



Energy Conservation and Demand Management Plan

2024-2029

June 25, 2024 (Draft R2)

Township of Warwick



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1.0 Overview

In 2014, the Township of Warwick (Township) developed a 5-year Conservation and Demand Management (CDM) Plan in compliance with the requirements of *Ontario Regulation 397/11* under the *Green Energy Act, 2009*. This regulation was replaced with *Ontario Regulation 507/18 in 2018*, and recently with *Ontario Regulation 25/23* in 2023 under the *Electricity Act, 1998*. The Township updated the CDM plan in 2019, under regulation 507/18.

Under *Ontario Regulation 25/23*, the requirements for broader public sector energy planning and reporting are identical to those under the former *Ontario Regulation 397/11* and *507/18*.

Under *Ontario Regulation 25/23*, all BPS organizations, including municipalities and townships, are required to report annually on energy use and greenhouse gas (GHG) emissions. The organizations are also required to develop a CDM plan and update it every five years, with the first update posted July 1, 2019. This document is the second update, which is required by July 1st 2024.

Ontario Regulation 25/23 requires public agencies to:

- Report annually on energy use and GHG emissions.
- Develop five-year energy CDM plans starting July 1, 2014 with the current update due July 1, 2024.
- Post annual reports and 5-year plans to the agency's website and make printed versions available for the public.

The Township of Warwick retained the Ontario Clean Water Agency (OCWA) to build on the existing CDM Plan, incorporating the experiences gained and results in energy conservation over the last five years. This updated CDM plan was developed as per the regulation and guidelines provided by Ministry of Energy and covers the period of 2019 to 2024. The plan was presented to the council and approved on July 8, 2024.

There are significant advantages to developing and implementing a CDM Plan. The lowest cost options for meeting energy demands could be to implement simple energy efficiency measures. Simple actions of turning off lights and appliances, shutting off heaters in the summer and establishing efficient usage times, efficient production requirement, and many other **actions can result in energy savings, while providing many other environmental, economic and social benefits, including reducing GHG emissions.** Reducing energy consumption translates to reducing costs incurred by municipalities and the savings could be directed to more important issues in the municipalities.

The Township seeks to incorporate energy efficiency throughout all of its activities to minimize the fiscal impact of energy on operating costs and its related environmental impacts. The requirements of Regulation 25/23 of the Electricity Act specify that the plan is to cover only municipal owned or leased heated/cooled facilities and facilities related to treatment of water or sewage. Streetlights were included as they were identified in the original CDM plan and consume a significant amount of energy. The full list of the Township’s facilities included in the CDM plan can be found in Table 1.

Table 1: Warwick Facilities and Infrastructure within the Boundaries of this Plan

Name	Address	Use	Area (sq. ft.)
FACILITIES			
Watford Sewage Lagoons	7716 Churchill LineRR #5	Facilities related to the pumping of water	
Watford Public Library	5317 Nauvoo Road	Public libraries	3,420
Pump Station	311 St. Clair Street	Facilities related to the pumping of water	
Warwick Community Centre & Warwick Fire Hall	7074 Egremont Road	Fire stations and associated offices and facilities	5,658
Warwick Park	6889 Egremont Road	Community Centre	3,212
Warwick Public Works Garage	6332 Nauvoo Road	Storage facilities where equipment or vehicles are maintained, repaired or stored	8,100
East Lambton Community Complex ¹	61 Centennial Avenue	Community centres	74,370
Watford Centennial Hall ²	101 Centennial Street	Community centres	10,080
Watford Fire Department	520 Ontario Street	Fire stations and associated offices and facilities	7,162
Watford Museum/Old Fire Hall	515 Ontario Street	Cultural facilities	2,988

Watford Roads Garage	7923 Confederation Line	Storage facilities where equipment or vehicles are maintained, repaired or stored	2,890
Street Lighting	-	Street lighting	
Centennial Park	97 Centennial Ave	Parks	
Sunken Garden	5365 Nauvoo Road	Parks	
Sunset Park	48 Sunset Ave	Parks	
Municipal Office (Leased) ³	5280 Nauvoo Road	Administrative offices and related facilities, including municipal council chambers	7,424
Parking Lot (by new Municipal Office) ⁴	501 Front Street	Parking Lot	
Zion Line Booster Pumping Station ⁵	8183 Zion Line	Facilities related to the pumping of water	258
Notes:			
<ol style="list-style-type: none"> 1. Watford Arena was expanded to East Lambton Community Complex (ELCC) in October 2022 (increase of floor area from 34,489 sq. ft. to 74,370 sq. ft.) 2. Watford Centennial Hall was demolished in November 2022 3. New leased downtown office online starting April 2022 4. New parking lot online starting December 2019 5. New water booster pumping station operational starting January 2019 			

There have been removals, additions and modifications of existing facilities at Warwick noted in the table above. The total floor area of the largest energy consuming facility, Watford Arena, more than doubled in size due to the expansion to the East Lambton Community Complex (ELCC) in late 2022. Subsequently, the 1967 Watford Centennial Hall was decommissioned in late 2022 due to reaching the end-of-life. Components of this facility were included in the newly renovated and expanded ELCC. A new-leased municipal office was included in the Township’s operating costs starting April 2022. In 2019, the new booster pumping station came online near the intersection of Zion Line and Power Road to provide adequate distribution pressure to rural areas of the Township. The changes to the facilities in Warwick has increased the combined operated facility floor area by about 48,000 sq. ft. from the 2012 baseline. This has resulted in an increase of energy consumption and will have to be accounted for in future CDM plans.

The intent of the CDM Plan is to provide a basis for the Township to implement improvements to its infrastructure and operations that reduce energy use, their associated costs, as well as environmental effects of the Township’s activities. It is a living document that will evolve with

the Township’s energy needs. The CDM Plan should be consistent with other existing planning documents that relate to energy conservation. The updated CDM Plan will outline the following:

- Warwick's Strategic Plan and Corporate Energy Conservation Goals
- Completed Energy Efficiency Projects to Date
- Current and Historical Energy Results
- Renewable Energy
- Plan Implementation
- Monitoring and Evaluation
- Future Measures to Implement (2024 - 2029)

2.0 Warwick's Strategic Plan and Corporate Energy Conservation Goals

The Six Strategic Pillars

The Township has a refreshed Strategic Plan (2023-2026) that is built on six strategic pillars. This represents the Township's commitment to fostering a thriving community through the facilitation of economic development, being a strong communicator, developing strategic intergovernmental relationships, improving & sustaining municipal infrastructure, responsible financial stewardship, and environmental stewardship.



Energy Conservation Goals

To support improving and sustaining infrastructure, the Township's goal is to reduce energy consumption in public and recreational facilities by 2% annually. This same target was established in the original 2014 CDM plan and carried over in the 2019 update. This target was achieved in the 2014-2019 as indicated in the 2019 CDM plan. However for the 2024 CDM plan update; there have been significant facility additions, which has caused an increased in the total annual energy consumption.

The Township of Warwick will allocate the necessary resources to implement the Energy Conservation and Demand Management (CDM) Plan as required under *Ontario Regulation 25/23* of the *Electricity Act*.

Council is committed to energy conservation and planning and will allocate resources to update the plan as required. Staff and council will strive to achieve the objectives presented in this plan and monitor progress on an ongoing basis. Staff and council will update the plan as required under *Regulation 25/23* of the *Electricity Act* or any subsequent legislation.

3.0 Completed Energy Efficiency Projects to Date

The Township has completed a number of energy conservation projects from 2014 - 2023 which have contributed significantly to the control of energy consumption and costs. Ongoing efforts have resulted in reduction of 24% total energy (ekWh) from 2012 to 2021. With the inclusion of the expanded ELCC and new-leased municipal office in 2022, total energy consumption has increased by 26% in 2023 compared to the 2012 baseline. The ELCC addition to the Watford Arena is the driving factor for the increase in energy consumption, which comes at a trade-off for providing a larger accessible facility for the Township and neighboring Lambton County communities.

A list of completed energy conservation measures completed to date and from 2019 – 2024 can be found in Table 2 below. The list illustrates the Township's leadership and commitment to actively manage energy consumption.

Table 2: Completed Energy Conservation Projects

Facility	Project	Timeline	Details
Streetlights	Lighting	Completed from 2015 to 2019.	LED streetlights upgrade through Warwick and Watford. Verified annual energy savings of approximately 130,000 kWh in 2018.
Pavilion & Ball Diamond	Lighting	Completed in June 2017.	LED lighting upgrades.
Watford Centennial Hall	Lighting	Completed in June 2017.	LED lighting upgrades.
Watford Roads Garage	Lighting	Completed in August 2018.	LED lighting & occupancy sensor.
Watford Public Library	Heating	Completed in June 2018.	Installed smart thermostat.
Watford Sewage Lagoons	Aeration Upgrades	Completed in October 2018.	Install Variable Frequency Drives (VFDs) on four mechanical surface aerator motors. Verified annual energy savings of approximately 200,000 kWh.
Warwick Roads Garage	Building Envelope	Completed in May 2019.	New overhead doors.
Watford Roads Garage	Building Envelope	Completed in November 2019.	New windows.
Watford Centennial Hall	Building Envelope	Completed in March 2020.	Replaced older roof to secure building envelope.
Watford Roads Garage	Building Envelope	Completed in June 2020.	New overhead doors.
Watford Park	Lighting	Completed in September 2020.	New ball diamond and LED lights.
Watford Arena	Ice plant	Completed in October 2021.	Ice plant optimization.
Watford Arena	Lighting	Completed in August 2022.	Replaced lights over ice surface with LED lights.

Watford Arena/ELCC	Lighting	Completed in August 2022/October 2022.	Installed occupancy sensors for all lights.
New leased Municipal Office	Lighting /HVAC	Completed in April 2022.	Light occupancy sensors, efficient HVAC, energy efficient building etc.
Nauvoo and Ontario Crosswalk flashing lights	Lighting	Completed in May 2022.	Installed new solar powered flashing crosswalk lights.
Watford Sewage Lagoons	Aeration Upgrades	Pilot Project commenced in August 2023.	Implement more energy efficient IPEX double vortex aerators in place of mechanical surface aerators. (One unit installed, project ongoing to early 2024).

4.0 Current and Historical Energy Results

This section reviews the current and historical Warwick facility energy usage. Electricity, propane and natural gas consumption was obtained from annual Energy Consumption and Greenhouse Gas Emissions Reporting spreadsheets, and summarized energy data provided by the Township. A summary of the annual energy consumption for the past 5-years (2019 – 2023) and the baseline year of 2012 is displayed in Table 3. The annual natural gas and propane consumption was converted to equivalent energy (ekWh) to determine the total energy usage. In 2012 (baseline year), the Township consumed approximately 2,000 eMWh (7,233 eGJ) of total energy. This was significantly reduced in 2021, but increased due to facility additions/expansions.

Table 3: Baseline and recent 5-year energy consumption for Warwick facilities

Year	Electricity (kWh)	Natural Gas (m ³)	Propane (L)	Total Energy (ekWh)
2012	1,185,080	65,435	20,264	2,006,774
2019	1,045,536	80,456	27,341	2,073,049
2020	844,552	69,676	21,377	1,718,082
2021	705,506	64,596	22,567	1,534,835
2022	973,287	62,002	26,390	1,802,839
2023	1,232,905	109,628	21,254	2,519,539

As indicated in Table 3, Warwick has achieved an impressive 24% reduction in energy consumption over the period of 2012 to 2021. Figure 1 displays the recent 5-year annual energy consumption by all Warwick facility’s for this CDM plan. The graph shows a steady decline in energy consumption up to 2021, followed by a significant increase primarily due to the expansions of the Watford Arena with the ELCC.

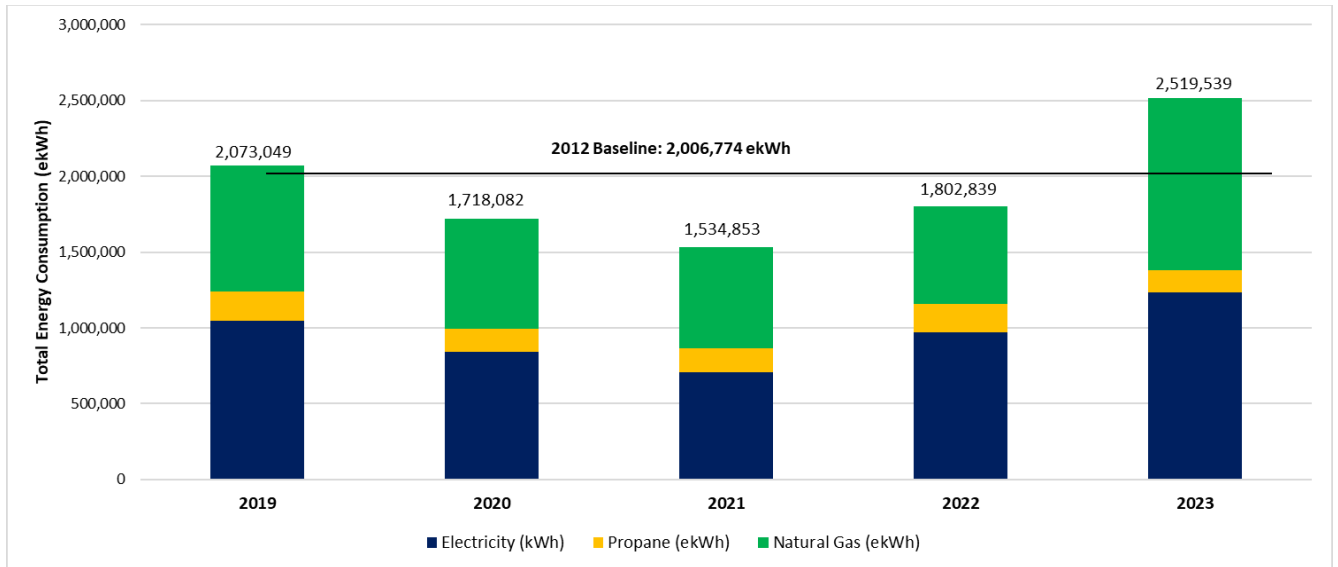


Figure 1: Total Annual Energy Consumption (ekWh) for all Reported Warwick Facilities (2019 – 2023)

Figure 2 illustrates that the Township facilities rely primarily on electricity and natural gas for energy and heating. Propane is used at the Warwick Community Centre/Fire Hall and the Warwick Public Works Garage. The Township is currently implementing service upgrades at the Warwick Public Works Garage from propane to natural gas. Natural gas is both less expensive and produces close to 20% less greenhouse gases (GHG) per BTU than propane when combusted. Council has approved natural gas line expansion to service the Warwick Roads Garage, which is anticipated to be completed in the fall of 2024.

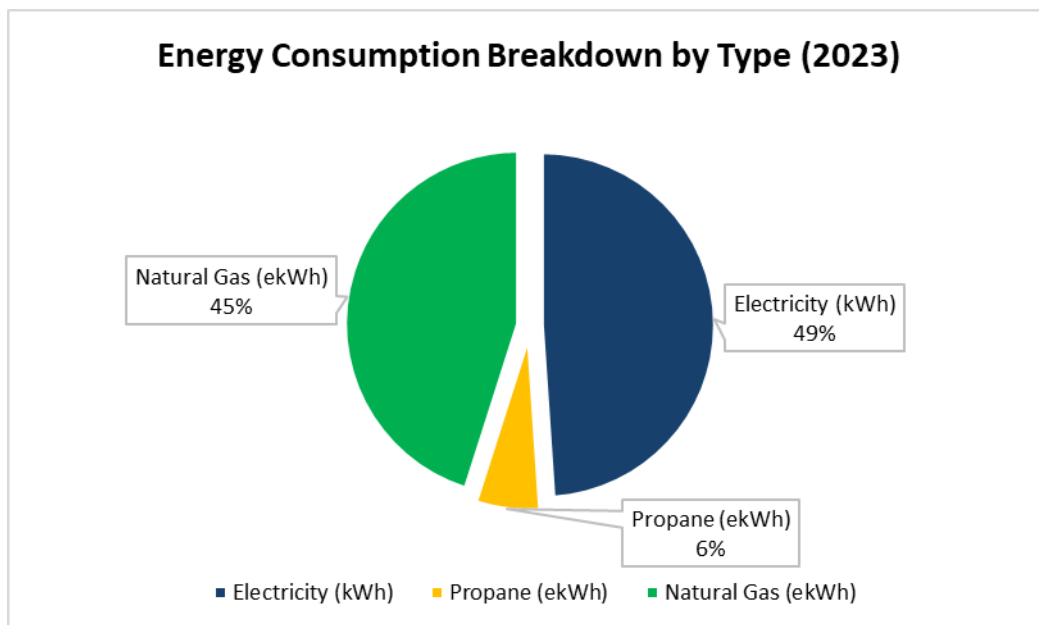


Figure 2: Energy Consumption Breakdown by Fuel Type (2021)

Figure 3 shows the energy consumption in 2023 by building type. Community Centres consumes the most energy (ekWh). This is followed by the fire stations and associated offices and facilities, primarily due to significant amounts of natural gas and propane being consumed. This is evident when reviewing Figure 4. In terms of electricity consumption (kWh) alone, the ELCC and water/wastewater treatment facilities and pumping stations are the highest consumers.

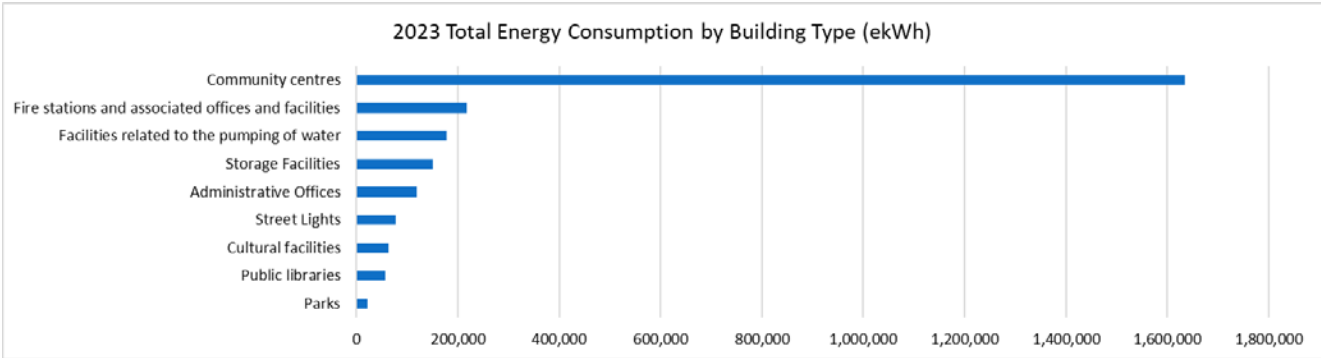


Figure 3: 2023 Total Energy Consumption (ekWh) by Building Type

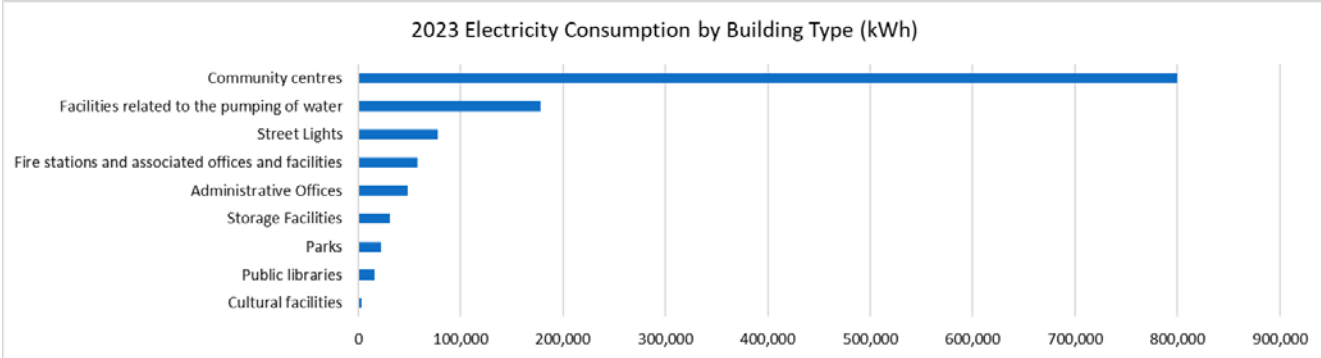


Figure 4: 2023 Electricity Consumption (kWh) by Building Type

Figure 5 breaks down the annual energy consumption for all Warwick facilities in 2012 (baseline year), 2019 and 2023. The highest energy consumer, by a significant amount, is the newly expanded ELCC/Watford Arena. The ELCC addition replaces the former Watford Centennial Hall, which served as a community hall to residents of Warwick Township for over 50 years. In 2023, the ELCC is responsible for 65% of the Township’s total energy consumption. This facility offers various sports, recreation, and leisure activities year-round and is one of the central hubs that brings residents together.

Due to the significant upgrades to the ELCC/Watford Arena and facility additions (new leased office, new booster pumping station etc.), it is recommended to use 2023 as the new baseline when assessing energy savings in the next CDM plan update in 2029 (reviews results from 2024 – 2028). The energy conservation target will remain as 2% per year, which aligns with the Township’s strategic plan.

The expanded ELCC was designed with energy efficiency and sustainability in mind. There are solar panels installed on the roof to offset energy costs for water heating. The building is equipped with energy efficient lighting, a building automation system (BAS), a cool roof etc. Despite the overall increase in energy consumption due to expansion, the new ELCC operates more efficiently. The average electricity consumption per square foot from 2012 to 2020 was approximately 14.8 kWh/sq. ft. This has been reduced to an average of 9.35 kWh/sq. ft. from 2021 to 2023.

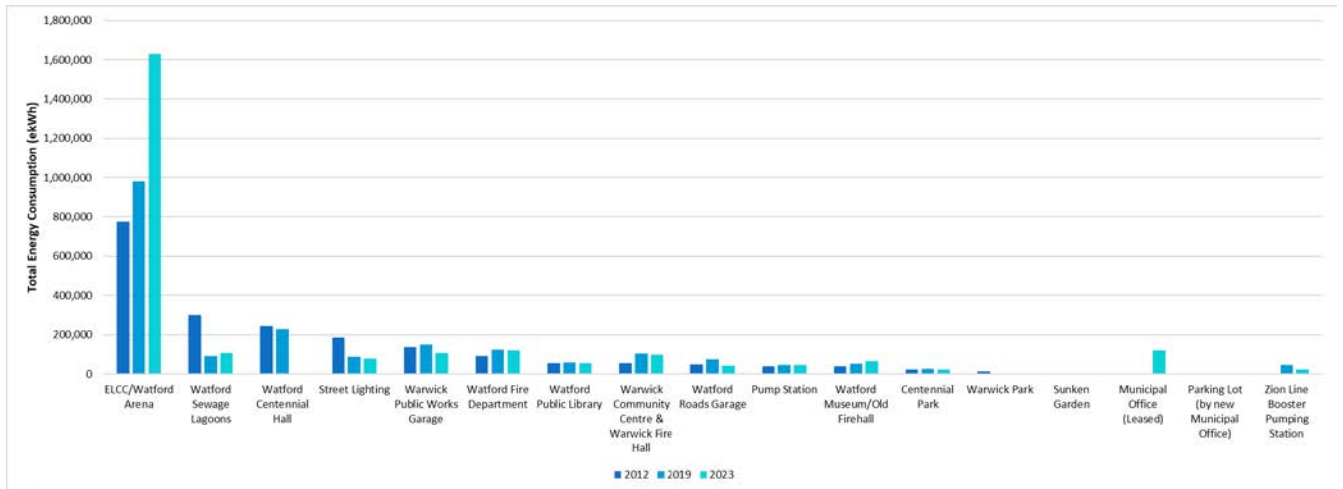


Figure 5: Annual Energy Consumption for Warwick Facilities (2019 – 2023)

The Watford Sewage Lagoons saw a significant decrease in energy consumption since 2012 (over 50%) by utilizing VFDs on the mechanical surface aerator motors in late 2018. In August 2023, the IPEX Vortex Aerator pilot program commenced where one unit was installed into the lagoon. The mechanical surface aerators are intended to be replaced with IPEX double vortex aerators through this pilot study. These units provide aeration to the lagoon much more efficiently and further energy savings are expected. In February 2024, two more IPEX units were installed in the lagoon. The exiting VFDs are utilized on the motors of the new IPEX units.

Various streetlights in the Warwick and Watford area have been upgraded to energy efficient LED lighting. This has resulted in actual annual energy savings of over 100 MWh since 2012.

There are several older facilities that were constructed from 1885 to 1982 such as the Watford Roads Garage, Watford Museum/Old Fire Hall, Warwick Public Works Garage, Warwick Fire Station etc. It is important to maintain the structural integrity of the buildings and their components. Compromise to the building envelope will lead to increased energy usage and costs to provide heating. In 2019, the Township completed facility condition assessments and

identified improvements in their long-term capital budget. The next condition assessment is planned for 2024 and will include a climate change component for all facilities.

5.0 Renewable Energy

Renewable Energy Utilized or Planned:

Renewable energy is generated from natural sources such as sunlight, wind, and geothermal heat. Currently the Township has implemented a rooftop solar water heating system at the new ELCC. The solar panels were commissioned in March 2023. The system is designed as a preheat for the conventional water heating system to offset the energy requirement for heating domestic water.

The roof at the ELCC was constructed to support additional solar panel loads. At the time of construction in 2021/2022, grid capacity and grants were not available to support the additional solar panel installation. Implementation of additional solar panels at the ELCC is a potential future project.

Besides additional rooftop solar panels at the ELCC, the Township does not currently have any plans for other new renewable energy generation for 2024 – 2029 at this time.

6.0 Plan Implementation

Ontario Regulation 25/23 promotes increased municipal energy management and engagement. The main driver for municipalities to change the way energy is used relates to fiscal benefits and financial incentives. Energy is a manageable input to the business process, much like any other resource cost. Warwick is maintaining and developing current and planned services that continue to be affordable to taxpayers.

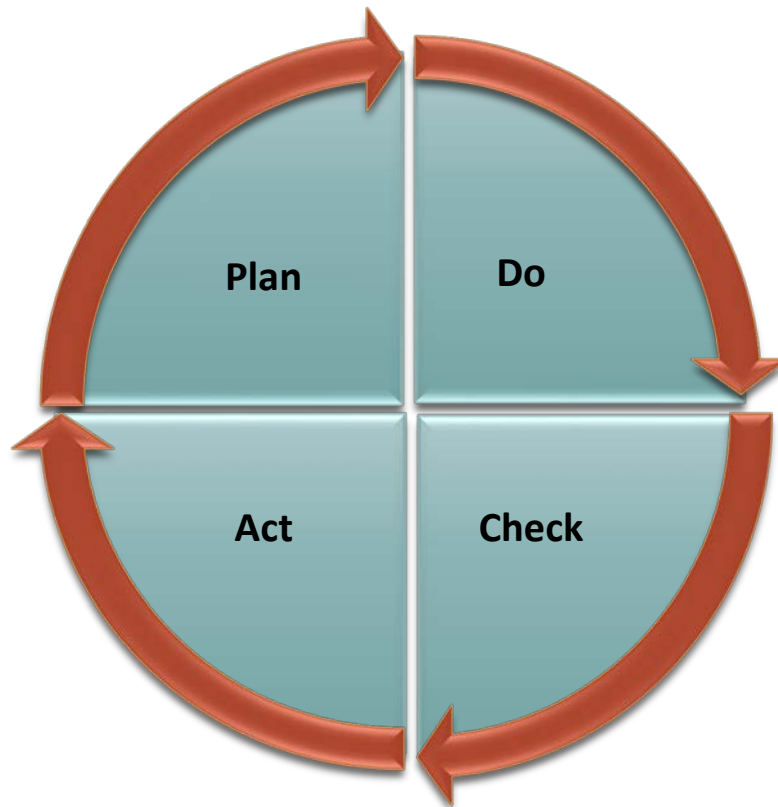
This CDM Plan provides the “big picture” view as an ongoing framework for optimizing overall energy use and achieving success.

Current practices must be enhanced and new approaches must be developed. To meet these needs, the Township will consider designing a comprehensive program for collecting and analyzing monthly energy billing information, and ensuring that staff is informed about energy consumption. The resulting energy costs and consumption database will be used to monitor excessive variations, target facility follow-up assessments, and determine areas that could be

candidates for improved conservation. These monitoring enhancements will improve Warwick’s understanding of the bottom line impact of energy management.

In order to establish a baseline for managing energy costs, the Township has captured information critical to energy management planning. This formalizes the process involved in understanding the relative magnitude of energy costs, the possible ways to reduce energy use, energy targets that are likely to be achievable, and other associated activities that need to occur.

CDM Planning is intended to be a process of “continuous improvement.” The Township follows *NRCAN, ISO 50001*’s four step plan–do–check–act management methodology, used in business for the control and continuous improvement of processes.



PLAN

Establish the energy conservation objectives and processes necessary to deliver results in accordance with the expected outputs: the energy conservation targets or goals. Start on a small scale to test possible effects and financial feasibility. Develop an Energy Conservation Demand Management Plan prioritizing budgets, resources, and timelines.

DO

Implement the plan and collect data for analysis in the following "CHECK" and "ACT" steps. Develop projects' design and execution, preparing status reports, and implementing the communication strategy.

CHECK

Study the actual results (measured and collected in "DO" above) and compare against the expected results (targets or goals from the "PLAN") to ascertain any differences. Evaluate any deviations in implementation from the plan and evaluate the appropriateness and completeness of the plan to enable the execution, i.e., "Do".

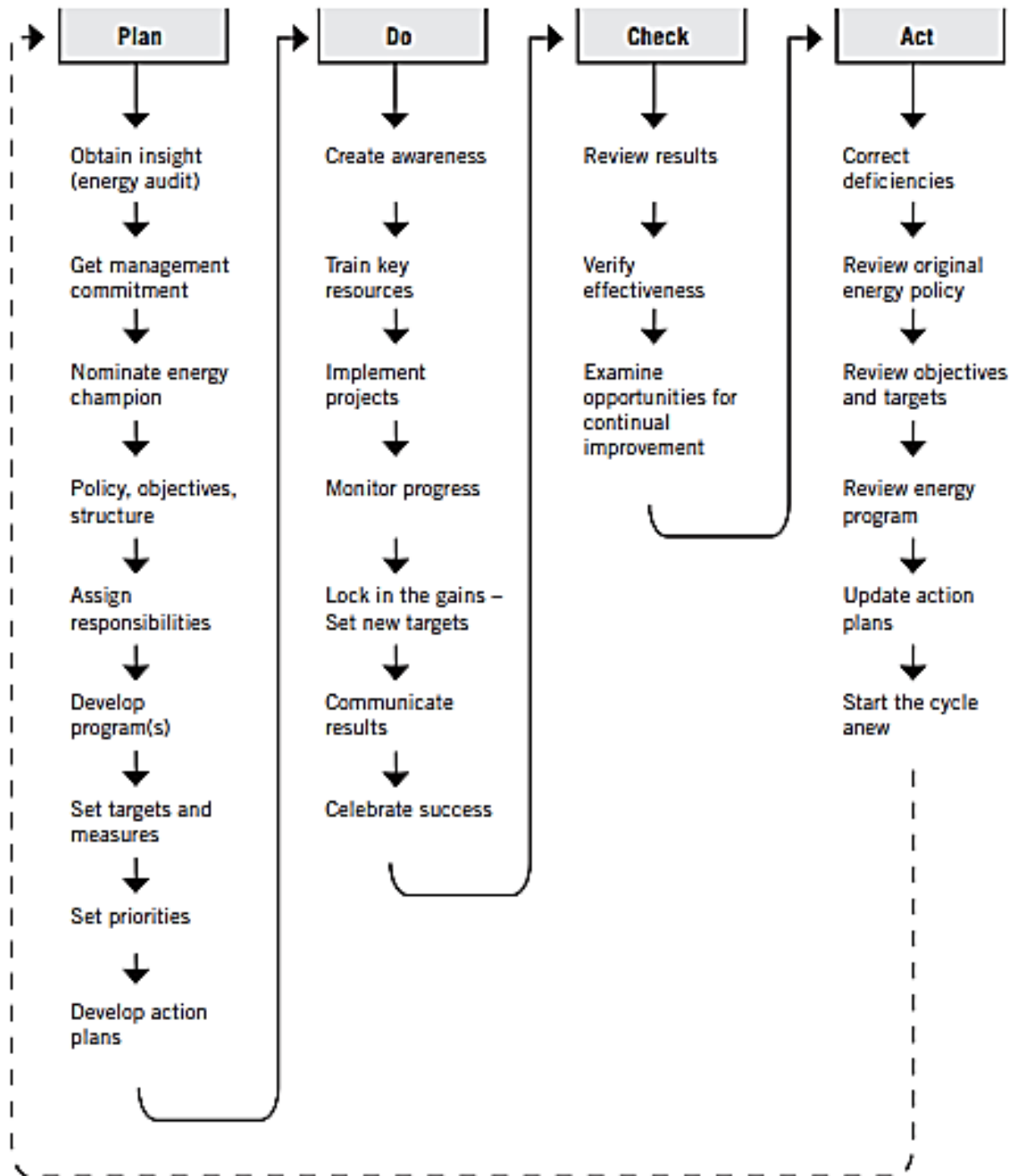
ACT

Recommend improvements and adjustments to the initial plan; determine the course of corrections and modifications to the plan.

The Township implements tools to maintain and continually improve energy conservation and demand management. Benchmarking is the process that the Township has implemented for collecting, analyzing and relating energy performance data of comparable activities to evaluate and compare performance between or within entities.

The detailed energy conservation project planning process is visually illustrated below.

Energy Conservation Project Planning Process¹



© Lam & Associates Inc., 2000

¹ Energy Efficiency Planning and Management Guide, CIPEC, 2002

7.0 Monitoring and Evaluation

We will review and evaluate our energy plan, revising and updating it as necessary, on an annual basis within our corporate planning process.

Annual Energy and GHG Emissions Reporting and Five-Year Plan Update

Ontario Regulation 25/23 requires that the Township of Warwick report on the results of the CDM Plan at the end of the five-year planning period. As in this update, in the next update due in 2029, the Township of Warwick will provide an update to include any revisions to the current CDM Plan. The Township of Warwick has submitted and published all of its annual Energy and Greenhouse Emission Reports and will continue to do so annually until the next CDM update. At that time, the revised Plan will provide:

- A description of current and proposed measures for conserving and otherwise reducing energy consumption and managing its demand for energy;
- A revised forecast of the expected results of the current and proposed measures;
- A report of the actual results achieved;
- A description of any proposed changes to be made to assist the Township in reaching any targets it has established or forecasts it has made; and
- Any additional Council initiatives geared at achieving or establishing new targets.

8.0 Future Measures to Implement (2024 – 2029)

A critical part of any plan is the detailed list of specific actions needed to achieve the desired goals and objectives. The Township of Warwick has developed a list of key projects, which will help meet the energy reduction goals set out in our Strategic Plan (see Section 2.0). As discussed in Section 4.0, it is recommended to use 2023 as the new baseline year due to the facility changes at Warwick.

The following is a list of future planned energy conservation measures and considerations to be implemented from 2024 – 2029:

Table 4: Warwick Future Measures to Implement (2024 – 2029)

No.	Facility	Project	Details	Timeline
1	Across Organization	Monitoring and Evaluation	Annual review and evaluation of energy plan. On an annual basis, review energy consumption of all facilities, consolidate data and review trends in usage. Review status of identified energy projects for the next 5-years and update if any new projects are identified.	Annual Basis
2	Across Organization	Condition Assessment	Facility condition assessment of all municipal facilities to recommend improvements. Report will include a climate change lens and inform long-term capital planning.	Planned for in 2024
3	Warwick Park	Lighting	Warwick ball diamond light replacements.	Planned for in 2024
4	Watford Roads Garage	Building Envelope	New roof at Watford shop for building envelope improvements.	Planned for in 2024
5	Watford Roads Garage	Heating	Implementation of smart meter at Watford Shop.	Planned for in 2024.
6	Watford Museum/Old Fire Hall	Building Envelope	Building envelope improvements for Watford Museum/Old Fire Hall.	Planned for 2024/2025
7	Watford Library	Lighting	Lighting upgrades at basement of Watford Library.	Planned for 2024
8	Various	Heating	Install smart thermostat in various buildings as deemed fit.	2024 – 2029
9	Warwick Roads Garage	Heating	Complete conversion at the Warwick Roads Garage from propane to natural gas.	Planned for completion in Fall 2024
10	ELCC	Rooftop solar water heating system	Additional solar panel installation at the ELCC for water heating.	Explore implementation in 2024 – 2029
11	Watford Sewage Lagoons	Aeration Upgrades	Installation of two more IPEX vortex aerators via pilot program in the Watford Sewage Lagoon (total of three), replacing four mechanical surface aerators. The existing VFDs will be utilized on the motors of the newly installed IPEX units. Anticipated annual energy savings of approximately 50,000 kWh.	February 2024

12	Watford Sewage Lagoons	Aeration Optimization	Continuous monitoring and optimization of the IPEX aeration system.	2024 – 2029
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