



Lake Huron
Primary Water Supply System



ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN

Green Energy Act
Ontario Regulation 397/11

June 26, 2014

Revision 0

Table of Revisions

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0	June 26, 2014	Initial Issue of Document



Lake Huron
Primary Water Supply System

June 24, 2014

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

Dear Sir/Madam;

We are pleased to submit the first 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.

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 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.
Division Manager, Regional Water Supply
Lake Huron Primary Water Supply System

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Acronyms

CDM	Conservation and Demand Management
EMS	Environmental Management System
GEA	Green Energy Act (2009)
GHG	Greenhouse Gas
HOEP	Hourly Ontario Energy Price
HVAC	Heating, Ventilation and Air Conditioning
LHPWSS	Lake Huron Primary Water Supply System
OCWA	Ontario Clean Water Agency
PS	Pumping Station
RWS	Regional Water Supply
VFD	Variable Frequency Drive
WTP	Water Treatment Plant

1 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 397/11 under the Green Energy Act 2009 required public agencies, including municipalities, municipal service boards, school boards, universities, colleges and hospitals to report on their energy consumption and greenhouse gas (GHG) emissions annually beginning in 2013, and to develop and implement energy Conservation and Demand Management (CDM) Plans starting in 2014.

The purpose of the Lake Huron Primary Water Supply System (LHPWSS) CDM Plan is to develop a framework in order to understand the historical impact of its operations on greenhouse gas (GHG) emissions, and to take action by setting reduction targets. The objective of this report was the development of a CDM Plan. This strategic approach to energy management supports LHPWSS's Business and Operating Plans.

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. Simple actions such as turning lights and appliances off, shutting off heaters in the summer, establishing efficient usage times, efficient production requirements, and many other actions can result in energy savings. Such actions, along with energy efficient capital and operating process improvements and project implementation, are key components which are outlined within the energy CDM Plan.

This CDM Plan is the culmination of a non-linear process involving the:

- Integration of establishing a baseline for performance to be measured against,
- Setting of future performance goals and objectives,
- Continuous improvement through identification of energy conservation potential,
- Strategic alignment of measure implementation and fiscal constraints, and
- Evaluation, measurement and communication of results achieved.

This CDM Plan contains three perspectives: historical, current and future. It looks at “what we have done”, “what we are doing”, and “what are we planning to do”.

2 KEY COMPONENTS

Sustainability is a concept which meets the needs of the present without compromising the ability of future generations to meet their own needs. This is sometimes referred to as the “triple bottom line”.

- **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 the comfort levels (e.g. in offices) and water production rates. It can be applied to any process or building where energy use is required. To make an efficient use of the energy and, as a consequence, to save it, the actions are focused on:

- Energy Conservation,
- Energy Recovery,
- Energy Substitution,
- Corporate Goals and Objectives, and
- Corporate Fiscal Management.

Regulatory Requirements

Under Ontario Regulation 397/11 (Part of the Green Energy Act, 2009), all public sector agencies must now comply with mandatory reporting requirements. By 2013, all energy consumption for the LHPWSS facilities has to be recorded and submitted to the Ministry annually. By 2014, the requirements become more stringent as the LHPWSS has to submit this CDM Plan, which encompasses measures taken to date with results, as well as a five year plan for further energy conservation measures to be implemented.

The LHPWSS is well positioned to meet this requirement as audits have been completed at most facilities, resulting in a compiled list of energy reduction projects, some of which are already implemented. The full list is reviewed throughout this Plan while the implementation program is outlined later in this report. This Plan itself is meant to serve as LHPWSS's CDM Plan and will help assist LHPWSS to meet all of its mandatory reporting requirements.

Key Factors and Constraints

It is important to both LHPWSS's future and to its image in the public at large to understand the value of a comprehensive CDM Plan. Many people around the world are beginning to embrace the notion that the earth's environment and precious resources need to be conserved. However, the necessary changes will not happen overnight. To be successful, a comprehensive energy management plan should embrace long-term thinking, taking advantage of "low hanging fruit" to achieve immediate cost savings which will be redirected to more complex projects involving higher initial costs with larger net benefits.

Public agencies should realize that each of their circumstances is unique and may not lend themselves to 'boiler plate' solutions used in many private sector segments. Those who have met their goals have utilized the advantages of the unique physical and non-physical attributes of their facilities. While it is easy to be focused on the larger solutions, even seemingly small efforts can make a major long-term impact on the overall goal. A good example of this is energy awareness training which encourages staff to take simple and effective actions such as turning off lights and computers when not in use.

Ongoing professional development is also 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.

While realities of budget restrictions are an important consideration in any planning activity, it is possible to achieve energy savings while adhering to the financial constraints of a publicly-funded water system. It is clear that new technology and ideology changes have produced continued operational cost reductions while improving indoor comfort and environmental sustainability. These cost saving projects can often fund themselves by avoiding the use of previously allocated funds. As long as the savings are reinvested, these improvements can continue for the foreseeable future, ensuring a sustainable process.

3 SCOPE OF THE CDM PLAN

Lake Huron Primary Water Supply System

The Lake Huron Primary Water Supply System Board of Management is the owner and provides governance for the Lake Huron Primary Water Supply System. 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 Ontario Clean Water Agency (OCWA) under contract to the Board of Management.

The LHPWSS includes four facilities that fall under the monitoring and reporting requirements for O Reg 397/11.

Lake Huron Primary Water Supply Facilities – General Information			
Facility	Operation Type	Address	Municipality
Lake Huron Water Treatment Plant	Facilities related to the treatment and pumping of water	71155 Bluewater Highway	South Huron
McGillivray Pumping Station	Facilities related to pumping of water	4064 McGillivray Drive	North Middlesex
Exeter – Hensall Pumping Station	Facilities related to pumping of water	39590 Huron Street	South Huron
Komoka-Mt. Brydges Pumping Station	Facilities related to pumping of water	13964 Medway Road	Middlesex Centre

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 Megaliters/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 3 sections of twinned pipeline.

Major 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) parallel plate clarifiers;
- twelve (12) dual media filters;
- four (4) backwash pumps;
- three (3) clear wells and one (1) treated water suction conduit;
- five (5) high lift pumps;
- four (4) service water pumps;
- four (4) 2,500 kW diesel generator sets for emergency back-up power, as well as several smaller generators;
- various chemical systems;
- A Residuals Management Facility (RMF).



Figure 1: High Lift Pumping Station at WTP

McGillivray Pumping Station

This intermediate booster station and reservoir were constructed in the former McGillivray Township (now part of the Municipality of North Middlesex) in 1976. The station is connected to the LHPWSS primary transmission main and withdraws water from the onsite treated water reservoir and discharges it back into the primary transmission main.

The booster pumping station is normally only required during the highest water demand periods. Under normal operations the booster station is by-passed.

Major components of the station include:

- one (1) reservoir cell with a total storage capacity of 18,200 m³;
- four (4) 2300 kW variable speed pumps rated at 1,158 L/s;
- one (1) 60 kW diesel generator for emergency back-up power



Figure 2: McGillivray Pumping Station

Exeter-Hensall Pumping Station

In 2007, the LHPWSS constructed a pipeline, reservoir and pumping station to service areas of the Municipality of South Huron and the Municipality of Bluewater. The pumping station was commissioned in 2008.

Major components of the station include:

- two (2) reservoir cells with a total storage capacity of 8000 m³;
- three (3) variable speed booster pumps rated at 92 L/s;
- one (1) variable speed jockey pump rated at 35 L/s;
- a sodium hypochlorite re-chlorination system;
- one (1) 350 kW diesel generator for emergency back-up power.



Figure 3: Exeter-Hensall Pumping Station

Komoka-Mt. Brydges Pumping Station

In 2010, the LHPWSS constructed a pipeline and pumping station to service the communities of Komoka and Kilworth in the Municipality of Middlesex Centre, and the community of Mt. Brydges in the Municipality of Strathroy-Caradoc. The pumping station began operating in 2010.

Major components of the station include:

- two (2) pumps rated at 181 L/s;
- one (1) pump rated at 100 L/s;
- one (1) pump rated at 51 L/s;
- a chlorine gas re-chlorination system;
- one (1) 350 kW diesel generator for emergency back-up power



Figure 4: Pump Gallery within Komoka-Mt. Brydges Pumping Station

4 HISTORICAL ENERGY MANAGEMENT

ISO14001 Environmental Management System

The LHPWSS has operated under the guidance of an ISO 14001 registered Environmental Management System (EMS) since 2003. In August 2012 the LHPWSS underwent a three-year re-registration audit and was recommended for continued registration to the ISO14001:2004 standard for another three-year period (August 2015) after which time it will seek reregistration.

The continued utilization and registration of the EMS to the ISO14001 standard is also a requirement of the Service Agreement with Ontario Clean Water Agency (OCWA), the contracted Operating Authority for the water supply system.

Through the EMS, energy consumption has been identified as a significant environmental aspect. Since the implementation of the EMS in 2003, the LHPWSS has established and maintained an objective, target and programme related to energy reduction.

Capital Projects

Historically, LHPWSS has addressed Energy Conservation and Demand Management on a project-by-project basis. Capital projects were implemented based on equipment's expected useful life or in response to equipment emergency breakdowns. Utility savings, realized as a result of the implementation of these individual projects, have not historically been uniquely reported formally, but have been considered as a component of general operations. Thus, they have been reported through utility expenses in the Accounting System. Sustainability and long-term energy reduction goals, through this CDM Plan, will become integral components of the business reporting system.

Utility costs were viewed as a fixed overhead cost. The management of these costs relied on an exception-based investigation approach. In other words, utility costs were only reviewed if a utility bill was much higher, or lower, than typical.

To date, several capital projects undertaken at the LHPWSS have contributed to overall energy conservation and demand reductions.

Project:	LH1340 - PCB Removal and Plant Lighting Upgrades
Budget:	\$267,000 (total expenditure \$226,405)
Status:	Completed (2011)
Scope of Work:	Changes in federal regulation required water treatment plants to end the use of high and low-level polychlorinated biphenyl (PCB) containing equipment by December 31, 2009. The Lake Huron WTP had low-level PCBs in dry transformers, as well as PCB containing light ballasts. The LHPWSS used the opportunity to incorporate energy efficient lighting and motion sensors at the time the facility lighting was replaced.

Project:	LH1604 – Surge Tank Air Compressors
Budget:	\$472,272
Status:	Completed (2014)
Scope of Work:	Due to age, the previously existing surge tank air compressors at the Lake Huron WTP and McGillivray PS were prone to periodic failure and repair parts were no longer manufactured. This project involved the replacement of the surge tank air compressors at both facilities. The newly replaced air compressors can deliver a sufficient level of service with a lower air supply and power consumption rating, based on the hydraulic tests and analysis. The McGillivray PS and Lake Huron WTP compressors were placed into service in December 2013 and March 2014, respectively.

Energy Audit

In 2013, LHPWSS embarked upon a strategic energy auditing project. The purpose of the audit was to identify and analyze potential energy conservation and demand management opportunities. These efforts have been instrumental in assisting LHPWSS in aligning the CDM Plan with the Board’s Business and Operating Plans.

Through the audits, one of the consulting team members, VIP Energy Services Inc., assessed LHPWSS’s energy management practices. This assessment was completed by speaking to LHPWSS staff and reviewing relevant LHPWSS material. Upon completion of this review, VIP determined that LHPWSS had provided staff members with a mandate to pursue proper energy management, and through LHPWSS staff ingenuity; LHPWSS was able to direct resources to energy management. However, VIP also noted that if LHPWSS is to achieve the Ministry of Energy’s mandate, it will require the development of this CDM Plan that will address LHPWSS’s energy management needs.

5 CURRENT STATE OF ENERGY MANAGEMENT

Energy Data Management

While LHPWSS has an admirable history of managing its energy consumption, the Ontario government has required an increase in public sector energy management practices. This has resulted in the need to enhance current practices and develop new approaches. To meet this need, the LHPWSS has a comprehensive program in place for collecting and analyzing monthly energy billing information, and ensuring staff are informed about energy consumption. This effort will produce an energy costs and consumption database that will be used for monitoring excessive variations, targeting facility follow-up evaluations, and highlighting areas that could be candidates for improved conservation.

Energy 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 Union Gas Ltd. This strategy is reviewed annually during the budgeting process.

Equipment Efficiency

LHPWSS has pursued many measures to improve the energy efficiency of their equipment. Some of these measures include, heating and cooling equipment retrofits, building envelope improvements and electrical systems upgrades.

As the understanding of energy consumption improves, LHPWSS staff will be equipped with the knowledge necessary to make informed decisions.

Organizational 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 will be enhanced with future plans 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.

Staff across all departments will be given the necessary tools to address corporate energy concerns such as budgeting, procurement, conservation, and generation.

6 BASELINE ENERGY PERFORMANCE

Effectively managing energy requires implementing appropriate energy monitoring procedures. The establishment of an accurate energy baseline is essential in this process. It will assist with energy conservation and greenhouse gas reduction target setting, energy procurement and budgeting, bill verification, energy awareness, and the selection and assessment of potential energy projects. LHPWSS, like many other water systems, relies on its utility bills to establish its energy baseline.

Baseline Performance (2012)

LHPWSS has elected to utilize the consumption data from 2012 to represent its baseline energy consumption performance. It is imperative to understand the energy characteristics of each facility. By understanding these values, baselines can be established and future retrofits and improvements to the buildings can be monitored and tracked to ensure that the intended benefits are fully realized.

LHPWSS's most recent energy consumption inventory was completed in 2012. This inventory took into account the electricity and natural gas consumption of LHPWSS facilities. In 2012, LHPWSS's total energy use consisted of 38,682,012 kWh of electricity and 82,434 m³ of natural gas, which results in a total GHG emission of 3,870,872 kg.

Lake Huron Primary Water Supply Facilities – 2012 Energy						
Facility	Annual Flow (Mega Litres)	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m ³)	GHG Emissions (kg)	Energy Intensity (ekWh/ Mega Litre)	Energy Intensity (GJ/ Mega Litre)
Lake Huron Water Treatment Plant	49,169	34,817,535	82,434	3,499,728	726	2.6
McGillivray Pumping Station	418	3,091,732	0	296,930	7398	26.6
Exeter-Hensall Pumping Station	610	511,852	0	49,158	839	3.0
Komoka-Mt. Brydges Pumping Station	622	260,894	0	25,056	419	1.5
TOTAL	49,169*	38,682,012	82,434	3,870,872**		

*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.

7 MISSION AND VISION

ISO14001 Environmental Management System

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. See Appendix A for the LHPWSS Board of Management Environmental Policy.

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.”

8 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. All LHPWSS staff will have an essential role in the success of this CDM Plan and it will be the responsibility of the Energy Management Team to ensure that energy management measures are properly communicated and effectively implemented.

LHPWSS’s CDM Plan was completed to help support the following goals:

- 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 ISO14001 Environmental Management System, which includes energy related objectives, targets and programmes.
- Maintain regulatory compliance

The primary objective of this CDM Plan is to improve the management of LHPWSS's energy consumption. Part of this objective is setting a conservation target that will see LHPWSS reduce its 2012 energy consumption. LHPWSS's energy conservation target will be intensity based. It is also the objective of this Plan to 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 ISO14001 Environmental Management System,
- Reaching the CDM Plan's energy conservation target,
- Achieving the savings outlined in the Plan's budget section, and
- Imbedding energy management in LHPWSS's capital and operations decision making process.

Reporting Standards

The CDM Plan will allow for the monitoring and reporting that is necessary for LHPWSS to meet the regulatory requirements of the Green Energy Act and LHPWSS's facility specific energy intensity targets. Regular energy monitoring and reporting to the Ministry of Energy and LHPWSS senior management and staff will 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 will be provided with annual updates on the state of energy management at LHPWSS through annual regulatory reporting. Energy consumption feedback provided to staff will be imbedded into LHPWSS's regular operations.

9 ENERGY MANAGEMENT TEAM

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 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 Division Manager, 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.

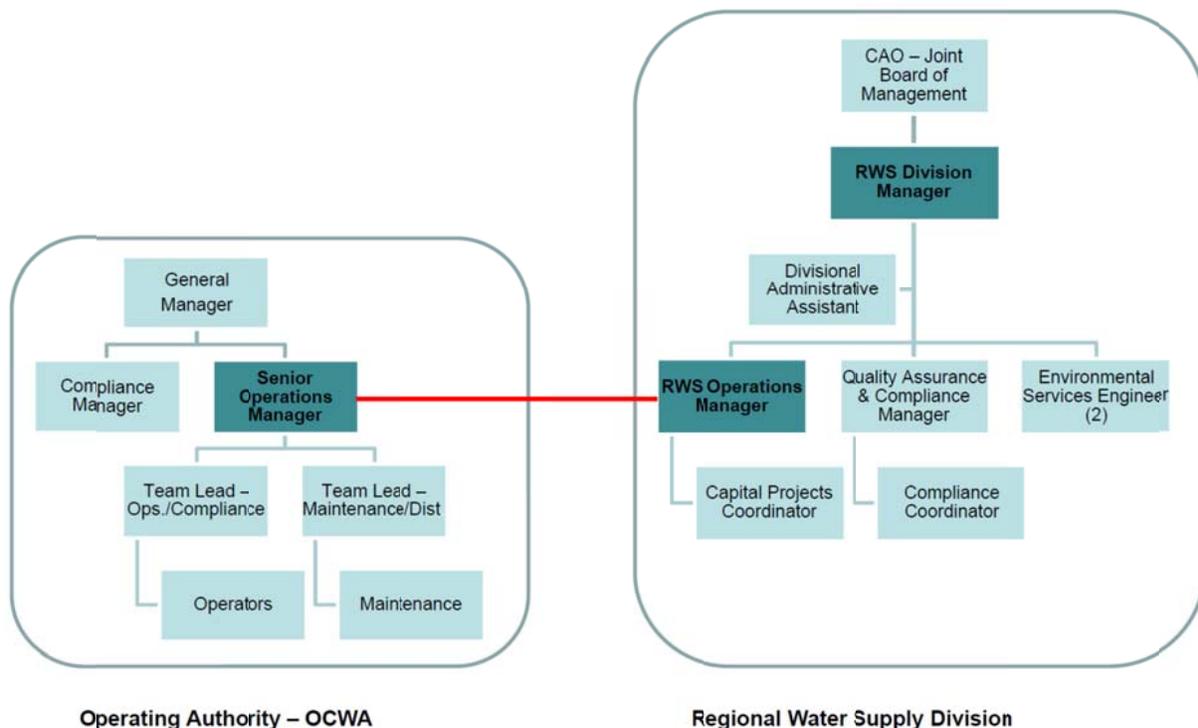


Figure 5: Structure of Energy Management Team

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.

10 FINANCIAL ASSESSMENT

The energy CDM Plan's financial assessment philosophy is to treat fiscal resources as if they were energy assets. Therefore, financial investments follow the same three pronged approach used for the management of energy:

- Elimination of waste,
- Improving efficiencies, and
- Optimizing energy supply.

In 2013, energy audits of the LHPWSS facilities were conducted by VIP Energy Services, Inc. The audits consist of a detailed analysis of historical consumption and demand information as well as a walkthrough of the facility by a qualified energy auditor. Based on the auditor's survey, a detailed equipment list and an energy consumption breakdown have been created, as well as a comprehensive list of potential energy conservation measures for each facility. The initial cost and saving estimates for the preliminary proposed process improvements, program implementation, and projects are outlined in Appendix B. Final cost and savings will be updated once the final audit report is received.

The listed costs and savings are for the inaugural year of a process, program, or project. If initiated and monitored effectively, it can be anticipated that these savings can be sustained. It should also be noted that the price of energy is anticipated to increase, whereas the costs of capital projects will likely decrease with advancements in technology. This could potentially lead to increased savings and decreased costs in the later years of the plan.

11 ENERGY MANAGEMENT ACTIONS

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

The EMS also drives internal actions and reviews and since energy conservation is recognized as a Significant Environmental Aspect within the EMS its mechanisms will support ongoing projects and reviews beyond the results of the 2013 energy audit. A copy of the current scope of projects and studies can be found in Appendix C. 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.

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

Annual and Future Reporting

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 is a living document that will be reviewed and updated as the need for change arises. At a minimum, the CDM Plan will be updated every five years, with the next update required by July 1, 2019. The CDM Plan will continue to take a forward view of the upcoming 5 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 Energy Projects

Energy projects at LHPWSS were evaluated prior to the development of the CDM Plan. LHPWSS Staff Members have advocated for some ambitious energy initiatives that were investigated and determined to be not feasible for a variety of reasons. It is anticipated that as LHPWSS grows and energy management practices improve, these actions will be reassessed.

Renewable Energy - Wind Generator

Under the HELP Clean Water initiative, one of the proposed projects was for a wind generator to be constructed and used on the Lake Huron Water Treatment Plant property. All electricity generated from a wind generator would be consumed by the plant itself. Following the completion of the Environmental Assessment and initial related studies, the Province of Ontario amended the site setback and connection requirements which effectively rendered this project as impossible to construct. As a result, the wind generator is no longer being considered as a feasible option.

Purchasing Practices

Traditionally, purchasing practices in the public sector were designed to favour equipment or physical retrofits at the lowest cost in order to ensure the highest possible financial responsibility. As energy conservation best practices emerged, it was revealed that there are drawbacks in doing this. Almost all wasteful energy consuming equipment is less expensive than their energy conserving counterparts. The practice in itself does not encourage energy efficiency, as most energy intensive alternatives such as standard efficiency motors are less costly than their higher efficiency counterparts. When dealing with energy intensive hardware, the initial capital cost is only a fraction (5%-10%) of the total lifecycle cost.

Where possible, the LHPWSS will take the opportunity to incorporate energy efficiencies into engineering designs as projects, as budget allows and in accordance with the Board's purchasing policies.

Building Re-Commissioning

Building re-commissioning, or retro-commissioning, refers to the optimization of the current automation, controls and energy consuming systems. As buildings age, both the functionality of the equipment and the functions that they serve can undergo significant changes. A re-commissioning program generally focuses on ensuring that the equipment operations are modified to include any new or deleted duties.

National Resources Canada (NRCan) has published several guidelines for costing and expected returns from re-commissioning projects. Building re-commissioning is an increasingly important practice, not only from an energy standpoint, but also from a comfort and safety perspective as well. The more complex building controls and ventilation become, the more risk there is that one or more components will fail or deliver incorrect measurements.

There is a cost to complete building re-commissioning initiatives, but expected savings can create very attractive paybacks in this area, depending on the starting efficiency of the building.

Energy and Resource Awareness (ERA) Programs

Independent studies done by organizations such as Natural Resources Canada (NRCAN) show that initiatives directed at staff and facility users, in particular ERA Programs, can lead to significant savings on their own. In fact, NRCAN reports indicate that dedicated, consistent Energy Awareness Programs are proven to be the most effective way to reduce energy usage with no capital costs and minor operational expenses.

Mechanisms exist within the structure of the LHPWSS ISO certified EMS to allow for employee feedback and input for system and process improvements as well as training for new processes and procedures in order to ensure effectiveness and efficiency of any newly implemented procedure or system improvement.

APPENDIX A

ENVIRONMENTAL POLICY



Lake Huron
Primary Water Supply System

Environmental Policy

The Lake Huron Primary Water Supply System Joint Board of Management (LHJBOM) is the owner and provides governance for the Lake Huron Primary Water Supply System. Benefiting member municipalities currently participating in the LHJBOM include the City of London, Municipality of Bluewater, Municipality of North Middlesex, Municipality of Lambton Shores, Municipality of South Huron, Township of Lucan-Biddulph, Municipality of Middlesex Centre and the Municipality of Strathroy-Caradoc.

The Lake Huron Primary Water Supply System is comprised of the Lake Huron Water Treatment Plant located near Grand Bend, the McGillivray Booster Pumping Station and Reservoir, the Exeter-Hensall Booster Pumping Station and Reservoir, the Arva Terminal Reservoir, the Komoka-Mt. Brydges Booster Pumping Station, and the associated transmission water mains.

The LHJBOM provides management oversight for the Environmental Management System (EMS), approves and monitors policy and objectives as they apply to the Lake Huron Primary Water Supply System. The LHJBOM also provides the necessary resource support for the successful implementation and ongoing viability of the EMS at all of its facilities.

The LHJBOM currently utilizes the services of an Independent contract Operating Authority who operates and maintains the Lake Huron Primary Water Supply System on behalf of the LHJBOM. Under the EMS, the Operating Authority is responsible for developing and recommending policy, objectives and targets in partnership with the LHJBOM.

The LHJBOM is committed to managing and operating the Lake Huron Primary Water Supply System in an environmentally responsible manner in accordance with documented environmental policies and procedures.

At a minimum, the LHJBOM will meet all relevant environmental legislation and other requirements and will encourage their suppliers and sub-contractors to similarly meet these requirements.

The LHJBOM will implement pollution prevention measures and promote continual improvement in order to control the impact on the environment.

The LHJBOM will periodically undertake appropriate reviews, evaluations and performance measurements of its operations to promote conformance with the LHJBOM Environmental Management Policy.

December 5, 2013

APPENDIX B

PROPOSED ACTIONS
VIP AUDIT 2013

Lake Huron Water Treatment Plant			
Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Power Factor Correction	\$176,794	\$382,654	2.2
Demand Control Management & Optimization	\$129,200	\$229,935	0.6
Re-Commissioning	\$552	\$5,160	9.3
Install E-Film on Glass Windows	\$2,541	\$26,213	10.3
Install Variable Frequency Drive (VFD) on AHU Motor	\$2,541	\$5,860	2.4
Replace Fittings having T12 U Lamps with New Fittings having T8 Lamps	\$356	\$4,080	11.4
Replace Outdoor Metal Halide Luminaries with LED	\$1,095	\$14,880	13.6
Install VFD for Hot Water Loop Circulating Pump	\$1,877	\$3,180	1.7
Replace Analog Control System for AHU with Digital Direct Control (DDC)	\$18,240	\$123,200	6.8
OPA Feed-in Tariff – 215kW Solar Rooftop PV Panel	\$107,500	\$755,000	7.0
Install Solar Panel to Preheat Feed Water for Boiler	\$845	\$11,040	131
Install Ground Source Loop Exchanger to Preheat Feed Water for AHU / Boiler	\$2,595	\$33,193	12.8
Energy and Resource Awareness	\$12,314	\$39,404	3.2
Total	\$683,667	\$1,539,664	2.3

McGillivray Pumping Station			
Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Demand Control Management & Optimization	\$109,677	\$111,200	1.0
Replace Baseboard Heaters with Multi-Split Ductless Heat Pump	\$3,424	\$29,960	7.9
Install Variable Frequency Drives on AHU Motors	\$1,444	\$4,560	3.2
Lighting Upgrade – Replace Highbays with LED	\$692	\$4,380	6.3
OPA Feed-in Tariff – 70kW Solar Rooftop PV Panel	\$35,000	\$236,300	6.8
Domestic Hot Water Control System	\$441	\$3,860	8.8
Energy Awareness Training	\$5,099	\$21,560	4.2
Total	\$155,778	\$408,820	2.6

Exeter-Hensall Pumping Station			
Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Install Occupancy Sensors	\$315	\$1,250	4.0
Replace Existing Wallpack Fixtures with LED Fixtures	\$371	\$2,325	5.3
OPA Feed-in Tariff	\$16,566	\$169,000	10.2
Total	\$17,252	\$172,575	10

Komoka-Mt. Brydges Pumping Station			
Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Power Factor Correction	\$2,032	\$11,762	5.8
Install Thermostat for Electric Baseboard Heaters	\$349	\$1,555	2.2*
Install VFDs for Booster Pumps	\$2,141	\$15,739	5.0*
Install Occupancy Sensors	\$330	\$3,505	10.1
Total	\$4,852	\$26,553	5.5

Arva Terminal Reservoir (ATR)			
Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Replace High Bay Metal Halide Fixtures with LED Fixtures	\$305	\$3,261	5.3
Install Occupancy Sensors	\$319	\$2,230	6.0
Replace Existing Wallpack Fixture with a LED Fixture	\$169	\$,655	4.9
Total	\$793	\$7,146	5.8

APPENDIX C

SCHEDULED ACTIONS
ENVIRONMENTAL MANAGEMENT PROGRAMME



FORM TITLE: Environmental Management Programme	FORM NO.: LF-ADMIN-1500
REVISION No.: 10	EMS REFERENCE NO.: 4.3.3
	QMS REFERENCE NO.: N/A

Objective 1: Reduce the demand on the Provincial electrical generation and transmission system through conservation and displacement efforts.

Target Years: January 1, 2013 - July 1, 2017

Target and Baseline: < 750 kWh/ML on a quarterly basis

Project/Study	Tasks	Project Manager/Person Responsible	Status
Filter Operations	Annual Maintenance of Filters	Sr. Ops. Manager (OCWA)	On-going
	Filter efficiency to be evaluated through filter optimization studies, including incorporation of particle counters	Env. Services Engineer (RWS) and CH2MHill	On-going
Surge Tank Air Compressors	Replacement of Surge Tank Air Compressors at Huron WTP and McGillivray Booster Station	Env. Services Engineer (RWS)	On-going
Operational Efficiency Strategy & Energy Audit	Conduct an audit of facilities and energy optimization study to identify opportunities for energy savings and operational improvements	Operations Manager (RWS) & AECOM	Q4, 2013
	Board to endorse the proposed energy efficiency strategy.	Division Manager (RWS)	Q1, 2015
Huron 4kv & 600v Distribution	Replacement of Low Lift 4kv & 600v Distribution	Operations Manager (RWS)	Q4, 2014
	Replacement of High Lift 4kv & 600V Distribution	Operations Manager (RWS)	Q4, 2015
	Review opportunities for sub-metering of treatment equipment	Operations Manager (RWS)	Q4, 2014
Huron and McGillivray HVAC Upgrades	Pre-design	Operations Manager (RWS) and Chorley and Bisset (consultant)	Q4, 2013
	Installation of new HVAC equipment	Operations Manager (RWS)	Q1, 2015
Residue Management Facility (RMF)	Installation of two new centrifuges with VFD motors.	Env. Service Engineer (RWS)	Q4, 2013
	Installation of new Facility	Env. Service Engineer (RWS)	Q4, 2013
	Monitoring of the affect new facility has on overall electrical usage.	Compliance Coordinator (RWS)	Q4, 2014
Pipeline Twinning and Replacement Project	Review and monitor the effect the pipeline twinning and replacement project has on energy consumption	Compliance Coordinator (RWS)	Q4, 2014
High Lift Pumping	Rebuild HLP #5	Operations Manager (RWS)	Q4, 2014
	Addition of a High Lift Pump	Operations Manager (RWS)	Q4, 2016
All Projects	Review energy savings/reductions and monitoring	Top Management (OCWA) and Quality Assurance & Compliance Manager (RWS)	Annually
	Identify/recommend new energy opportunities; revise objective,	Top Management (OCWA) and Division Manager (RWS)	Annually

Objective 1: Reduce the demand on the Provincial electrical generation and transmission system through conservation and displacement efforts.			
Target Years: January 1, 2013 - July 1, 2017			
Target and Baseline: < 750 kWh/ML on a quarterly basis			
Project/Study	Tasks	Project Manager/Person Responsible	Status
	target and program		
	Provide recommendations to the Board for approval	Division Manager (RWS)	As Necessary
Significant Environmental Aspect(s): Using Electricity			
Legal and Other Requirements: N/A			
Technological Options: N/A			
Financial: Lighting Replacement - \$117,000 Surge Tank Air compressors - \$415, 000 Operational Efficiency Strategy & Energy Audit - \$200,000 HLP #6 Addition – Estimated \$500,000 Huron 4kv & 600V Distribution - \$4,965, 000 Huron HVAC replacement - \$6,200,000			
Operational and Business Requirements: N/A			



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