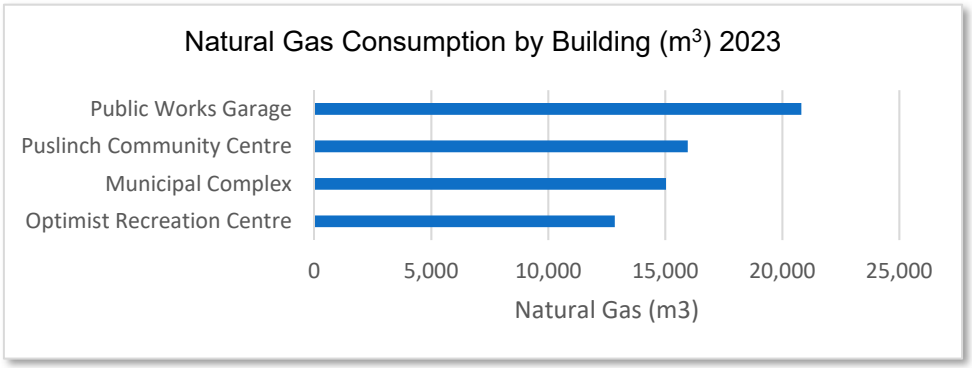

Figure 4.5 2023 Natural Gas Consumption by Facility

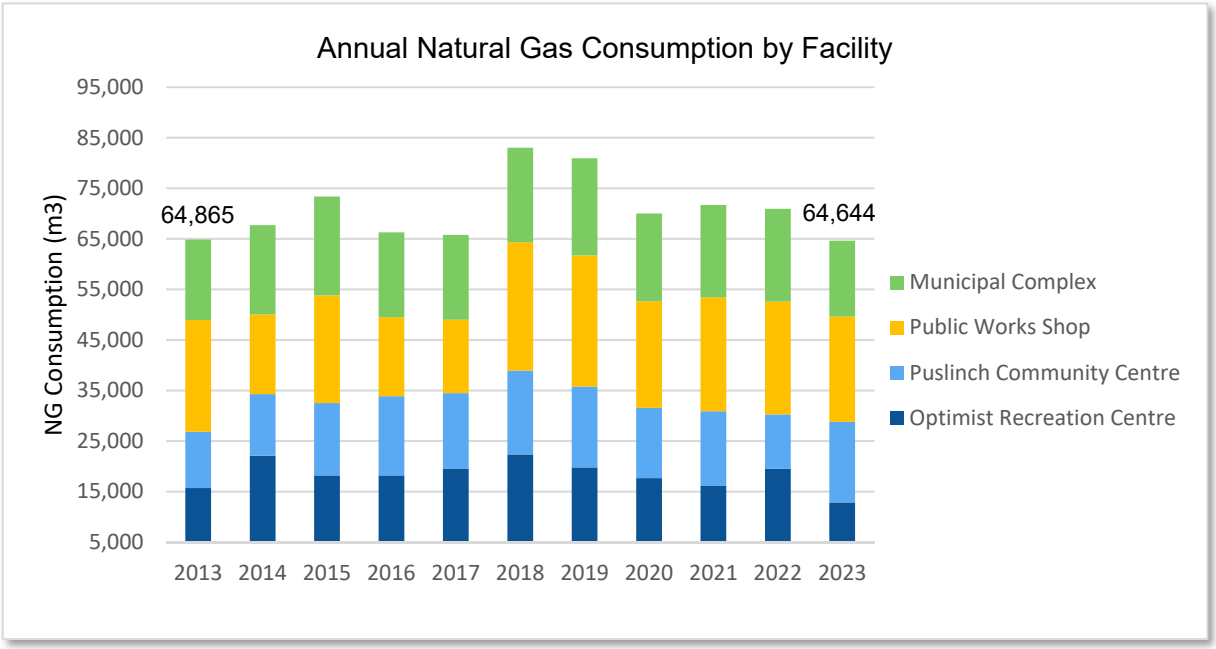

Figure 4.6 Annual Natural Gas Consumption by Facility

4.3 Carbon Emissions

The carbon footprint related to the energy used by the Township is tracked. The rate of GHG production varies by energy source and is directly affected by the emissions conversion factors and the Township consumption. Emission conversion factors used in the ECDMP were published values for Ontario and can vary year to year based on how clean the energy generation is.

The GHG emissions resulting from Township energy use are broken down by fuel source in Figure 4.7.

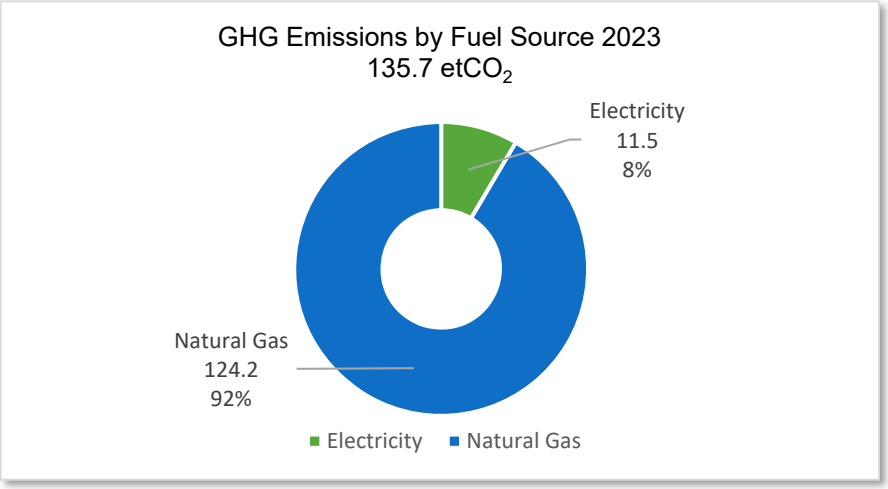

Figure 4.7 Total Annual GHG Emissions for 2023 by Energy Source

Note that although natural gas provides 63% of the total energy needs for the Township, it is responsible for 92% of the GHG emissions. It is for this reason that GHG emissions reduction plans must include a strategy for the reduction of consumption of natural gas.

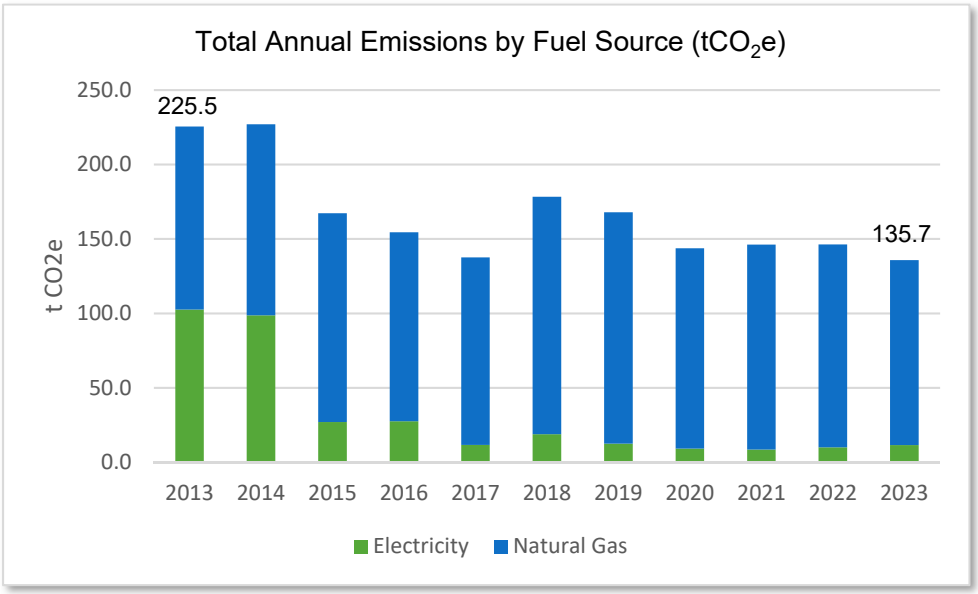

Figure 4.8 Total Annual GHG Emissions from 2013 to 2023 by Fuel Source

Figure 4.9 below lists the GHG emissions by facility for 2023. The four largest emitters are the Public Works Shop, Puslinch Community Centre, Optimist Recreation Centre and the Municipal Complex. As indicated by the previous figures, the larger GHG emission levels are due to the consumption of natural gas in these facilities.

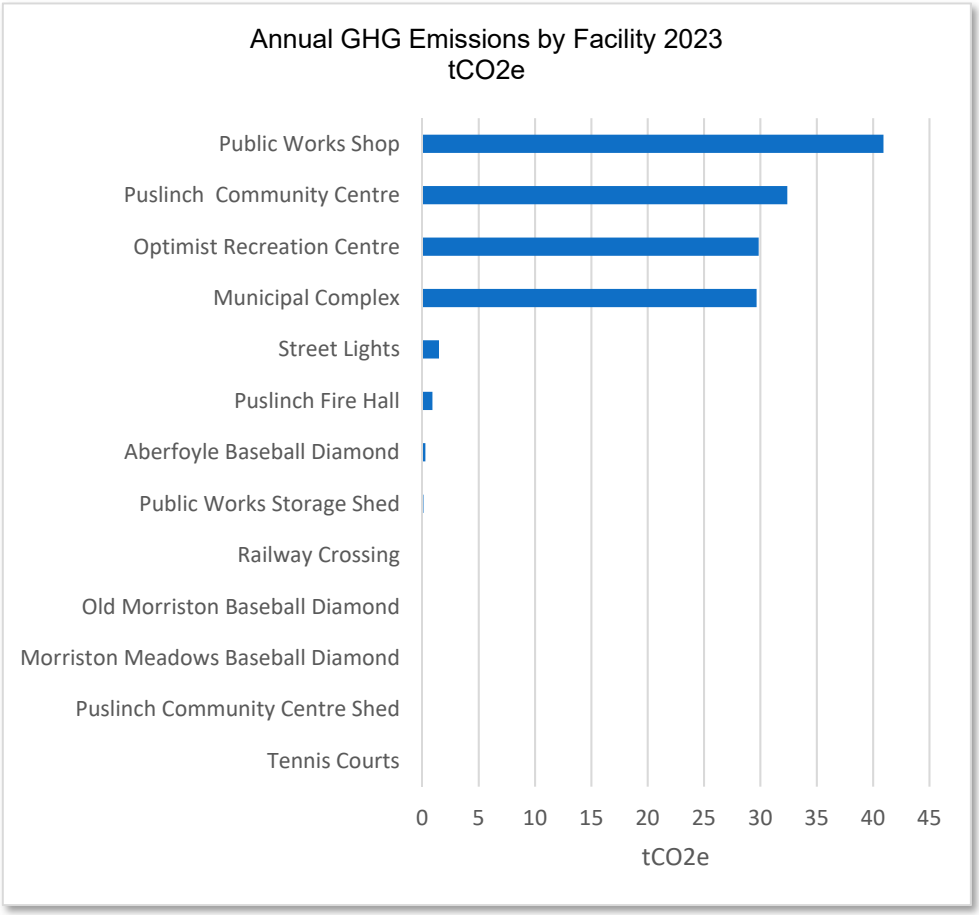

Figure 4.9 Annual GHG Emissions by Facility 2023

5. Our Conservation Successes

Township staff have been continuously delivering upgrades to facilities and processes which contribute to lower energy consumption and costs. As mentioned previously, the Township has reduced its overall energy use by over 22% and reduced GHG emissions by almost 40% in the last five years. This is a significant achievement, and the following section outlines a few of the improvements made.

One of the most significant energy conservation improvements over the last five years was the replacement of the street lighting with both decorative and standard LED lighting fixtures. This project was completed in 2019. Figure 5.1 below illustrates the significant electricity savings realized in 2020 onward compared to previous years. This improvement resulted in an 80% reduction in annual electricity consumption from street lighting.

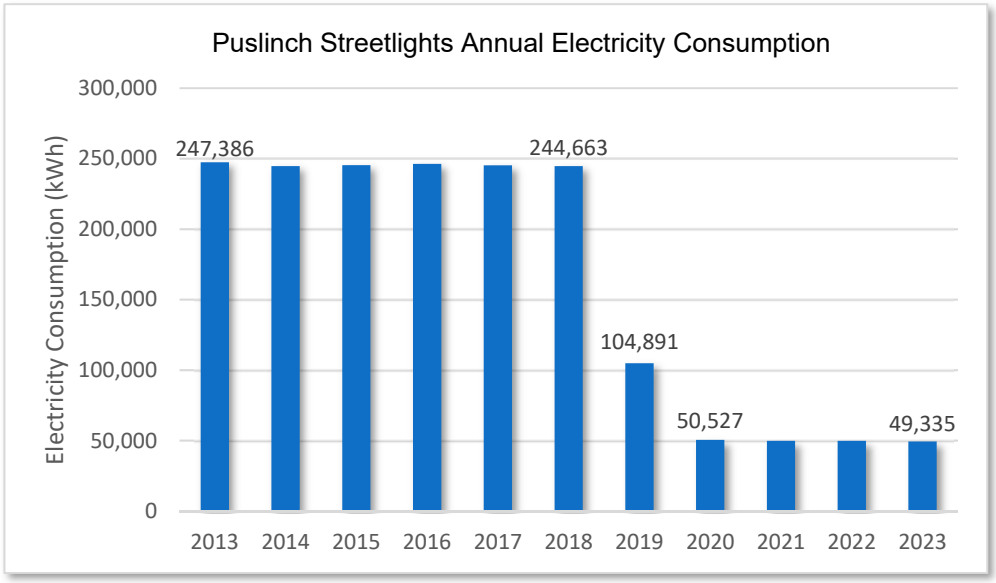

Figure 5.1: Total Annual Electricity Consumption - Streetlights

Lighting improvements were made in several other facilities:

- Puslinch Community Centre and Optimist Recreation Centre Light Fixtures to LED
- Old Morriston Baseball Diamond: Light Fixtures to LED
- Senior Soccer Field: Light Fixtures to LED

Other energy conservation of measures that were delivered in the Township include:

- Puslinch Community Centre - accessible front doors (reduced air infiltration)
- Municipal Complex upgrades (improved efficiency)
    - New condenser units
    - New John Woods boiler.
- Arena Curtains around outdoor rink (reduces the impact of solar heat gains on ice surface)

Figures 5.2, 5.3 and 5.4 below, illustrate several of the completed energy conservation upgrades.

Figure 5.2 Energy Efficient Upgrades at the Puslinch Community Centre

Figure 5.3 New Curtains at the Optimist Recreation Centre Outdoor Rink

Figure 5.4 Senior Soccer Field and Old Morriston Baseball Diamond LED Lighting Retrofit

6. Renewable Energy

The Township does not currently have significant renewable energy technologies installed nor any short-term plans to install renewable energy generation in the next few years.

The Township however has 10-15 solar powered digital and lit traffic signs throughout the Township. Figure 6.1 below are images of solar powered lit stop signs.

Figure 6.1: Stop Signs with Solar Powered Lights

7. ECDMP Action Plan

The Township has developed an ECDMP action plan which will support the achievement of the energy reduction goals outlined in Section 2. The programs and projects will build on the accomplishments of previous plans and will not only drive improvements to energy efficiency, but will help build awareness, while showing our commitment to protecting the environment for future generations.

The plan will focus on three main areas as follows:

Capital Planning – Energy Efficient Guidelines and Standards

The Township will develop an energy efficiency standard for future capital purchases covering various topics including:

- Heating systems - boilers, packaged rooftop units, heat pumps
- Refrigeration and cooling systems – space cooling, refrigerators, freezer chests
- Building Controls

Building and Operational Improvements (Upgrades)

Energy savings will be delivered through the identification and implementation of projects which reduce energy consumption across the facility portfolio. The majority of the projects fall into one of the following categories:

- Heating systems - boilers, packaged rooftop units
- Refrigeration and cooling systems – space cooling, refrigerators, freezer chests
- Air Handling
- Building Envelope
- Lighting
- Domestic Hot Water

Building and Process Controls

The Township will leverage existing building controls to optimize building performance and eliminate energy waste. Schedules and setpoints will be reviewed and optimized, and older building thermostats upgraded to provide better thermal control.

The detailed list of projects included in the ECDMP, which covers a period from July 2024 to June 2029, can be found in Appendix A.

8. Update and Review Process

As part of any energy management strategy, continuous monitoring, verification, and reporting is an essential tool to track consumption and cost savings/avoidance as a result of implemented initiatives.

The monitoring and reporting for this plan will align with the requirements of Regulation 25/23 of the Electricity Act and/or any subsequent legislation related to energy management.

Appendix A:

2024-2029 Energy Conservation and Demand Management Action Plan

Corporation of the Township of Puslinch: Energy Conservation & Demand Management Action Plan

VISION: To be as energy efficient as possible by leveraging our organization and by using new and efficient technology wherever it is cost effective to do so. We will wisely and continually seek to reduce energy consumption while maintaining an effective level of service to our customers and the general public.

TARGET: Our target is to reduce our consumption of fuels and electricity in all Township operations by 3% (31.6 eMWh) by 2029 compared to the 2023 annual energy consumption of 1,052 eMWh.

Projects and Programs						
Facility	**Strategic Focus**	**Measure Type**	**Description**	**Notes**	**Capital/ Operating Budget**	**Forecasted Timing**
All	Capital Planning	Standards	Develop energy efficient technical guidelines as part of capital design works for purchasing of heating system equipment (packaged HVAC units, boilers, fans, heat pumps (ground and air source), controls).		Capital	Ongoing
All	Capital Planning	Standards	Study the feasibility of purchasing hybrid vehicles for Township fleet. Review criteria on a case-by-case basis.		Operating	Ongoing
Various	Investigation	Building Envelope	Take thermal infrared (IR) images of all outer facility walls to help identify infiltration and thermal bridging issues		Operating	2025
Optimist Rec Centre	Controls	HVAC	Upgrade gym thermostat and move from back utility room to main space		Operating	2025
Optimist Rec Centre	Upgrade	HVAC	Install destratification fans in gymnasium		Capital	2027
Optimist Rec Centre	Upgrade	Rink	Investigate the possibility of adding a heat reclaim system for the rink compressors: heat could be used for change rooms or other spaces.		Capital	2027
Optimist Rec Centre	Operations	Rink	Review water quantity needed per flood. Fill ice resurfacer with only what is required avoiding unnecessary water heating.		Operating	Ongoing
Public Works Shed	Controls	Heating	Upgrade thermostats on unit heaters with programmable models. Program temperature setbacks for space heating during unoccupied periods.		Operating	2025
Public Works Shed	Upgrade	Lighting	Upgrade interior fluorescent lighting to LED.	Note 1	Capital	2025
Public Works Shop	Upgrade	Lighting	Upgrade interior fluorescent lighting to LED.	Note 1	Capital	2025

Facility	Strategic Focus	Measure Type	Description	Notes	Capital/ Operating Budget	Forecasted Timing
Public Works Shop	Upgrade	Building Envelope	Replace/maintain weather stripping on roll up doors as required.		Operating	2026
Public Works Shop	Controls	HVAC	Replace older thermostats with programmable models. Program temperature setbacks for space heating during unoccupied periods.	Note 1	Operating	2025
Public Works Shop	Controls	HVAC	Install interlocks between bay doors and ceiling heating units (infrared (IR) heaters) to prevent heaters from running when bay doors are open.	Note 1	Capital	2025
Public Works Shop	Upgrade	Building Envelope	Replace exterior door in shop with insulated version to reduce infiltration and heat transfer.	Note 1	Capital	2025
Township Office	Upgrade	Building Envelope	Upgrade exterior windows and doors to reduce heat transfer and infiltration.	Note 1	Capital	2025
Township Office	Upgrade	Heating	Replace plug in floor heaters with low wattage radiant panel heaters.	Note 1	Capital	2025
Township Office	Upgrade	Lighting	Upgrade interior fluorescent lighting to LED and add motion sensors.	Note 1	Capital	2025
Township Office	Upgrade	Building Envelope	Consider installing air curtain on front doors of office to reduce infiltration.	Note 1	Capital	2025
Township Office	Upgrade	Building Envelope	Replace windows and doors	Note 1	Capital	2025
Township Office	Upgrade	Building Envelope	Inspect and improve wall and roof insulation as required	Note 1	Capital	2025
Township Office	Upgrade	HVAC	HVAC system upgrade	Note 1	Capital	2025
Puslinch Community Centre	Upgrade	Building Envelope	Upgrade exterior windows and doors to reduce heat transfer and infiltration.		Capital	2025
Puslinch Community Centre	Upgrade	Lighting	Upgrade parking lot light fixtures		Capital	2024
Puslinch Community Centre	Controls	HVAC	Investigate enhanced thermostats control which allow automatic return to temperature setpoints		Operating	2025
Fire Hall	Upgrade	Building Envelope	Review and maintain weather stripping and sealing around exterior person doors as necessary in bay area, and around building.		Operating	2026
Fire Hall	Controls	Heating	Replace older thermostats on bay radiant natural gas heaters with programmable. Program temperature setback for space heating during unoccupied periods.		Operating	2025

Facility	Strategic Focus	Measure Type	Description	Notes	Capital/ Operating Budget	Forecasted Timing
Fire Hall	Controls	HVAC	Ensure that temperature setbacks have been programmed for unoccupied periods in office area using existing thermostat.		Operating	2025
Fire Hall	Upgrade	Lighting	Convert existing fluorescent fixtures in bay area to LED.	Note 1	Capital	2025
Fire Hall	Upgrade	Lighting	Convert existing fluorescent fixtures in office/kitchen/common areas to LED.	Note 1	Capital	2025

Note 1: Project to be completed with the Municipal Administration and Operations Facility renovation.