



Elgin Area

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

<i>Revision #</i>	<i>Date</i>	<i>Description of Revision</i>
0	June 26, 2014	Initial Issue of Document



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 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.

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 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 "A. Henry", is written over the printed name.

Andrew Henry, P.Eng.
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Acronyms

CDM	Conservation and Demand Management
EMPS	Elgin-Middlesex Pumping Station
EMS	Environmental Management System
GEA	Green Energy Act (2009)
GHG	Greenhouse Gas
HOEP	Hourly Ontario Energy Price
HVAC	Heating, Ventilation and Air Conditioning
EAPWSS	Elgin Area 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 Elgin Area Primary Water Supply System (EAPWSS) 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 EAPWSS'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 EAPWSS facilities has to be recorded and submitted to the Ministry annually. By 2014, the requirements become more stringent as the EAPWSS 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 EAPWSS 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 EAPWSS's CDM Plan and will help assist EAPWSS to meet all of its mandatory reporting requirements.

Key Factors and Constraints

It is important to both EAPWSS'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

Elgin Area Primary Water Supply System

The Elgin Area Primary Water Supply System Board of Management is the owner and provides governance for the Elgin Area Primary Water Supply System. The EAPWSS is responsible for the treatment and transmission of drinking water to the following seven municipalities in southwestern Ontario; City of London, City of St. Thomas, Town of Aylmer, Municipality of Bayham, Township of Malahide, Municipality of Southwold, and the Municipality of Central Elgin.

The population served by this system is approximately 112,000 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 EAPWSS includes two facilities that fall under the monitoring and reporting requirements for O Reg 397/11.

Elgin Area Primary Water Supply Facilities – General Information			
Facility	Operation Type	Address	Municipality
Elgin Area Water Treatment Plant	Facilities related to the treatment and pumping of water	43665 Dexter Line	Central Elgin
Elgin-Middlesex Pumping Station	Facilities related to pumping of water	490 South Edgeware Road	Central Elgin

Elgin Area Water Treatment Plant

The Elgin Area 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 91 Megaliters/day (MLD). After water is treated, it is pumped from the WTP to various communities or to storage reservoirs. The primary transmission mains are 14.7 km in length, and fully twinned.

Major equipment within the WTP includes:

- a low lift pumping station (four (4) low lift pumps);
- two (2) flash mix chambers;
- two (2) banks of flocculation tanks;
- two (2) gravity sedimentation tanks;
- four (4) dual media filters;
- two (2) backwash pumps;
- one (1) centrifugal blower
- one (1) clearwell and one (1) treated water storage reservoir;
- four (4) high lift pumps;
- two (2) diesel generator sets rated at 2500 kW and 100 kW, for emergency back-up power;
- various chemical systems.
- HVAC systems



Figure 1: High Lift Pumping Station at WTP

Elgin-Middlesex Pumping Station (EMPS)

The Elgin-Middlesex Pumping Station (EMPS) property, located at 490 South Edgeware Road in the Municipality of Central Elgin, contains three pumping stations within one facility. The EAPWSS Board of Management owns the building and property, but has no pumping equipment within the station. There are three separate pumping stations within the building, owned by three separate entities:

- St. Thomas Area Secondary Water Supply System Board of Management;
- Aylmer Area Secondary Water Supply System Board of Management;
- City of London.

These three pumping stations are operated by OCWA under a joint service agreement with the three owners noted above.

The EAPWSS performs administrative functions related to the EMPS facility. Through their service agreement, the three pumping station owners have requested the EAPWSS administration staff (Regional Water Supply Division) to facilitate payment of invoices related to the operation, maintenance, and repair of the facility on their behalf, and recover those costs from them as mutually agreed upon. The EAPWSS receives and pays the electricity and natural gas bills for the EMPS facility, then charges the appropriate amounts back to the three other water systems owners based on their consumption for the period (100% charge back).

The EAPWSS has clarified with the Ministry of Energy that since there is no formal occupancy agreement in place with the three pumping station owners and the space is not leased, then the EAPWSS is responsible for reporting on the energy consumed at the building.

The EAPWSS has no control over the pumping station operations. Through the energy CDM Plan, the EAPWSS commits to providing the other owners with their energy consumption data (monthly through the invoicing, and annually through the energy reporting required by the Ministry of Energy). The owners will be provided with a copy of the energy CDM Plan and encouraged to optimize their energy consumption where possible.

Major components of the station include:

- two (2) reservoir cells with a total storage capacity of 54,600 m³;
- The Aylmer Area Secondary Water Supply System portion of the pumping station includes two (2) pumps each rated at 100 L/s, a shared rechlorination facility and a shared 600 kW diesel generator for emergency backup power;
- The St. Thomas Area Secondary Water Supply System portion of the pumping station includes three (3) pumps each rated at 316 L/s, a shared rechlorination facility and a shared 600 kW diesel generator for emergency backup power;
- The City of London portion of the pumping station includes three (3) pumps and a hydropneumatic surge tank with two (2) air compressors.



Figure 2: City of London Pumps at EMPS

4 HISTORICAL ENERGY MANAGEMENT

ISO14001 Environmental Management System

The EAPWSS has operated under the guidance of an ISO 14001 registered Environmental Management System (EMS) since 2003. In August 2012 the EAPWSS 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 EAPWSS has established and maintained an objective, target and programme related to energy reduction.

Capital Projects

Historically, EAPWSS 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 EAPWSS have contributed to overall energy conservation and demand reductions.

Project:	EA4058 – Plant HVAC
Budget:	\$1,278,403 (total expenditure \$1,270,098)
Status:	Completed
Scope of Work:	The existing air handling and hydronic heating systems at the Elgin Area WTP were approximately 40 years old, past their useful life and were substandard to current requirements. It was necessary to upgrade the existing air handling system to improve air circulation in various parts of the plant. In addition, the existing hydronic heating system failed due to its age and required replacement.

Project:	EA4063 – 4kv & 600v MCC/Switchgear Replacement
Budget:	\$1,290,000 (total expenditure \$1,002,334)
Status:	Completed
Scope of Work:	As with much of the plant’s electrical system, the existing switchgear for the plant is 40 years old and well beyond its useful life. This project was undertaken in two phases to replace and update the motor control centres (MCC) and switchgear, following the completion of the emergency backup generator project in late 2009. Phase 1 of the 600v MCC project focused on the replacement of the high lift pump MCC’s and switchgear, with the second phase to address the low lift system.

Project:	EA4075 - PCB Removal and Plant Lighting Upgrades
Budget:	\$258,000 (total expenditure \$153,096)
Status:	Completed (2011)
Scope of Work:	Changes in federal regulation required water treatment plants to end the use of high and low-level PCB containing equipment by December 31, 2009. The Elgin Area WTP had low-level PCBs in dry transformers, as well as PCB containing light ballasts. The EAPWSS used the opportunity to incorporate energy efficient lighting and motion sensors at the time the lighting was replaced.

Energy Audit

In 2013, EAPWSS embarked upon a strategic energy and pumping optimization 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 EAPWSS 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 EAPWSS’s energy management practices. This assessment was completed by speaking to EAPWSS staff and reviewing relevant EAPWSS material. Upon completion of this review, VIP determined that EAPWSS had provided staff members with a mandate to pursue proper energy management, and through EAPWSS staff ingenuity; EAPWSS was able to direct resources to energy management. However, VIP also noted that if EAPWSS is to achieve the Ministry of Energy’s mandate, it will require the development of this CDM Plan that will address EAPWSS’s energy management needs.

5 CURRENT STATE OF ENERGY MANAGEMENT

Energy Data Management

While EAPWSS 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 EAPWSS 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

EAPWSS has currently adopted a strategy of procuring its electricity from Hydro One Networks Inc. EAPWSS has chosen to contract its natural gas through Union Gas Ltd. This strategy is reviewed annually during the budgeting process.

Equipment Efficiency

EAPWSS 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, EAPWSS staff will be equipped with the knowledge necessary to make informed decisions.

Organizational Integration

Day to day management of energy has been primarily the responsibility of the operating authority for the EAPWSS, 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. EAPWSS, like many other water systems, relies on its utility bills to establish its energy baseline.

Baseline Performance (2012)

EAPWSS 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.

EAPWSS's most recent energy consumption inventory was completed in 2012. This inventory took into account the electricity and natural gas consumption of EAPWSS facilities. In 2012, EAPWSS's total energy use consisted of 12,366,360 kWh of electricity and 153,432 m³ of natural gas, which results in a total GHG emission of 453,773 kg.

Elgin Area 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)
Elgin Area Water Treatment Plant	15592	8,683,400	100,507	1,023,975	625	2.25
Elgin-Middlesex Pumping Station	11,758	3,682,959	52,925	453,773	361	1.30
TOTAL	27,350*	12,366,360	153,432	1,477,748**		

*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.

7 MISSION AND VISION

ISO14001 Environmental Management System

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

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.”

8 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. All EAPWSS 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.

EAPWSS’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 EAPWSS's energy consumption. Part of this objective is setting a conservation target that will see EAPWSS reduce its 2012 energy consumption. EAPWSS's energy conservation target will be intensity based. It is also the objective of this Plan to 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 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 EAPWSS's capital and operations decision making process.

Reporting Standards

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

9 ENERGY MANAGEMENT TEAM

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 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 EAPWSS Board of Management, has key responsibilities for energy management with respect to approving goals and objectives, and through the annual budget approval process.

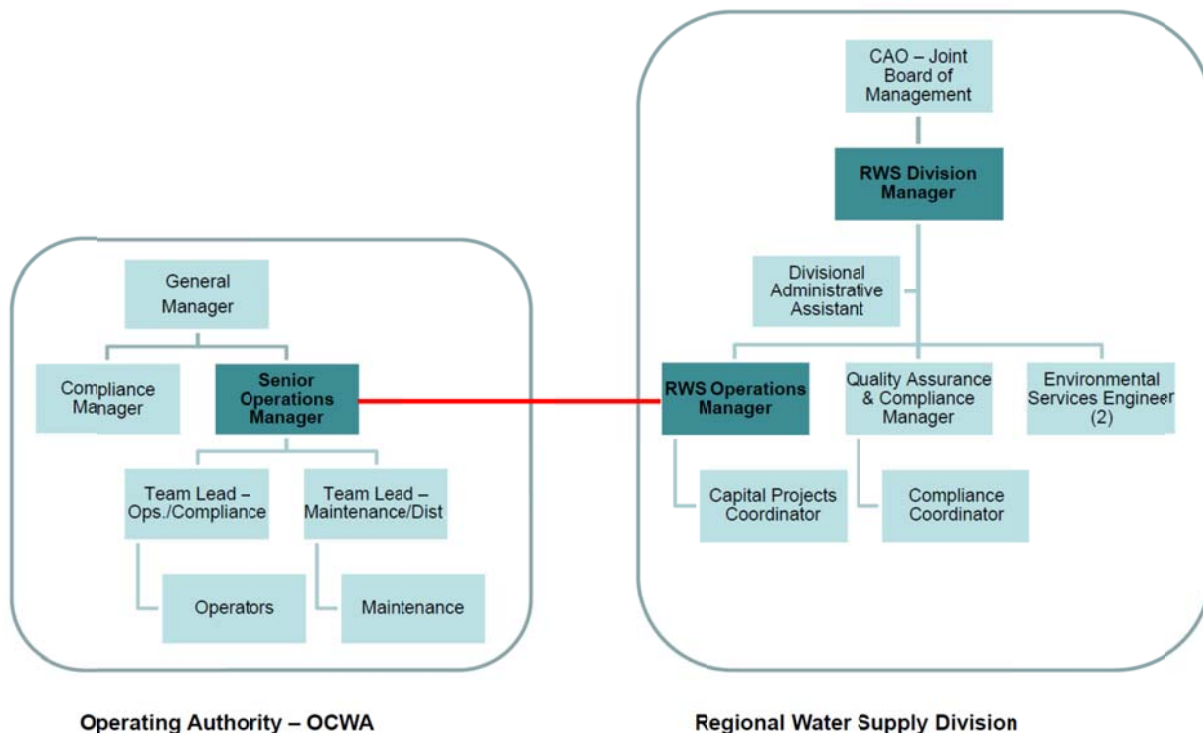


Figure 3: Structure of Energy Management Team

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.

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 EAPWSS 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 EAPWSS'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 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 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 EAPWSS were evaluated prior to the development of the CDM Plan. EAPWSS 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 EAPWSS 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 Elgin Area Water Treatment Plant property. All electricity generated from a wind generator would be consumed by the plant itself. The proposed wind generator was found to be in an environmentally significant area related to bird migration. After the initial project studies were completed, including the Environmental Assessment report, Environment Canada notified the EAPWSS of the migratory significance of this area of the Lake Erie shoreline, despite the fact that Environment Canada did not identify the issue nor object to the project during the initial assessment studies. 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 EAPWSS 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 EAPWSS 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

Environmental Policy

The Elgin Area Primary Water Supply System Joint Board of Management (EJBOM) is the owner and provides governance for the Elgin Area Primary Water Supply System. Benefiting member municipalities currently participating in the EJBOM include the City of London, City of St. Thomas, Municipality of Bayham, Municipality of Central Elgin, Town of Aylmer, Township of Malahide and the Township of Southwold.

The Elgin Area Primary Water Supply System is comprised of a water treatment plant located near Port Stanley, a terminal reservoir located near St. Thomas, and the associated transmission watermains and appurtenances.

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

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

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

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

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

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

APPENDIX B

PROPOSED ACTIONS
VIP AUDIT 2013

Elgin Area Water Treatment Plant			
Building Service Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Power Factor Correction	\$55,721	\$110,286	2.0
Demand Control Management & Optimizing based on HOEP Rates	\$81,706	\$113,000	1.4
Condenser – Night Purging – Cooling during Summer	\$167	\$4,380	26.2
Install VFD for Hot Water Loop Circulating Pump	\$184	\$2,130	11.0
Occupancy Sensor with CO2 Monitor for Ventilation Fan	\$777	\$2,980	3.8
Lighting Upgrade – Replace Exterior Lights with LED	\$1,329	\$16,380	6.2
OPA Feed-in Tariff – 215kW Solar Rooftop PV Panel	\$107,500	\$755,600	7.0
Domestic Hot Water Pipe Insulation	\$125	\$1,430	5.7
Installation of Low E Film over Window Glass	\$1,390	\$9,080	6.5
Solar Heating for Boiler Feed Water	\$3,460	\$25,480	7.4
Boiler – Night Purging – Heating during Winter	\$989	\$4,880	4.9
Energy and Resource Awareness	\$894	\$6,930	5.1
Total	\$254,242	\$1,052,556	4.1

Elgin Area Water Treatment Plant			
Process Optimization Energy Conservation Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Increase reservoir operating range at Elgin-Middlesex reservoir – avoid maximum Elfin HLPS pumping during high HOEP rates	\$25,000	\$0	Immediate
Change out or add 2 pumps at Elgin area WTP HLPS – same size, better efficiency – change P2/P3 with more efficient pumps with lower shutoff head	\$82,000	\$3,100,000	17.8*
Replace Low Lift pumps with smaller	\$25,000	\$4,050,000	102*
Install PSV's on 'A' and 'B' Lines, upstream of Elgin-Middlesex Reservoir	\$17,000	\$1,500,000	44.1*
Total	\$149,000	\$8,650,000	31.2*

*Includes maximum allowable incentive, custom incentive application required

APPENDIX C

SCHEDULED ACTIONS ENVIRONMENTAL MANAGEMENT PROGRAMME



form title: Environmental Management Programme	form no.: EF-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: <600 kWh/ML on a quarterly basis			
Project/Study	Tasks	Project Manager/Person Responsible	Status
HVAC Upgrades	Replacement of multi-zone air handling unit and exhaust fans in High Lift Building.	Operations Manager (RWS)	Complete
Lighting efficiency study and replacement	Replacement of non-energy efficient bulbs	Operations Manager (RWS)	Complete (Q1 – Q2, 2011)
	Redo all lighting in administrative building area.	Sr. Operations Manager (OCWA)	Complete
	Install light/motion in generator, caustic soda and CO ₂ buildings.	Operations Manager (RWS)	2014
Filter Operation	Annual Maintenance of Filters	Sr. Operations Manager (OCWA)	On-going
	Filter efficiency to be evaluated through filter optimization studies, including the incorporation of particle counters	Env. Services Engineer (RWS)	On-going
	Develop data points for the operation of filter #4	Env. Services Engineer (RWS)	On-going
	Rebuild Filters 1, 2 and 3	Operations Manager (RWS)	2014-2016
600 V MCC, Switchgear and 4kv Protective Relay Replacement	Replacement of 600 V MCC and Switchgear	Operations Manager (RWS)	Complete (Q1 – Q2, 2011)
	Review 600 V MCC, Switchgear and 4kv Protective Relay for opportunities for sub-metering	Operations Manager (RWS)	Q4 2013 – Reviewed as part of the energy and optimization study.
	Periodic review of electrical consumption data (existing power monitoring). Identify and recommend operational changes based of electricity consumption data.	Operations Manager (RWS)	Annually
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)	Complete

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: <600 kWh/ML on a quarterly basis			
Project/Study	Tasks	Project Manager/Person Responsible	Status
Relocate Air Compressors	Relocate Air Compressor to minimize compressor run times and make more efficient	Operations Manager (RWS)	Q1 2014
New 900 mm pipeline	Develop an operational plan for the shutdown of the 750mm pipeline A	Sr. Operations Manager (OCWA) & Operations Manager (RWS)	In process
	Monitor the effects the new 900 mm twinned pipeline has on electrical consumption	Compliance Coordinator (RWS)	Q4, 2013
New Residue Management Facility (RMF)	Install new facility	Env. Service Engineer (RWS)	Q1, 2015
	Monitoring of the effect new facility has on overall electrical usage.	Compliance Coordinator (RWS)	Q1, 2016
All projects	Review energy savings/reductions and monitoring	Sr. Operations Manager and Compliance Manager (OCWA) and Quality Assurance & Compliance Manager (RWS)	Annually
	Identify/recommend new energy opportunities; revise objective, target and program	Sr. Operations Manager and Compliance Manager (OCWA) and Division Manager (RWS)	Annually
	Provide recommendations to the Board for approval	Division Manager (RWS)	As Necessary
Significant Environmental Aspect(s): Using Electricity			
Legal and Other Requirements: O. Reg. 397/11 Energy Conservation and Demand Management Plans.			
Technological Options: Upgrades of MCC and Switchgear (1967) and 4kv Protective Relay (1996) because of periodic failures and aging components. HVAC systems are approximately 40 years old; upgrades will provide energy reductions and better heating and cooling. Lighting replacement will save an estimated \$7000 per year in energy costs. T8 lighting to be implemented throughout the plant. Filter #4 upgraded with new drain system and air scour.			
Financial: MCC, Switchgear, and 4 kv replacement – \$832,500 HVAC upgrades – \$244,900 Lighting Replacement - \$81,640 Filter Backwash Protocol upgrades – \$350,000 Operational Efficiency Strategy & Energy Audit - \$200,000 Filter Rebuild - \$3,600,000			
Operational and Business Requirements: N/A			



Elgin Area

Primary Water Supply System

c/o Regional Water Supply Division

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