Energy Conservation and Demand Management Plan

2024-2028

Township of

Lucan Biddulph

Table of Contents

Contents

Schedules

Disclaimer: This document has been prepared by the Ontario Clean Water Agency on behalf of the Township of Lucan Biddulph in accordance with Ontario Regulation 25/23 under the Electricity Act, 1998 for submission to the Ministry of Energy, Northern Development and Mines. This Plan is constantly evolving and may be revised to reflect the most current information and circumstances. The Township of Lucan Biddulph, its council, directors, officers, shareholders or representatives do not accept any liability whatsoever by reason of, or in connection with, any information in this document or any actual or purported reliance on it by any person. The Township of Lucan Biddulph may update any information in this document at any time.

For any questions related to this Plan, please contact Kerry Tuyen, Director – Innovation, Technology and Alternate Delivery, KTuyen@ocwa.com

Executive Summary

The Township of Lucan Biddulph retained the Ontario Clean Water Agency to build on the Township's first CDM Plan originally developed in 2014 incorporating the experience gained 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 from 2024 to 2028. The Plan also compares the energy use in 2023 to energy use in 2019 (baseline year), and highlights variations to electricity and natural gas use as a result of efficiency improvements, and operational and climate changes.

The plan update describes our Township's:

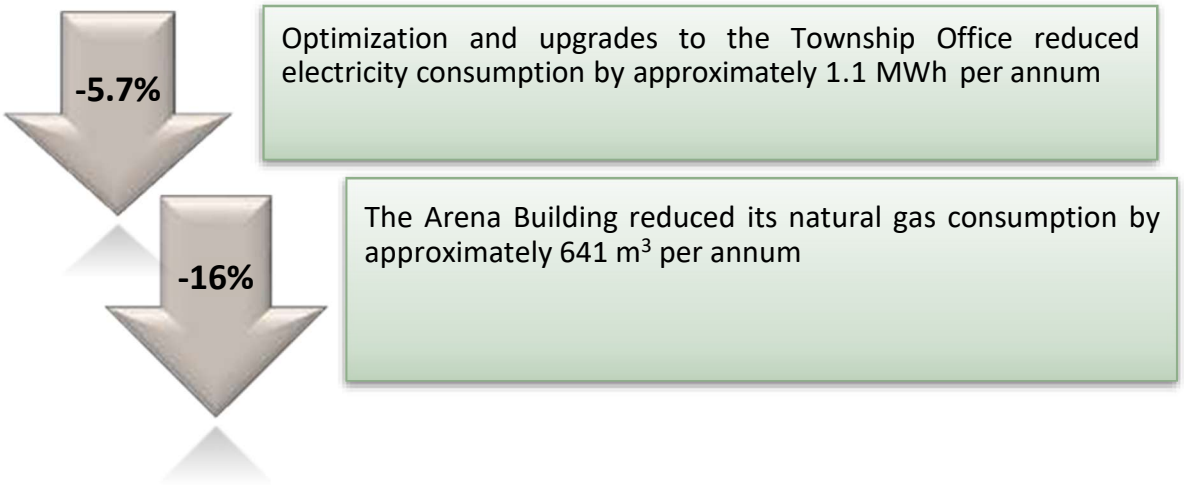
- New energy conservation goals and objectives;
- Current and proposed energy conservation measures;
- Results from the first CDM plan; and
- Changes made from the previous plan to help achieve the new goals and objectives.

The Plan update identifies the Energy Conservation Measures (ECMs) implemented from 2019 to 2023 and outlines future ECM opportunities planned for the period of 2024 to 2028 including capital upgrades and behavioral improvements.

The intent of the CDM Plan update is to provide a basis for the Township of Lucan Biddulph 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. This plan is designed to meet the current energy conservation needs of the Township.

Overall ***electricity consumption across all municipal buildings reported on was increased by 54% in 2023 compared to the 2019 baseline, while natural gas consumption reported a decrease of 10.3%.***

From 2019 to 2023, the greatest reductions achieved at the Township were:



Overall, from 2019 to 2023, the Townships has increased its electricity consumption by 892.7 MWh (+54%), and decreased natural gas use by 16,000 m^3 (-10.3%).

In addition to the Arena Building, improvements and operational changes at the Public Works Building, the Township Office, the Firehalls and the Wastewater Treatment Plant have also reduced their natural gas consumption.

In addition to the municipality benefitting from reducing its energy use, residents and local businesses also benefit from more efficient use of tax payer dollars and better maintained/ operated public buildings and facilities.

The Township of Lucan Biddulph has taken significant steps in reducing the amount of energy consumption throughout municipal facilities and equipment. While the Township has surpassed its original conservation objectives from the 2014 plan, we recognize measures can take place to ensure savings continue to grow and that new conservation measures are identified and acted upon.

We also recognize that Covid restrictions have created abrupt and unforeseen changes to economic conditions, including energy use, across Canada. COVID-19 disrupted many businesses, resulting in reduced provincial demand/consumption. Industrial and Commercial consumption were drastically reduced due to the closure of many factories and industries. Residential and household demand experienced some increase because of the stay-at-home rule that was employed to manage social distancing concept for the COVID-19 period.

In terms of electricity use, most municipalities and towns experienced changes in electricity use at businesses, community centers, pools, arenas and libraries. Covid also affected natural gas; the

impact ranged from moderate to significant. Some saw a decline in business sales which meant that they did not require as many workers and/or shifts to be operating. This was due to plant shutdowns and decreased demand from their customers, primarily in the automotive or construction industries. There was a reduction in natural gas consumption, as a result of decreased operations.

Most of the Township of Lucan Biddulph facilities were also affected by Covid restrictions.

The Township will strive to ***reduce its energy consumption by an additional 2.5% in municipal operations by 2028 compared to the 2023 baseline***. This Energy Reduction Target will apply to all departments and facilities owned by the Municipality. Included herein are the measures that will be undertaken to support the achievement of that goal.

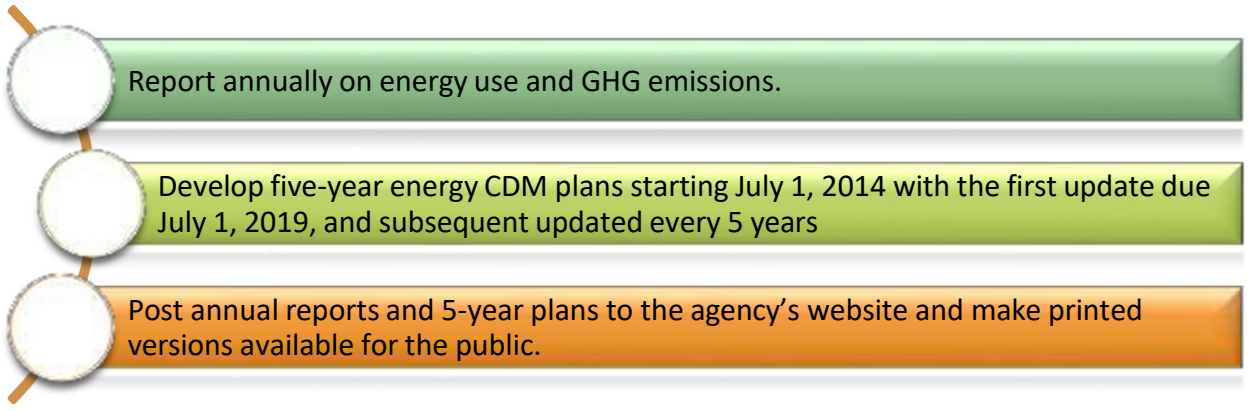
Overview

In 2014, the Township of Lucan Biddulph developed a Five 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* under the *Electricity Act, 1998* in 2018, and the plan was updated 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 this second update due July 1, 2024.

Regulation 25/23 requires public agencies to:



The Township retained the Ontario Clean Water Agency (OCWA) to build on the Township's first CDM Plan originally developed in 2014, incorporating the experiences gained 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 from 2024 to 2028. The Plan also compares the energy use in 2023 to energy use in 2019 (baseline year), to highlight variations to electricity and natural gas use as a result of efficiency improvements, and operational and climate changes.

The baseline GHG Emissions and Energy Consumption reflects data gathered and submitted to the Ontario Ministry of Energy. In order to review the results and accomplishments of the 2019 to

the 2023 CDM plan targets and objectives and to determine the present state of energy management in the Township of Lucan Biddulph, we have summarized the energy reports for 2019 to 2023 in
Schedule 1. Additionally, this plan incorporates historical data of energy use, and actions and steps already taken with the intention of realizing energy savings.

In addition to energy conservation, the updated CDM plan supports our capital plan and other key strategic plans. This CDM Plan is intended to serve as a guide for staff and Council during the capital planning and budgeting process.

Municipal Energy Background

Increased economic activity in Ontario has resulted in the rise of GHG emissions and presents a challenge to fulfilling the provincial environmental objectives expressed in the government's Made-in-Ontario Environment Plan.

In Ontario, 6.9% of GHG emissions are generated from the combustions of the commercial and institutional buildings sector; the largest sources of GHG emissions generations are the industrial operations and transportation. Optimizing energy consumption in municipal buildings will be essential if we are to meet future energy needs and witness a global transition to sustainable energy sources.

The Township must implement changes in the way we use energy to meet our needs (energy conservation) and use the most efficient equipment and measures (energy efficiency) to reduce consumption and costs.

In 2014, the primary source of energy for municipal operations (facilities, social housing, and street lighting) in Ontario was electricity (63%) and natural gas (35%), with minor use of other fuels including hot water and steam from district heating, chilled water from district cooling, propane, and fuel oils. Municipalities spent an estimated $917 million on electricity and $105 million on natural gas in 2014[1].

Energy consumption and costs are relatively high in Ontario. The figure below shows the significant increase in electricity costs over the last decade, taxing municipal reserves.

[1] Ontario Municipal Energy Profile, ICF, 2018

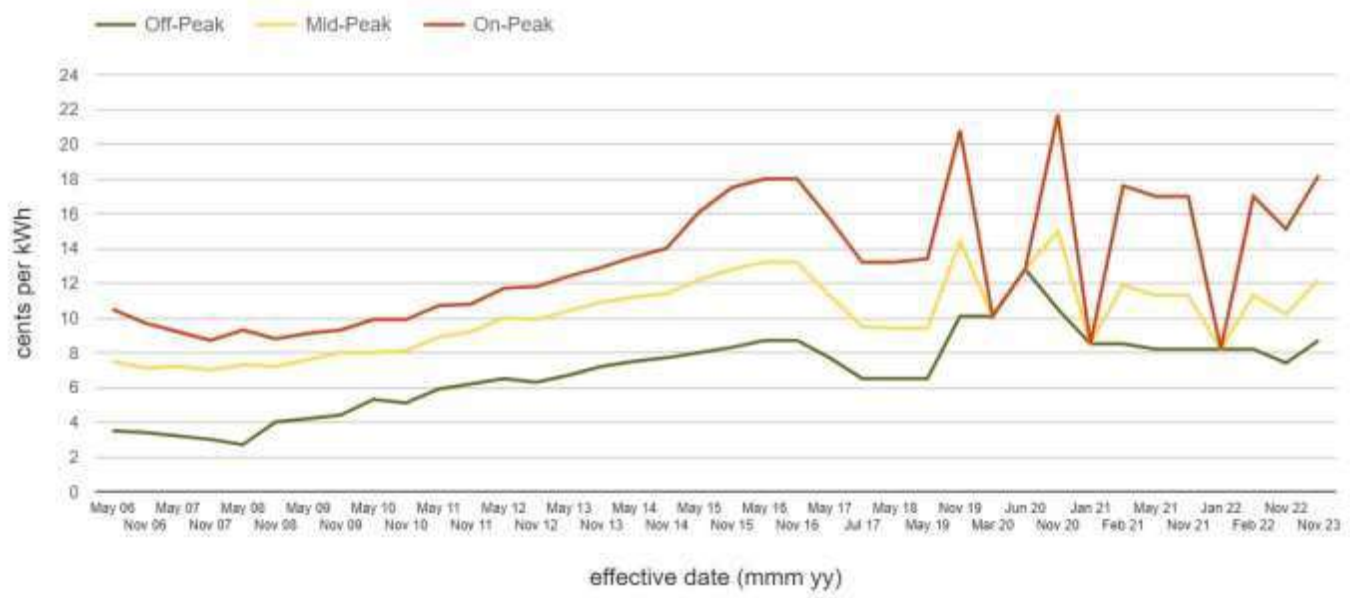


Figure 1 Historical TOU Electricity Rates[2]

The TOU prices are primarily for users with utilization rates under 50kW of average demand such as small pumping station, small commercial and residential locations.

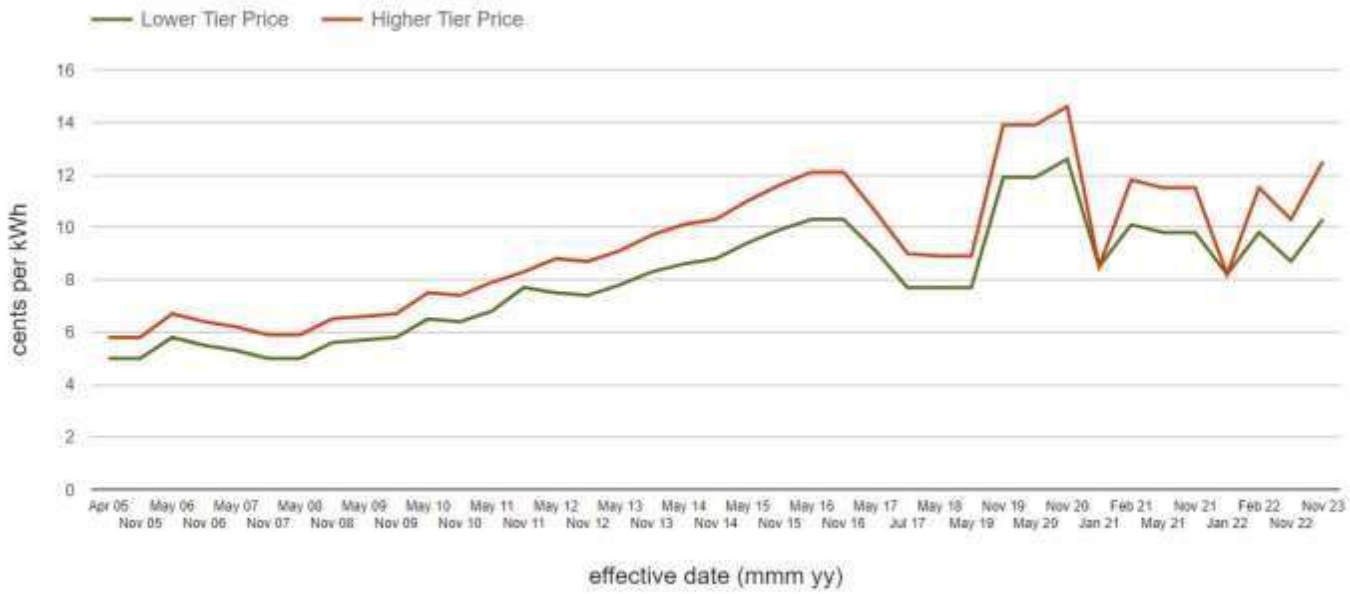


Figure 2 Historical Tiered Prices[3]

Tiered is primarily for the medium size facilities, where Lucan-Biddulph facilities fall under this category. However, for the purposes of highlighting the rise in the electricity prices over the years both of the above figures display a comparable trend.

[2] Ontario Energy Board, 2024;

[3] Ontario Energy Board, 2024

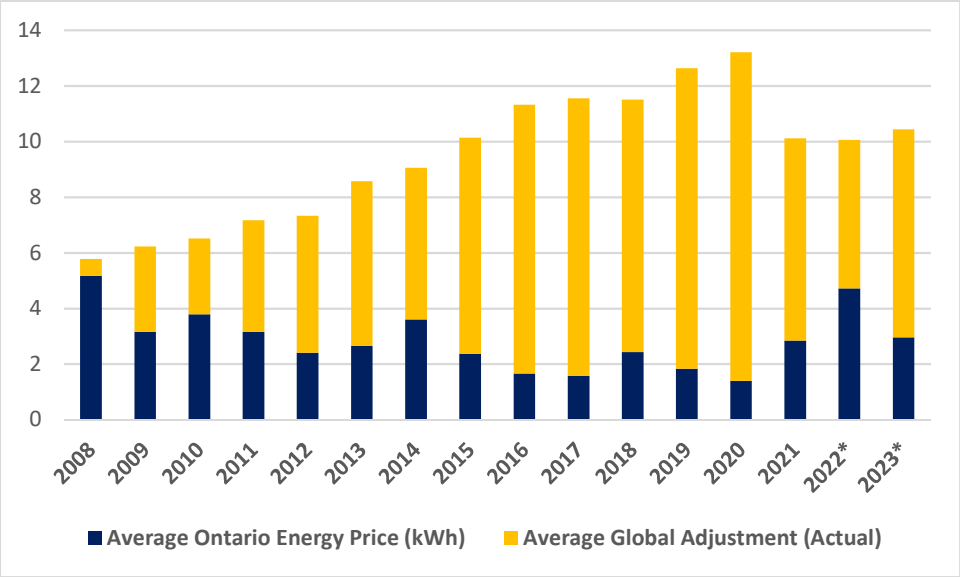


Figure 3 Historic HOEP and GA Blended Cost[4]

The Hourly Ontario Energy Price (HOEP) in combination with Global Adjustment (GA) is used for determining the bulk of the typical invoice from the Local Distribution company (LDC). Unlike the figures before, total cost is steadily rising, however Lucan-Biddulph has taken significant measures to mitigate the global adjustment portion of the electricity bill.

[4] IESO, 2024

The Ontario water and wastewater treatment sectors are the largest municipal electricity consumers, representing more than a third of annual electricity consumption. In 2011, water and wastewater systems used about 1,815 gigawatt-hours (GWh) of electricity (enough to power about 200,000 homes) and 40 million m^3 of natural gas (enough to heat approximately 15,000 homes). This energy use may rise due to ever-more stringent treatment requirements, but these systems also have many opportunities to become more energy efficient, and even to generate renewable energy.[6]

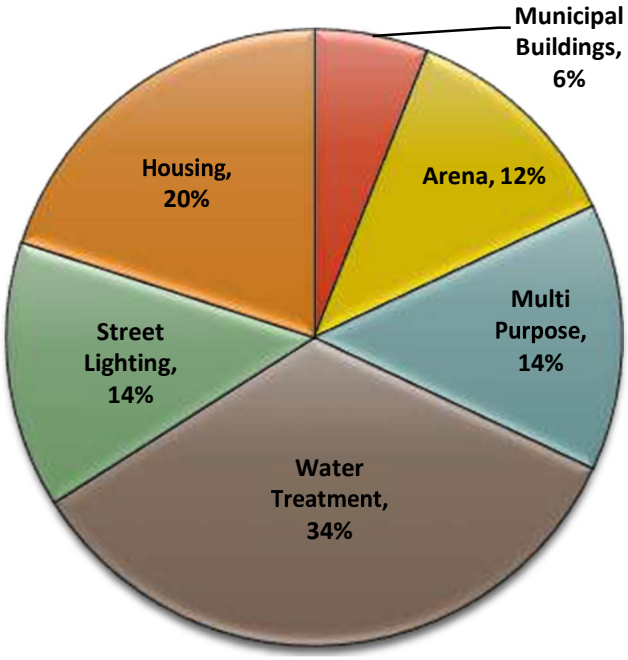


Figure 4: Municipal Energy Use by Sector in Ontario[5]

Managing municipal energy consumption efficiently means providing the same services with less energy. Energy conservation measures are often the lowest cost options for providing many other environmental, economic and social benefits. This also results in cost savings, lower environmental load by avoiding GHG and local air, water and land emissions associated with energy production and consumption, local economic development opportunities and associated new jobs, enhanced reliability of energy systems, and reduced price volatility, and improved energy supply security.

[5] Study Report: Market Characterization & Conservation Potential for Ontario's Drinking Water & Wastewater Treatment Plants (Dec. 2018), IESO, Posterity Group, 113.

[6] Every Drop Counts, ECO, 2017

CDM Plan Mission,Vision and Goals

The plan update describes our Township's:

- New energy conservation goals and objectives;
- Current and proposed energy conservation measures;
- Results from the first CDM plan; and
- Changes made from the previous plan to help achieve the new goals and objectives.

The Plan update identifies the Energy Conservation Measures (ECMs) implemented from 2014 to 2023 and outlines future ECM opportunities planned for the period of 2024 to 2028 including capital upgrades and behavioral improvements targeted toward energy consumption and GHG emissions reduction.

The intent of the CDM Plan update 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. This plan is designed to meet the current energy conservation needs of the Township of Lucan Biddulph.

Mission

The mission statement of Township of Lucan Biddulph's Strategic Plan is also integrated into the Five Year Conservation and Demand Management Plan:

The Corporation of the Township of Lucan Biddulph is committed to provide residents, businesses, and visitors with strong municipal leadership, quality services, and support that are relevant and future-oriented, and in so doing, support the community's sense of place and ongoing volunteerism.

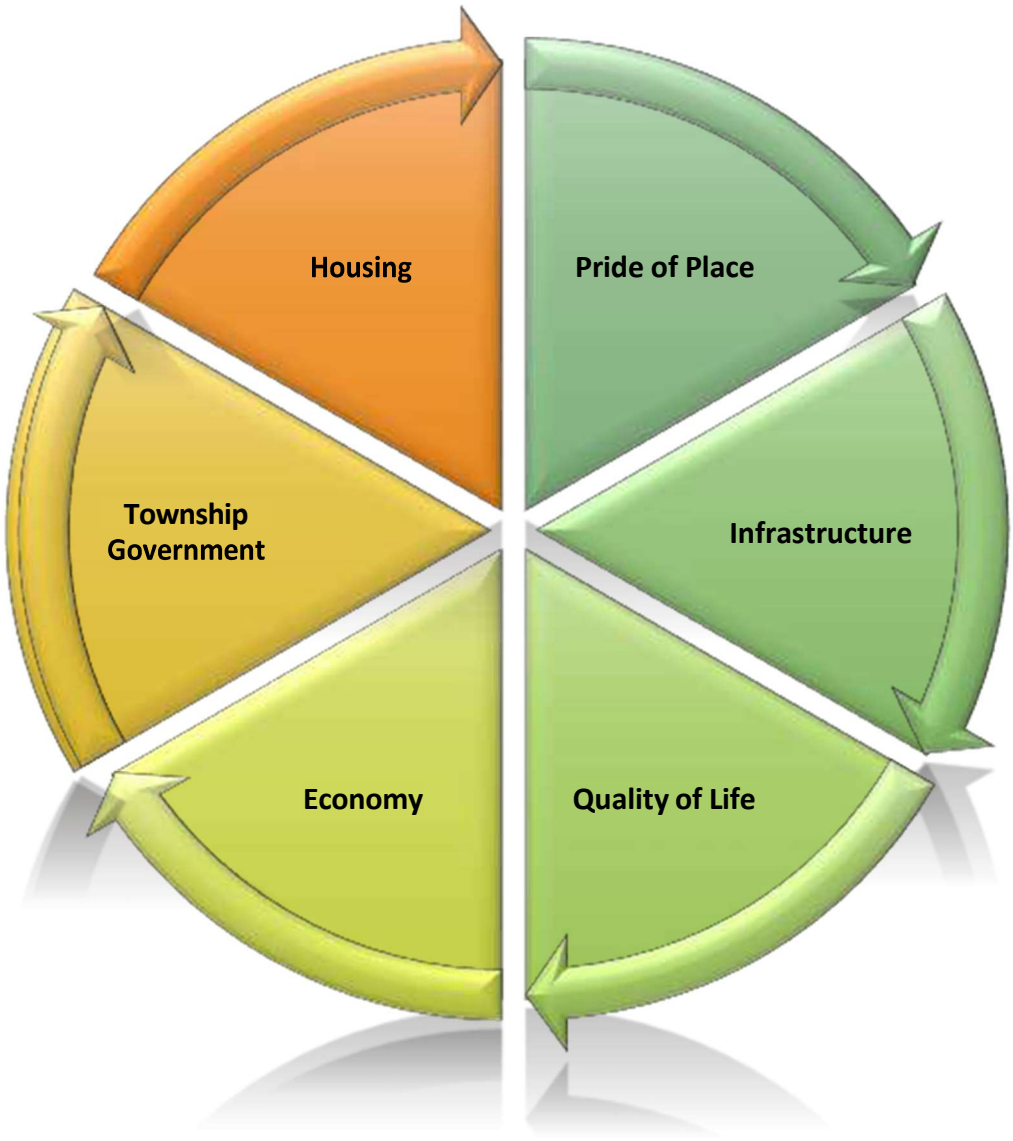
Vision

The Township of Lucan Biddulph will be moving toward its holistic future, or the so-called preferred state, while pursuing the continual improvement of energy consumption performance and GHG emissions reductions.

The Township of Lucan Biddulph is committed to a process of diligent community development and planning with sustainable living in mind. This commitment by the Township of Lucan Biddulph reflects its Strategic Plan.

The Township of Lucan Biddulph seeks to achieve the following vision:

Township of Lucan Biddulph will be a prosperous and growing community with a strong character and identity that is supported by an active Council, administration, and volunteer sector.

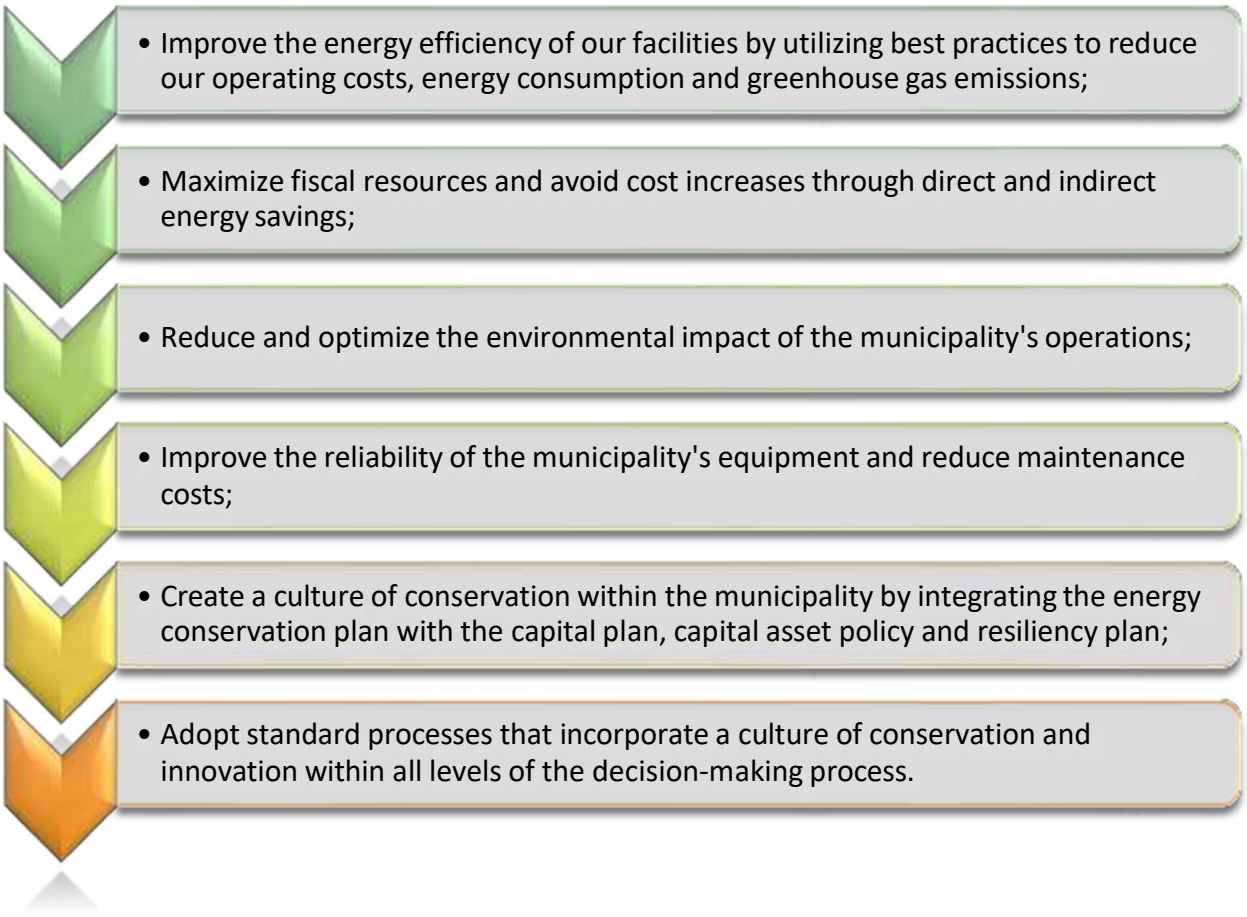


The Five Year Conservation Demand Management Plan thus aligns with the Core Values as listed in the 2023 Strategic Plan, which:

> *consists of a number of initiatives or action items grouped into three priorities:* ***Accountability, Transparency, Integrity****.*

Goals

The Township of Lucan Biddulph's Energy Conservation and Demand Management Plan was completed and updated to help achieve the following goals:



Municipal Commitment

Effective energy management begins with the specific, visible expression of commitment by the Municipality, to making the reduction of energy consumption an organizational priority. The Municipal Council of the Township of Lucan Biddulph is committed to delivering sustainable and reliable cost effective services to the community while meeting regulatory requirements and obligations.

The Council at the Township of Lucan Biddulph will manage the energy Conservation and Demand Management initiatives and implement the Five Year Conservation and Demand Management Plan in the local municipality.

The Council follows through on the commitments expressed in the Conservation and Demand Management Plan, and has fully endorsed this document.

The Council at the Township of Lucan Biddulph is fully committed to energy conservation and greenhouse gas emissions reduction, as evidenced by:

- Adapting Energy Conservation and Demand Management as an integral part of Township of Lucan Biddulph's Strategic Plan
- Promoting energy conservation culture throughout the organization
- Setting and approving the energy Conservation and Demand Management objectives
- Establishing energy conservation targets and ensuring they have been communicated
- Communicating the importance of meeting the energy conservation objectives and goals
- Allocating resources for Energy Conservation and Demand Management initiatives
- Conducting reviews of energy conservation goals based on set targets vs. actual energy consumption
- Facilitating the organization's integration of energy conservation measures
- Designating responsibilities and interactions for the implementation of the energy conservation initiatives

An ***Energy Mandate*** is included in Schedule 2. This Energy Mandate affirms commitment by the Township of Lucan Biddulph to implement the Five Year Energy Conservation and Demand Management Plan.

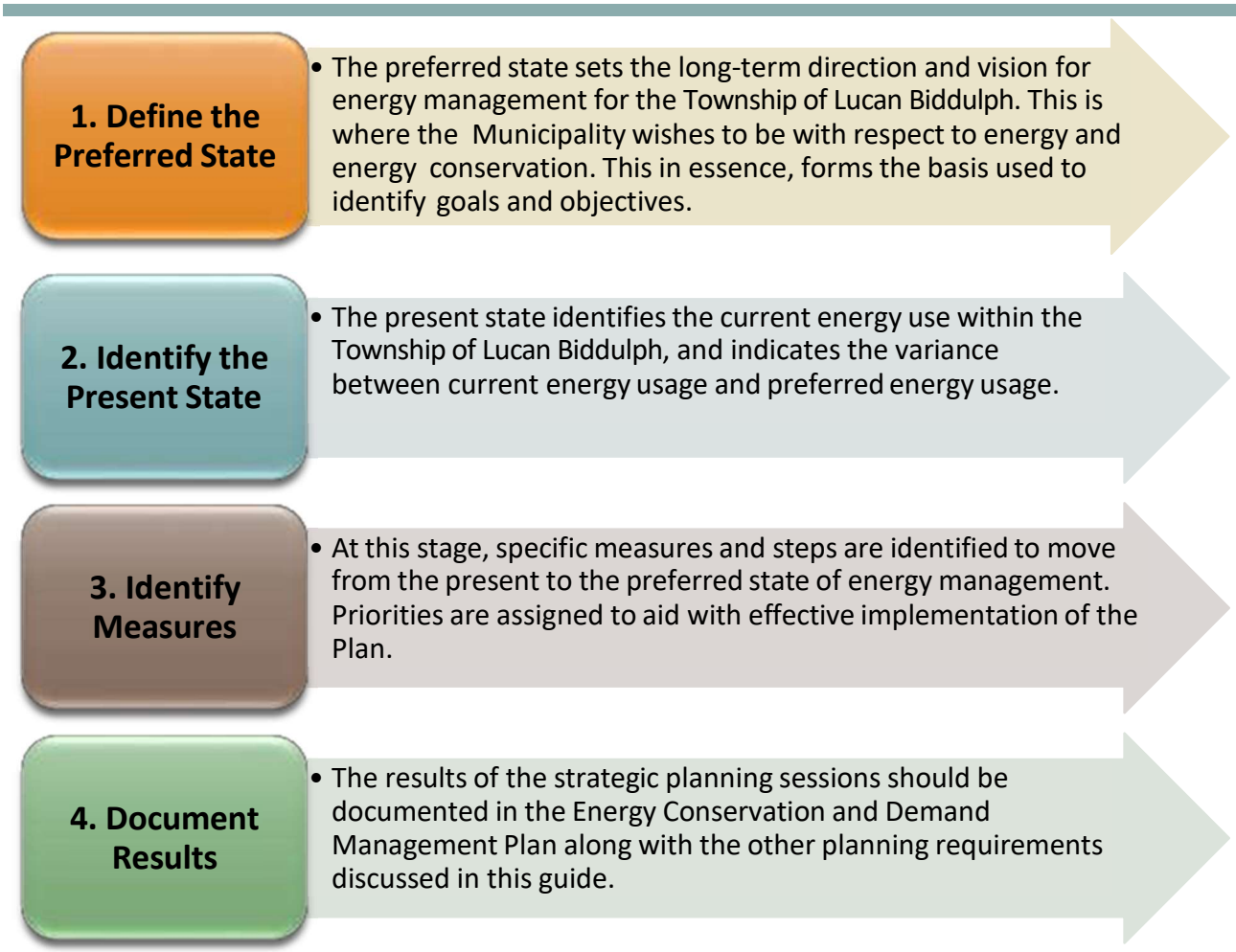
Energy Conservation Objectives, Goals and Actions

The Township of Lucan Biddulph's 2024-2028 Conservation and Demand Management Plan includes the major goals and objectives to be implemented within the 5 Year period. The Plan will evolve and will be subject to adjustments as deemed necessary to best serve taxpayer interests and the Township's aim for optimized operations. The Township of Lucan Biddulph sets the overall energy reduction targets for the period of 2024-2028, based on energy assessments to its municipal buildings.

The Conservation and Demand Management Plan was developed as a road map for the energy conservation activities in the Township. It is consistent with the responsibility of the Township Council to address the need to develop mechanisms to balance energy demand and reduction of energy consumption and GHG emissions for municipal buildings.

The Five Year Conservation and Demand Management Plan is based on the Ministry of Energy, Northern Development and Mines' guidelines and recommended approach. During the development of the Five Year Energy Conservation and Demand Management Plan, the Township applied strategic planning tools, process engineering judgement and methodologies. The Township of Lucan Biddulph aims to optimize and integrate existing operational systems with necessary energy efficiency upgrades.

The CDM planning process progressed through the following stages:



Energy Conservation Objectives

1. Energy Conservation **Stewardship** - promote energy efficiency at the corporate level, such as the creation and engagement of an energy management team, the development of a corporate energy management plan or policy, or the implementation of a formalized energy management processes.
2. Energy Conservation Process and Technology **Improvements** - reduce energy intensity in industrial processes by improving procedures and equipment such as refrigeration or compressed air systems.
3. Energy **Performance** Management - enhance monitoring and measuring of, and reporting on facility or company-wide energy consumption and improve energy performance.
4. Energy Conservation Employee **Awareness and Training** - raise employee awareness and understanding of energy efficiency and promote best practices through knowledge exchange.
5. **Integration** of Energy Efficiency Strategy - improve energy efficiency at municipal facilities at corporate-wide level through a range of initiatives as a result of an integrated strategy.
6. Future Energy Conservation **Leaders** - study the advances in the field of industrial energy efficiency and broadly disseminate energy efficiency best practices.

7. **Transparency** in energy conservation activities - setting requirements for energy-efficient procurement and implementation of profitable energy conservation projects as well as disclosure of electricity consumption in the facilities operated by the Township

Energy Conservation Goals

1. Initiate, participate, and collaborate in energy conservation, including public education and awareness
2. Encourage denser, contiguous development: intensification of existing built-up areas and the efficient use of existing infrastructure
3. Incorporate energy conservation measures into site design, and into the design, construction and renovation of buildings
4. Encourage the use of walking, bicycling, transit, and carpooling as alternatives to private automobile use
5. Encourage the planting of native trees and natural resources preservation
6. Promote design of buildings, which maximize the use of alternative or renewable energy systems, such as solar and wind energy, at appropriate locations
7. Encourage development using the highest building design standards, such as LEED and any related standards
8. Evaluate opportunities for energy reduction and establish aggressive targets
9. Work collaboratively with the local utility and other agencies to implement beneficial and

cost- effective programs that enhance and optimize energy consumption

10. The Township of Lucan Biddulph will pursue energy-efficient procurement policies and achievement of energy savings, with expeditious payback times

Energy Conservation Actions

1. Complete energy audits and assessments in municipal buildings
2. Assign sustainable energy goals and targets based on audit result and trend analysis
3. Disseminate information about energy conservation products and innovative pollution prevention technologies, broadly within the community
4. Initiate measuring, monitoring and consistent reviews of energy consumption in municipal buildings
5. Provide consumer information and education on energy conservation, through promotion at local fairs, events, and Township Hall
6. Provide ongoing education regarding energy management and energy savings opportunities and results to management and operations staff
7. Continuously track the effectiveness of energy conservation initiatives based on consistent measurable performance indicators
8. Identify sources of financing and support for energy projects and programs
9. Urge municipal developers to produce energy-efficient building designs
10. Provide education to municipal personnel, to promote energy efficient use, and implement behavioral energy conservation measures to produce results
11. Establish a designated Lead to be responsible for lighting optimization at the respective facilities
12. Provide opportunities to telecommute and use advanced internet media for meetings in order to reduce on travel associated with greenhouse gas emissions pollution

2024-2028 Proposed Energy Conservation Measures

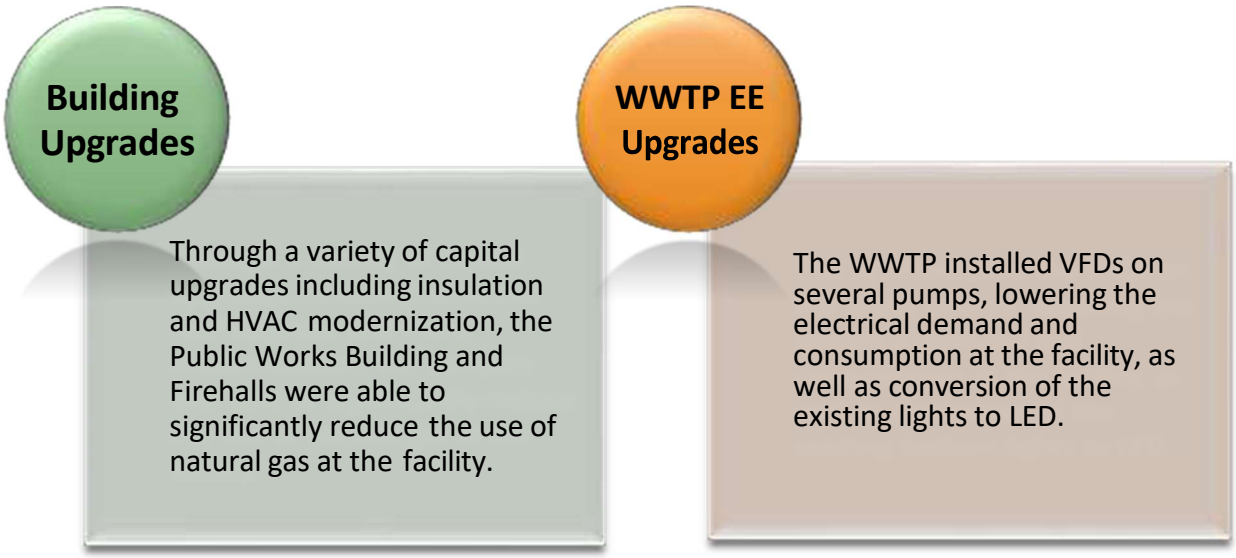
A summary of recommended measures for the 2024-2028 period, the estimated time those measures would be in place, and the prioritization of conservation measures in the facilities at the Township of Lucan Biddulph follows:

ORGANIZATIONAL AND BEHAVIOURAL MEASURES			
PREFERRED STATE	**PRESENT STATE TIMELINE**	**MEASURES**	**STATUS**
Established Energy Conservation Organizational System	Need to establish a structured CDM Program and designate a CDM Team	Implement sustainable CDM Program and designate roles and responsibilities	**Ongoing**

Sustained Energy Conservation culture throughout the organization	Staff needs to build better awareness about energy conservation and is getting engaged in various activities	Provide training and broadly disseminate energy conservation ideas and initiatives. Energy awareness campaign.	**Ongoing**
Consumer information and education provided	Limited information about energy conservation best practices	Explore experiences in other communities and work with Lucan-Biddulph Hydro to promote energy conservation.	**Ongoing**
Green IT	Need for structured IT approached for power conservation and efficient operational organization	Use innovative technologies to reduce energy consumption in IT by using computing resources.	**Ongoing**

TECHNICAL MEASURES			
PREFERRED STATE	**PRESENT STATE TIMELINE**	**MEASURES**	**STATUS**
Energy assessments to establish baseline	Need to establish energy baseline and assess the energy efficiency of existing equipment	Review and refine measures based on energy assessments	**2014-Ongoing**
Optimized functional parameters of equipment with energy efficient design	Energy inefficient equipment that needs better control	Install VFDs to optimize the functional parameters and energy consumption – already installed on Sewage Pumping Station pumps and WWTP RAS pumps	**2017, Ongoing**
Optimized energy efficient lighting	Lighting energy consumption in the buildings is high. Energy inefficient T-12, HPS, HID lamps require replacement	Install LED lighting, T-8 lamps and ballast, de-lamp and remove unnecessary light bulbs. Street lighting conversion in 2014 has helped reduced the electricity consumption by 36% (2022 vs 2014)	**2014, ongoing**

Optimized energy consumption control of buildings	Energy consumption for building maintenance is high	Monitor energy consumption and optimize scheduling. Install timers, occupancy sensors and energy-smart products	**Ongoing**
Energy assessments to establish baseline	Need to establish energy baseline and assess the energy efficiency of existing equipment	Review and refine measures based on energy assessments	**Ongoing**
Smart Grid and Sustainable low cost renewable generation for local consumption	No existing solar generation projects	Install solar generators where possible. Work with stakeholders to enable the renewable generation projects. Build in concepts of Zero Energy Buildings	**Ongoing**
Ensure long-term sustainability of the WWTP through reduced waste to landfill, energy usage and GHG emissions	Trucking biosolids to nearby processing site for treatment	Identify options for dewatering of biosolids and identify options for beneficial use of dewatered biosolids	**Ongoing**

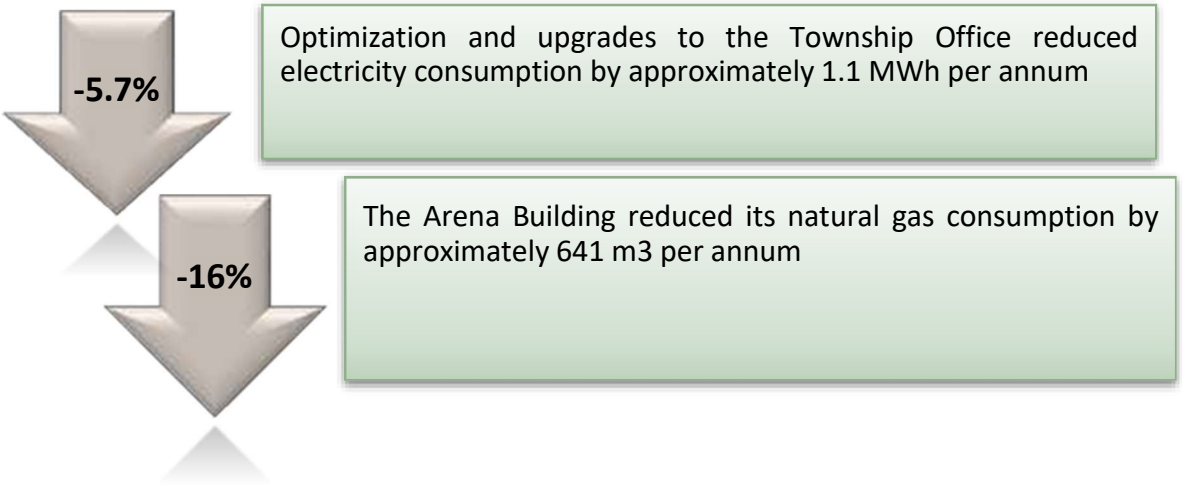


2019-2023 Energy Consumption Summary

Tracking Energy Consumption and Savings

Annual energy reporting is required under the regulation and allows our Township to understand how energy is used in our buildings, identify potential energy conservation opportunities and track progress on energy conservation efforts. In addition to including the municipality's 2021 annual energy report as required under the regulation, we have also included and considered our 2023 annual energy consumption information, which helped us to report on our achievements and inform the development of new measures (see Schedule 1 - Actual 2019-2023 Energy Consumption). Overall ***electricity consumption across all municipal buildings reported on was reduced by 15.7% by 2023 compared to the 2019 baseline, while natural gas consumption across all municipal buildings reported on decreased by 14.2%.***

From 2019 to 2023, the greatest reductions achieved at the Township of Lucan Biddulph were:



Overall, from 2019 to 2023, the Townships has increased its electricity consumption by 892.7 MWh (+54%), and decreased natural gas use by 16,000 m3 (-10.3%).

In addition to the municipality benefitting from reducing its energy use, residents and local businesses also benefit from more efficient use of taxpayer dollars and better maintained/ operated public buildings and facilities.

Please see Schedule 1 for a detailed analysis of the Township's energy consumption from 2019 to 2023.

Looking forward: 2024-2028

Concerns over ever-increasing energy prices and the negative impact of fossil fuels on the environment have raised interest in energy conservation, sustainability, and predictable energy rates.

> The Township of Lucan Biddulph will strive to ***reduce our energy consumption by an additional 2.5 % in municipal operations by 2028***. This Energy Reduction Target will apply to all departments and facilities owned by the Municipality.

It is recognized that the ability to meet the target relies on the allocation of resources to implement energy reducing initiatives.

Proposed, Ongoing & Completed Energy Conservation Measures

Energy conservation projects can be categorized as technical (switching street lighting from high-pressure sodium to LED), organizational (establishing a green team), or behavioral (running a daylight harvesting campaign, where lights are turned off on sunny days).

Potential energy conservation projects were identified by comparing building-level energy benchmarks to the median energy benchmark for that building type. The Township aims to optimize and integrate existing operational systems with necessary energy efficiency upgrades.

A summary of recommended measures and timelines at the Township of Lucan Biddulph follows:

Technical Measures

Efficiency Measure	Timeline
Eliminating/reducing outdoor decorative lighting	Completed 2020
Require white/off-white wall paint for maximum light reflectivity	Completed 2020
Use open windows and passive cooling when mechanical air conditioning is not needed	Completed 2020
Maximize night, weekend and holiday temperature setbacks	Completed 2020
Replace old boilers/furnaces/hot water tanks with new high efficiency boilers/furnaces/hot water tanks of proper size	To be investigated 2025

Reduce AC operating hours, turn off reheats and stop controlling humidity levels during the cooling season	To be investigated 2025
Replace old motors, pumps, and air handling units with high efficiency ones with variable speed drives (VSDs) on motors	Ongoing since 2021
Install heat recovery system for swimming pool	Delayed since 2021
Switch to direct digital control energy management systems	Delayed since 2021
Biosolids Management and Digester Optimization	Ongoing since 2021
Convert all lighting in all facilities to LED	Ongoing since 2020
Installed Variable Frequency Drives at the SPS – energy efficiency gains	Completed 2017
Installed Variable Frequency Drives at WWTP – energy efficiency gains	Completed 2017
Replacement of the Air handlers at the Complex – energy efficiency gains	Completed 2019
Power Systems Analysis Report at the Complex – review of the electrical issues and recommendations for energy efficiency improvements	Completed 2019
Firehalls – new building construction – higher insulation, and energy efficient systems compared to old building	Completed 2020
New Humidified at the Complex – energy efficiency gains	Completed 2023
Water Distribution repairs and replacement – higher diameter pipe with less friction losses will improve the water transfer efficiency rates and subsequent energy efficiency	To be completed by 2026
Reflective ceiling at the Arena – insulation improvements gain and subsequent energy efficiency gains	Completed 2022
Conversion of the salt water to chlorination for the community pool – energy efficiency gains through removal of the electrode component and the pumps associated with the process	To be completed by 2025

Organizational Measures

Efficiency Measure	Timeline
Creation of a CDM Team	Completed 2020

Behavioral Measures

Efficiency Measure	Timeline
Place poster near kitchen/bathroom sinks reminding users to limit water usage where appropriate	Completed 2020
Place poster/sticker near light switch in rooms reminding users to turn off lights when no one is in the room	Completed 2020
Continue to ensure the temperature of facilities meets the needs of the users	Completed 2020
Harvest day light where possible by opening blinds instead of using electric lighting	Completed 2020
Close windows when air conditioning is in operation	Completed 2020
LAWN WATERING BYLAW 2675/15 – water conservation initiative to reduce the water consumption during specific time of day to reduce the energy consumption at the Water Plant -	Completed 2021
Campaign against flushable wipes – public education and reduced treatment energy at the STP	Completed 2023

Renewable Energy Projects

Efficiency Measure	Timeline
Investigate options for solar energy	To be investigated 2025
Smart Grid and Sustainable low cost renewable generation for local consumption	To be investigated 2025

Proposed Projects

Energy Management

The central task of facility management is to reduce costs of energy consumption in the facilities while enhancing the work environment. It is important to keep the excellent level of quality and availability of municipal services, while service life of the equipment and the ease of use should remain the same, or improve. The Township of Lucan Biddulph is consistently optimizing facility management practices and aims to minimize the total cost of the energy-related processes by implementing energy efficient techniques and technologies.

Renewable Energy Generation and Smart Grid

The Township of Lucan Biddulph is evaluating opportunities to invest in eco-friendly alternatives such as solar power, and promoting concepts of zero-energy buildings (buildings with zero net energy consumption, where the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on-site).

The development of modern zero-energy buildings became possible, not only through the progress made in new energy and construction technologies and techniques. It has also been significantly improved by academic research, which collects precise energy performance data on traditional and experimental buildings and provides performance parameters for advanced computer models to predict the efficacy of engineering designs. Zero Energy Building is considered a vital component as a part of smart grid.

The zero-energy concept allows for a wide range of approaches due to the many options for producing and conserving energy combined with the many ways of measuring energy (relating to cost, energy, or carbon emissions).

Energy Awareness Campaign

It is essential for the Township of Lucan Biddulph to deploy an effective energy awareness program or campaigns that encourage individual and group action.

An effective energy awareness program might reduce energy consumption by 5 or 10 % or more.

Green IT

The Township of Lucan Biddulph is Green IT practices of using computing resources in ways that help reduce energy and operating costs, enable sustainable business practices and reduce the environmental impact of services.

Green IT principles and practices are associated with servers, and subsystems, such as monitors, printers, storage devices, and networking and communications systems. The Township is gradually replacing the energy inefficient systems with energy efficient models. Green IT approaches within the organization are implementing innovative solutions that reduce the utility bills and “green” the procurement practices. Throughout the replacement, the Township s using environmentally safe disposal methods or partnerships that will result in minimal or no

impact on the environment. With the help of IT, work processes can be eliminated or improved significantly.

Approaches and practices utilized to promote electronics stewardship:

- **Green procurement and asset management**: This initiative focuses on purchasing computing equipment that is more energy efficient and environmentally friendly and includes measures to extend equipment useful life, recycle and engage with suppliers that demonstrate a commitment to reducing hazardous materials in their manufacturing, packaging and factory waste management programs.
- **Technology-based solutions**: This includes programs that employ technology in ways that are designed to reduce travel, commuting and facilities costs along with the environmental impacts of employee tasks related to people movement.
- **Power consumption management**: This initiative includes efficient approaches to power conservation. Many programs, like screen savers, low energy consumption computer profiles, etc. support and complement organizations energy conservation. Establishing and implementing policies to enable power management, duplex printing, etc.

Technical Efficiency Improvements

An aggressive energy conservation policy at the Township of Lucan Biddulph is addressing various technical measures. The following energy conservation measures will be evaluated and implemented where appropriate:

Building Envelope

Improvements include:

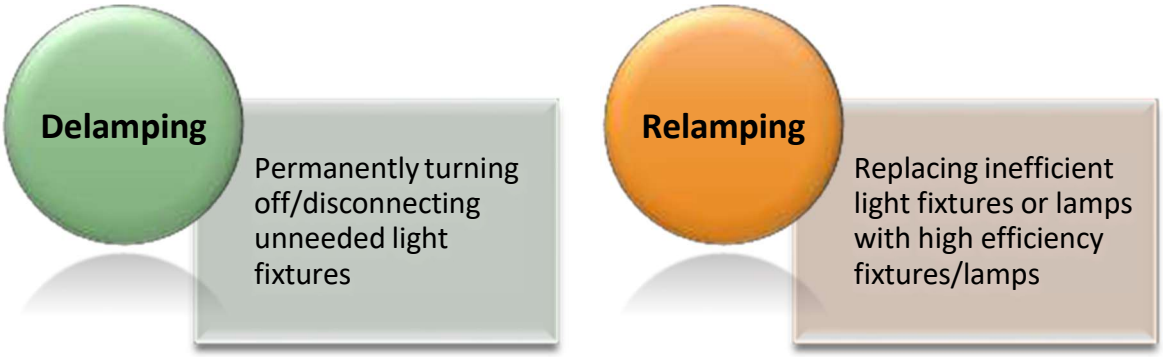
- ✓ Weather/infiltration sealing
- ✓ Increased insulation
- ✓ High performance window replacement
- ✓ Low emissivity reflective window film (to reduce unwanted solar gain in the summer and increase the R-value of windows in the winter)

Lighting

Lighting can be the single greatest load for electricity in many offices, and can cost as much as space heating over the year. Reducing heat output from lighting can also reduce air conditioning costs. Without proper lighting, productivity, safety, security and overall aesthetics can be compromised. Good lighting design contributes to employee comfort and health, which in turn can result in greater productivity.

Careful planning of energy-efficient lighting design geared to building utilization needs is an important aspect considered by the Township of Lucan Biddulph. Replacement of existing T12 fluorescent lamps and magnetic ballasts with T8 fluorescent lamps and electronic ballasts can reduce up to 40% of the energy costs, lower maintenance costs, increase the system's life and improve the quality of light.

The Township is also planning to retrofit accent lighting applications, where the intent is to replace incandescent lamps with line voltage (PAR type) or low voltage (MR16 type) halogen lamps. They last longer, consume less energy and add more light reflection with greater sharpness. There are two major strategies for reducing energy load from lighting:



Some of the most commonly energy efficiency lighting measures currently evaluated by the Township of Lucan Biddulph are listed below:

- ✓ Convert T-12 fixtures/lamps to T-8 or T-5Relamp 32 watt T-8 lamps with 28 watt T-8
- ✓ Eliminate incandescent bulbs
- ✓ Convert all exit lighting to LEDs or switch to photo-luminescent signs that require no electricity
- ✓ Avoid retrofitting with indirect lighting that require more fixtures and more wattage
- ✓ Exit signs fixtures shall be rated less than 12 W each
- ✓ Increase reliance on task lighting in order to decrease general illumination without adversely affecting productivity
- ✓ Task lighting (not in the ceiling) shall have a control switch near the workstation.
- ✓ Improve lighting controls
- ✓ Photoelectric and/or dimming controls shall be provided for lighting of common use areas greater than 40m² and within 6 m of the building perimeter. Apply recognized daylighting design techniques to improve daylight levels, increase daylight penetration while minimizing adverse effects such as glare.
- ✓ Implementation of **lighting controls**:
    - Occupancy sensors
    - Timers (stand alone or energy management system/EMS-interfaced)
    - Daylight harvesting sensors and controls including simple photocells

Additionally, changing existing habits can have a positive effect with developing an energy conservation culture. For instance, lights can be turned off whenever an area is unoccupied; this includes unused common areas such as copy rooms, break rooms, conference rooms and restrooms. If lights can be controlled separately, it is wise to turn off lights whenever there is enough natural light. Posting reminders next to light switches or installing occupancy sensors to keep lights off in unused areas is an important energy savings measure. Occupancy sensors turn off lights automatically when space is unoccupied; savings can be equivalent to 25% of the lighting energy cost.

Other measures may include:

- ✓ Converting outdoor lighting to high pressure sodium
- ✓ Eliminating/reducing outdoor decorative lighting
- ✓ Considering LEDs for general indoor and outdoor illumination (the technology is almost there)
- ✓ Considering outdoor solar powered-LED light fixtures (this technology is also almost there)
- ✓ Requiring white or off-white wall paints for maximum light reflectivity; this strategy helps adequate lighting levels can be achieved with minimum lighting wattage
- ✓ When renovating spaces, designing new lighting for less than 1.0 watts per square foot

LED Street Lights

While LED street lighting is not specifically mentioned in the MOE Guidelines, the Township of Lucan Biddulph is proud of its commitment and investment in the municipal street lighting retrofit. The ratepayers of the Township of Lucan Biddulph will be pleased with the Council's commitment and forward thinking, in its progressive investment in LED lighting, which will lead to substantial annual savings on the hydro bill, coupled with significant energy consumption.

Boilers

- ✓ Replace old boilers with new high efficiency boilers
- ✓ Ensure that replacement boilers are not oversized
- ✓ Retrofit boilers with variable flame burners
- ✓ Consider multiple high efficiency modular boilers to improve efficiency by better matching hot water heating loads
- ✓ Consider replacing boilers with co-generators (which also produce electricity)
- ✓ Control boiler output water temperature with outside air temp reset so boiler does not need to heat water hotter than necessary
- ✓ Retrofit boilers with flue gas/stack heat recovery

Chillers

- ✓ Replace old chillers with new high efficiency chillers whose efficiency curve best matches your load profile
- ✓ Do not over-size replacement chillers

- ✓ Operate at peak efficiency (by adjusting water flow, load, condenser/evaporator water temps, etc.)
- ✓ Replace old cooling towers with new high efficiency towers

Air Conditioning

- ✓ Replace older AC equipment with maximum efficiency models
- ✓ Discontinue use of inefficient window units
- ✓ Reduce AC operating hours
- ✓ Turn off reheats and stop controlling humidity levels during the cooling season
- ✓ Clean cooling coils on a regular basis
- ✓ Maximize use of "free cooling" with economizer cycle
- ✓ Use open windows and passive cooling when mechanical air conditioning is not needed
- ✓ Close windows when air conditioning is in operation

Temperature Controls

- ✓ Reduce temperature settings in winter
- ✓ Increase temperature settings in summer
- ✓ Maximize night, weekend and holiday temperature setbacks
- ✓ Install tamper proof or remote thermostats

Motors, Fans and Pumps

- ✓ Adjust operating schedule to minimize run hours (review and update periodically)
- ✓ Replace old motors, pumps, and air handling units with high efficiency
- ✓ Control motors serving fans and pumps with variable speed drives (VSDs)
- ✓ Operate VSDs at maximum acceptable turn-down; vary by time of day and occupancy; also vary by season
- ✓ Convert constant volume fan system to variable air volume
- ✓ Reduce outside air volume during morning warm-up cycle and where/whenever possible through damper settings and demand control ventilation
- ✓ Reduce needless pumping by eliminating three-way by-pass valves

Heat Recovery

- ✓ Run around loops
- ✓ Heat wheels
- ✓ Heat pipes
- ✓ Desiccant wheels
- ✓ Air-to-air heat exchangers

Swimming Pools

- ✓ Pool covers that significantly reduce the evaporation of pool water -- reducing pool heating boiler load as well as outside air ventilation and space heating requirements; they save chemical water treatment too
- ✓ High efficiency boilers for pool water heating
- ✓ Install heat recovery system

Energy Management Systems

- ✓ Switch to direct digital control (DDC) systems
- ✓ Purchase EMS systems which are easy to program (so programming capabilities will be fully utilized by facilities staff)
- ✓ Utilize and optimize use of EMS energy conservation programs, e.g.
    - Optimal start/stop
    - Night setback
    - Demand shedding
    - Remote programmed lighting control

Reduce Solar Gain

Install shades and awnings in the south and west facing windows to prevent overheating and too much glare from the sunlight during the summer

Fuel Switching

- ✓ Consider converting electric space and water heating to natural gas, especially with significant innovation within the space of heat pumps

Information Feedback Systems

- ✓ Accessible display units that show energy use and savings can have dramatic results in energy use behaviours

Additional Considerations

- ✓ The Township of Lucan Biddulph will also evaluate opportunities for natural gas-fired cogeneration and fuel switching from electric heating to natural gas with the goal to reduce the carbon footprint (as opposed to simply reducing the energy costs).
- ✓ LEED program elements are strongly considered where appropriate as an effective vehicle for moving toward more energy efficient future building state.

Renewable Energy

The Township seeks to enhance Conservation and Demand Management initiatives by investigating and facilitating future implementation of renewable generation, green gas and energy reduction projects.

The Township will evaluate opportunities for renewable energy projects in partnership with the local electricity distribution company. Any renewable energy projects will be included in the Conservation and Demand Management Plan.

Shrinking the Carbon Footprint

The Township of Lucan Biddulph targets reducing the carbon impacts in every aspect of its business, by:

- ✓ Investing in innovative, energy efficient products
- ✓ Making its own operations more energy efficient

Understanding the Benefits

Improving energy efficiency can deliver a range of benefits to the local economy at the Township of Lucan Biddulph. Energy conservation initiatives are often evaluated based on the energy savings they deliver. As a result, the full value of energy efficiency improvements can be significantly underestimated. This also means that energy efficiency policy may not be optimized to target the potential of the full range of outcomes possible. Appendix B illustrates the direct financial benefits from the implementation of Energy Conservation Measures at two municipal facilities.

There are wider socioeconomic outcomes that can arise from energy efficiency improvement, aside from energy savings. Challenges exist in determining the full social benefits from the energy conservation activities. Firstly, the non-market, somewhat intangible nature of the socio-economic benefits, makes them difficult to quantify. Secondly, the effects due to energy efficiency alone can be complex to isolate and to attribute causality.

Non-tangible benefits from the Greenhouse emissions reduction include reduced risk to human health and welfare and less global warming and climate change.

Investment in energy efficiency and the increased disposable income can lead to direct and indirect job creation in energy and other sectors. This makes energy efficiency an important part of municipal government in terms of the Township of Lucan Biddulph's green growth strategies.

Reduced energy - related public expenditures can free significant funds for other community projects. The Municipal budgetary position can be improved through lower expenditures on energy in public buildings.

This Plan outlines the long-term strategy for managing Conservation Demand Management. The current Conservation and Demand Management Plan covers the planned conservation projects in two of the municipal facilities for the next five years (Appendix B). Further evaluation based on energy assessments will result in expensing the project portfolio and the Conservation and Demand Management Plan will be revised accordingly. Specific Plan adjustments based on the changing business environment may be required to meet the dynamics of the community needs. Additional research and planning will be necessary to establish energy consumption targets and

develop initiatives for consideration during the budget process and coordination with capital forecasts and effective asset management.

Plan Implementation

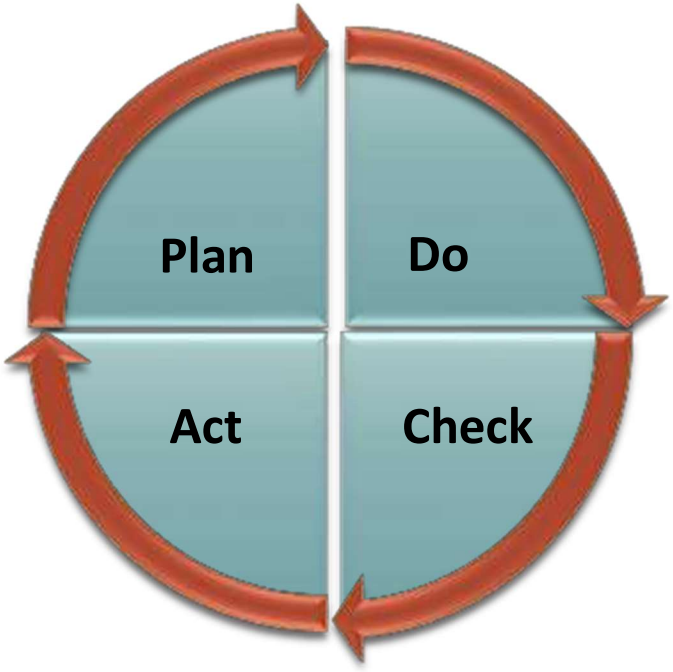
Ontario Regulation 25/23 requires increased municipal energy management and engagement. Development of an energy conservation strategy as part of an overall sustainability plan is a complex process. The main driver for a local municipality to change the way energy is used, relates to fiscal benefits and financial incentives. Energy is a manageable input to the business process, much like any other resource cost. The Township of Lucan Biddulph is maintaining and developing current and planned services that continue to be affordable to taxpayers.

Current practices must be enhanced and new approaches must be developed. To meet these needs, the Township of Lucan Biddulph 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, targeting facility follow-up assessments, and determining areas that could be candidates for improved conservation. These monitoring enhancements will improve the Township'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.

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

CDM Planning is intended to be a process of “continuous improvement.” The Township of Lucan Biddulph 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 also 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 of Lucan Biddulph 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 comparing performance between or within entities.

Four Pillars for a Successful Energy Management Program

Top Management Support

Top Management shall make a commitment to allocate manpower and funds to achieve continuous improvement. To establish the energy management program, the Township should:

- ✓ Obtain Council endorsement
- ✓ Assign energy management responsibility
- ✓ Institute an energy policy

Strategy Plan

Assess Energy Performance

Understanding current and past energy use helps the Township of Lucan Biddulph identify opportunities to improve energy performance and gain financial benefit.

- ✓ Data Collection and Management
- ✓ Establish Baselines and Benchmarks
- ✓ Analysis and Evaluation
- ✓ Conduct Technical Assessments & Audits

Set Goals

Performance goals drive energy management activities and promote continuous improvement. Setting clear and measurable goals is critical for understanding intended results, developing effective strategies, and reaping financial gains.

- ✓ Determine Scope
- ✓ Estimate Potential Improvement
- ✓ Establish Goals

Create and Implement Action Plan

Once past performance has been assessed and the goals set, an Action Plan can be created. A detailed action plan is used to ensure a systematic process to implement energy performance measures. Unlike the policy, the action plan is regularly updated, most often on an annual basis, to reflect achievements, changes in performance, and shifting priorities.

- ✓ Define Technical Steps and Targets
- ✓ Determine Roles and Resources
- ✓ Create a Communication Plan
- ✓ Raise Awareness and Motivate

Technical Ability

Investments must be made in training and systems. Staff must have adequate technical ability for analyzing and implementing energy saving options.

- ✓ Industry Seminars & Conferences
- ✓ Certified Director of Public Works
- ✓ Other Energy related training

Monitoring Systems

Evaluate Progress

Evaluating progress includes formal review of both energy use data and the activities carried out as part of the action plan as compared to your performance.

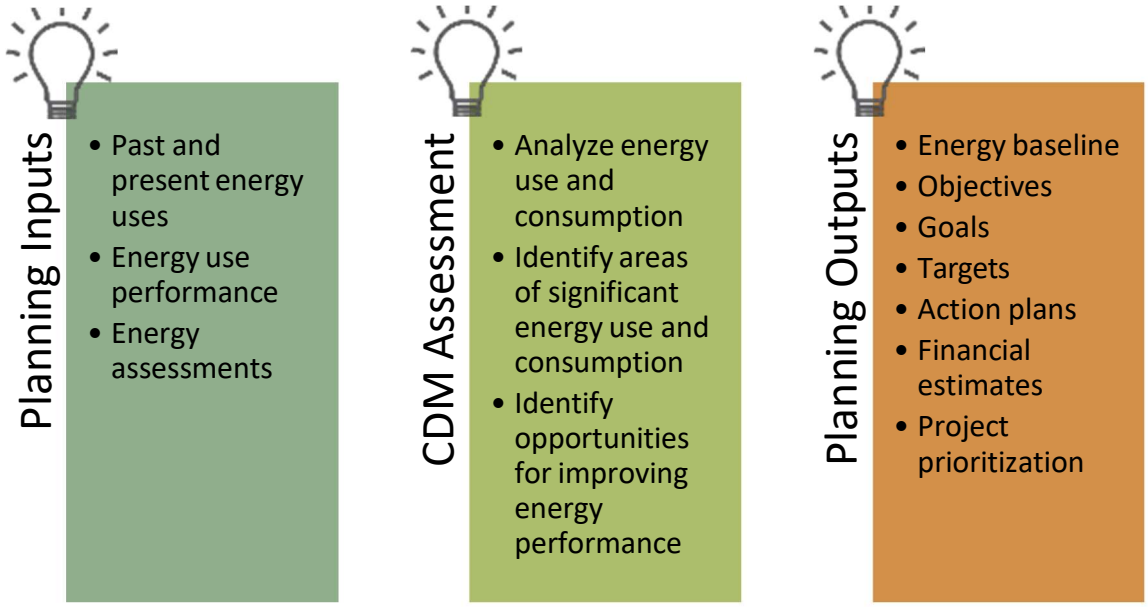
- ✓ Measure results
- ✓ Gather tracking data
- ✓ Benchmark
- ✓ Review action plan

Recognize Achievements

Providing and seeking recognition for energy management achievements is a proven step for sustaining momentum and support for your program.

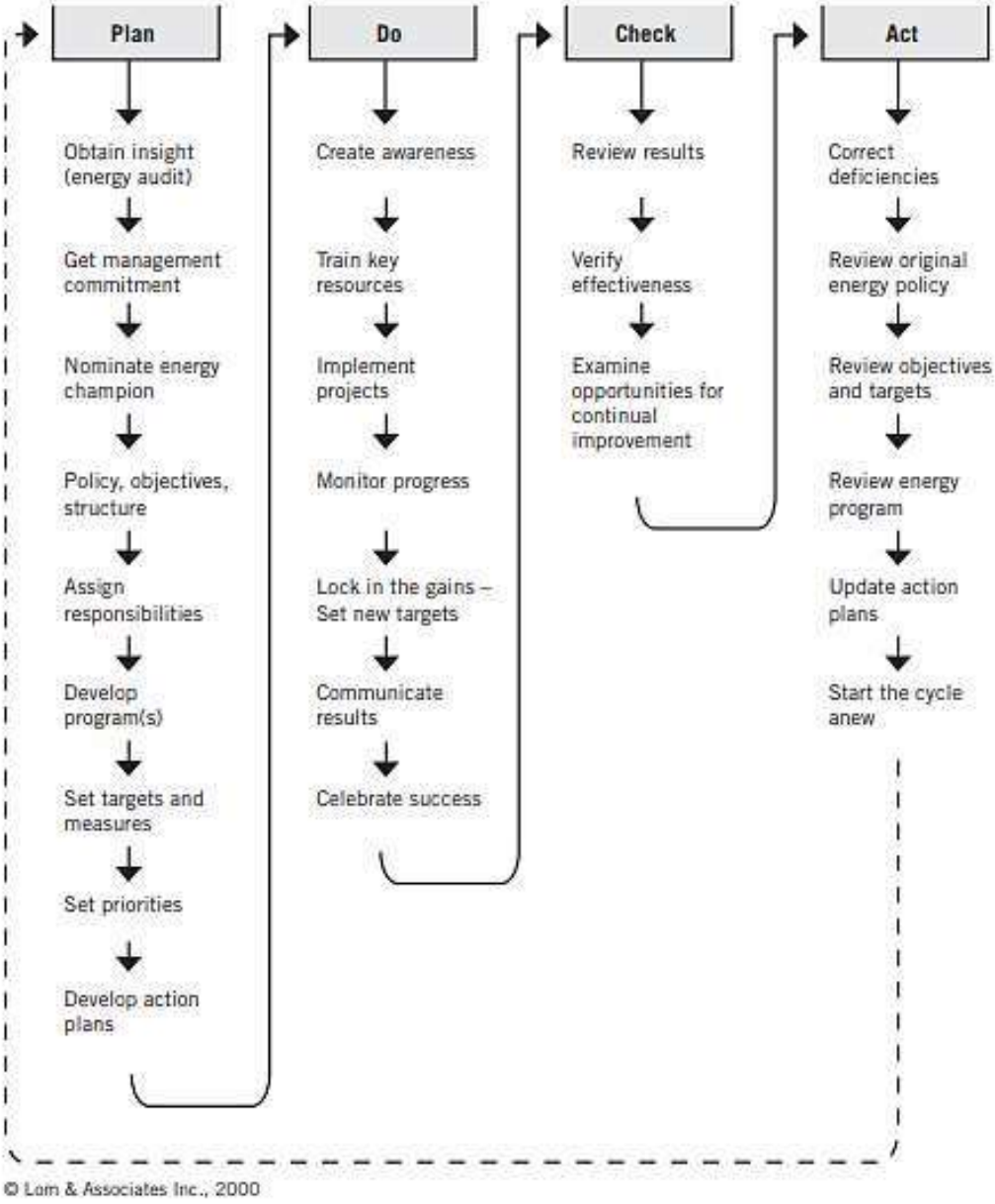
- ✓ Internal Recognition
- ✓ Determine recognition type and action
- ✓ External Recognition

CDM Planning Process Inputs and Outputs



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

Energy Conservation Project Planning Process[7]

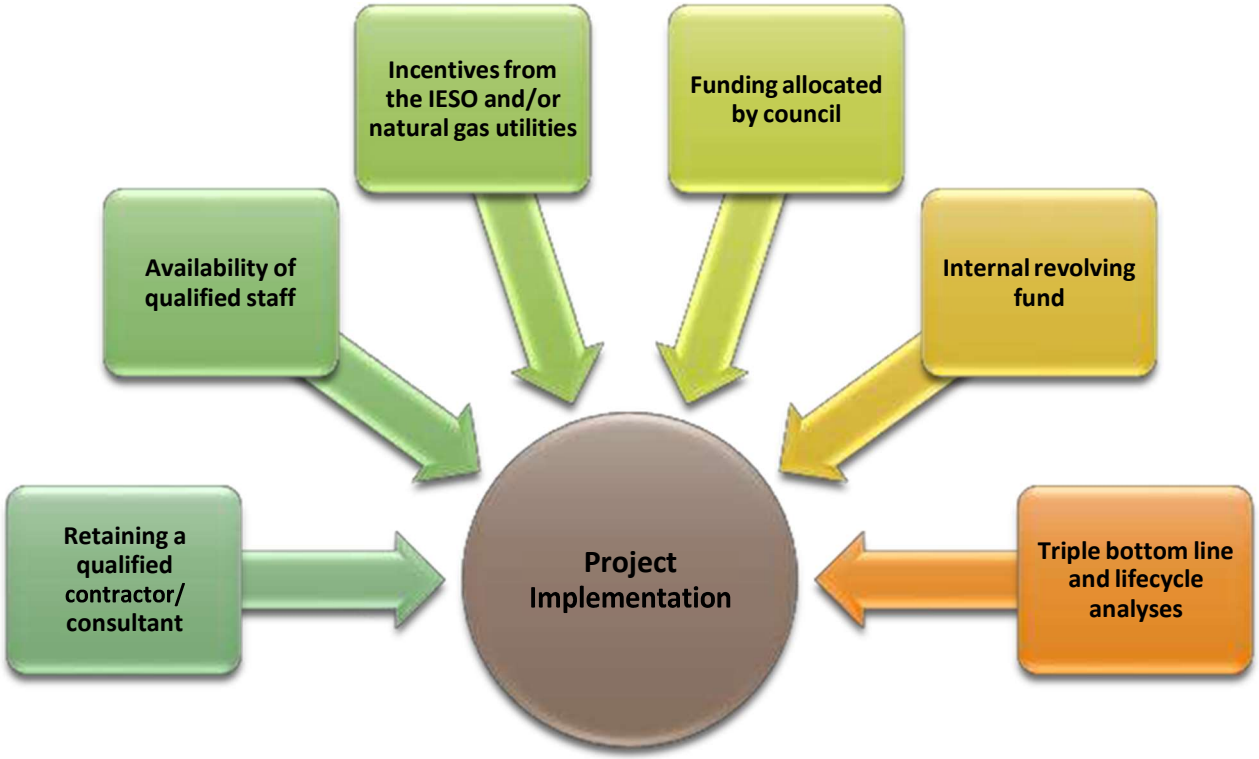


Evaluation Metric Development

Energy conservation projects will be evaluated using an internal rate of return (the rate of interest the project could generate), along with simple payback (the number of years it would take to pay off the project from the savings). Hydro cost savings and life cycle analysis will be used to derive these parameters. In addition, more costly conservation projects will be bundled with more cost-effective ones to ensure their successful implementation.

[7] Energy Efficiency Planning and Management Guide, CIPEC, 2002

Implementation of the proposed projects depends on:



Progress on projects will be monitored using the annual energy reports prepared under the regulation. A separate summary for each project will be prepared and archived.

Integration of Corporate Activities with CDM Plan

The Township of Lucan Biddulph is fully committed to make available any information relating to municipal energy conservation initiatives in the community. The Township of Lucan Biddulph will work with other stakeholders, agencies and organizations to achieve energy consumption and greenhouse gas emissions reduction. Public dissemination of the Conservation and Demand Management Goals and Objectives will encourage successful implementation of the Plan.

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 Lucan Biddulph 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 2024, the Township of Lucan Biddulph will provide an update to include any revisions to

the 2020-2024 CDM Plan. The Township of Lucan Biddulph has submitted and published all of its annual Energy and Greenhouse Emission Reports and will continue to do so annually until July 1, 2024. 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 public agency in reaching any targets it has established or forecasts it has made; and
- Any additional Council initiatives geared at achieving or establishing new targets.

Responsibilities

Successful energy management requires the allocation of staff and resources to continually improve energy performance. The Council of the Township of Lucan Biddulph ensures the availability of resources required to implement the energy conservation initiatives of this plan. Resources include human resources and specialized skills, organizational infrastructure, technology and financial resources.

The Township of Lucan Biddulph's Energy Conservation Framework model includes the following layers:

Township Council

1. Approves the Conservation and Demand Management Plan and approve the financial budget and resource allocation for energy conservation projects
2. Reviews and approves on-going modifications to the Conservation and Demand Management Plan as required
3. Designates an energy management team to direct energy conservation activities
4. Provides advocacy in promoting energy conservation and GHG emission reduction
5. Provides general oversight of the Plan implementation
6. Provides leadership and promotes work culture focused on energy conservation and pollution prevention
7. Ensures that energy conservation regulatory requirements are met

CDM Team

The Township will establish an organizational team dedicated to energy conservation and pollution prevention management.

The implementation of the Five Year Conservation and Demand Management Plan will focus on integrating achievement of sustainability goals with strategic planning to optimize performance and minimize implementation costs.

Energy Management is also considered as a subtask for department managers. Each facility will develop and carry out sections from an integrated Performance Plan that prioritizes the Township's actions toward optimized and sustainable energy consumption. Ultimately, the implementation will be managed by various stakeholders and staff working together.

Council

1. Provides execution leadership for energy conservation and pollution
2. Monitors and facilitates energy conservation projects in conjunction with Senior Staff

Department Managers

1. Ensure that appropriate actions are taken based on CDM Key Performance Indicators from the analyses within their work unit
2. Lead execution of energy conservation projects and implementation of energy conservation measures
3. Serve as the primary technical contact and/or subject matter experts on operational and equipment functionality
4. Provide daily direction of technical activities within their work unit
5. Ensure that CDM projects and actions are in accordance with sound technical practices
6. Communicate regularly with CDM Team on technical and organizational energy optimization measures

Support Staff (Consultants and Subject Matter Experts)

1. Gather knowledge related to energy conservation and best practices
2. Apply energy conservation methodologies used within their work areas
3. Follow appropriate maintenance and other energy conservation activities for their work areas
4. Work on project execution as assigned
5. Gather energy conservation reporting data as assigned

Communication, Awareness and Training

The Township of Lucan Biddulph has recognized the importance of a community-wide natural resources conservation and environmental preservation culture, driven by the municipal government and key stakeholders. Internal communication or communication within the organization is important for employees to understand current energy consumption issues and the Corporation's position with respect to their management. This helps staff to be positive and active in implementation of the Township's energy conservation initiatives and improve their energy conservation behavioural performance while at work and in the community.

All staff has an environmental contribution to make whether they have an operational, maintenance, planning or support function. Internal communications include training programs, newsletters, notice boards, staff briefings and toolbox talks.

The Township also maintains external communication to encourage public understanding and acceptance of the organization's efforts to improve its energy performance. External parties may include shareholders, regulators, local government agencies, adjacent community, environmental groups, customers, community groups and the media.

The Township will release specific information to the public predominantly in the form of the annual GHG report to the Ministry of Energy, and will provide greater extent, through the Corporate website, newsletters, factsheets and media releases.

The Township pursues community involvement in many areas of its operations and sponsors many local community events and programs. These provide opportunities to communicate the Township's commitment to moving toward a more energy conscious and efficient future.

Training is an essential element in ensuring safe and environmentally friendly operations, compliance with Township's Strategic directives and legal requirements. Training covers the areas of environmental awareness, energy conservation practices, compliance issues and energy efficient management. Training may be related to specific equipment, processes and monitoring of energy conservation initiatives. There is a consistent effort for identification of training needs, drawing up a training plan and creating awareness.

Induction sessions will be implemented for new staff and contractors. The Township ensures the development the technical competencies so that any person performing tasks will have the potential to cause a significant energy conservation impact. The Township will implement a

dynamic process for the submission and processing of staff suggestions for energy efficiency improvements.

Timelines

Timelines are assigned based on measures/facility prioritization. These timelines allow for flexibility during implementation, and will be dependent upon the costs/incentives and business decisions driven by the Township of Lucan Biddulph. We will carry out the required development of business procedures and communication programs and implement them methodically according to the planned timelines within the resources constraints that apply.

Administration

As per the requirements of O. Reg. 25/23, the Energy Conservation and Demand Management Plan is available for public access through:

- ✓ Publishing the Five Year Conservation and Demand Management Plan on the Township of Lucan Biddulph web site at https://www.lucanbiddulph.on.ca/
- ✓ Printed form, available for the public, at theTownship's office.

Incentive Funding

To ensure that the Township of Lucan Biddulph will take advantage of all funding and grant opportunities related to energy efficient projects, the Township will liaise with representatives from local utility providers. Township staff and utility representatives are in a unique position to review current and future process improvements, program implementations and projects that can meet future funding requirements. As funding opportunities arise that are suitable for specific energy conservation projects, Township Staff will report to Council and clearly outline the cost savings associated with a successful application.

Conclusions and Recommendations

Conclusions

- ✓ The Township of Lucan Biddulph is on its way to the implementation of a structured Conservation Program
- ✓ The Township plans to complete energy audits to support its investment decision in technologies to reduce electricity expenditures and revise the current plan where appropriate
- ✓ Reasonable targets must be set and targeted based on analysis through the facility assessments
- ✓ A structured implementation framework has been set to secure the success of the CDM initiative

Recommendations

- ✓ Council adoption of the updated CDM plan
- ✓ Complete the additional energy audits and assessments across the facilities as necessary and provide the concise details to the council for review and approval
- ✓ Revise Plan as required based on analysis, energy assessments and energy consumption trends
- ✓ Revisit the energy assessments toward the end of the 4th year period (2027) to facilitate the planning process in the next stages

Schedule 1:
Actual 2019-2023 Energy Consumption

Many changes have occurred to the Township of Lucan Biddulph's facilities over the last five years. That said, even though a facility may have experienced an increase in electricity and/or natural gas consumption from 2014 to 2023, the increase in facility floorplan and/or services offered must also be taken into account when evaluating energy consumption.

Table S-1: Change in Electricity Consumption (2019-2023)

	Total Annual Electricity Consumption (kWh)					
Groups of Facilities	**2019**	**2020**	**2021**	**2022**	**2023**	**2019-2023 Variance**
Arena Bldg	1,018,275	550,919	949,394	1,011,777	1,230,679	**21%**
Wastewater Treatment	187,572	181,324	703,401	850,164	688,935	**267%**
Water Distribution	128,545	122,275	320,468	287,490	276,082	**115%**
Lights	129,257	125,231	187,216	169,379	164,451	**27%**
Township Office	100,423	90,504	93,310	96,532	94,741	**-5.7%**
Firehalls	20,967	23,090	29,410	23,063	20,717	**-1.2%**
Heritage/Donnelly Museum	23,977	15,431	13,972	16,213	16,232	**-32%**
Recreation	5,093	5,585	5,455	17,755	13,522	**166%**
Public Works Building	39,002	40,201	40,500	40,500	40,500	**3.8%**
TOWNSHIP TOTAL	**1,653,111**	**1,154,560**	**2,343,126**	**2,512,873**	**2,545,859**	**54%**

Table S-2: Change in Natural Gas Consumption (2019-2023)

Total Annual Natural Gas Consumption (m^3)						
Facility	**2019**	**2020**	**2021**	**2022**	**2023**	**2019-2023 Variance**
Arena Bldg	97,506	115,032	102,253	83,326	81,484	**-16%**
Public Works Building	20,759	17,785	13,751	17,852	15,504	**-25%**
Township Office	18,420	15,303	15,282	16,581	15,098	**-18%**
Firehalls	11,920	11,350	10,067	11,825	9,791	**-18%**
Wastewater Treatment	7,298	9,575	20,887	17,675	17,987	**146%**
Lucan Library	0	0	0	0	0	
Heritage/Donnelly Museum	0	0	0	0	0	
TOWNSHIP TOTAL	**155,903**	**169,045**	**162,240**	**147,259**	**139,864**	**-10.3%**

Figure S-1: 2023 vs 2019 Township Electricity Consumption Profile

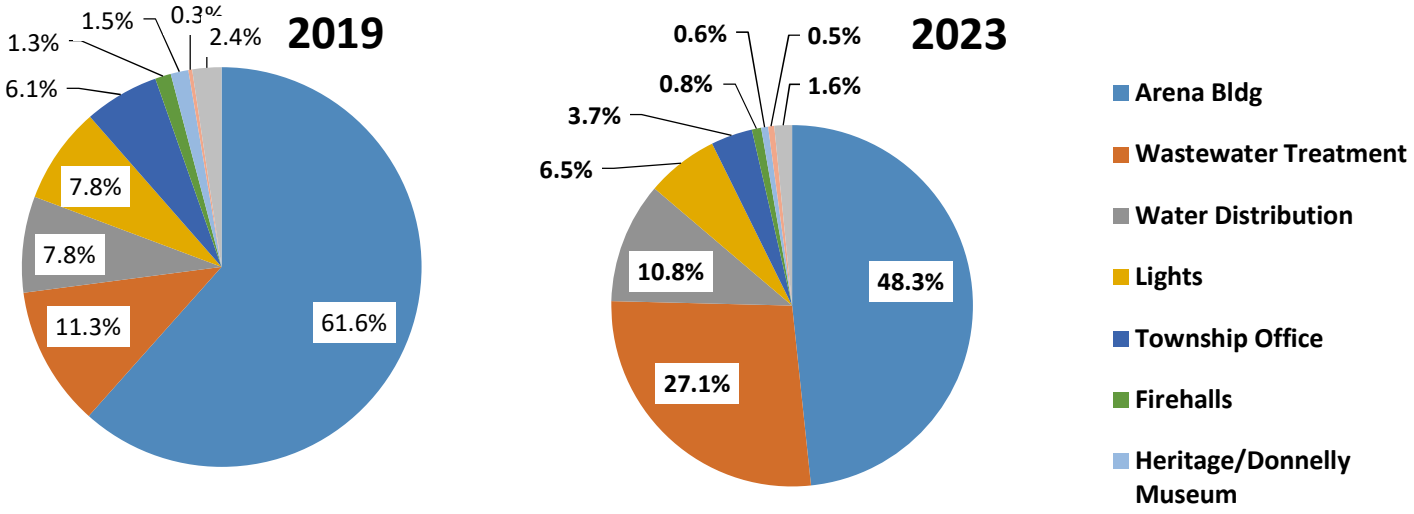
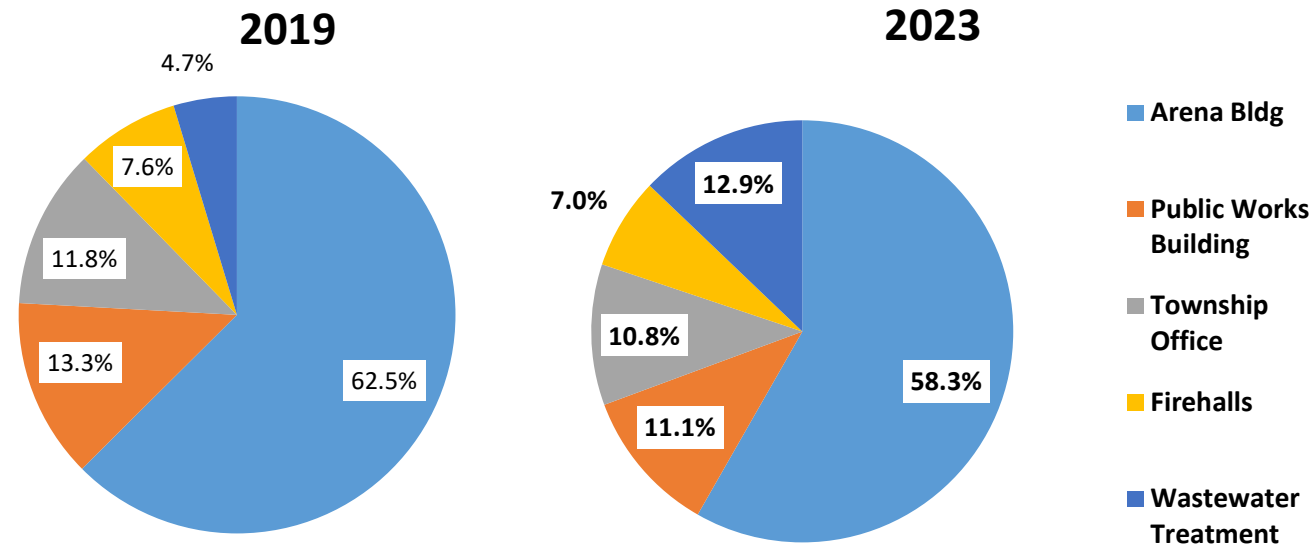


Figure S-2: 2023 vs 2019 Township Natural Gas Consumption Profile



Schedule 2:
Council Energy Mandate

Council Energy Mandate

WHEREAS the Township of Lucan Biddulph prides itself in being responsible stewards of all resources, and

FURTHER, the Township recognizes that energy is a resource that must be efficiently and properly managed

AND FURTHER, the Township of Lucan Biddulph is committed to delivering sustainable and reliable cost effective services to the community, while meeting regulatory requirements and obligations

AND FURTHER, the Township of Lucan Biddulph acknowledges that energy is an operating expense, which can be controlled, where the anticipated fiscal savings will benefit the local community

AND FURTHER, the Township of Lucan Biddulph will continue to reduce energy consumption and mitigate costs through the wise consumption of energy

AND FURTHER, the Township of Lucan Biddulph recognizes the need to build conservation awareness to develop energy management understanding throughout the Township, and all must pursue that responsible energy management

AND FURTHER, the Council of the Township of Lucan Biddulph will designate a leadership team to manage initiatives and implement the Five Year Conservation Demand Management Plan

AND FURTHER, Council will ensure that the necessary resources are budgeted and allocated to implement the goals and objectives as recommended in the Five Year CDM Plan

AND FURTHER, it is also recognized that this initial Plan will evolve as knowledge and experience allows for additional improvements and efficiencies

THEREFORE, be it resolved that that the Township of Lucan Biddulph endorse the goals and vision as outlined in the Five Year CDM Plan, and support the actions and initiatives necessary to meet these goals.

Schedule 3:
Council Resolution Adopting 2024 CDM Plan Update