Lake Huron
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

Lake Huron
Primary Water Supply System

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 Lake Huron 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 Lake Huron Primary Water Supply System Board of Management, I confirm that this Plan has been approved by senior management. The Lake Huron 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,

Andrew Henry, P.Eng.
Director, Regional Water Supply
Lake Huron Primary Water Supply System

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Acronyms

CDM	Conservation and Demand Management
EMS	Environmental Management System
GHG	Greenhouse Gas
HLP	High Lift Pump
HVAC	Heating, Ventilation and Air Conditioning
IESO	Independent Electricity System Operator
LHPWSS	Lake Huron Primary Water Supply System
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 Lake Huron Primary Water Supply System (LHPWSS) 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 LHPWSS's first plan developed in 2014 and the experience gained over the last five years.

The strategic approach to energy management supports the LHPWSS'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 LHPWSS Board of Management for the administration and operation of the water system, as initially adopted by the Board in 2000, is as follows:

> *"The Lake Huron 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 LHPWSS 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 LHPWSS 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 LHPWSS 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 LHPWSS. The EMS serves as a planning tool to allow the LHPWSS to continually improve its operations.

The LHPWSS 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 LHPWSS.

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

The LHPWSS 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 LHPWSS 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

Lake Huron Primary Water Supply System

The Lake Huron Primary Water Supply System Board of Management is the owner and provides governance for the LHPWSS. The LHPWSS is responsible for the treatment and transmission of drinking water to the following eight municipalities in southwestern Ontario; City of London, Municipality of Bluewater, Municipality of Lambton Shores, Township of Lucan Biddulph, Municipality of Middlesex Centre, Municipality of North Middlesex, Municipality of South Huron, and the Municipality of Strathroy-Caradoc.

The population served by this system is approximately 375,000 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 LHPWSS includes one (1) facility that fall under the monitoring and reporting requirements for O. Reg. 507/18.

Lake Huron Primary Water Supply Facilities – General Information

Facility	Operation Type	Address	Municipality
Lake Huron Water Treatment Plant	Facilities related to the treatment of water	71155 Bluewater Highway	South Huron

Lake Huron Water Treatment Plant

The Lake Huron Water Treatment Plant (WTP) and primary transmission main were constructed in the late 1960's. It is a conventional WTP with a rated capacity of 340 Mega Litres/day (MLD). After water is treated, it is pumped from the WTP to various communities or to storage reservoirs. The primary transmission main is 47 km in length and includes three (3) sections of twinned pipeline.

Major energy consuming equipment within the WTP includes:

- a low lift pumping station (six (6) low lift pumps);
- two (2) flash mix chambers;
- two (2) banks of flocculation tanks;
- four (4) backwash pumps;
- five (5) high lift pumps;
- four (4) service water pumps;
- various chemical systems;
- A Residuals Management Facility (RMF) which includes sludge transfer pumps, waste sludge pumps, centrifuge 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 LHPWSS 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 LHPWSS have recently been completed which have contributed to energy conservation and demand reductions.

Project:	Lighting Upgrade - High Lift Basement
Cost:	$2047
Status:	Completed (2018)
Scope of Work:	A project was undertaken to install some LED lights in the high lift basement, over an area being used for a research study. Old lighting fixtures were replaced with LED lights. The lighting upgrade resulted in improved overall lighting as well as energy reduction.

Project:	#LH1238 – Low Lift and High Lift Building Roof Replacements
Cost:	$174,633
Status:	Completed (2018)
Scope of Work:	The roof on the Low Lift Building and segments of the High Lift Building roof were replaced in 2018. The entire Low Lift Building roof was replaced with all new insulation. The High Lift Building roof had small sections of insulation removed and replaced in localized areas. This new insulation supports energy reduction measures.

Project:	#LH1218 – Low Lift Door Replacement
Cost:	$8779
Status:	Completed (2018)
Scope of Work:	The double person door at the Low Lift Building was replaced. The work included a complete replacement of the door and frame, and includes a removable center post, new hardware and energy efficient glass.

Project:	#LH1233 – Control Panel/Wire Cleanup
Cost:	$17,716
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:	#LH1222 – Low Lift Pump Refurbishments
Cost:	$164,820
Status:	Completed (2017)
Scope of Work:	Periodic major maintenance is required to refurbish large pumps and extend their useful asset life. Low Lift Pumps #3 & #4 motors have been replaced.

Project:	#LH1361 – Grit Pump Motor Replacement
Cost:	$38,505
Status:	Completed (2016)
Scope of Work:	This was an equipment renewal project, which involved replacing the motor on the grit pump in the low lift pump well.

Project:	#LH1381 - Instrument Air Compressors Replacement
Cost:	$50,341
Status:	Completed (2016)
Scope of Work:	The air compressors which are used for the modulating flow-control valves on the filters were original to the plant's construction, prone to periodic failures, and were beyond the end of their useful life requiring replacement.

Project:	#LH1203 – WTP HVAC Replacement
Cost:	$7,307,530
Status:	Project completed, with minor deficiencies left to be addressed in 2019
Scope of Work:	The heating, air conditioning and ventilation (HVAC) system at the WTP was original from the plant's construction in the 1960's, and many of the major components were outdated and no longer functioned properly. An appropriately designed and functioning HVAC system is necessary at the WTP to ensure appropriate control of excess moisture throughout the facility and protect electrical and electronic control systems. An HVAC Serviceability Study was undertaken to evaluate the current condition and air handling needs of the facility. The study recommended the replacement and upgrade of the air handling systems at the WTP. The HVAC replacement project was a multi-year project.

	Major equipment changes included: • Installation of three (3) 1,500,000 BTU/hr natural gas condensing boilers. These replaced previously existing electric heat throughout most of the facility. • Installation of two (2) 750,000 BTU/hr natural gas dehumidification systems. One was a replacement of a previously existing electric dehumidifier, and the other was a new addition, installed to serve additional areas of the facility.
Notes:	Energy efficiency and system optimization was a major consideration of the new HVAC system being installed. Due to the efficiency of the equipment being installed, the Board received a rebate of $16,700 from Union Gas for the installation of high efficiency boilers and energy recovery ventilators. Dual hydronic heating natural gas condensing boilers were installed. These boilers will lower the overall energy consumption used in heating the facility. The previous electrical heating systems utilized 1MW of installed electrical capacity. The resulting net energy savings are conservatively estimated to be in the order of approximately $70,000 to $100,000 per year, when factoring in a conservative estimate for additional natural gas consumption. The new condensing boilers are approximately 93% efficient, resulting in a significant savings to heating costs in the order of 70%. Approximately 25% of the electrical control panels at the WTP were previously utilized for electric heat (unit heaters). With the conversion to natural gas hydronic heat system, approximately eighty (80) 600v electric unit heaters and forty-one (41) 208v baseboard units were eliminated, resulting in further savings in future capital cost for pending replacement of the 600v and 4160v electrical systems. This savings is currently estimated to be in the order $750,000.

Data Management

LHPWSS has a comprehensive program in place for collecting and analyzing monthly energy billing information and ensuring staff are informed about energy consumption. Currently, LHPWSS 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

LHPWSS has currently adopted a strategy of procuring its electricity from Hydro One Networks Inc. LHPWSS 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 LHPWSS, 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, LHPWSS 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, LHPWSS staff are better equipped with the knowledge necessary to make informed decisions on asset management.

Renewable Energy

The LHPWSS 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.

LHPWSS 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 **726 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)

LHPWSS'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	49,169	34,817,540	82,434	3,499,728	726
2013	45,373	30,839,730	90,487	2,515,267	701
2014	44,286	29,905,395	91,832	1,370,165	697
2015	43,722	30,364,363	143,090	1,501,744	729
2016	44,763	30,887,393	198,562	1,473,392	737
2017	44,422	30,580,591	251,199	1,003,907	749

**The water discharged from the Lake Huron 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 increased from 726 ekWh/ML to 749 ekWh/ML. This represents a 3.2% increase overall.

The total electricity consumption at the WTP has decreased from 34,817,540 kWh to 30,580,591 kWh. This represents a 12.2% decrease. High lift and low lift pumping typically account for the majority of total electricity consumption within a WTP. When the electricity consumption is normalized to take into account the total flow that left the facility, this still represents a 2.8% decrease in electricity.

The total natural gas consumption at the WTP has increased from 82,434 m^3 to 251,199 m^3. This represents a 204.7% increase.

The major factor contributing to the decrease in electricity consumption and increase in natural gas consumption was the recent HVAC Replacement Project. Natural gas boilers were installed, replacing electric heat through most of the facility. The new natural gas boilers were fully in-service in November 2014. Natural gas dehumidification systems were installed, replacing electric dehumidification. The new

natural gas dehumidification systems were fully in-service in July 2015. This new equipment has contributed to the overall reductions in electricity consumption, and a corresponding increase in natural gas consumption.

Forecast

Now that the HVAC system has been fully operational for several years and is reaching a steady state through optimization activities, 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 2018 or 2019 as the new baseline, to reflect the steady-state operation of the new HVAC system once this is achieved.

5.0 ENERGY GOALS AND OBJECTIVES

It is of the utmost importance that LHPWSS 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 LHPWSS's energy consumption;
- Improve LHPWSS's understanding of energy consumption which is essential for LHPWSS 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 LHPWSS'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 LHPWSS 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 LHPWSS Board of Management, has key responsibilities for energy management with respect to approving goals and objectives, and through the annual budget approval process.

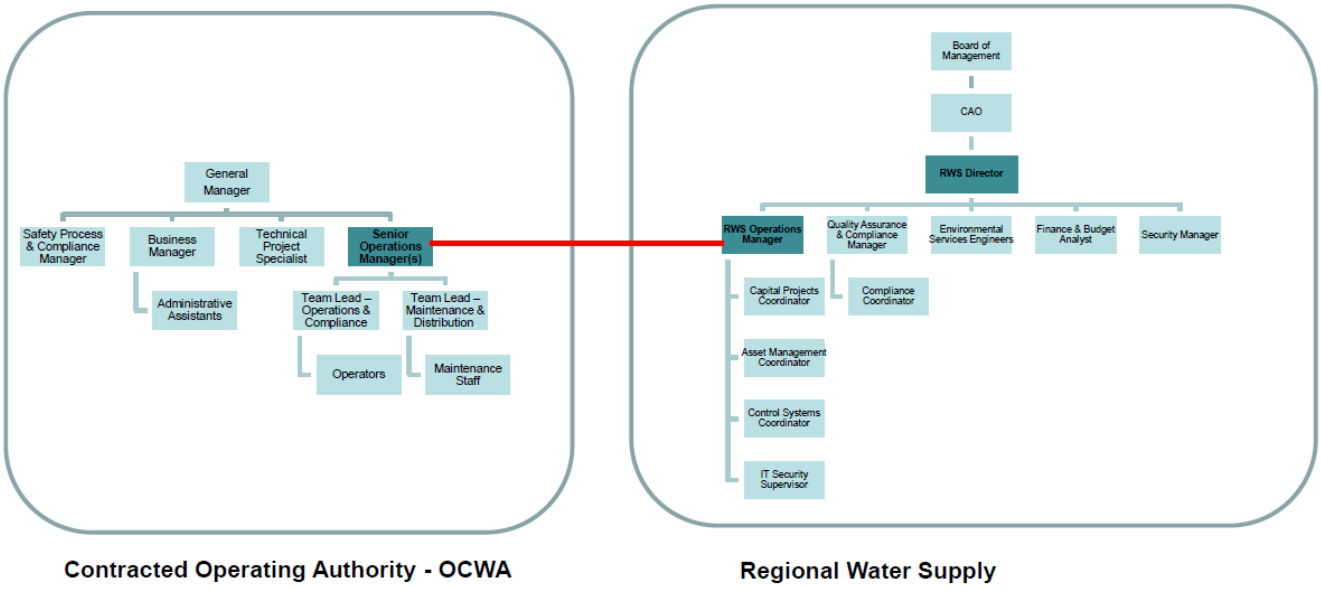

Figure 2: Structure of Energy Management Team

Historically, LHPWSS addressed Energy Conservation and Demand Management on a project-by-project basis. Strategic directives have been provided by the LHPWSS Board of Management and senior management.

This CDM Plan outlines a commitment to integrate Energy Conservation and Demand Management into the operations of the LHPWSS, 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 LHPWSS. 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 (ie. 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 LHPWSS'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 (eg. capital projects);
- Process optimization;
- Energy awareness and promotion;
- Monitoring and reporting.

Equipment Efficiency - Capital Projects

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

Project:	#LH1230 - High Lift Pump (HLP) Replacement
Budget:	$13,557,000 with an estimated $1,541,000 in financial incentives through IESO's Industrial Accelerator Program (IAP)
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 energy optimization and savings. The ideal solution is to replace all five (5) of the 3000 HP pumps with a more optimal pump set-up. However, a more cost effective short- to mid-term solution is being pursued. This involves removing three (3) pumps and replacing them with two (2) lower volume high-head pumps and two (2) more efficient high volume pumps. 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 and other government agencies. The 2019 portion of the project includes the pump pre-selection process and equipment purchases. Construction/installation will take place 2020-2022.
Potential Savings:	The current annual consumption of the HLP is calculated at 24,127 MWh/yr. The estimated electricity savings as a result of the upgrade will be 6700 MWh/yr. The estimated electricity bill savings is **$770,500 per year.** The estimated project payback is 15 years.
Notes:	Estimated project completion December 31, 2022

Project:	#LH1219 - Filter Backwash Turbidity Meters
Budget:	$100,000
Status:	In progress
Scope:	An assessment of the filter backwash process has recommended that turbidity meters be installed on each filter drain to monitor the cleanliness of the wastewater during the backwash process, reducing the amount of backwash water required to clean the filters. Modifying the backwash process in this manner will optimize the time and amount of water required for effective backwashing. Energy savings will be realized due to shorter backwash pump run times. The average volume of backwash water should be significantly reduced, estimated at up to 50% reduction. As a result of reduced water usage, a reduced volume of water will be sent to the Residuals Management Facility (RMF) for treatment. This will result in energy savings as well.
Potential Savings:	To be confirmed once project is initiated

Project:	#LH1244 - Building Exterior Condition Assessment
Budget:	$85,000
Status:	Project to be initiated
Scope:	This project involves undertaking a comprehensive condition assessment of the building structures, including the slab walls, windows and glazing. Pending the results of the condition assessment, future capital projects will then be identified to implement recommended repairs or replacements. This should provide future opportunities to install energy efficient windows, reduce heat losses, and improve the overall energy efficiency of the facility.
Potential Savings:	To be confirmed once project is initiated

Process Optimization

To manage energy costs, the LHPWSS 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 LHPWSS 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 LHPWSS to meet the regulatory requirements of the *Electricity Act* and LHPWSS's facility energy intensity targets. Regular energy monitoring and reporting to the Ministry of Energy and LHPWSS 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 LHPWSS through annual regulatory reporting. Energy consumption feedback provided to staff is imbedded into LHPWSS's regular operations.

As required by regulation, the LHPWSS 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.

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Primary Water Supply System

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APPENDIX A

ENVIRONMENTAL AND QUALITY POLICY

Lake Huron
Primary Water Supply System

ENVIRONMENTAL AND QUALITY POLICY

The Lake Huron Primary Water Supply System (LHPWSS) 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 LHPWSS 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
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Blair Tully
General Manager
Ontario Clean Water Agency

Effective Date: October 4, 2018

APPENDIX B

SCHEDULED ACTIONS
ENVIRONMENTAL MANAGEMENT PROGRAMME
2017-2022

Lake Huron Primary Water Supply System	
Form Title: ENVIRONMENTAL MANAGEMENT PROGRAM	**EMS Reference: 6.2.1, 6.2.2**
Form No.: LF-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: Huron Water Treatment Plant: < 700 kWh/ML measured on a quarterly basis McGillivray Pumping Station: To Be Determined, following data download and review of current trends

Program

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

Project/Study: Other Projects & Studies	Tasks	Project Manager/Person Responsible	Target Completion Date	Progress
WTP: High Lift Pumps	Prepare a business case to address potential changes to the high lift pumps.	RWS Division Manager	Q2, 2017	

WTP: High Lift Pumps	Implement the approved recommendation.	RWS Division Manager	Q4, 2018	
LH1332: Huron WTP Electrical System Upgrades	VFDs will be included as part of the low lift replacement, will improve low lift efficiency.	Operations Manager (RWS)	Q4, 2017	
LH1332: Huron WTP Electrical System Upgrades	Review opportunities for sub-metering of treatment equipment; enhance or maintain program.	Operations Manager (RWS)	Q4, 2017	
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	
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	

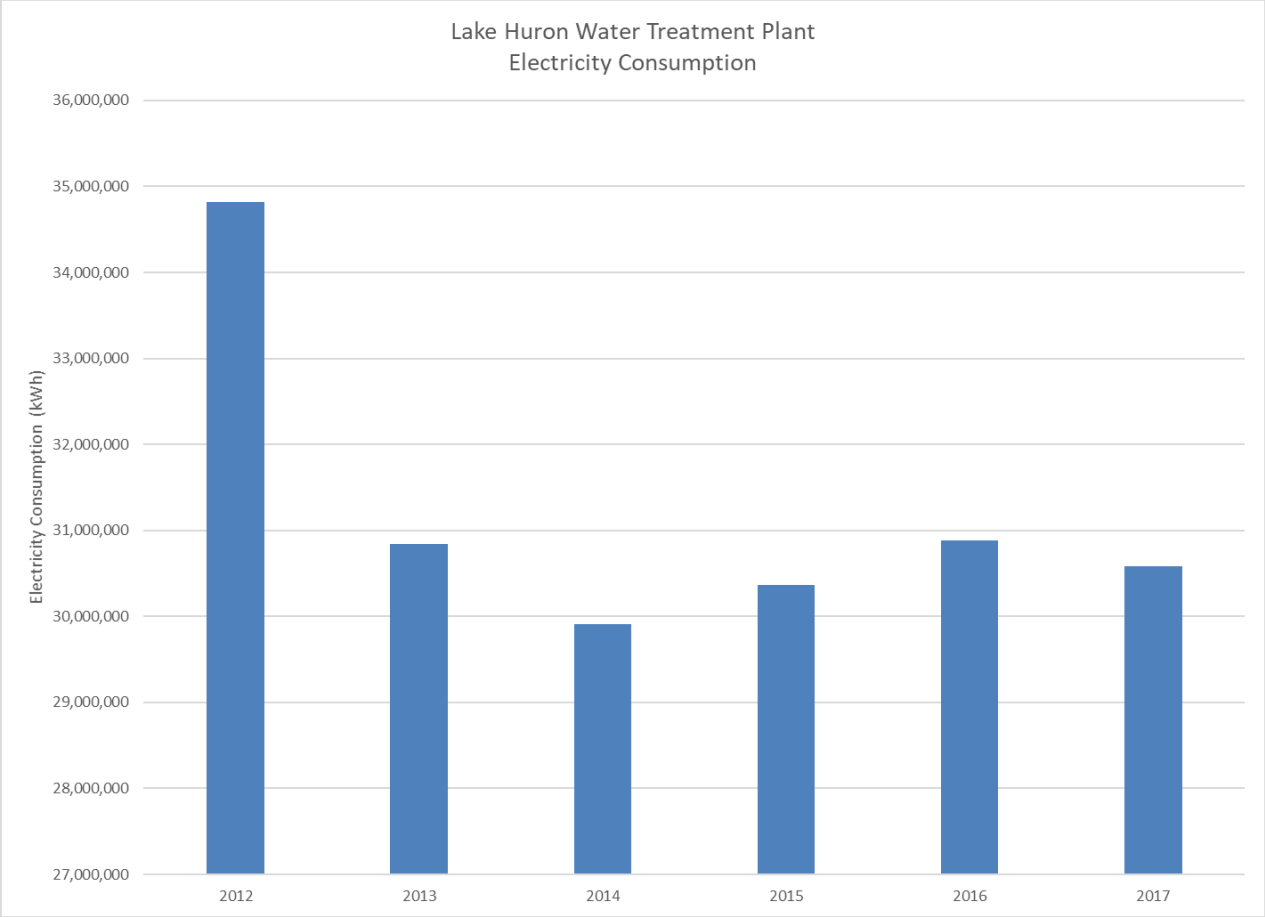
Significant Environmental Aspects:
- Electricity Consumption

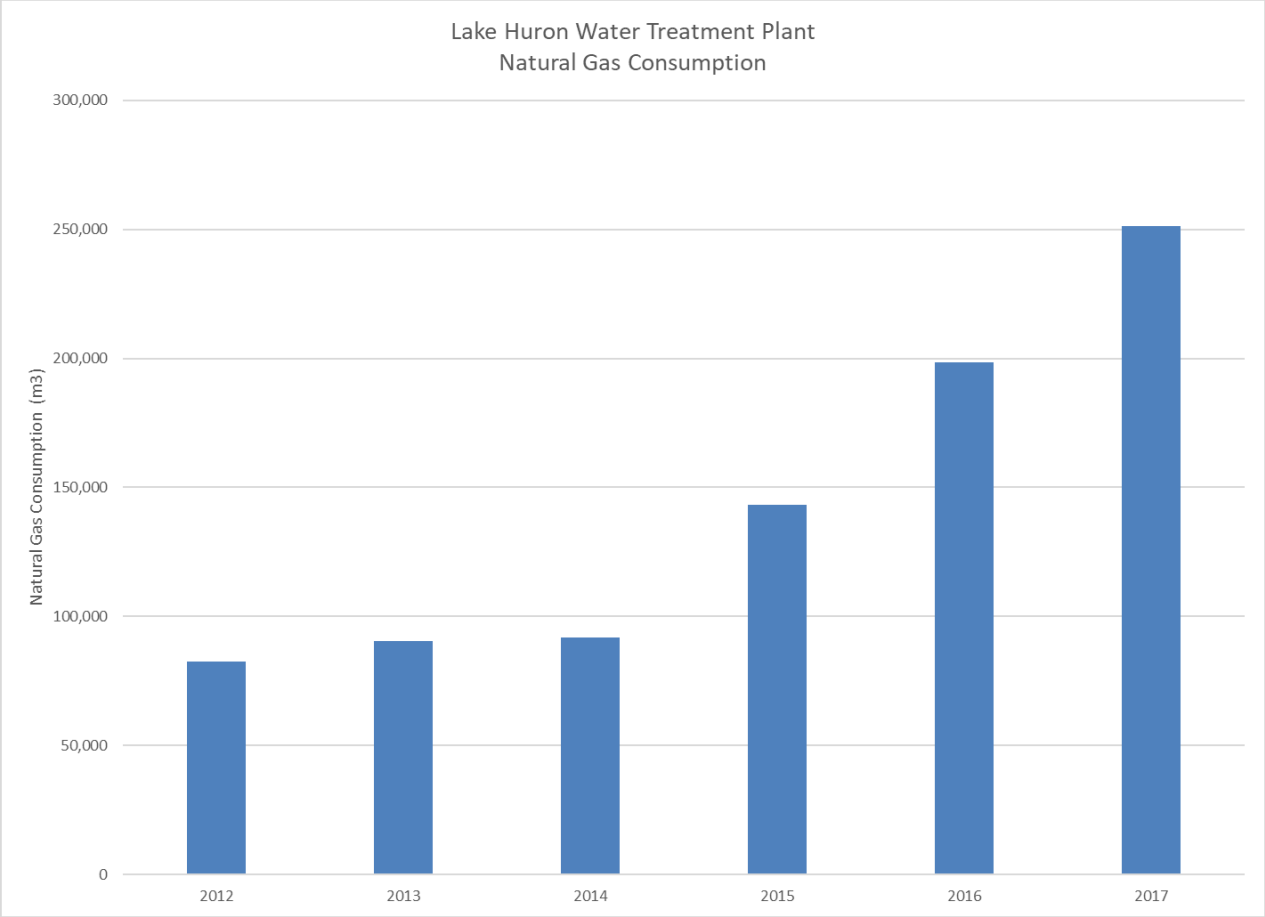
Compliance Obligations:
- Green Energy Act
- O. Reg. 397/11 Energy Conservation and Demand Management Plans
- Electricity Act

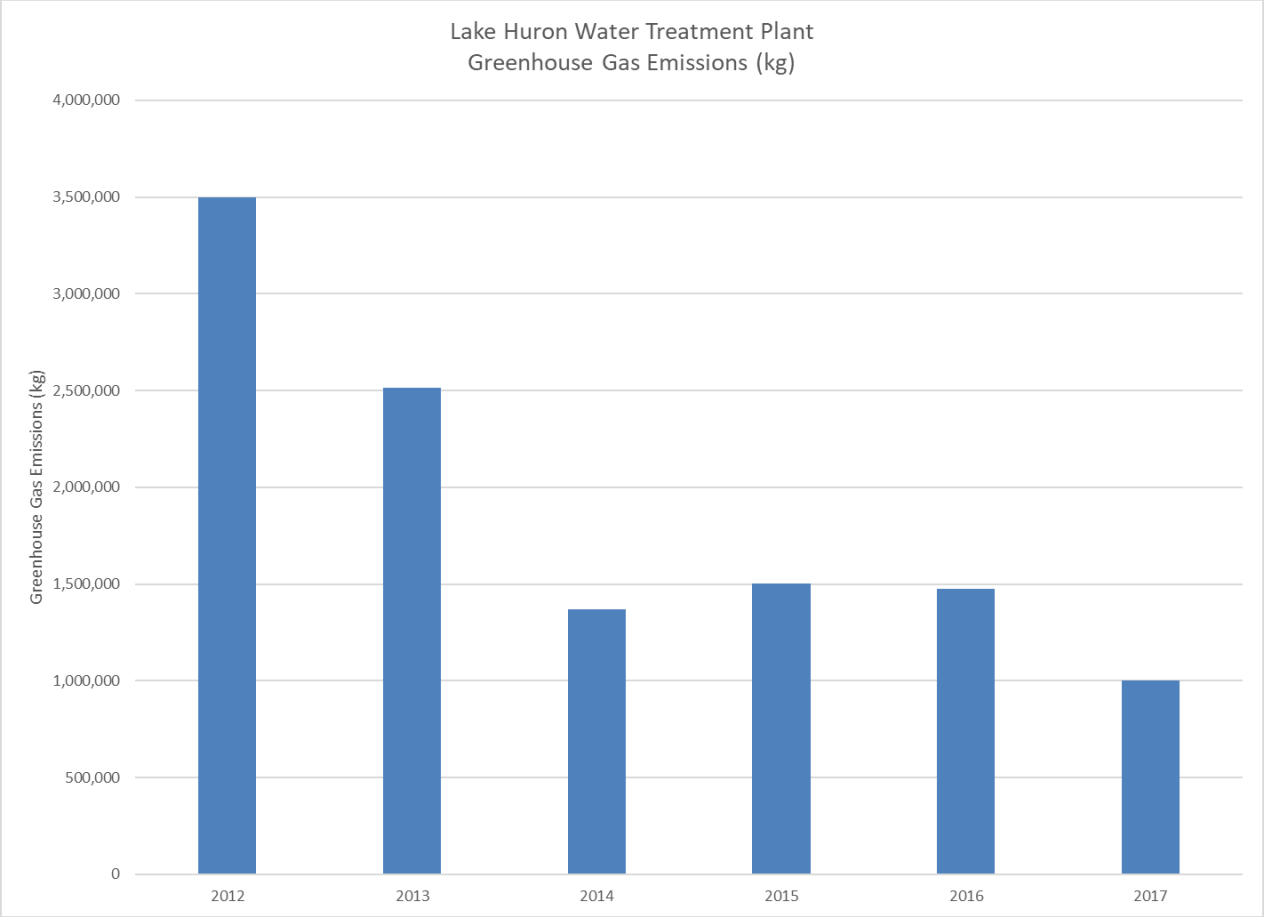
Risks and Opportunities:
- Potential beneficial effects (opportunities) – cost savings; carbon footprint reduction; prolongs asset life
- Potential adverse effects (threats) – significant wear and depreciation of asset life; too great of a focus on energy could put customer needs at risk (eg. water quality, reservoir operating levels) or compromise the integrity of the system.

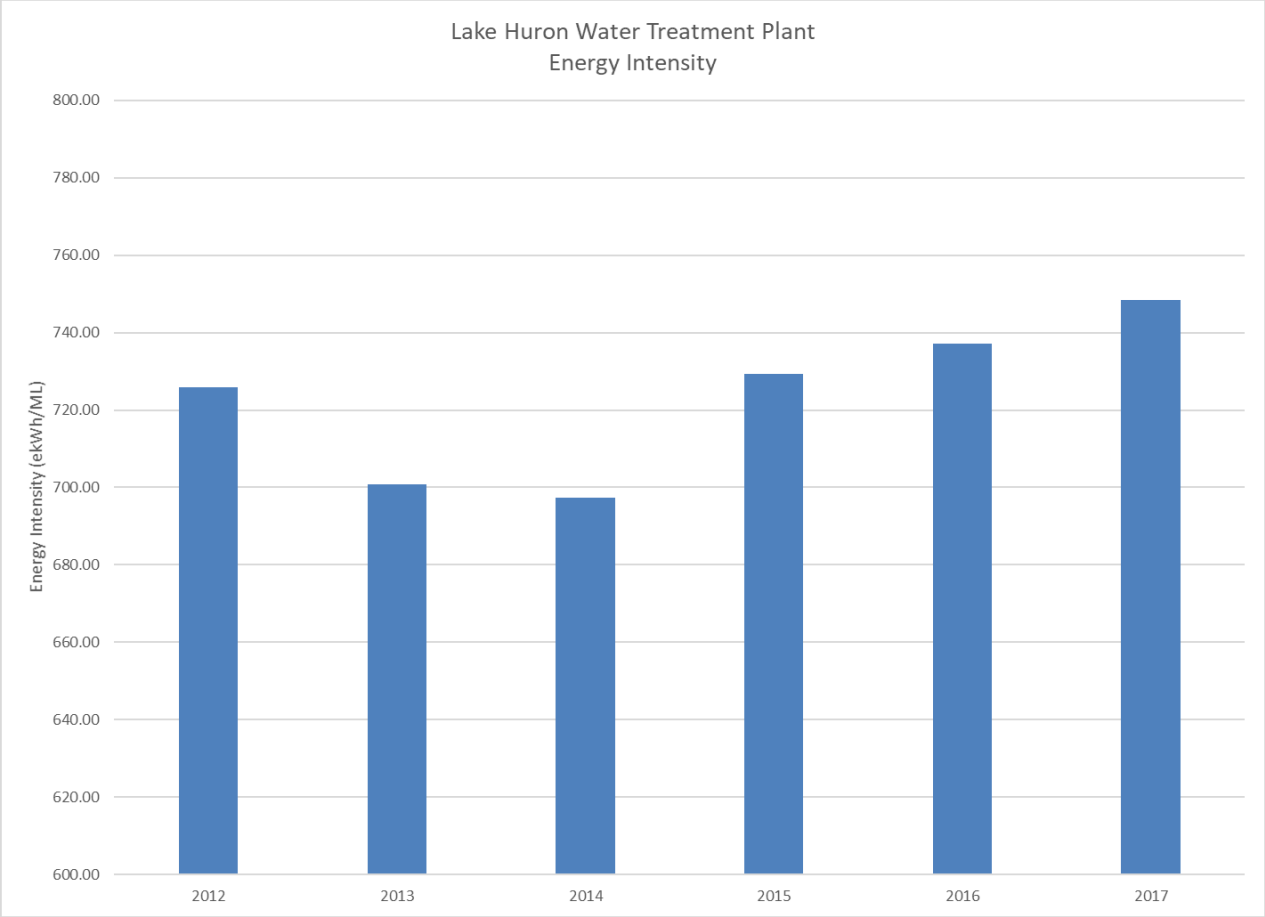
APPENDIX C

ENERGY PERFORMANCE TRENDS
2012-2017


Lake Huron Water Treatment Plant
Electricity Consumption
Electricity Consumption (kWh)
36,000,000
35,000,000
34,000,000
33,000,000
32,000,000
31,000,000
30,000,000
29,000,000
28,000,000
27,000,000
2012
2013
2014
2015
2016
2017


Lake Huron Water Treatment Plant
Natural Gas Consumption
Natural Gas Consumption (m3)
300,000
250,000
200,000
150,000
100,000
50,000
0
2012
2013
2014
2015
2016
2017


Lake Huron Water Treatment Plant
Greenhouse Gas Emissions (kg)
Greenhouse Gas Emissions (kg)
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2012
2013
2014
2015
2016
2017


Lake Huron Water Treatment Plant
Energy Intensity
Energy Intensity (ekWh/ML)
800.00
780.00
760.00
740.00
720.00
700.00
680.00
660.00
640.00
620.00
600.00
2012
2013
2014
2015
2016
2017