



# Energy Conservation and Demand Management Plan

Electricity Act

O. Reg. 25/23

**June 20, 2024**

Revision 2

## Table of Revisions

<b><i>Revision #</i></b>	<b><i>Date</i></b>	<b><i>Description of Revision</i></b>
0	June 26, 2014	Initial Issue of Document
1	June 24, 2019	Five-year review and update of entire document
2	June 20, 2024	Five-year review and update of entire document



June 13, 2024

Ministry of Energy  
77 Grenville Street  
Toronto ON M7A 2C1

Dear Sir/Madam;

We are pleased to submit the five-year review and update of the Energy Conservation and Demand Management Plan for the Elgin Area Primary Water Supply System (EAPWSS).

The attached Plan summarizes our annual energy consumption information, as well as our goals, objectives and proposed measures with respect to energy conservation and demand management. The Plan also provides a report of the actual results achieved during the period 2018-2023.

Acting as the Owner Representative on behalf of the EAPWSS Board of Management, I confirm that this Plan has been approved by senior management. The EAPWSS is committed to implementing and maintaining energy conservation and demand management measures in accordance with this Plan.

Should you require any further information, please feel free to contact our office at your earliest convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "A. Henry", with a long horizontal stroke extending to the right.

Andrew Henry, P.Eng.  
Director, Regional Water Supply

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## TABLE OF CONTENTS

<b>1.0</b>	<b>EXECUTIVE SUMMARY</b>	6
<b>2.0</b>	<b>INTRODUCTION</b>	7
	Vision Statement	7
	Background	7
	ISO 14001 Environmental Management System	8
<b>3.0</b>	<b>SCOPE</b>	10
	Elgin Area Primary Water Supply System	10
	Elgin Area Water Treatment Plant	10
<b>4.0</b>	<b>CDM PLAN RESULTS &amp; CURRENT STATE</b>	12
	Equipment Efficiency - Capital Projects	12
	Data Management	15
	Supply Management	15
	Organizational & Behavioural Integration	15
	Renewable Energy	16
	New Energy Consumption Baseline (2017)	16
	Energy Consumption Performance (2018-2023)	16
	Data Analysis	19
	Forecast	20
<b>5.0</b>	<b>ENERGY GOALS AND OBJECTIVES</b>	21
	Measurements of Success	21
<b>6.0</b>	<b>ENERGY MANAGEMENT TEAM</b>	22
<b>7.0</b>	<b>CURRENT AND PROPOSED MEASURES</b>	24
	Equipment Efficiency - Capital Projects	24
	Process Optimization	26
	Energy Awareness & Promotion	26
	Monitoring and Reporting	27
	Future Work	27

APPENDIX A: Environmental and Quality Policy

APPENDIX B: Scheduled Actions, Environmental Management Program, 2023-2027

APPENDIX C: Energy Performance Trends, 2018-2023

## **Acronyms**

CDM	Conservation and Demand Management
EAPWSS	Elgin Area Primary Water Supply System
EMS	Environmental Management System
GHG	Greenhouse Gas
HLP	High Lift Pump
HVAC	Heating, Ventilation and Air Conditioning
IESO	Independent Electricity System Operator
LLP	Low Lift Pump
ML	Mega Litres
OCWA	Ontario Clean Water Agency
RMF	Residuals Management Facility
RWS	Regional Water Supply
WTP	Water Treatment Plant

## 1.0 EXECUTIVE SUMMARY

The Ontario Provincial Government has committed to help public agencies better understand and manage their energy consumption. As part of this commitment, O. Reg. 25/23 under the *Electricity Act, 1998* requires public agencies to report on their energy consumption and greenhouse gas (GHG) emissions annually, and to develop and implement energy Conservation and Demand Management (CDM) Plans. This regulatory requirement was first implemented in 2014, with required updates to the CDM Plan every five (5) years. As part of the regulatory requirements, energy consumption and GHG emissions have been reported annually since 2011.

The purpose of the initial Elgin Area Primary Water Supply System (EAPWSS) CDM Plan (dated June 26, 2014) was to develop a framework to understand the historical impact of its operations on GHG emissions, and to act by setting reduction targets, goals and objectives consistent with the utility's Environmental Management System (EMS). A baseline was established for performance to be measured against. This updated CDM Plan builds on the EAPWSS's previous Plans developed in 2014 and 2019, and the experience gained over the last five (5) years.

The strategic approach to energy management supports the EAPWSS's Business Plan, which encompasses asset management, financial, operational and capital plans.

The purpose of this update to the CDM Plan is to provide the following:

- A summary of the data on the Energy Consumption and GHG Emissions Templates that were submitted and published for 2018–2023,
- An analysis of the actual results achieved,
- A description of current and proposed measures for conserving and otherwise reducing energy consumption and managing demand for energy,
- A revised forecast of the expected results of the current and proposed measures, and
- A description of any proposed changes to be made to assist the drinking water system in reaching any targets it has established or forecasts it has made.

## 2.0 INTRODUCTION

### Vision Statement

The vision statement of the EAPWSS Board of Management for the administration and operation of the water system, as initially adopted by the Board in 2000, is as follows:

*“The Elgin Area Water Board strives to operate and to continually improve the sustainable, environmentally friendly utility that provides safe drinking water at stable and reasonable prices to current and future member municipalities.”*

### Background

Achieving a balance between the environment, society and the economy is considered essential to meet the needs of the present without compromising the ability of future generations to meet their needs. Sustainable development as a goal is achieved by balancing the three pillars of sustainability.

- **Environmental Sustainability:** Managing the effects of human activity so that it does not permanently harm the natural environment.
- **Economic Sustainability:** Managing the financial transactions associated with human activities so that they can be sustained over the long term without incurring unacceptable human hardship.
- **Social/Cultural Sustainability:** Allowing human activity to proceed in such a way that social relationships between people and the many different cultures around the world are not adversely affected or irreversibly degraded.

The CDM Plan is the sum of measures planned and carried out to achieve the objective of using the minimal possible energy while maintaining water production rates, as well as comfort levels (e.g. in offices). It can be applied to any process or facility where energy use is required.

Energy efficiency and the wise use of energy are two of the lowest cost options for meeting energy demands, while providing many other environmental, economic and social benefits, including reducing GHG emissions, cost avoidance and savings. Energy efficient capital upgrades and operating process improvements are key components which are outlined within the CDM Plan.

The EAPWSS recognizes the importance of decarbonization of public facilities and infrastructure in accordance with federal climate change policy. Board staff worked with a Western University Masters in Environment and Sustainability student group in early 2024 to assess various decarbonization opportunities and plans for the regional water supply system, including but not limited to green building/project certification (e.g. Leadership in Energy and Environmental Design (LEED)), zero carbon building design, carbon offset opportunities and funding options.



## **ISO 14001 Environmental Management System**

The EAPWSS has committed to integrating the management of environmental issues with all other aspects of its core business, which is the provision of safe drinking water to customers. The implementation of an Environmental Management System (EMS) which adheres to the principles of the ISO 14001:2015 Standard has been used to accomplish these commitments.

Consistent with the EAPWSS Environmental and Quality Policy (see Appendix A), the intended outcomes of the EMS are:

- enhancement of environmental performance,
- fulfilment of compliance obligations, and
- achievement of environmental objectives.

Maintaining the EMS ensures that the EAPWSS continues to conduct its business in a proactive, environmentally accountable, and socially acceptable manner. The comprehensive EMS manages environmental risks and opportunities and integrates environmental matters into overall administration of the EAPWSS. The EMS serves as a planning tool to allow the EAPWSS to continually improve its operations.

The EAPWSS has operated under the guidance of an ISO 14001 registered Environmental Management System (EMS) since 2003. The continued utilization and registration of the EMS to the ISO14001 Standard is a requirement of the Service Agreement with Ontario Clean Water Agency (OCWA), the contracted operating authority for the EAPWSS.

Through the EMS, energy consumption has been identified as a significant environmental aspect. Since the implementation of the EMS, the EAPWSS has established and maintained an objective, target and program related to energy reduction, specifically electricity.

The EAPWSS strives to demonstrate leadership in water resource management and utilizes a continual improvement cycle to control its impact on the environment. Reducing energy consumption, associated costs and secondary environmental impacts is at the forefront of all planning and operating activities from the EAPWSS Board of Management down to everyday operations.

Mechanisms exist within the ISO 14001 EMS to allow employees to provide feedback and input to top management regarding suggested system and process improvements. As part of the EMS, employees are provided with training on new processes and procedures to ensure effectiveness and efficiency of any newly implemented system improvement.

The EMS drives internal actions and reviews, and since energy consumption is recognized as a significant environmental aspect within the EMS its mechanisms will support ongoing projects and reviews. A copy of the current EMS environmental management program can be found in Appendix B. The continued implementation of the recommended processes and programs will result in an improved understanding and awareness of energy consumption. This will allow for improved decision making and greater success with future energy projects.

### 3.0 SCOPE

#### Elgin Area Primary Water Supply System

The Elgin Area Primary Water Supply System Board of Management is the owner and provides governance for the EAPWSS. The EAPWSS is responsible for the treatment and transmission of drinking water to the following eight (8) municipalities: City of London, City of St. Thomas, Town of Aylmer, Municipality of Bayham, Township of Malahide, Municipality of Southwold, Municipality of Central Elgin, and the Municipality of Dutton Dunwich.

The population served by this system is approximately 138,000 (as per the 2020 Master Water Plan Update) and water is provided bulk wholesale to the municipalities who then distribute it to their customers.

The water system is operated and maintained by OCWA under contract to the Board of Management. The current contract with OCWA is in effect from January 1, 2023 to December 31, 2027. Goals and objectives for the EMS were set to coincide with this five (5) year operating term.

The EAPWSS includes one (1) facility that falls under the mandatory monitoring and reporting requirements for O. Reg. 25/23.

**Table 1: EAPWSS Facilities – General Information**

Facility	Operation Type	Address	Municipality
Elgin Area Water Treatment Plant	Facilities related to the treatment of water	43665 Dexter Line	Central Elgin

At this time, energy reporting for facilities related to the pumping of water (i.e. pump stations) remains voluntary. The EAPWSS is currently collecting data and monitoring the energy consumption at the Elgin-Middlesex Pump Station (located at 490 South Edgeware Road, St. Thomas) for consideration in future reporting. The Elgin-Middlesex Pump Station is a joint-use station located on the EAPWSS property, in which three (3) other drinking water systems have occupancy within the building. The EAPWSS receives and processes the energy bills for this station as part of the “Joint Occupancy and Use Agreement” among all parties.

#### Elgin Area Water Treatment Plant

The Elgin Area Water Treatment Plant (WTP) was constructed in the late 1960’s. It is a conventional WTP with a rated capacity of 91 Mega Liters/day (MLD). After water is treated, it is pumped from the WTP to various communities or to the terminal storage reservoir. The primary transmission mains are fully twinned, each 14.7 km in length,

although one transmission main was taken out of service in 2019 for a condition assessment and subsequent rehabilitation.

Major electricity consuming equipment within the WTP includes:

- four (4) low lift pumps,
- two (2) flash mix chambers,
- two (2) banks of flocculation tanks,
- two (2) gravity sedimentation tanks equipped with scraper systems,
- two (2) backwash pumps,
- one (1) centrifugal blower,
- four (4) ultraviolet (UV) reactors,
- four (4) high lift pumps,
- various chemical systems,
- air compressors,
- Residuals Management Facility (RMF) including various mixing pumps and feed pumps, two (2) centrifuges, and various chemical systems,

Major natural gas consuming equipment within the WTP includes Heating, Ventilation and Air Conditioning (HVAC) building systems including boilers and air handling units.

Other sources of GHG emission on the WTP site are combustion source based including diesel fuel for standby/emergency power needs, other process related fuel and oil consumption, and fleet vehicles. These fuel sources are not considered in the annual reporting due to limitations in the Ministry's reporting software.

## 4.0 CDM PLAN RESULTS & CURRENT STATE

### Equipment Efficiency - Capital Projects

Since the CDM Plan was first developed in 2014, the EAPWSS has pursued many measures to improve the energy efficiency of equipment. The focus has generally been on equipment rehabilitation, equipment replacement, and process optimization. Several capital projects recently completed at the Elgin Area WTP in 2018-2023 have contributed to energy conservation and demand reductions.

#### **Project #EA4156 - High Lift Pump (HLP) Upgrade**

**Cost:** \$2,849,941 with \$527,040 in financial incentives through Hydro One's Save-On Energy program

**Status:** Completed (2020)

**Scope:** The previously completed Energy Audit and Pump Optimization Study identified the replacement of the high lift pumps (HLPs) at the Elgin Area WTP as a significant opportunity for energy savings and optimizing pump operations. The pumping system was largely original to the initial WTP construction in the late 1960's, with some modifications done in the mid-90s. The project involved replacing the four (4) HLPs with energy efficient equipment sized to meet current and future water demands.

In 2018 the detailed engineering assessment and design work were completed to confirm the construction requirements, anticipated savings, and available funding incentives. The new equipment was pre-purchased in 2019. Construction was undertaken in two stages to minimize interruptions in supply. Two pumps were replaced in the winter of 2019/20 and the remaining two pumps were replaced in the spring of 2020. Commissioning of the new pumps was complete by mid-June 2020.

In order to qualify for financial incentives, a one-year monitoring and verification study took place to verify the estimated project energy savings. The data analysis determined that energy savings are slightly higher than original estimates.

**Estimated Savings:** The predicted annual energy consumption savings is 750 MWh/year.

**Awards:** The Lake Huron and Elgin Area Water Treatment Plant High Lift Pump Replacement Projects received an Ontario Water Works Association (OWWA) Water and Energy Efficiency Committee 2023 Award of Excellence.



**Figures 1a & 1b:** New 500hp High Lift Pumps #1, #2, #3 & #4 in the high lift pumping station

**Project #EA4174 - Lighting Motion Sensors in the Residuals Management Facility (RMF)**

**Cost:** \$22,234

**Status:** Completed (2019)

**Scope:** Operations staff identified an opportunity to improve the energy efficiency of the RMF. This project included the installation of motion sensors and lighting controls, consistent with the remainder of the WTP, to control lighting in the RMF when rooms are not occupied.

**Project #EA4179 – Window Glazing/Replacement**

**Cost:** \$118,450

**Status:** Completed (2020)

**Scope:** A significant number of windows at the WTP were original to plant construction in the late 1960's and were starting to leak. Repairing and installing new windows, where appropriate, provided the opportunity to install energy efficient windows, reduce heat losses, and improve the energy efficiency of the facility.

**Project #EA3012 – Interior LED Lighting Upgrades**

**Cost:** \$74,957

**Status:** Completed (2021)

**Scope:** This project was for the installation of LED lighting throughout various WTP buildings. Lighting upgrades were completed in various rooms within the High Lift Building, Low Lift Building, Chemical Building, and Chlorine Building. LED lighting is more energy efficient and offers a longer lifespan.

**Project #EA3020 – Roof Replacements**

**Cost:** \$653,831

**Status:** Completed (2023)

**Scope:** A condition assessment in 2012 identified that several roofs at the Elgin Area WTP required advanced repairs or replacement. In 2023 the Chemical and Flocculation Building roof was replaced. This was part of a multi-year replacement program which included previous replacements of the Chlorine Building roof in 2022, and a portion of the High Lift / Administration Building roof in 2020-2021. This replacement program concluded in 2023. This project contributes to overall WTP building energy efficiency.

**Project #EA4114-21 – Low Lift Pump (LLP) #3 Rebuild**

**Cost:** \$40,216 (EAPWSS) plus OCWA expenses

**Status:** Completed (2022)

**Scope:** LLP #3 was no longer operating efficiently and had deteriorated to the point where it required a major rebuild. The pump was inspected and rebuilt, and the motor reconditioned.

[Note: LLP #1 was rebuilt in 2018, and previously reported on in the 2019 Energy CDM Plan.]

**Project #EA3014 – Elgin Low Lift Pump #2 & #3 Replacement Study**

**Cost:** \$25,267

**Status:** Completed (2022)

**Scope:** The testing of the Low Lift Pumps (LLP) and the study is completed. A Technical Memo was finalized in September 2022. The study recommended re-evaluation of performance and condition re-assessment of the LLP in 2-5 years. LLP replacements are expected in 3-5 years. A new business case will be required to determine timing of the replacement project. As noted above, LLPs #1 and #3 were recently rebuilt.

## **Data Management**

EAPWSS has a comprehensive program in place for collecting and analyzing monthly energy billing information and ensuring staff are informed about energy consumption. Currently, EAPWSS utilizes the service of a consultant (VIP Energy) to assist with monitoring electricity consumption. If there is an anticipated critical peak, the consultant will provide a notification which is forwarded to OCWA. In addition, a website has been made available to monitor electricity and consumption costs (Utilismart). OCWA has also contracted an outside vendor to provide email notifications to staff when there is a forecasted anticipated Ontario energy critical peak. OCWA monitors Ontario energy demands through the Independent Electricity System Operator (IESO) website, and weather conditions.

These efforts allow for monitoring excessive variations, targeting facility follow-up evaluations, and highlighting areas for improved conservation or asset renewal.

## **Supply Management**

EAPWSS has currently adopted a strategy of procuring its electricity from Hydro One Networks Inc. EAPWSS has chosen to contract its natural gas through Enbridge Gas Inc. (formerly Union Gas). This strategy is reviewed annually during the budgeting process. VIP Energy provides monthly ongoing support for electricity supply management, guidance and assistance of future pricing decisions, ongoing support for Independent Electricity System Operator (IESO) services, and various other guidance and assistance.

## **Organizational & Behavioural Integration**

Day to day operational management of energy has been primarily the responsibility of the operating authority for the EAPWSS, which is currently OCWA. Current practices have been enhanced, including:

- Improved coordination of operational activities through further development of the [energy management team](#),
- Improved energy monitoring and feedback, and
- Interactive energy training and awareness.

In October 2023, EAPWSS and OCWA staff were presented with an energy orientation/refresher training workshop entitled “Ontario Electricity Market Overview Training”. The purpose of the workshop was to develop an understanding of how actions affect the electricity bills. The challenge of energy management and energy management benefits were also discussed.



Staff are directed to ensure water pumping in off peak hours (when possible), to utilize full pump capacity before activating additional pumps, and make efficient use of interior and exterior lighting.

As the understanding of energy consumption improves, EAPWSS staff are better equipped with the knowledge necessary to make informed decisions on asset management.

## **Renewable Energy**

The EAPWSS currently has no renewable energy generation (e.g. solar energy, ground source energy, wind, biogas), therefore there is no energy production to report on an annual basis.

## **New Energy Consumption Baseline (2017)**

Effectively managing energy requires implementing appropriate energy monitoring procedures. The establishment of an accurate energy baseline is essential in this process. It assists with energy conservation and GHG reduction target setting, energy procurement and budgeting, bill verification, energy awareness, and the selection and assessment of potential energy projects.

EAPWSS originally utilized the consumption data from 2012 to represent its baseline energy consumption performance, as 2012 coincided with the start of OCWA's operating term.

From 2014-2016, a new Residuals Management Facility (RMF) was being constructed on the WTP site and commissioned. The RMF began fully operating in January 2017. The RMF has been fully operational for several years and the energy intensity of the overall site (including the RMF and WTP) has stabilized.

**As a result of the RMF operation, the baseline energy consumption year has been re-established, with 2017 being utilized as the new baseline year. 2017 represents the new baseline year for energy consumption as well as GHG emissions.**

It is imperative to understand the energy characteristics of the WTP, including the RMF. After re-establishing the baseline, future retrofits and improvements to the facility can be monitored and tracked to ensure that the intended benefits are fully realized.

In the future, consideration should be given to re-establish the baseline energy consumption year to 2021. This represents the first full year of data with all four (4) new HLP in operation (i.e. new steady state for high lift pumping).

## **Energy Consumption Performance (2018-2023)**

In 2024, the EAPWSS's most recent energy consumption reporting was submitted to the Ministry of Energy for 2022 & 2023. The table below summarizes the WTP energy

consumption and GHG emissions as reported annually to the Ministry of Energy. These energy performance trends are also presented graphically in Appendix C.

**Table 2: Annual WTP Energy Consumption and GHG Emissions**

<b>Year</b>	<b>Annual Treated Water Flow (ML)</b>	<b>Average Flow (m<sup>3</sup>/day)</b>	<b>Total Electricity Consumption (kWh)</b>	<b>Total Natural Gas Consumption (m<sup>3</sup>)</b>	<b>GHG Emissions (kg) *</b>	<b>Energy Intensity (ekWh/ML) *</b>	<b>Electricity Intensity (kWh/ML)</b>
2012	15,592	----	8,683,400	100,507	1,023,975	625.44	556.93
2013	15,347	----	8,908,242	100,108	866,400	649.76	580.44
2014	15,557	----	9,553,379	130,727	629,396	703.39	614.08
2015	15,421	----	9,578,759	127,856	630,128	709.26	621.14
2016	15,668	----	9,658,036	148,258	623,624	716.97	616.41
<b>2017 (New Baseline)</b>	15,753	----	10,039,604	230,201	608,889	792.61	637.31
2018	16,133	----	10,227,025	238,033	752,220	790.73	633.92
2019	15,942	----	9,502,192	229,986	724,378	749.36	596.04
2020	16,033	----	9,442,845	188,815	597,280	714.12	588.96
2021 **	15,953	43,693	9,572,561	195,624	655,600	Not available	600.06
2022 **	16,013	43,858	9,707,050	194,954	648,500	Not available	606.21
2023 **	16,099	44,057	9,676,900	170,994	601,300	Not available	601.06

\* Calculated within the Ministry's reporting software.

\*\* Effective 2021: Reporting is through the new Energy Star Portfolio Manager® application

## Data Analysis

As a result of the RMF coming into operation, the baseline energy consumption year has been re-established, with 2017 being utilized as the new baseline year.

From 2017 to 2023, both the total electricity consumption and total natural gas consumption decreased overall.

The total electricity consumption decreased from 10,039,604 kWh to 9,676,900 kWh, which represents a **3.6% decrease**. When the electricity consumption is normalized to take into account the total treated water flow that left the WTP (i.e. electricity consumption analyzed on a kWh/ML basis) the performance improves. The electricity intensity decreased from 637.31 kWh/ML to 601.06 kWh/ML, representing a **5.7% decrease**.

Several operational changes made at the Elgin Area WTP in recent years likely contributed to the improvement in electricity consumption.

In 2019, an operational change was made at the WTP to temporarily decommission the original 750mm transmission pipeline and operate solely on the new 900mm pipeline. This eliminated the need to alternate which transmission pipeline was in service, and the corresponding shutdown/start-up of the WTP to switch pipelines which was operationally and energy intensive. This has had a positive impact on the overall electricity consumption trend.

In 2020, all four (4) High Lift Pumps (HLP) at the WTP were replaced. The new pumps are more energy efficient and were sized to meet current and future water demands. The HLP replacement project resulted in a reduction in electricity consumption.

The total natural gas consumption decreased from 230,201 m<sup>3</sup> to 170,994 m<sup>3</sup>, which represents a significant **25.7% decrease**. However, this analysis does not currently factor in weather normalization of the data, as natural gas consumption at the Elgin Area WTP is mainly required for HVAC systems, particularly heating.

The total GHG emissions decreased from 608,889 kg to 601,300 kg, which is a **1.2% decrease**. For a comprehensive list of equipment that contributes to GHG emissions, refer to [Section 3.0 \(Scope\)](#).

Graphs depicting the total electricity consumption, electricity intensity, total natural gas consumption, and total GHG emissions from 2018-2023, as compared to the 2017 baseline, can be found in Appendix C.

In the future, consideration should be given to re-establish the baseline energy consumption year to 2021. This represents the first full year of data with all four (4) new HLP in operation (i.e. new steady state for high lift pumping).

## Forecast

Over the next five (5) year period, there are planned capital upgrades and optimization projects that may have an impact on energy consumption, particularly the electricity consumption. For a list of approved projects, refer to [Section 7.0 \(Current and Proposed Measures\)](#).

As an addition to the program, energy monitoring at the pumping stations is currently underway to establish an electricity consumption baseline for each facility. Future consideration will be given to start reporting on these facilities and establishing programs for reducing the electricity consumption.

## **5.0 ENERGY GOALS AND OBJECTIVES**

It is of the utmost importance that EAPWSS improve energy efficiency, minimize operating costs and reduce its impact on the environment, all without adversely impacting operations and quality.

This CDM Plan has the following goals and objectives:

- Achieve a reduction in GHG emissions over the duration of the CDM Plan (as compared to the 2017 baseline year, with future consideration for a 2021 baseline year),
- Maintain registration of the ISO 14001 EMS, which includes energy related objectives, targets and programs (see Appendix B for current details),
- Maintain regulatory compliance,
- Improve the management of EAPWSS's energy consumption, and
- Improve EAPWSS's understanding of energy consumption which is essential for EAPWSS to meet its energy management goals.

### **Measurements of Success**

The measurements of success will be based on a variety of indicators:

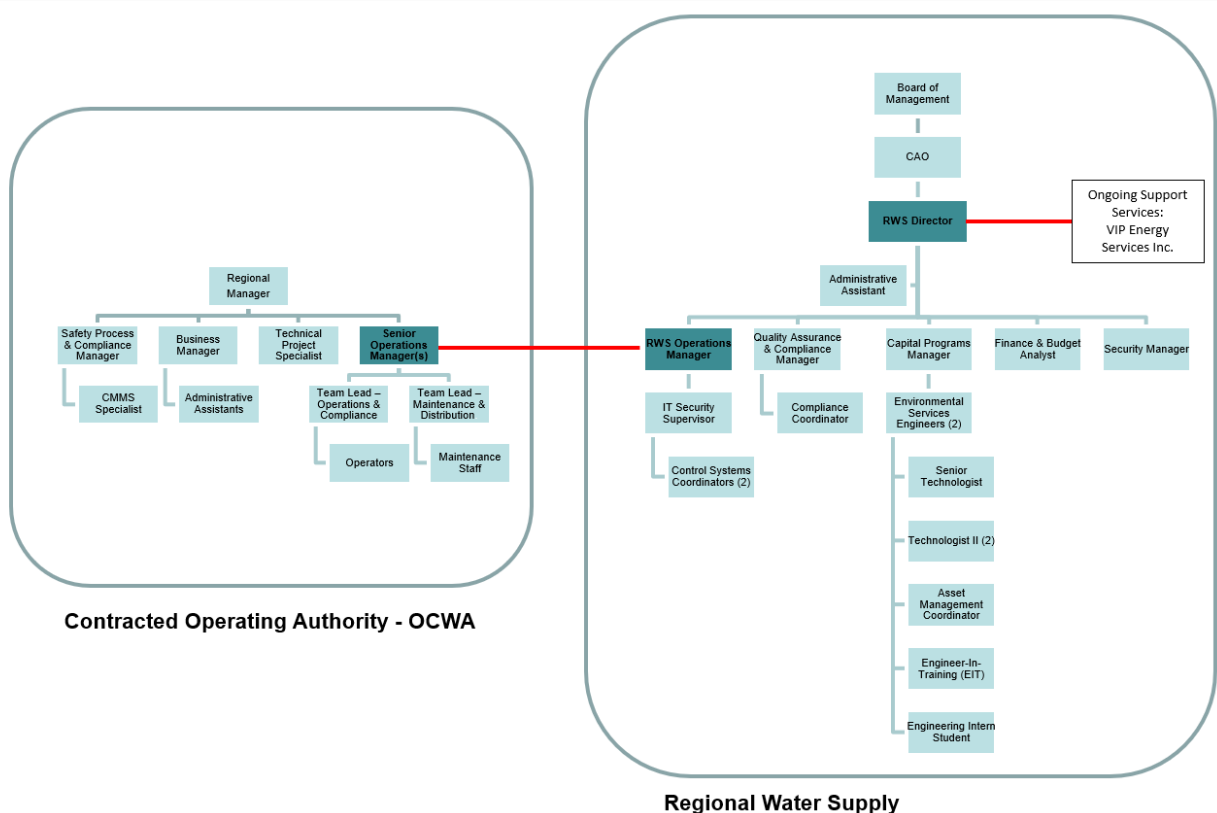
- Achieving the energy related objectives and targets as identified in the ISO 14001 EMS (see Appendix B for current details), specifically the electricity consumption target,
- Reaching the CDM Plan's general energy conservation targets,
- Achieving the savings, where estimates are available, and
- Imbedding energy management in EAPWSS's capital and operations decision-making process.

## 6.0 ENERGY MANAGEMENT TEAM

All staff have an essential role in the success of this CDM Plan and it is the responsibility of the energy management team to ensure that energy management measures are properly communicated and effectively implemented.

Energy management is the responsibility of both EAPWSS staff, and OCWA staff as they are responsible for the day-to-day operations and maintenance of the facilities. There is a key linkage for energy management activities between the Regional Water Supply (RWS) Operations Manager and OCWA's Senior Operations Manager, mainly with respect to coordination of operational and maintenance activities and the implementation of capital projects.

The RWS Director, acting as the owner representative for the EAPWSS Board of Management, has key responsibilities for energy management with respect to approving goals and objectives, and through the annual budget approval process.



**Figure 2: Structure of Energy Management Team**

Historically, EAPWSS addressed energy conservation and demand management on a project-by-project basis. Strategic directives have been provided by the EAPWSS Board of Management and senior management.

This CDM Plan outlines a commitment to integrate Energy Conservation and Demand Management into the operations of the EAPWSS, as indicated in the covering letter from senior management.

Within the duration of the CDM Plan, CDM planned activities will become an integral component of the annual budgeting process. A collaborative effort will be undertaken to achieve this integration, involving:

- Internal Staff,
- Advisement from the Ministry of Energy, where applicable, and
- Consultations with Energy Management experts.

OCWA has dedicated energy management team resources that provide support to all OCWA staff through training and programs. OCWA has a corporate sustainable energy plan and can help their clients achieve efficiencies and savings through OCWA's energy program. OCWA will undertake client energy audits and energy studies where required, support the delivery of energy-related upgrades, and assist in identifying and quantifying energy savings in other capital projects.



## 7.0 CURRENT AND PROPOSED MEASURES

Measures are the actions taken to save energy and help achieve the goals and objectives of the EAPWSS. The energy saving measures identified in this CDM Plan fall into three categories: technical, organizational, and behavioural.

- **Technical** measures are operational and/or technological changes. They generally relate to energy consuming equipment, and includes re-commissioning of buildings and equipment, and demand response (i.e. shifting energy usage from times of peak demand to off-peak times through operational adjustments).
- **Organizational** measures involve working together to build an energy management culture. This includes utilization of policies, procurement practices, and design standards.
- **Behavioural** measures relate to awareness, improving habits, procedures and feedback. This includes informing staff of potential savings associated with their actions, and employee engagement programs.

The economic feasibility of proposed actions plays a large role in the prioritization of the processes, programs, and projects. Equally important in this prioritization is the evaluation of EAPWSS's internal capacity to complete the proposed initiatives.

Areas of focus for the period covered by this CDM Plan include:

- Equipment replacements and/or rehabilitation to address efficiency (e.g. capital projects),
- Process optimization,
- Energy awareness and promotion, and
- Monitoring and reporting.

### Equipment Efficiency - Capital Projects

The following projects are either currently in progress or planned to be undertaken within the next five (5) years. These projects are projected to optimize and/or improve the energy efficiency of equipment and subsequently contribute to energy conservation and demand reductions.

#### **Project EA4183 – Ultraviolet (UV) System and Backwash Pump Replacement Project**

**Budget:** \$9,109,360

**Scope:** This project involves the end-of-life replacement of the existing and UV disinfection system and the two (2) backwash pumps.

**Potential Savings:** To be determined. The new UV reactors will be more energy efficient than the existing ones. However, the new reactors will be larger which may offset any efficiency savings. The new backwash pumps will be more energy efficient.

However, backwash optimization will be minimal on this project. Under certain circumstances operations may be able to run only one (1) backwash pump instead of two (2).

#### **Project EA4184 - Water Quality Facility Plan (WQFP) Update**

**Budget:** \$130,599

**Scope:** The WQFP update provides the EAPWSS with new information on WTP performance and treatment capacity as supply conditions change. The final WQFP will provide staff with a detailed report on the status of the WTP and residuals management processes and their overall performance. It will also provide recommendations and the framework to prioritize the timing for further sampling programs, studies, capital upgrades and/or operational modifications or changes to improve water treatment efficiency and efficacy. The recommendations will be implemented as future projects over a 10-year planning horizon. This study commenced in June 2022 with anticipated completion in October 2024.

**Potential Savings:** To be determined. Future projects recommended by this study should contribute to future chemical efficiency and backwash optimization, which has a direct correlation to electricity savings.

#### **Project EA4186 - Sodium Hydroxide Assessment Study**

**Budget:** \$130,000

**Scope:** The Elgin WTP has a sodium hydroxide system which adjusts the pH of the treated water supplied to customers. During a routine inspection of the distribution pipeline and valve chambers, precipitation build up was identified in the discharge header and valves immediately downstream of the sodium hydroxide injection point. Periodic camera inspections and monitoring took place over a two (2) year period to observe the precipitate buildup. A Sodium Hydroxide Assessment Study was completed to review the operational challenges caused by the sodium hydroxide system and provide recommendations to mitigate. The final report was received in January 2023 and includes an engineering solution for enhanced sodium hydroxide injection and mixing, and a plan to remove the existing precipitate. Detailed design commenced in early 2024 with construction scheduled to follow.

**Potential Savings:** To be determined. Once the deposits are removed from the pipeline the high lift pumping efficiency (i.e. electricity efficiency) is anticipated to improve.

#### **Project EA3017 - Exterior WTP Building Seals**

**Budget:** \$60,000

**Scope:** The project involves installing ground level exterior caulking sealants to various buildings on the WTP property. The goal is to ensure proper sealing and waterproofing of the building enclosure. This is a multi-year project.

**Potential Savings:** Minimal building energy efficiency improvement anticipated as this is a relatively small project.

## **Process Optimization**

To manage energy costs, the EAPWSS will continue working on the following process optimization measures:

- **Pumping Off-Peak:** The majority of pumping is scheduled during off-peak hours when electricity costs less. High lift pumps represent the biggest opportunity for energy load shifting and the EAPWSS is currently able to do this because there is sufficient water storage.
- **Preventive maintenance programs:** Energy and cost savings can be realized through proper preventive maintenance of mechanical, electrical, compressed air and hydraulic systems.
- **Continued long-term research and investigation** to identify future process optimization initiatives.
- **Review of planned and completed capital replacement projects** to ensure correct equipment and output is current based on required service levels and “right sizing” equipment.

## **Energy Awareness & Promotion**

Energy awareness training is an effective way to reduce energy usage with no capital costs and minor operational expenses. These initiatives directed at staff can lead to significant savings.

Electricity Market Orientation Training first took place in February 2018. In October 2023, a follow-up course was provided as refresher training for staff who took the original 2018 course, and as an orientation training session for new staff as their availability permitted. System specific case studies of actual operating scenarios were presented for analysis and best management practices. It is anticipated that future training sessions will continue to be more in-depth and include more case studies to build upon the energy awareness basic training previously provided. Periodic refresher training will continue be provided to staff as required.

Ongoing professional development is a key factor in the success of a CDM Plan to ensure that staff members understand their role in the greater goal. The CDM Plan and accompanying education should be a required part of their daily activities.

## Monitoring and Reporting

The CDM Plan allows for the monitoring and reporting that is necessary for EAPWSS to meet the regulatory requirements of the *Electricity Act* and EAPWSS's facility energy intensity targets. Regular energy monitoring and reporting to the Ministry of Energy and EAPWSS senior management and staff, improve knowledge and help make energy consumption a tangible asset, making possible appropriate behavioural changes. The intent of monitoring and reporting on energy consumption is to make energy management transparent and the water system accountable. The Ministry of Energy is provided with annual updates on the state of energy management at EAPWSS through annual regulatory reporting. Energy consumption feedback provided to staff is imbedded into EAPWSS's regular operations.

As required by regulation, the EAPWSS will continue to report annually on energy use and GHG emissions utilizing the Ministry's reporting software (i.e. the Energy Star Portfolio Manager® application). At that time, staff will take the opportunity to review activities and results that have been achieved in the previous year and will focus on linking actions to results. The CDM Plan will be updated a minimum of every five (5) years, with the next update required by July 1, 2029. The CDM Plan will continue to take a forward view of the upcoming five-year period to lay out the roadmap and identify any changes or adjustments that should be considered based on what the current market conditions are.

## Future Work

As actions are completed, the energy management team will meet to discuss monitoring results and how they can be used to enhance the CDM Plan. The CDM Plan is intended to be a living document that is updated as the need arises. Anticipated improvements in knowledge and capacity will result in enhancement of the proposed actions.



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# APPENDIX A

## ENVIRONMENTAL AND QUALITY POLICY



## ENVIRONMENTAL AND QUALITY POLICY

The Elgin Area Primary Water Supply System (EAPWSS) and Ontario Clean Water Agency (OCWA) as the Operating Authority are committed to:

- Maintaining and continually improving the Environmental Management System (EMS) and Quality Management System (QMS) to enhance environmental and quality performance.
- Providing the customer with safe drinking water.
- Meeting all relevant compliance obligations and encouraging suppliers and subcontractors to similarly meet these requirements.
- Developing and implementing policies and environmental objectives in partnership.
- Protecting the environment, including prevention of pollution, climate change mitigation and adaptation, energy management, and chemical usage optimization.
- Managing and operating the drinking water system in a responsible manner.
- Being environmental and quality leaders in the municipal drinking water industry.
- Promoting owner and consumer confidence in the safety of the drinking water supply.
- Promoting resource stewardship, including conservation.
- Aligning and coordinating the EMS and QMS with the Asset Management System.
- Accomplishing these commitments through the dedication, support and participation of all personnel.

The EAPWSS and OCWA will periodically undertake reviews, evaluations and performance measurements of the operations to promote conformance with the Environmental and Quality Policy.

OCWA also maintains a separate Quality Management System Policy which governs the activities of the Operating Authority as a Corporation.

A blue ink signature of Andrew Henry, consisting of stylized, overlapping loops.

Andrew Henry  
Director, Regional Water Supply  
Elgin Area Primary Water Supply System

Date Signed: June 1, 2023

A blue ink signature of Matt Bender, featuring a series of horizontal strokes with a long, sweeping underline.

Matt Bender  
Regional Manager  
Ontario Clean Water Agency

Date Signed: June 1, 2023

Effective Date: June 1, 2023

# APPENDIX B

SCHEDULED ACTIONS

ENVIRONMENTAL MANAGEMENT PROGRAM

2023-2027

(As endorsed by the EAPWSS Board of Management on March 2, 2023, with updates)





**2023-2027**

**Environmental Objectives, Targets and Program**

<b>Environmental Objective #1:</b>	Reduce the demand on the Provincial electrical generation and transmission system through efficiency, conservation and displacement efforts.
<b>Target Years:</b>	January 1, 2023 - December 31, 2027
<b>Target Location:</b>	Elgin Area Water Treatment Plant (including Residuals Management Facility)
<b>Target:</b>	<640 kWh/ML measured as an annual average, with quarterly monitoring

<b>Significant Environmental Aspects:</b>	Electricity consumption
<b>Compliance Obligations:</b>	Electricity Act and O.Reg. 507/18 (Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans)
<b>Risks and Opportunities:</b>	<p>Potential beneficial effects (opportunities) – cost savings; carbon footprint reduction; prolongs asset life; operational efficiency</p> <p>Potential adverse effects (risks/threats) – significant wear and depreciation of asset life; too great of a focus on energy could put customer needs at risk (eg. water quality, reservoir operating levels) or compromise the integrity of the system; increased front end costs if upgrades/retrofits are required</p>

<b>Environmental Objective #2:</b>	Optimize the use of chemicals in the production of treated potable water and associated residuals treatment.
<b>Target Years:</b>	January 1, 2023 - December 31, 2027
<b>Target Location:</b>	Elgin Area Water Treatment Plant (including Residuals Management Facility)
<b>Target:</b>	<80 kg/ML measured as an annual average, with quarterly monitoring

<b>Significant Environmental Aspects:</b>	Chemical consumption – water treatment Chemical consumption – residuals treatment
<b>Compliance Obligations:</b>	Safe Drinking Water Act and O.Reg. 170 Municipal Drinking Water Licence (MDWL) and Drinking Water Works Permit (DWWP) Transportation of Dangerous Goods Act and associated regulations
<b>Risks and Opportunities:</b>	Potential beneficial effects (opportunities) – cost savings; less chemical consumption uses less raw materials in the manufacturing of the chemicals and reduces the associated trucking and deliveries; carbon footprint reduction
	Potential adverse effects (risks/threats) – Potential for increased electricity consumption; there is potential to optimize chemical addition to the point where water quality may be impacted which is a risk to regulatory and contractual performance limits; potential operational deficiencies

Elgin Area Primary Water Supply System  
Environmental Program

Electricity Program (Objective #1)	Chemical Program (Objective #2)	Project Number	Project Name	Project Location	Project Manager	Project Microsite - Status	Rationale / Comments	Target Completion Date	Progress
✓		EA3014	Low Lift Pump 2 & 3 Replacement Study	WTP	MM	Study	New pumps will be more energy efficient.	Study: Completed in 2022 LLP Replacement: TBD	The study is completed. A Tech Memo was finalized in Sept. 2022. The study recommends re-evaluation of performance and condition re-assessment of the LLPs in 2-5 years. LLP replacements are expected in 3-5 years. A new business case is required to determine timing of the replacement project. Note LLP #1 was rebuilt in 2022, LLP#3 was rebuilt and new motor in 2022.
✓		EA4153- EA4156	High Lift & Backwash Pump Replacement	WTP	MM	Design	The backwash pumps are being replaced. New pumps will be more energy efficient. Backwash optimization will be minimal on this project. Under certain circumstances operations may be able to run only 1 backwash pump instead of 2 (electricity efficiency). There may be HLP operational optimization associated with this project, but mainly related to transients. Minimal impacts to electricity optimization.	Design: 2022/23 Pump manufacturing: 2023 Construction: 2024	EA4156 Highlift Pump project - pump optimization scope of work is being drafted. EA4153 Backwash Pump design in progress, in parallel with pump pre-selection. The detailed design will progress as shop drawings for the backwash pumps are provided/approved (early 2023). The pumps will be ordered when shop drawings are approved, followed by a 52 week manufacturing period.
✓		EA4183	UV Replacement	WTP	MM	Design	The new UV reactors will be more energy efficient than the existing ones. However the new reactors will likely be larger which may offset any efficiency savings. The preferred design concept is still being confirmed with new configuration still TBD.	Design: 2022/23 Construction: 2024/25	Detailed design awarded to AECOM in June 2022. Preliminary design is currently underway. A preliminary design workshop took place in Nov. 2022. The detailed design will follow once the preferred design concept is confirmed.
✓	✓	LH1901- EA4184	Water Quality Facility Plan	WTP	JS	Study	Future projects will be recommended by this study. Future projects should contribute to future chemical efficiency and backwash optimization.	2024	The study, led by Stantec, commenced in June 2022 with estimated completion in late 2024.

Electricity Program (Objective #1)	Chemical Program (Objective #2)	Project Number	Project Name	Project Location	Project Manager	Project Microsite - Status	Rationale / Comments	Target Completion Date	Progress
✓	✓	EA4186	Sodium Hydroxide Assessment Study	WTP	JS	Study	Once the deposits are removed from the pipeline the HL pumping efficiency (electricity efficiency) should improve. There should also be chemical optimization with the recommended change in injection method.	Study: 2022 Detailed Design: 2023 Construction: 2023/24	The study was completed in January 2023 (Final Report received). Detailed design and construction to follow.
	✓	EA4175	Pilot - Unchlorinated Filtration	WTP	JS	To be initiated	Project intent is to turn off the pre-chlorine prior to the filters. This will result in a reduction in chlorine.	TBD	To be initiated
✓		EA3017	Exterior WTP Building Seals	WTP	JW / OCWA	Construction	Building energy efficiency improvements would be minimal. Top Management directed at the Nov. 23, 2022 Management Review to include this small project, even if impact is minimal	2023	Multiyear project
	✓	EA4172	Dedicated Raw Water Sample Line	WTP	JW / OCWA	Design	Adding a chlorination point to LL surge well; would continue dosing at only one location (switching locations during sampling) except during challenging raw water conditions (eg. Mn events) when both locations could be used; increased chemical consumption during those times but they are infrequent events - minimal impact Top Management directed at the Nov. 23, 2022 Management Review to include this small project, even if impact is minimal	2023	In design stage
✓		LH2047- EA4195	Electric Vehicle Charging Stations	WTP	JS	To be initiated	Electric vehicles will result in a minimal increase in electricity consumption. However electric vehicles offer other benefit, such as a minimal reduction in air emissions and fuel consumption. Top Management directed at the Nov. 23, 2022 Management Review to include this small project, even if impact is minimal	2026	A consultant completed an assessment in Aug. 2022. Detailed design will be initiated in 2025 with construction in 2026 (subject to budget approval).

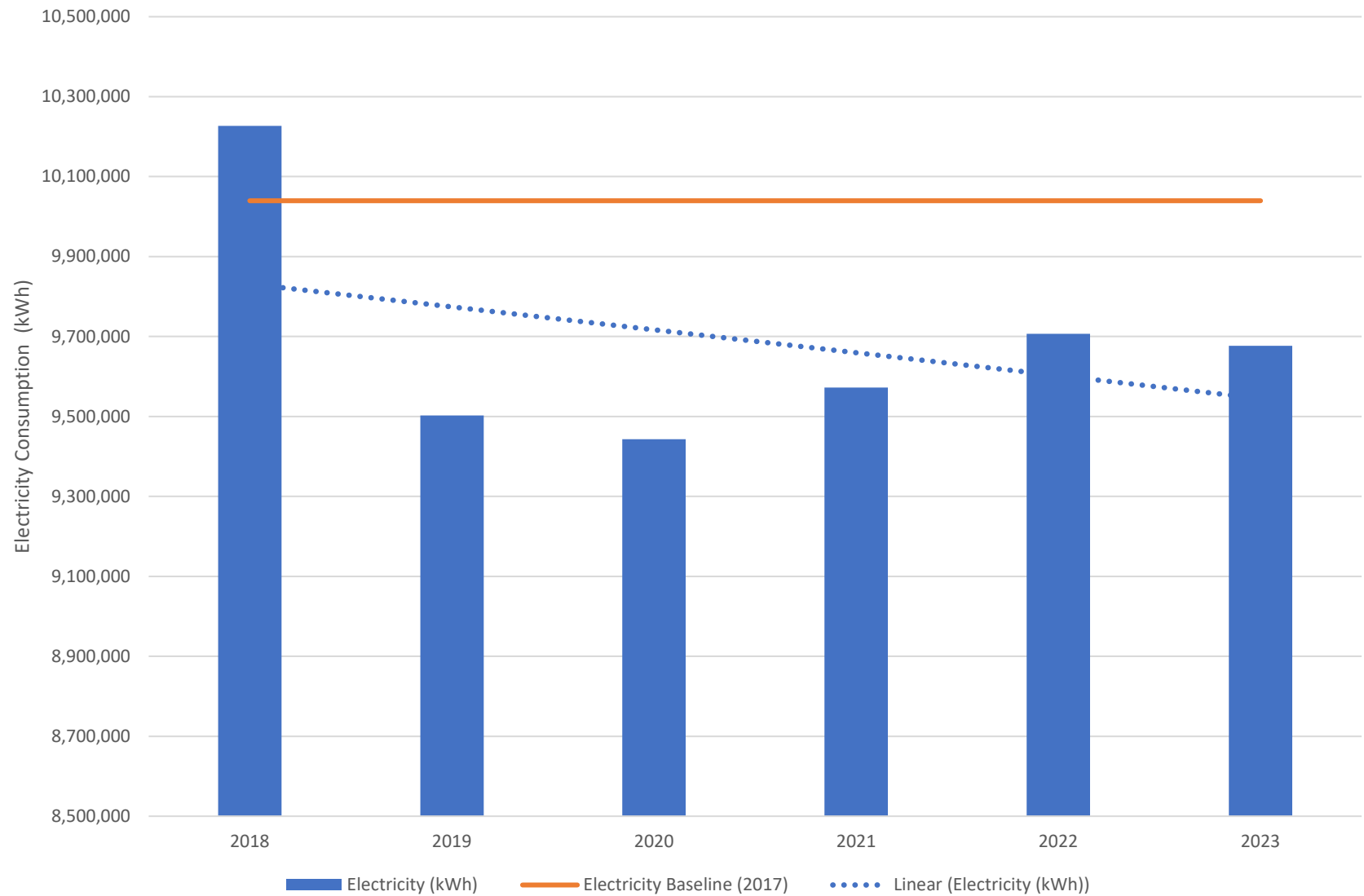
Electricity Program (Objective #1)	Chemical Program (Objective #2)	Project Number	Project Name	Project Location	Project Manager	Project Microsite - Status	Rationale / Comments	Target Completion Date	Progress
✓		N/A	Remote Stations - Monitoring to establish an electricity consumption baseline	EMPS	EM / JW	N/A	Monitoring the electricity trend at this facility to establish a baseline and assess the impacts of upcoming projects: • EA3025 - EMPS HVAC Replacement	2023	To be initiated
✓	✓	N/A	Monitor electricity and chemical use to review savings/reductions. Provide annual updates to Top Management.	All	EM	N/A	Monitoring and reporting	Ongoing	Ongoing
✓	✓	N/A	Identify/recommend new opportunities. Revise program as needed to incorporate new projects and tasks.	All	All	N/A	Identify new opportunities	Ongoing	Ongoing

# APPENDIX C

ENERGY PERFORMANCE TRENDS  
2018-2023

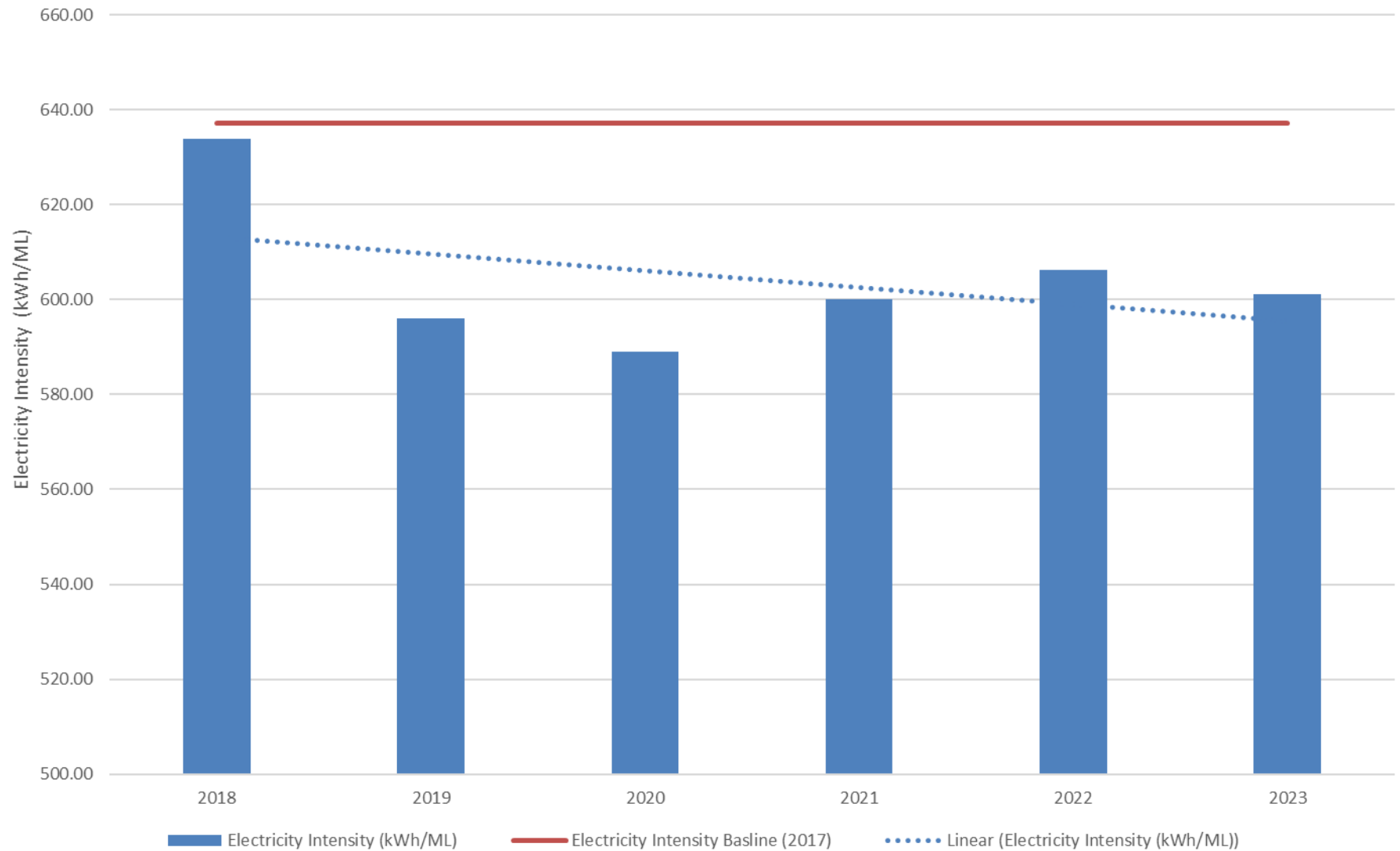
# Elgin Area WTP

## Total Electricity Consumption (kWh)

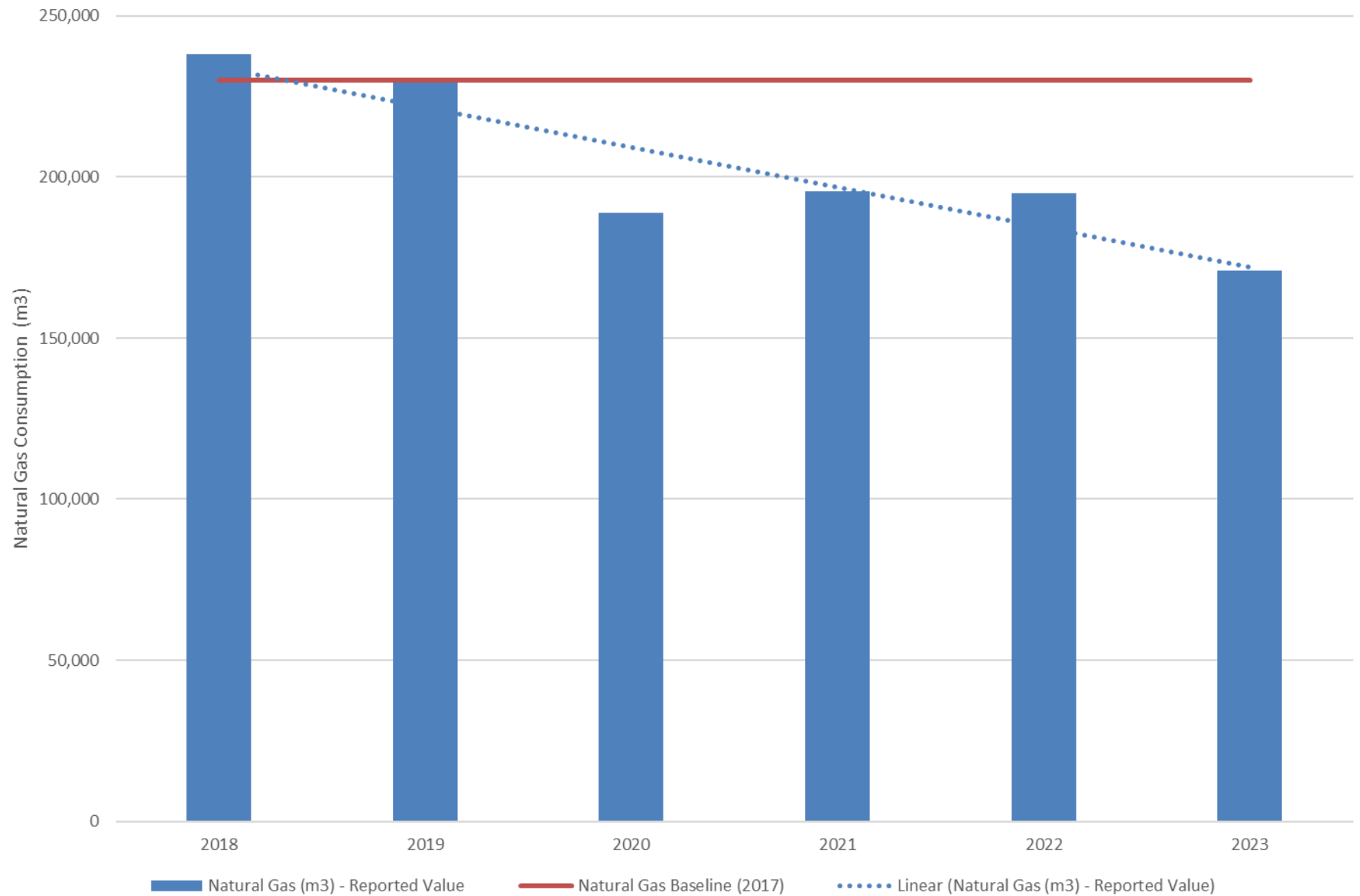




Elgin Area WTP  
Electricity Intensity (kWh/ML)



# Elgin Area WTP Total Natural Gas Consumption (m3)



# Elgin Area WTP Greenhouse Gas Emissions (kg)

