Strategic Energy Conservation and Demand Management Plan

YEARS 2025-2029

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1. EXECUTIVE SUMMARY

The Windsor Utilities Commission (WUC) is committed to reducing energy usage through innovative and proven methods while providing a safe and reliable water supply to Windsor, LaSalle, and Tecumseh. WUC aims to reduce energy consumption and greenhouse gas emissions by implementing various initiatives and projects.

Ontario Regulation 25/23: Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans requires Broader Public Sector (BPS) organizations to develop an Energy Conservation and Demand Management (CDM) plan and update it every five years. This updated CDM plan was developed in compliance with the regulation and covers the period from 2025 to 2029.

This plan describes in detail the following:

Goals, targets and progress measurements: WUC has set goals to reduce its environmental impact, communicate its plan to the community, improve staff understanding of energy usage, and execute a capital upgrade program. It will track metrics such as Energy Use Intensity (EUI), Greenhouse Gas (GHG) emissions intensity, and water use intensity. EUI is an indicator of total energy usage per square foot of building space, and GHGs are gas emissions targeted for reduction by the Ministry of Environment, Conservation, and Parks (MECP). It has also set targets to decrease its source EUI and GHG emissions intensity by 8% by 2029.

Baseline assessment and previous plan assessment: WUC has compared its energy performance in 2023 with its former baseline in 2016. It has achieved a 12% reduction in source EUI but a 27% increase in GHG emissions intensity, mainly due to the use of natural gas generators for peak demand avoidance. It has also evaluated the completion status of its previous plan's initiatives and projects.

Long-term programs and projects: WUC has identified several long-term programs and projects that will help it achieve its energy performance goals. These include power monitoring upgrades, facility energy audits, fleet vehicle replacement with electric vehicles (EVs), organizational energy management awareness, water treatment process optimization, large pump hydraulic assessments, asset management program improvement, and pump rehabilitation program.

Short-term capital projects: WUC has also planned some short-term capital projects that will have a positive impact on its overall energy demand. These include natural gas generator upgrades, old water treatment plant demolition, ozone power supply unit upgrades, high-lift pump variable frequency drives (VFDs), low-lift pump replacement, diesel generator rebuild, and heating, ventilation, and air conditioning (HVAC) equipment replacement.

Process improvements: WUC intends to implement additional process improvements to enhance its energy management. These include inputting monthly energy bill information into the MECP online system, reporting benchmarking data and key performance indicators (KPIs), reviewing energy performance results, conducting annual facility walk-throughs, establishing written procedures and controls, maintaining a corrective maintenance program, and considering external funding for energy efficient projects.

2. INTRODUCTION

Windsor Utilities Commission (WUC) is dedicated to advancing its efforts to lower energy usage through creative and effective methods while delivering a safe and reliable water supply to Windsor, LaSalle and Tecumseh. The organization continuously increases awareness of its energy reduction initiatives and energy management processes. Energy is a key component of the developed master plan and capital reinvestment plan. WUC is committed at all levels within the organization to ensure the fulfillment of the action plan to reduce energy consumption. Currently, we report on energy usage and initiatives taken to reduce the amount of energy used in those areas. WUC strives to keep the capital reinvestment plan on target with energy conservation and management goals that are integrated into the business culture.

Ontario Regulation 25/23: Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans, requires Broader Public Sector (BPS) organizations to develop an Energy Conservation and Demand Management (CDM) plan and update it every five years. This updated CDM plan was developed in compliance with the regulation and covers the period from 2025 to 2029.

Our updated CDM plan builds on the utility's previous CDM initiatives as presented in previous plans. This updated plan also continues to build on experience gained in energy conservation and demand management over the last five years.

As stewards of environmental responsibility, we recognize the critical importance of conserving energy resources while meeting the evolving demands of our operations. In this document, we present a framework designed to optimize energy efficiency, reduce consumption, and cultivate a culture of sustainability within our organization. Through these strategies, projects, and continuous improvement, we aim to meet the regulatory requirements.

3. PROGRESS MEASUREMENTS:

To achieve the goals and objectives, the following metrics will be tracked:

- **Source EUI [kBtu/ft2]** – The total amount of all the raw fuel required to operate a property, including losses that take place during the generation, transmission, and distribution of the energy.
- **Total (Location-Based) GHG Emissions Intensity [kgCO2e/ft²]** – Uses a regional emissions factor for electricity and national factors for district fuels. Onsite Green Power has zero emissions, but Offsite Green Power is treated as regular grid electricity.
- **Water Use Intensity (All Water Sources) [gal/ft²]** – Total service water use by water facilities per square foot.
- **GHG Emissions from Energy Consumed / ML Treated [kg CO2e/M**L] – This tracks GHG emissions on a per Megaliter of treated water. This is the metric tracked as part of the benchmarking initiatives that WUC is part of and allows us to compare performance to our peers.
- **Energy Cost [$]** – Energy cost for each energy meter at a WUC facility.

Some of these metrics measure energy usage on a per-square-foot basis. This will allow for future building additions or subtractions to still be effectively tracked without baseline scaling issues. They are also the standard metrics used in the MECP online energy management website system.

4. GOALS AND OBJECTIVES

WUC has established the following goals:

- Reduce its energy and environmental impact over the reporting period by meeting reduction targets.
- Communicate WUC's plan to the community.
- Improve staff understanding of energy usage and tracking.
- Execute on a robust capital upgrade program to assist with meeting the targets.

WUC has established the following targets:

- An 8% decrease in the Source EUI [kBtu/ft2] treated by 2029.
- An 8% decrease in the Total (Location-Based) GHG Emissions Intensity [kgCO2e/ft^2] by 2029.

5. BASELINE ASSESSMENT

The previous CDM Plan was created in 2014. Through its initiatives, it improved energy data collection and reporting. The data selected as the "Former Baseline" was collected starting in 2016. For the upcoming reporting cycle, the most recent 2023 data has been chosen as the "New Baseline" to serve as the point of comparison.

The following buildings are tracked and included in this table along with their Former and New Baseline's EUI data:

TABLE 1 - BASELINE ENERGY PERFORMANCE

Property Name	Former Baseline 2016 Source EUI (kBtu/ft²)	New Baseline 2023 Source EUI (kBtu/ft²)	% Change
AH Weeks Treatment Plant	262	260	-1%
AJ Brian Pump Station	949	881	-7%
George Pump Station	4,793	3,479	-27%
JF Cook Booster Station	981	650	-34%
Old Treatment Plant*	180	253	41%
Total	**384**	**340**	**-12%**

*OLD TREATMENT PLANT FORMER BASELINE DATA IS FROM 2017, AS DATA WAS NOT COLLECTED IN 2016.

No buildings have been added or demolished since the former baseline. This helps to improve the accuracy of the baseline comparisons over the reporting period. The previous CDM plan showed some success as the Source EUI has decreased from the former baseline by 12%. This success was primarily realized early in the reporting period, and energy use has increased since then, as shown in the figure below.

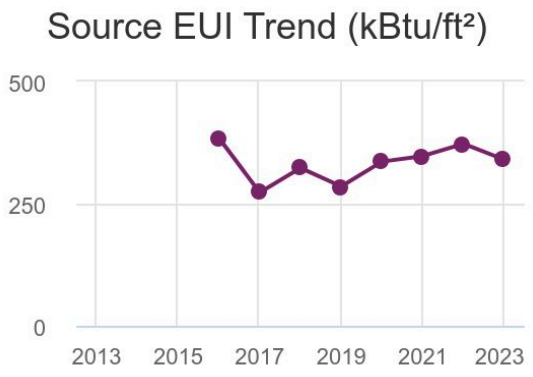

FIGURE 1 - SOURCE EUI TREND

A summary of the greenhouse gas emissions (GHG) can be found in the table below along with a figure denoting the GHGs over the reporting period.

TABLE 2 - BASELINE GHG PERFORMANCE

Property Name	Former Baseline 2016 Total GHG Emissions Intensity (kgCO2e/ft²)	New Baseline 2023 Total GHG Emissions Intensity (kgCO2e/ft²)	% Change
AH Weeks Treatment Plant	4.1	6.2	51%
AJ Brian Pump Station	10.3	5.1	-50%
George Pump Station	30.7	15.6	-49%
JF Cook Booster Station	6.3	2.9	-54%
Old Treatment Plant	5.2	6.1	17%
Total	**4.9**	**6.2**	**27%**

*OLD TREATMENT PLANT FORMER BASELINE DATA IS FROM 2017, AS DATA WAS NOT AVAILABLE IN 2016.

FIGURE 2 - TOTAL (LOCATION-BASED) GHG EMISSIONS INTENSITY (KGCO2E/FT²)

The GHG emissions dropped at the beginning of the reporting period and then increased significantly after 2019. This increase is due to the operational decision to exercise "Global Adjustment" (GA) avoidance by running the natural gas engine generators during peak electrical grid demand. This helps drastically lower electrical costs as avoiding GA substantially reduces electricity rates.

The gas generators provide an additional benefit to the operation of the water treatment plant by allowing the running of the generators during storms to avoid a sudden power outage to the water treatment plant and pump stations. This lowers the risk of watermain breaks and water treatment issues at the expense of higher GHG emissions.

The figure below compares WUC's emissions per Megalitre of treated water to other similar utilities. This One of the ways that WUC measures its performance against others in the industry. WUC has higher emissions than many of its peers, likely due to the more extensive use of its natural gas generators as explained above.

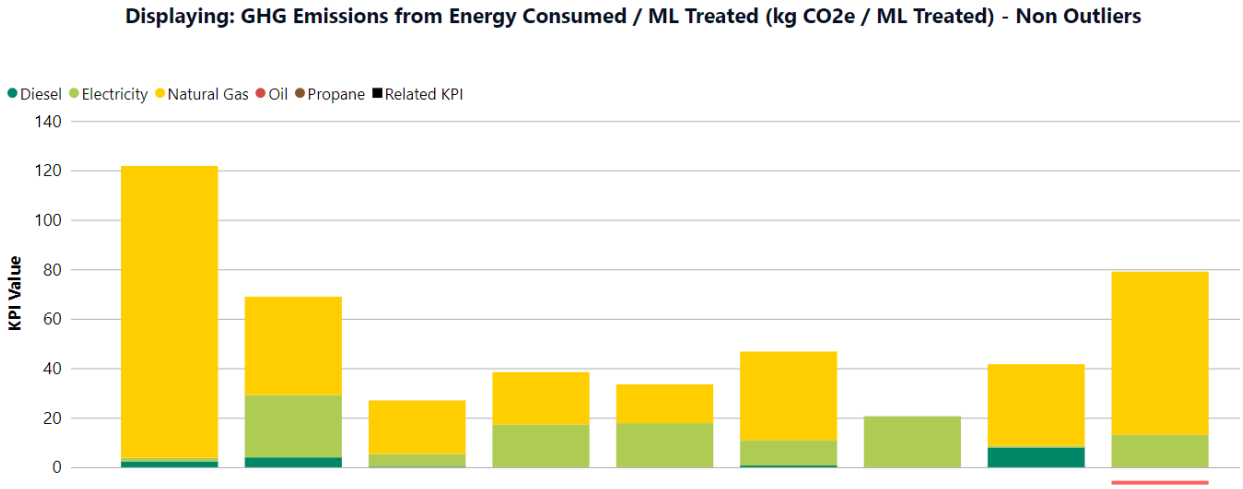

FIGURE 3 - GREENHOUSE GAS/ML TREATED WATER COMPARED TO PEER WATER UTILITIES (WUC UNDERLINED IN RED)

6. PREVIOUS PLAN ASSESSMENT

The previous plan created in 2014 outlined many proposed initiatives and projects aimed at improving energy performance. Below is an assessment of their completion.

6.1. PROCESS IMPROVEMENT:

- Utility bill review and comparison - complete
- Incentives update - complete
- Review of shutdown procedures - complete
- Corporate established KPIs - complete
- Manage heating and cooling loads during summer and winter months - complete
- Implement a new pumping strategy to lower pumping requirements - complete

6.2. PROGRAM IMPLEMENTATION:

- Expand facility-wide energy and demand management programs - incomplete
- Initiate energy efficiency improvement projects - complete
- Review the application of solar energy at the production facility – complete
- Continue Demand Response Program through Rodan (program sponsored through the Ontario Power Authority to reduce overall peak demand in the province) - complete

6.3. PROJECTS:

- Install new LED light fixtures that are energy efficient and brighter - complete

- Install lighting controls to maintain light levels as required in the workplace – partially complete
- Install soft starters and variable frequency drives to improve the energy required to pump treated water - complete
- Replace aging HVAC equipment as required with new energy-efficient models – partially complete
- Replace aging steam boiler with a new energy-efficient boiler – cancelled (no longer required due to planned demolition of the building)
- Rebuild pumps to original specification to improve efficiency – partially complete
- Replace ozone system diffuser injection method with Mazzei injection to reduce ozone generation electrical requirements – cancelled (uneconomical)
- Diversion of the wastewater process to sanitary sewer - complete
- Rebuild of natural gas generators to maintain efficiency – complete
- Ozone power supply unit upgrades – are not included in the previous CDM report but have a significant impact on energy usage at A.H. Weeks.

7. LONG-TERM PROGRAMS AND PROJECTS

Long-term programs and projects have been identified that can contribute to ongoing energy performance. They are to be continually performed and will contribute to the short and long-term success of the CDM Plan.

The following table summarizes the long-term programs and projects that WUC is implementing to meet our energy performance targets:

TABLE 3 - LONG-TERM PROJECTS

Type of Measure	Conservation Measure	Description	Cost	Anticipated Savings	Project Timeline
Technical	Power Monitoring Upgrades	Improve power monitoring capabilities on treatment facility sub-systems to identify areas for future energy performance improvements	$25,000/year	$0	2025-2030
Organizational	Enhance organizational energy management awareness	Communicate to front-line staff the importance of energy management best practices	N/A	$0	2025

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Type of Measure	Conservation Measure	Description	Cost	Anticipated Savings	Project Timeline
Technical	Facility Energy Audits	Conduct facility energy audits at treatment and pumping facilities to identify areas for future energy performance improvements and create an action plan	$75,000	$0	2026-2027
Technical/ Organizational	Fleet Vehicle Replacement with EVs	Replace a portion of the WUC truck fleet with EVs	$200,000 /year	$10,000-15,000/year	2024-2029
Technical	Water Treatment Process Optimization	Conduct continual water treatment process optimization on unit processes to achieve operational efficiencies, thereby reducing energy usage, chemical usage, wastewater generation, etc.	$5,000/ year	$15,000-25,000/year	On-going
Technical	Large Pump Hydraulic Assessments	Hydraulic Assessments of large pumping equipment to determine optimal operating range for VFD usage and reduce energy demand.	$5,000/ year	$15,000-$20,000/year	2025-2029
Technical	Improve Overall Asset Management Program	Collect data on existing assets to determine energy efficiency. Target improvements or replacements in future capital budget planning.	$5,000/ year	$20,000/year	2024-2030

Type of Measure	Conservation Measure	Description	Cost	Anticipated Savings	Project Timeline
Technical	Pump Rehabilitation Program	Rehabilitate Large Pumping Equipment on a regular basis to restore to original specification and improve operational efficiency	$125,000 /year	$10,000/year	On-going

8. SHORT-TERM CAPITAL PROJECTS

Short-term capital projects with defined scopes and allocated funds have been developed to achieve the CDM targets. The following table summarizes the short-term capital projects that WUC is implementing to meet our energy performance targets:

TABLE 4 - SHORT-TERM PROJECTS

Type of Measure	Conservation Measure	Description	Cost	Anticipated Savings	Project Timeline
Technical	Natural Gas Generator Upgrades	Replacement of four existing 30-year-old 4MW natural gas generators with new fuel-efficient models.	$7,000,000	$100,000 / year	2024-2025
Technical	Old Water Treatment Plant Demolition	Demolition of existing decommissioned ~5,900 sqm water treatment facility, which was constructed in 1926, removing long-term building maintenance, heating, and lighting requirements.	$5,900,000	$75,000 / year	2024-2025
Technical	High-Lift Pump VFDs	Install additional variable frequency drives (VFDs) on high-lift pumps to reduce energy usage	$900,000	$25,000 / year	2025-2027

Type of Measure	Conservation Measure	Description	Cost	Anticipated Savings	Project Timeline
Technical	Low-Lift Pump Replacement	Replace aging and inefficient low-lift pumps and motors with new energy-efficient models	$600,000	$15,000 / year	2027
Technical	Rebuild Diesel Generators	Rebuild existing diesel generators to improve overall efficiency	$200,000	$10,000 / year	2028
Technical	Replacement of HVAC Equipment	Replacement of aging HVAC equipment with newer energy-efficient models	$150,000/ year	$10,000 / year	2023-2029

9. PROCESS IMPROVEMENTS

In addition to projects, WUC intends to implement the following process improvements to help meet its goals:

- Input monthly energy bill and cost information into the standard MECP online energy management system.
- Continue to report benchmarking data and KPIs of energy that WUC currently participates in.
- Establish usage/cost reports for regular review of energy performance results.
- Schedule and commit to an energy-focused facility walk-through annually.
- Build upon written procedures to ensure control of equipment and systems are optimized to reduce energy usage.
- Build upon the current comprehensive corrective maintenance program to ensure key energy-using equipment is operating correctly.
- Build upon established appropriate controls for systems when operating load is reduced to decrease energy use and cost.
- Consider external funding for energy-efficient projects during the capital planning budget phase.

10. PLAN APPROVAL

This plan has been reviewed and approved for the period July 1, 2024, to July 1, 2029.

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