



Elgin Area

Primary Water Supply System



Energy Conservation and Demand Management Plan

Electricity Act

Ontario Regulation 507/18

June 24, 2019

Revision 1

Table of Revisions

Revision #	Date	Description of Revision
0	June 26, 2014	Initial Issue of Document
1	June 24, 2019	Five-year review and update of entire document



June 24, 2019

Ministry of Energy
900 Bay Street, 4th Floor
Hearst Block
Toronto ON M7A 2E1
Canada

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.

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 2012 - 2017.

Acting as the Owner Representative on behalf of the Elgin Area Primary Water Supply System Board of Management, I confirm that this Plan has been approved by senior management. The Elgin Area Primary Water Supply System 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 blue ink, appearing to read "Andrew Henry".

Andrew Henry, P.Eng.
Director, Regional Water Supply
Elgin Area Primary Water Supply System

Elgin Area Primary Water Supply System
Office 519.930.3505 ext. 1355
Fax 519.474.0451
ahenry@huroneginwater.ca
<https://huroneginwater.ca>



c/o The City of London
Regional Water Supply Division
Ste. 200 - 235 North Centre Rd
London, ON
N5X 4E7

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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
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, Ontario Regulation 507/18 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 starting in 2014, with updates every five (5) years.

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

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

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

- A summary of the Energy Consumption and Greenhouse Gas Emissions Templates that were submitted and published for 2012 – 2017;
- 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;
- A report of the actual results achieved;
- 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 greenhouse gas (GHG) emissions, cost avoidance and savings. Energy efficient capital upgrades and operating process improvements are key components which are outlined within the CDM Plan.

ISO 14001 Environmental Management System

The EAPWSS has committed to integrating the management of environmental issues with all other aspects of its core business; 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 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 ISO 14001 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 programme related to energy reduction, specifically electricity.

The EAPWSS strives to demonstrate leadership in water resource management and utilizes a continual improvement cycle in order 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 in order 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 programme 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 municipalities in southwestern Ontario; 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 130,000 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 July 1, 2017 to December 31, 2022. Goals and objectives for the EMS are typically set to coincide with this five (5) year operating term.

The EAPWSS includes one (1) facility that falls under the monitoring and reporting requirements for O. Reg. 507/18.

Elgin Area Primary Water Supply Facility – General Information

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

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 a terminal storage reservoir. The primary transmission mains are 14.7 km in length, and fully twinned, although one transmission main was recently decommissioned (2019).

Major energy consuming equipment within the WTP includes:

- a low lift pumping station (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;
- Residuals Management Facility (RMF) including various mixing pumps and feed pumps, two (2) centrifuges, and various chemical systems;
- HVAC systems.



Figure 1: High Lift Pumping Station at WTP

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 their equipment. The focus has generally been on equipment recommissioning, equipment replacement, and process optimization. Several capital projects undertaken at the EAPWSS have recently been completed which have contributed to energy conservation and demand reductions.

Project:	#EA4146 - Overhead Garage Door Replacements
Cost:	\$69,256
Status:	Completed (2018)
Scope of Work:	The exterior garage doors were original to the plant construction and had significantly deteriorated, requiring replacement. There were gaps in the door frame and structure, and a condition assessment confirmed that the door structures had little remaining insulation. New overhead garage doors were installed at the main plant and low lift. The new sealing system minimizes air filtration and thermal transference.

Project:	#EA4148 - Low Lift Pump #1 Rebuild
Cost:	\$108,805
Status:	Completed (2018)
Scope of Work:	Low Lift Pump #1 was no longer operating efficiently and had deteriorated to the point where it required a major rebuild. The pump and motor were removed, dismantled, and sent away for rebuild. Upon return they were reassembled and installed.

Project:	#EA4154 – Polymer System Upgrade
Cost:	\$183,979
Status:	Completed (2018)
Scope of Work:	The existing chemical dosing pumps required replacement due to age related deterioration. This project involved replacing the four (4) dual-head chemical metering pumps with four (4) peristaltic metering pumps. Energy savings resulted from the replacement due to a reduction in pumps/motors.

Project:	#EA4139 – Control Panel/Wire Cleanup
Cost:	\$23,918
Status:	Completed (2018)
Scope of Work:	Previous changes, upgrades and replacements at the WTP over its fifty-year history resulted in a significant number of panels that were virtually abandoned in place, in whole or in part. In order to ensure operational responsiveness, it was necessary to investigate each panel, determine if any of the control wires were still active, and remove any abandoned panels and wiring currently in place. Removal of obsolete panels and equipment resulted in minimal energy reduction as some of these panels were still powered but no longer in service.

Project:	#EA4095 - Lighting Upgrades (Filter Area & Office Administration Area)
Cost:	\$34,560
Status:	Completed (2017)
Scope of Work:	Two separate projects were undertaken to install LED lights in the filter area, and the office administration area (upper floor office areas, hallway, east and west stairwells, and lower floor washrooms). Old lighting fixtures were replaced with LED lights. The lighting upgrades resulted in improved overall lighting as well as energy reduction.

Project:	#EA4082 - Filter Rebuilds & Filter Backwash Optimization
Cost:	\$3,399,072
Status:	Completed (2016)
Scope of Work:	Filters #1, #2 and #3 were completely rebuilt. The previously existing filter underdrains were replaced with stainless steel underdrains that incorporated a new air scour system (including centrifugal blower). As a result of the air scour system, the surface wash pump was no longer needed and was removed. A backwash turbidimeter was installed on each of the 4 filters, to optimize the time and amount of water required for effective backwashing.
Notes:	The average volume of backwash water used before and after filter rebuilding was reduced significantly (almost 50% on average). Energy savings are realized due to shorter backwash pump run times and shorter air scour blower run times. Also, of note as a result of this reduced water usage, is that a reduced volume of water is now going to RMF for treatment. This results in a savings in energy as well.

Project:	#EA4170 - Decommissioning of Pipeline A
Cost:	\$500,000 (estimate)
Status:	Completed (2019)
Scope of Work:	<p>The construction of the new 900mm transmission pipeline between the water treatment plant and the terminal reservoir was completed in 2013. Since that time, OCWA has had to alternate between operating the original 750mm pipeline and the new 900mm pipeline in order to maintain water quality in the transmission system, until such time that the 750mm pipeline could be temporarily decommissioned.</p> <p>As of April 15, 2019, the 750mm pipeline has been temporarily decommissioned to allow the transmission system to run solely on the new 900mm pipeline until both pipelines are required to meet future water demands from the benefiting municipalities. In the intervening years, a thorough pipeline inspection and refurbishment will be undertaken which will extend the longevity of the fifty-year-old pipeline.</p>
Notes:	<p>The energy costs associated with previously switching between the 750mm and 900mm pipelines is estimated to be in the order of \$25,000 to \$50,000 per month in commodity and Global Adjustment costs. The temporary decommissioning of the 750mm will see reduced energy costs, but also improvements to the water treatment processes as it eliminates the need to periodically shut the plant down to switch between the pipelines, which in turn causes frequent treatment process upsets and variable water quality. Operating the plant and pipeline in a steady-state condition, to the extent possible, minimizes the risk of impacting treated water quality.</p>

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 (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.

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 February 2018, EAPWSS and OCWA staff were presented with an energy orientation 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/treating in off peak hours, 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.

Energy Consumption Baseline (2012)

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.

For drinking water systems, energy benchmarking is used to compare a facility's energy use to the volume of treated water leaving the facility. An energy benchmark has been developed by the Ministry of Energy, which converts the energy used in the WTP to equivalent kilowatt hours of electricity (ekWh) and then divides it by the volume of treated water (ML). The resulting value is the energy intensity for the WTP.

EAPWSS has elected to utilize the consumption data from 2012 to represent its baseline energy consumption performance, as 2012 coincides with the start of OCWA's operating term. This energy consumption inventory takes into account the electricity and natural gas consumption of the WTP.

In 2012, the energy intensity of the WTP was **625 ekWh/ML**.

It is imperative to understand the energy characteristics of the WTP. Now that a baseline has been established, future retrofits and improvements to the facility can be monitored and tracked to ensure that the intended benefits are fully realized.

Energy Consumption Performance (2012-2017)

EAPWSS's most recent energy consumption inventory was completed in 2017. The table below summarizes the WTP energy consumption and GHG emissions as reported annually to the Ministry of Energy. These energy performance trends have also been presented graphically in Appendix C.

Annual WTP Energy Consumption and GHG Emissions

Year	Annual Flow* (ML)	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m ³)	GHG Emissions** (kg)	Energy Intensity** (ekWh/ML)
2012	15,592	8,683,400	100,507	1,023,975	625
2013	15,347	8,908,242	100,108	866,400	650
2014	15,557	9,553,379	130,727	629,396	703
2015	15,421	9,578,759	127,856	630,128	709
2016	15,668	9,658,036	148,258	623,624	717
2017	15,753	10,039,604	230,201	608,889	793

*The water discharged from the Elgin Area WTP represents the total flow in the system.

** Calculated using the Ministry of Energy Greenhouse Gas Emissions reporting template.

Data Analysis

From 2012 to 2017, the energy intensity of the WTP steadily increased from 625 ekWh/ML to 793 ekWh/ML. This represents a 26.9% increase.

The overall increase in electricity consumption, natural gas consumption, and energy intensity are obviously undesirable.

The increase can mainly be attributed to the construction, commissioning and operation of the new Residuals Management Facility (RMF). Construction and subsequent commissioning of the RMF took place from 2014 – 2016. The RMF began fully operating in January 2017. Natural gas is sub-metered for the RMF.

Another factor that contributed to the increase in energy intensity was the operational practice of alternating which transmission pipeline was in service. This required WTP shutdown/start-up which is energy intensive. As of April 15, 2019, the original 750mm pipeline has been decommissioned which has eliminated the need for the pipeline switching. This is expected to have a positive impact on the overall energy consumption trend.

Forecast

Now that the RMF has been fully operational for several years, the energy intensity of the overall WTP is expected to level off.

Planned capital projects over the next 5 years, particularly the high lift pump replacement project, should result in a decrease in electricity consumption.

Future consideration will be given to re-establish the baseline energy consumption year, with 2017 being utilized as the new baseline year, to reflect the full operation of the RMF.

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 overall energy intensity over the duration of the CDM Plan (as compared to the 2012 baseline year);
- Maintain registration of the ISO 14001 Environmental Management System, which includes energy related objectives, targets and programmes (see Appendix B for current details);
- Maintain regulatory compliance;
- Improve the management of EAPWSS's energy consumption;
- 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 Environmental Management System (see Appendix B for current details),
- Reaching the CDM Plan's energy conservation target for energy intensity,
- 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.

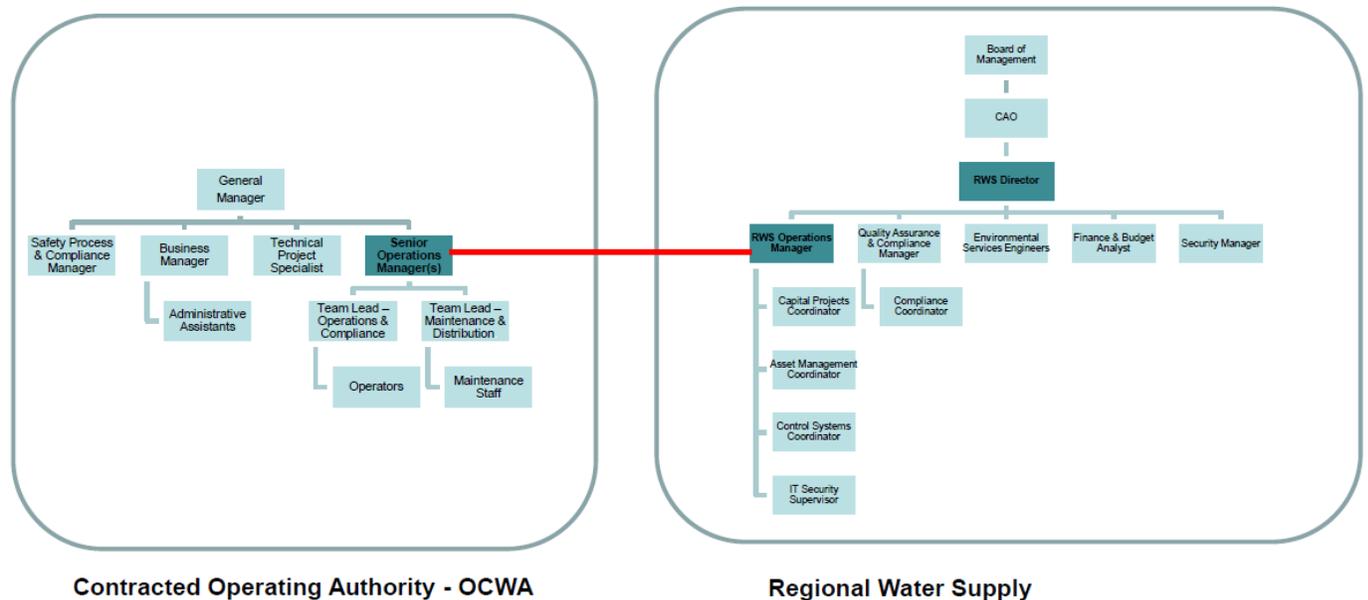


Figure 2: Structure of Energy Management Team

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 (which may include but will not be limited to Facilities Management, Finance, and Procurement),
- 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;
- Monitoring and reporting.

Equipment Efficiency - Capital Projects

The following projects being undertaken for the EAPWSS are projected to improve the energy efficiency of equipment and subsequently contribute to energy conservation and demand reductions.

Project:	#EA4156 - High Lift Pump (HLP) Upgrade
Budget:	\$4,800,000 with an estimated \$480,000 in financial incentives through Hydro One's Save-On Energy program
Status:	In progress
Scope:	The Energy Audit and Pump Optimization Study completed in 2013 identified the high lift pumps at the WTP as a significant opportunity for

	<p>energy optimization and savings. The WTP currently has four (4) HLP each equipped with a 700 HP motor. These pumps are scheduled to be replaced with high performance (higher efficiency) pumps that have smaller motors. The new pumps will be energy efficient equipment sized for current and future water demands.</p> <p>The 2018 portion of the project provided a detailed engineering assessment and design work necessary to confirm the construction requirements, anticipated savings, and available funding from IESO/Hydro One. The 2019/2020 portion of the project is the equipment purchase and installation.</p>
Potential Savings:	<p>The current annual consumption of the HLP is calculated at 6454 MWh/yr. The estimated electricity savings as a result of the upgrade will be 2397 MWh/yr. The estimated electricity bill savings is \$287,664 per year.</p> <p>The estimated project payback is 13.98 years.</p>
Notes:	Estimated project completion December 31, 2020

Project:	#EA4174 - Lighting Motion Sensors in the Residuals Management Facility (RMF)
Budget:	\$25,000
Status:	In progress
Scope:	Operations staff have identified an opportunity to improve the energy efficiency of the newly constructed RMF. This project proposes to install motion sensors and lighting controls, consistent with the remainder of the WTP, to control lighting in the RMF when rooms are not occupied.
Potential Savings:	To be confirmed once project is initiated

Project:	#EA4179 – Window Glazing/Replacement
Budget:	\$60,000
Status:	Project to be initiated
Scope:	A significant number of windows at the WTP are original to plant construction in the late 1960's and are starting to leak. Repairing and installing new windows, where appropriate, provides the opportunity to install energy efficient windows, reduce heat losses, and improve the energy efficiency of the facility.

Potential Savings:	To be confirmed once project is initiated
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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 completed capital replacement projects to ensure correct equipment and output is still current based on required service levels “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.

Additional training is planned, to build on the energy orientation training that took place in February 2018. It is anticipated that future training will be more in-depth as it relates to energy awareness, and case studies of actual operating scenarios will be presented for analysis and best management practices. Periodic refresher training will 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. 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 years, with the next update required by July 1, 2024. 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.



Elgin Area

Primary Water Supply System

c/o Regional Water Supply Division

City of London

235 North Centre Road, Suite 200

London, ON N5X 4E7

Tel.: 519-930-3505

www.huronelginwater.ca

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.
- Managing and operating the drinking water system in a responsible manner.
- Providing the customer with safe drinking water.
- Being environmental and quality leaders in the municipal drinking water industry.
- Promoting owner and consumer confidence in the safety of the drinking water supply.
- Developing and implementing policies and environmental objectives in partnership.
- Protecting the environment, including prevention of pollution, energy management, and chemical usage optimization.
- Promoting resource stewardship, including conservation.
- Meeting all relevant compliance obligations and encouraging suppliers and subcontractors to similarly meet these requirements.
- 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.



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



Blair Tully
General Manager
Ontario Clean Water Agency

Effective Date: October 4, 2018

APPENDIX B

SCHEDULED ACTIONS
ENVIRONMENTAL MANAGEMENT PROGRAMME
2017-2022



Form Title: Environmental Management Program	EMS Reference: 6.2.1, 6.2.2
Form No.: EF-ADMIN-1500	QMS Reference: N/A
Version: 1.0	

Objective and Target

Objective #1: Reduce the demand on the Provincial electrical generation and transmission system through conservation and displacement efforts.
Target Years: July 1, 2017 – December 31, 2022
Target and Baseline: Elgin Water Treatment Plant: interim target of <650 kWh/ML measured on a quarterly basis; to be re-evaluated once a baseline is developed for the Residuals Management Facility (RMF) (ie. after 2 years of operation)

Program

Project/Study: Energy & Pump Optimization Study	Tasks	Project Manager/Person Responsible	Target Completion Date	Progress
Building Services Energy Management Strategies	Prepare business cases for the recommendations identified in the study.	RWS Division Manager	Q2, 2018	
Building Services Energy Management Strategies	Implement the approved recommendations.	RWS Division Manager	Q4, 2019	
Process Optimization Energy Management Strategies	Prepare business cases for the recommendations identified in the study.	RWS Division Manager	Q2, 2018	
Process Optimization Energy Management Strategies	Implement the approved recommendations.	RWS Division Manager	Q4, 2019	



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Project/Study: Other Projects & Studies	Tasks	Project Manager/Person Responsible	Target Completion Date	Progress
Rebuild of High Lift Pumps #2 and #3	Rebuild pumps; may improve efficiency.	Sr. Operations Manager (OCWA)	Q4, 2017	
Review of high lift, low lift and backwash pumps	Prepare business cases to address potential changes to the pumps.	RWS Division Manager	Q2, 2017	
Review of high lift, low lift and backwash pumps	Implement the approved recommendation.	RWS Division Manager	Q4, 2019	
EA4082: Elgin Filter Replacements	Confirm/develop data points for the operation of the rebuilt filters.	Process Engineer (RWS)	Q4, 2017	
EA4082: Elgin Filter Replacements	Optimize the backwash and filter run time processes.	Process Engineer (RWS)	Q4, 2017	
Twinned Pipeline Operations	EA4077: Pipeline A&B Transient Analysis: Establish short-term and future solutions to supply Port Stanley under various operating conditions.	Env. Services Engineer (RWS)	Q2, 2017	
Twinned Pipeline Operations	Develop and implement an operational plan for the shutdown of the 750mm pipeline A, to avoid pipeline switching.	Sr. Operations Manager (OCWA) & Operations Manager (RWS)	Q4, 2017	
EA4128: High Lift Switchgear Replacement	Consider submetering as part of this project, for measuring efficiency.	Env. Services Engineer	Q4, 2018	
EA4128: High Lift Switchgear Replacement	Replace high lift pump(s) following the replacement of the high lift switchgear.	Env. Services Engineer	Q4, 2019	
EA4125: Low Lift 4kv Switchgear Replacement	Consider submetering as part of this project, for measuring efficiency.	Env. Services Engineer	Q4, 2018	
All projects	Monitor electricity consumption and review savings/reductions.	Quality Assurance & Compliance Manager (RWS)	Quarterly	
All projects	Provide updates to top management.	Quality Assurance & Compliance Manager (RWS)	Annually	



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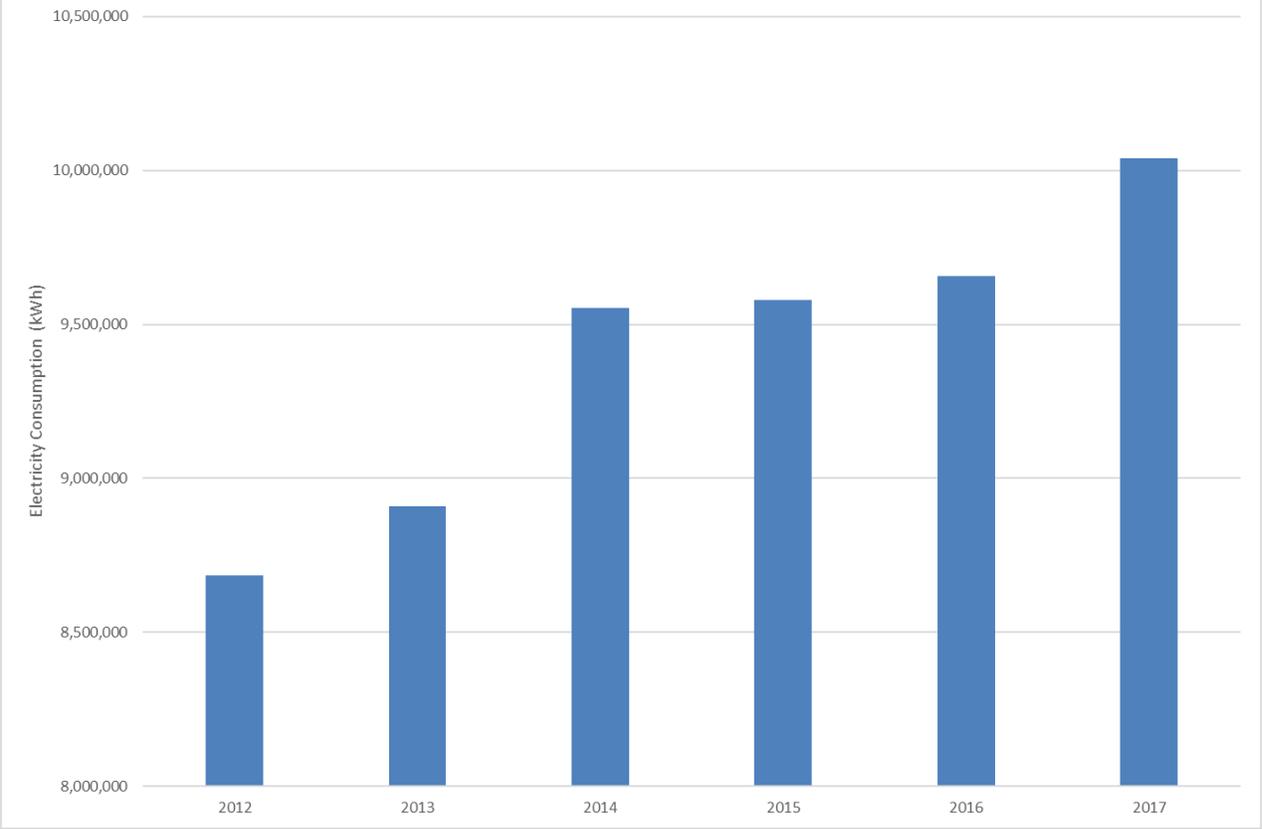
Project/Study: Other Projects & Studies	Tasks	Project Manager/Person Responsible	Target Completion Date	Progress
All projects	Identify/recommend new energy opportunities; revise objective, target and program.	Quality Assurance & Compliance Manager (RWS)	Annually	
All projects	Provide recommendations to the Board for approval.	Division Manager (RWS)	As Necessary	

<p>Significant Environmental Aspects:</p> <ul style="list-style-type: none"> • Electricity Consumption
<p>Compliance Obligations:</p> <ul style="list-style-type: none"> • Green Energy Act • O. Reg. 397/11 Energy Conservation and Demand Management Plans • Electricity Act
<p>Risks and Opportunities:</p> <ul style="list-style-type: none"> • Potential beneficial effects (opportunities) – cost savings; carbon footprint reduction; prolongs asset life • Potential adverse effects (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.

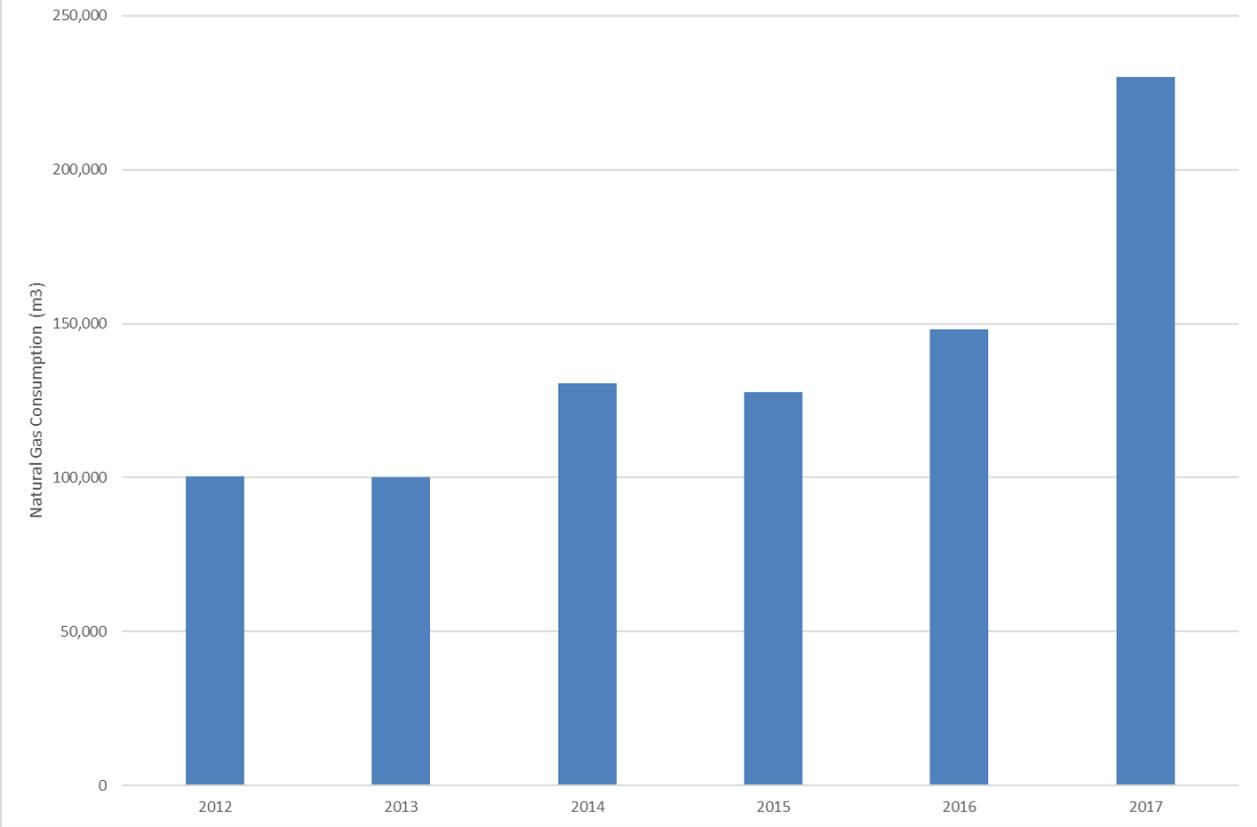
APPENDIX C

ENERGY PERFORMANCE TRENDS
2012-2017

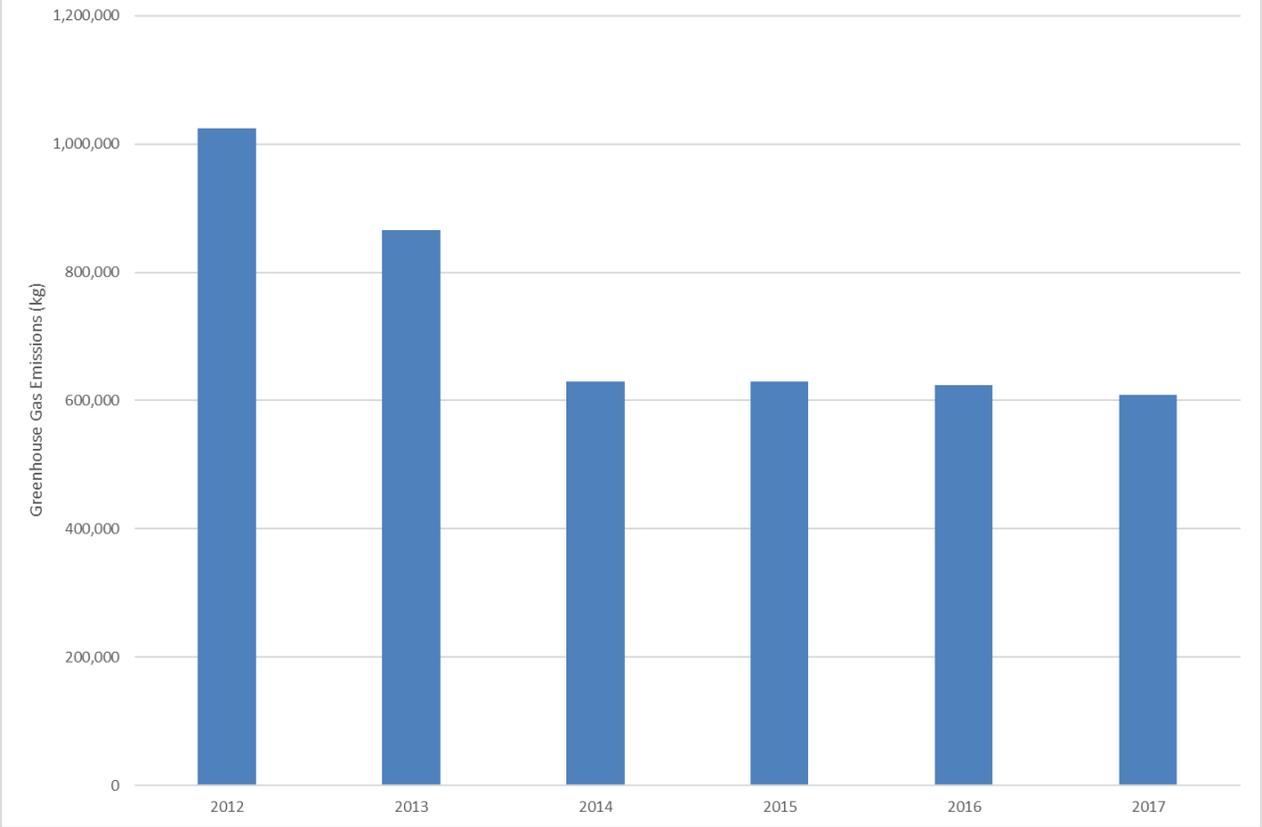
Elgin Area Water Treatment Plant Electricity Consumption



Elgin Area Water Treatment Plant
Natural Gas Consumption



Elgin Area Water Treatment Plant
Greenhouse Gas Emissions (kg)



Elgin Area Water Treatment Plant
Energy Intensity

