



Burman Energy Consultants Group



the Public Utilities Commission
of the City of Sault Ste. Marie

Energy Conservation and
Demand Management Plan

O. Reg. 397/11 – July 1, 2014

CONTENTS

Executive Summary.....	4
Introduction - Background.....	5
Long-Term Energy Plan - Achieving Balance	5
GREEN ENERGY ACT - O.Reg. 397/11: Requirements For BROADER Public Sector Agencies	7
Energy Use: Public Utilities Commission	9
Energy Conservation and Demand Management Planning Process	10
Process of Continuous Improvement	10
Vision, Goals and Objectives.....	12
Major Objectives, Goals and Actions of the CDM Plan.....	13
PUC Executive Team.....	14
Responsibility, Authority and Communication	14
Executive Team	15
CDM Team.....	15
Energy Consumption.....	15
Facility Assessments.....	15
Five Year Conservation and Demand Management Plan.....	16
Analysis: Measures.....	16
Energy Conservation Measures (ECM).....	16
Identification of CDM Measures	16
Summary – Energy Conservation Measures	18
Energy Management.....	19
Renewable Generation	19
Technical Efficiency Improvements	19
Shrinking the Carbon footprint.....	22

Understanding the Benefits	22
Costs, Savings and Lifespan of Measures	22
Renewable Energy	22
Plan Implementation	23
Prioritizing of Measures	23
Timelines for Measures Implementation	23
Responsibility for Measures	23
Integration of Corporate Activities with CDM Plan.....	24
Monitoring & Evaluation.....	24
Administration	24
Conclusions and Recommendations.....	24
Conclusions.....	24
Recommendations	25
Appendix	26
Appendix A 2011 GHG Emissions	27
Appendix A.1 2012 GHG Emissions	29
Appendix B – Summary of Measures	31
Appendix B-1.....	31
Appendix B-2.....	32

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EXECUTIVE SUMMARY

PUC Services Inc. (PUC) is “a utility services company operating as a wholly owned private company of the Corporation of the City of Sault Ste. Marie and is incorporated under the Ontario Business Corporations Act. PUC manages the assets and business of the Public Utilities Commission of the City of Sault Ste. Marie (the Commission) that owns the city’s water treatment and distribution system.”

PUC retained Burman Energy to develop a comprehensive five year Conservation and Demand Management (CDM) Plan for the Commission (a municipal services board), in compliance with requirements of Regulation 397/11.

Providing drinking water service to citizens requires energy—and a lot of it. The problems of steadily rising energy costs and climate change have therefore made the issue of energy management one of the most salient issues facing water utilities today. Energy management is also at the heart of efforts across the entire sector to ensure that utility operations are sustainable in the future. More and more utilities are realizing that a systematic approach for managing the full range of energy challenges they face is the best way to ensure that these issues are addressed on an ongoing basis in order to reduce climate impacts, save money, and remain sustainable.

The Five Year Conservation and Demand Management Plan (the Five Year Plan) provides a set of attainable business goals, for the Commission, related to energy conservation, while providing a structure and process by which to achieve these goals. This Plan contains baseline information about current energy consumption and about the role of CDM Team Lead whose responsibility it will be to implement necessary recommendations to attain these goals.

PUC’s goal is to meet the requirements of the Green Energy Act O. Reg. 397/11, due July 1st, 2014. A defined strategic direction in making decisions on allocating resources for optimizing energy operations and investments will be implemented through the plan.

This document represents the Five Year Plan for the Commission for the period of 2014-2019. The baseline greenhouse gas (GHG) emissions and energy consumption reflects data gathered and submitted to the Ontario Ministry of Energy on July 1, 2013, as required by O. Reg. 397/11. In order to determine the present state of energy management at Commission facilities, we have summarized the GHG reports for 2011. Additionally, this plan has incorporated a list of opportunities from the Energy Audits and studies conducted throughout several key Commission owned facilities, historical data of energy use, and actions and steps already taken with the intention of realizing energy savings. Monetary incentives from the OPA, accessible through the local utility as delivery agent, support the financial planning selection and decisions to move forward with the implementation of these initiatives.

The Plan identifies some feasible Energy Conservation Measures (ECMs) and implementation opportunities, behavioural improvements, targeted toward energy consumption and GHG emissions reduction, and associated costs. The Commission will be moving toward its holistic future, or the so-called preferred state, while pursuing to continually improve energy consumption performance and further reduce greenhouse gas emissions.

INTRODUCTION - BACKGROUND

LONG-TERM ENERGY PLAN - ACHIEVING BALANCE

On December 2, 2013, Ontario released its Long-Term Energy Plan, Achieving Balance. This document encourages conservation and lays out a plan for clean, reliable and affordable energy for Ontarians.

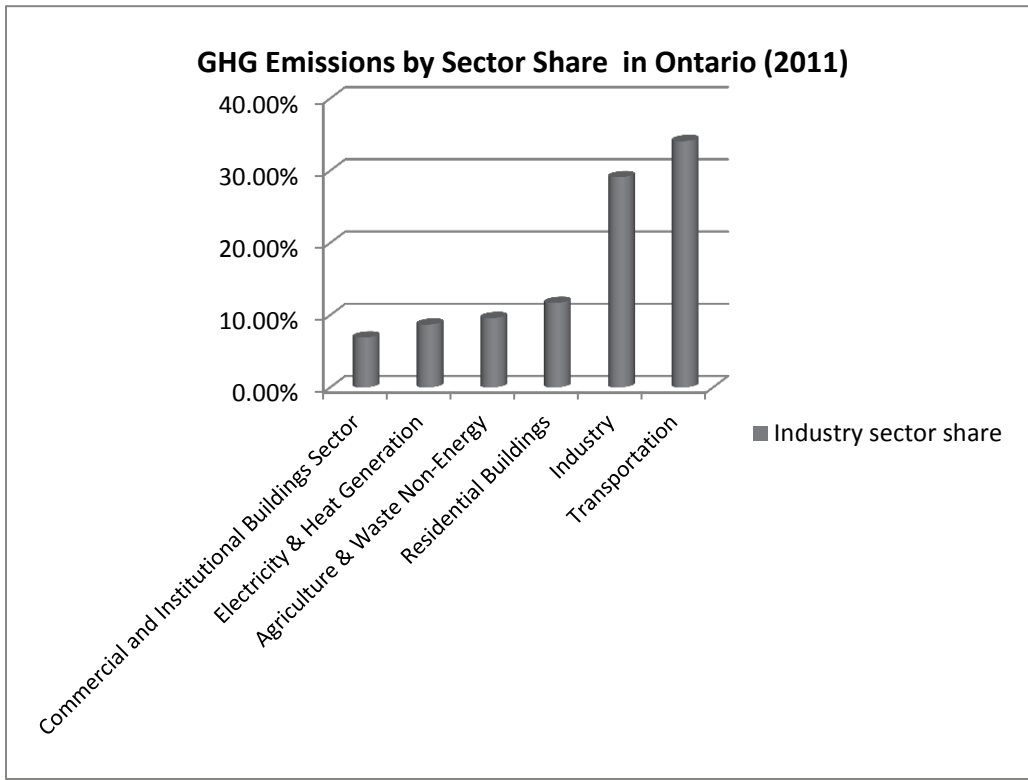
As the province plans for Ontario's future energy needs (20 years), conservation is the first resource considered. Conservation offers consumers a way to reduce their electricity costs/bills, and is the cleanest and most cost-effective energy resource. Conserving energy not only saves money for families and businesses, it also lowers demand on the electricity system and helps reduce greenhouse gas emissions.

To provide some context, through conservation efforts, Ontario homeowners, businesses and industry have saved more than 1,900 megawatts of peak demand electricity since 2005 – the equivalent of more than 600,000 homes being taken off the grid.

The updated Long-Term Energy Plan establishes a conservation target of 30 terawatt-hours (TWh) in 2032. The province expects to offset almost all of the growth in electricity demand to 2032, using conservation programs and improved codes and standards.

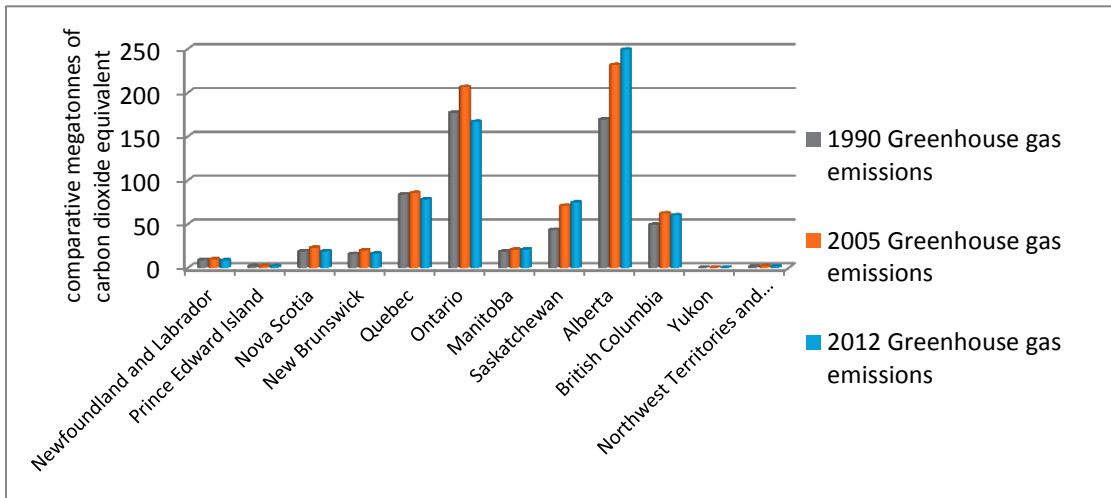
Governments at all levels must build climate change considerations into their operations and at the same time address mitigation by reducing greenhouse gas emissions.

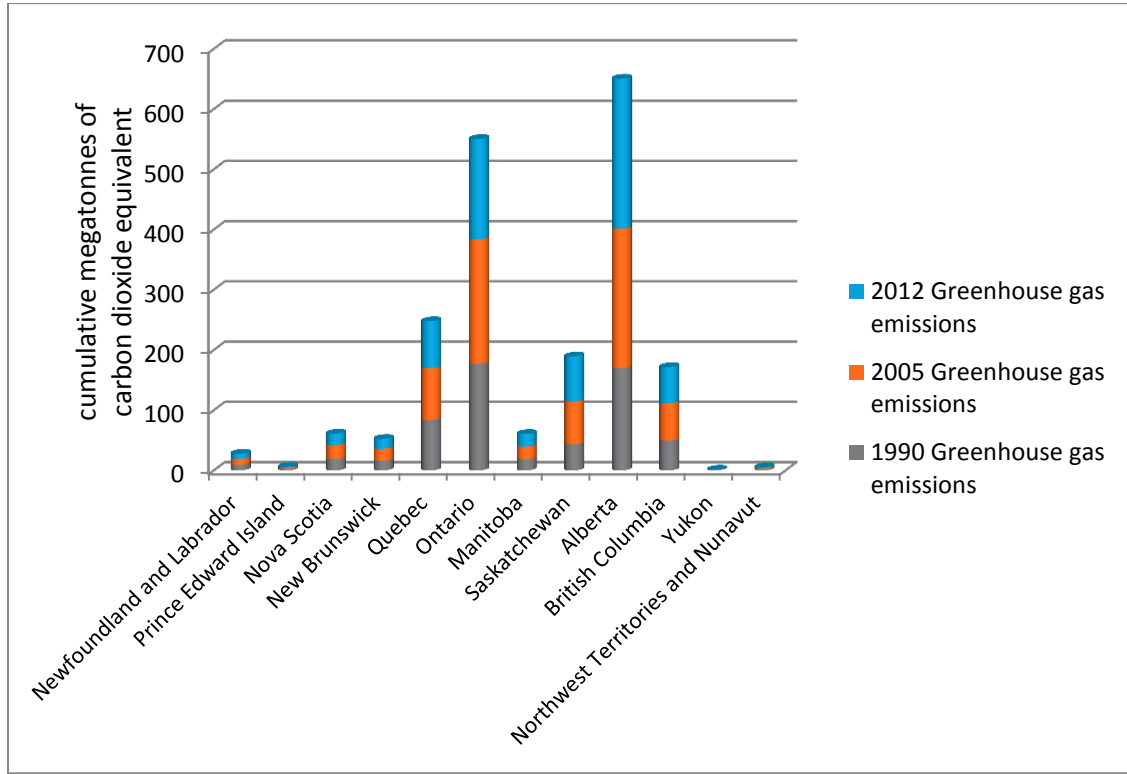
In Ontario, 6.9% of the GHG emissions are generated from the combustions of the commercial and institutional buildings sector; with the largest sources of GHG emissions generations coming from industrial operations and transportation. The chart below provides information about the GHG emissions generation by sector in Ontario:



The chart below illustrates results from an Environment Canada comparative study that shows GHG Emissions by province and territory for 1990, 2005 and 2012. Ontario’s GHG emissions are relatively higher than those of other provinces, due to its large manufacturing industry. Ontario’s emissions were reduced in the latter years; however the combined emissions from Ontario and Alberta still represented about 60% of the national total.

Greenhouse gas emissions by province and territory, Canada, 1990, 2005 and 2012





Any increase in economic activity increases GHG emissions. Ontario’s economic growth required that the government set directives for public agencies to be part of the solution in reducing these emissions.

It is essential that all broader public sector agencies be involved in optimizing energy consumption. Finding ways to manage municipal energy consumption efficiently means providing the same services with less energy. As stated earlier, energy conservation measures are often the lowest cost options for providing many other environmental, economic and social benefits.

GREEN ENERGY ACT - O.REG. 397/11: REQUIREMENTS FOR BROADER PUBLIC SECTOR AGENCIES

In 2009, the Green Energy Act was passed in Ontario:

- *The Government of Ontario is committed to fostering the growth of renewable energy projects, which use cleaner sources of energy, and to removing barriers to and promoting opportunities for renewable energy projects and to promoting a green economy.*
- *The Government of Ontario is committed to ensuring that the Government of Ontario and the broader public sector, including government-funded institutions, conserve energy and use energy efficiently in conducting their affairs.*

- *The Government of Ontario is committed to promoting and expanding energy conservation by all Ontarians and to encouraging all Ontarians to use energy efficiently.*

In 2009, the Province of Ontario enacted Ontario Regulation 397/11 – Energy Conservation and Demand Management Plan – mandating all public agencies to provide their energy consumption information to the public.

Ontario Regulation 397/11 requires public agencies to develop goals and objectives for conserving and otherwise reducing energy consumption and managing demand for energy as part of their CDM plans. BPS organizations include municipalities, municipal service boards, universities, colleges, school boards and hospitals.

The BPS CDM Plan regulation (O. Reg. 397/11) was developed under the *Green Energy Act, 2009* and requires BPS organizations to:

- ✓ Report annually to the Ministry on their energy use and GHG emissions and publish the reports on their websites.
- ✓ Develop and publish on their websites a CDM Plan every 5 years.

The Ministry of Energy recognizes that public agencies play an important role in helping Ontario meet its ambitious conservation targets and reduce GHG emissions.

Ultimately, energy reporting and conservation planning will help public agencies:

- manage electricity use and costs
- identify best practices and energy-saving opportunities
- evaluate results by comparing to similar facilities across the province
- assist in setting goals by providing a benchmark
- measure improvement over time.

Energy reporting will also inform the Ontario government about energy use in the broader public sector. The information will help Ontario to develop and enhance policies and programs in the future.

REQUIREMENTS

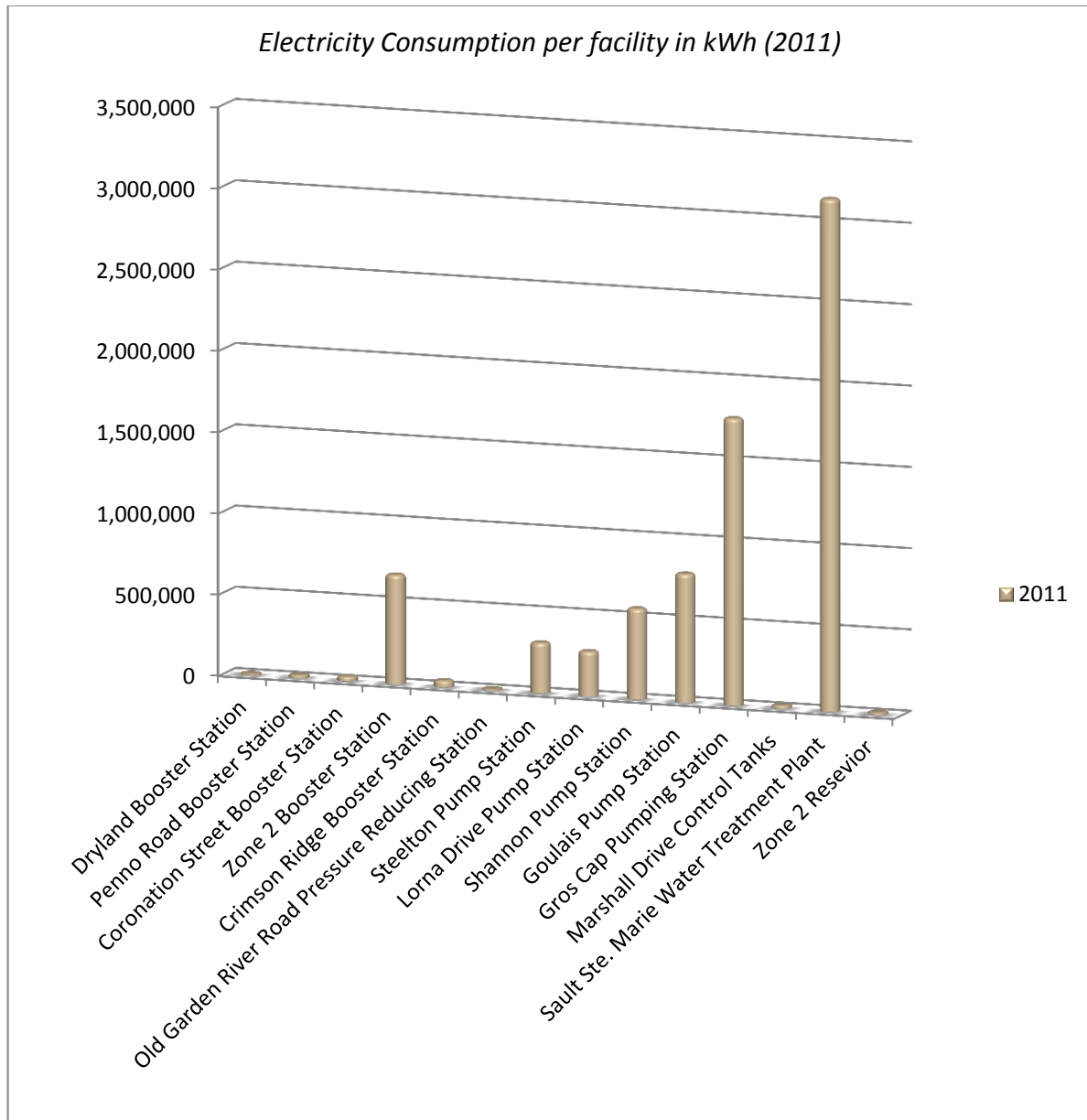
Regulation 397/11 requires BPS agencies to:

- ✓ **Report annually** on energy use and greenhouse gas emissions, beginning July 1, 2013, and post that information online. The Commission complied with this component, and submitted its first GHG report on July 1, 2013, using data compiled from 2011 utility bills (See Appendix A)
 - The second GHG report, due July 1, 2014, is included in Appendix A.1
- ✓ **Develop five-year energy conservation plans** starting July 1, 2014, and post those plans on line. The Commission is complying with this component in developing this Plan.
- ✓ **Post annual reports** on the agency’s website and make printed versions available for the public.

ENERGY USE: PUBLIC UTILITIES COMMISSION

In 2011, the Commission's total electricity used consisted of 7,693,136 kWh of electricity.

To aid in monitoring of energy consumption and development of a CDM Plan, the Commission's energy portfolio has been divided into distinct operations. The chart below indicates the electrical usage in the main facilities:



ENERGY CONSERVATION AND DEMAND MANAGEMENT PLANNING PROCESS

The main driver for the Commission to change the way energy is used, relates to fiscal benefits and financial incentives. Like any other resource cost, energy is a manageable input to the business process.

PUC is taking steps, starting with initial facility assessments, to gather data related to energy costs and consumption. This process will allow for greater understanding of the bottom line impact of energy management.

PUC is responsible for 14 Commission facilities. The initial GHG baseline report, submitted on July 1, 2013, captured information that is critical to energy management planning. Subsequent facility assessments provided more specific detail relating to equipment and potential energy conservation measures. This process provides a conscious assessment and understanding of energy costs involved in the operations of these facilities, while presenting opportunities to reduce energy costs. This Five Year Plan will provide an overview, and a good foundation for taking steps to optimize energy use.

As a water utility unprecedented challenges are ever increasing:

- Public expectations for holding rates/taxes while maintaining service standards.
- Population shifts/increases.
- Number and complexity of regulatory requirements.
- Maintenance and replacement of aging systems/infrastructure.
- Concerns about security and emergency preparedness.
- Changing work force demographics.
- Challenges in managing personnel, operations, and budgets.

Overlaying all these issues are steadily rising energy costs for utilities. Dealing with these rising costs will require utilities to better manage their energy consumption and identify areas for improvement.

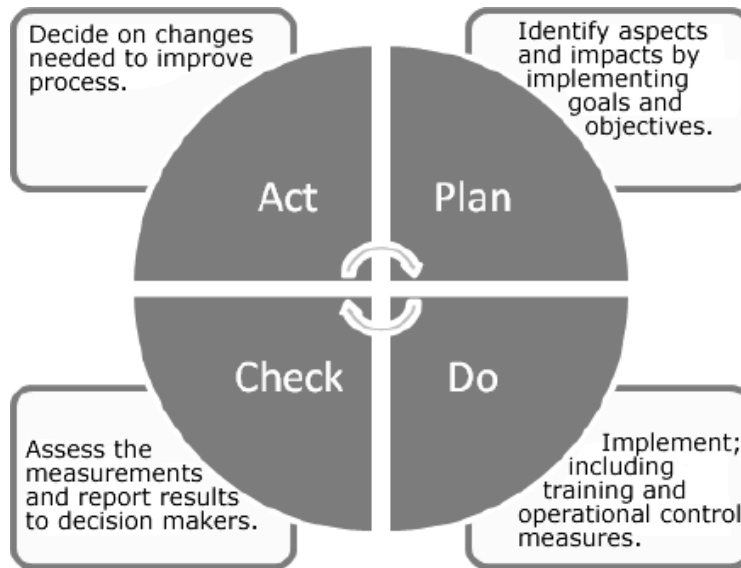
Energy represents the largest controllable cost of providing water services to the public. Most facilities were designed and built when energy costs were not a major concern. With large pumps, drives, motors, and other equipment operating 24 hours a day, water utilities can be among the largest individual energy users in a community.

Given these challenges, it is imperative for water utilities to investigate implementing systematic programs to minimize energy usage and cost, without sacrificing performance. It makes sound business and environmental sense to utilize a management system approach to optimize energy conservation efforts

PROCESS OF CONTINUOUS IMPROVEMENT

CDM Planning is intended to be a process of continuous improvement. This ensures continuous improvements by incorporating a process of ongoing monitoring, reviews, and revisions of procedures and policies through the use of the Plan - Do - Check - Act (PDCA) model. Just as a circle has no end, the

Plan - Do - Check - Act cycle is a four-step process model for carrying out change, cycling through each step for continuous improvement.



PLAN – OBJECTIVES & TARGETS

This establishes energy conservation objectives and processes necessary to deliver results based on either energy conservation targets, goals, oftentimes influenced by financial feasibility. In the Commission’s case, this involves developing an Energy Conservation Demand Management Plan prioritizing budgets, resources, and timelines.

DO - IMPLEMENTATION AND OPERATIONS

PUC will Implement the plan and collect data for analysis in the following "CHECK" and "ACT" steps.

CHECK - CHECKING

Actual results will be measured against the targets and goals, to determine any areas of discrepancy. Evaluating these deviations in implementation will enable determination regarding the feasibility of enabling the execution, i.e., “Do”.

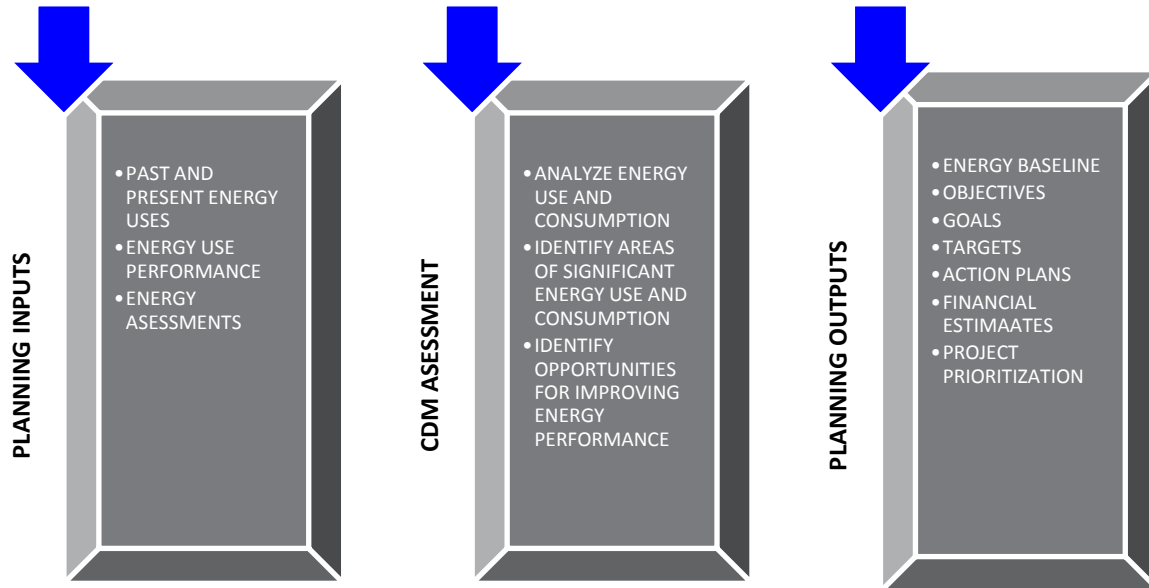
ACT - CORRECTIVE AND PREVENTIVE ACTIONS

Improvements and adjustments to the Plan can be made, with recommendations to correct and modify the Plan.

PUC will use benchmarking as the process for collecting, analyzing and relating energy performance data of comparable activities, to evaluate and compare performance between or within entities.

The CDM Planning Process, including inputs and outputs, is visually illustrated below:

CDM Planning Process Inputs and Outputs



VISION, GOALS AND OBJECTIVES

PUC includes, as part of its Strategic Mandate, a commitment to maintain environmental and safety leadership, while also maximizing shareholder value. Core Values include a respect for the environment. PUC defines its Mission to “Serve communities through the efficient, safe and reliable delivery of high quality Utility services.”

The values of PUC are applied and executed through management responsibility for the Commission operation and assets and support the owners, i.e. The City of Sault Ste. Marie’s Corporate vision, “The Corporation [of the City of Sault Ste. Marie] will be a leader in the provision of efficient, affordable, and quality services supporting a progressive and sustainable community” (Strategic Plan, Sault Ste. Marie 2011-2014).

The development of the Five Plan also aligns with the City of Sault Ste. Marie’s Corporate Values. As set out in the Strategic Plan, one of the core Strategic Directions, focusing on environmental leadership: *We will use resources wisely to maintain and create a livable city for future generations, minimizing the footprint of our activities on the environment.*

The Commission’s CDM Plan includes the major goals and objectives to be implemented within the 5 Year period. The Plan will evolve and will be subject to adjustments as deemed necessary to best serve customer interests and PUC’s aim for optimized operations.

MAJOR OBJECTIVES, GOALS AND ACTIONS OF THE CDM PLAN

The CDM Plan will serve as a blueprint for the Commission energy conservation activities. It is in alignment with the City of Sault Ste. Marie's goals to address the need to develop mechanisms to balance energy demand and reduction of energy consumption and GHG emissions for broad public sector buildings.

OBJECTIVES

- ✓ Energy Conservation Process and Technology Improvements - reduce energy intensity in industrial processes by improving procedures and equipment
- ✓ Energy Performance Management - enhance monitoring and measuring of, and reporting on facility energy consumption and improve energy performance
- ✓ Integration of Energy Efficiency Strategy - improve energy efficiency at facilities through collaborative sharing of best practices and technology information
- ✓ Transparency in energy conservation activities - Setting requirements for energy-efficient procurement and implementation of cost effective energy conservation projects as well as disclosure of electricity consumption in Commission facilities operated by PUC
- ✓ Ensure energy efficiency consistency across Commission facilities
- ✓ Better analyze energy costs and look for savings opportunities

GOALS

- ✓ To provide guidance for the utilities' next energy efficiency portfolios: to focus on any projects which are cost effective, energy efficient, and operationally and economically feasible,
- ✓ To review progress as the timing of the Plan evolves, to adjust energy and GHG reduction goals, and to establish targets
- ✓ Increase energy efficiency to reduce energy costs and consumption
- ✓ Reduce the impacts of energy production and use on the environment, and where possible, increase the use of renewable energy alternatives
- ✓ Maximize fiscal resources and avoid cost increases through direct and indirect energy savings
- ✓ Encourage the sharing of best practices
- ✓ Support efforts to make communities more sustainable in alignment with the CDM Plan endorsed by the City of Sault Ste. Marie, and as reflected in PUC's strategic mandate to maintain environmental and safety leadership

TARGET

A preliminary target of 5% energy reduction over 5 years has been set. Refinement of the target is expected as preliminary feasibility assessments are refined with more detail.

ACTIONS

- ✓ Assign sustainable energy goals and targets based on audit result and trend analysis
- ✓ Implement recommended measures as outlined in results from energy audits conducted
- ✓ Initiate measuring, monitoring and consistent reviews of building energy consumption

- ✓ Designate a CDM Team to ensure cost-effectiveness of the conservation initiatives, including improved joint prioritization and increased co-operation and co-ordination among all stakeholders
- ✓ Encourage strategic business associates to share best practices examples and results for publishing
- ✓ Continuously track the effectiveness of energy conservation initiatives based on consistent measurable performance indicators
- ✓ Identify sources of financing and support for energy projects and programs

PUC EXECUTIVE TEAM

Effective energy management begins with the specific, visible expression of commitment by organizational leaders to making the reduction of energy consumption an organizational priority. The Executive team is committed to delivering sustainable and reliable cost effective services to the community while meeting regulatory requirements and obligations.

The Executive Team will designate a leadership team/team lead to manage the energy CDM initiatives and implement the Five Year Plan.

The PUC Executive Team is fully committed to energy conservation and greenhouse gas emission reduction, as evidenced by:

- ✓ Setting and approving the energy CDM objectives
- ✓ Establishing energy conservation targets and ensuring they have been communicated
- ✓ Identifying the CDM Team and supporting their decisions
- ✓ Conducting ongoing CDM Plan reviews
- ✓ Allocating resources for Energy CDM initiatives
- ✓ Conducting reviews of energy conservation goals based on set targets vs. actual energy consumption
- ✓ Facilitating the organization's integration of energy conservation measures
- ✓ Designating responsibilities and interactions for the implementation of the energy conservation initiatives

RESPONSIBILITY, AUTHORITY AND COMMUNICATION

Successful energy management requires the allocation of staff and resources to continually improve energy performance. The Commission, through its agent, PUC, and its budget setting process, ensures that PUC provides the availability of resources required to implement the energy conservation initiatives of this plan. Resources include human resources and specialized skills, organizational infrastructure, technology and financial resources.

The Commission energy conservation framework model includes the following layers:

EXECUTIVE TEAM

- ✓ Approves the CDM Plan and approve the financial budget and resource allocation for energy conservation projects
- ✓ Reviews and approves on-going modifications to the CDM Plan as required
- ✓ Designates an energy management team/team lead to direct energy conservation activities
- ✓ Provides advocacy in promoting energy conservation and GHG emission reduction
- ✓ Provides general oversight of the Plan implementation
- ✓ Provides leadership and promotes work culture focused on energy conservation and pollution prevention
- ✓ Ensures that energy conservation regulatory requirements are met

CDM TEAM

CDM LEAD

- ✓ Designated to provide execution leadership for energy conservation and demand reduction initiatives
- ✓ Manages the execution and monitoring of energy conservation and demand reduction activities with the help of department managers and senior staff
- ✓ Develops energy conservation performance indicators or measurables and reports to Executive
- ✓ Ensures that appropriate plan adjustments are made as a result of project reviews, trend analysis and energy audits and assessments
- ✓ Monitors and facilitates energy conservation projects in conjunction with Senior Staff

ENERGY CONSUMPTION

FACILITY ASSESSMENTS

Burman Energy performed energy audits and/or facility assessments on the following facilities:

- ✓ Water Treatment Plant
 - Admin Offices
 - Water pumping equipment
- ✓ Well Pumping Stations
 - Gros Cap Raw Water Pumping Station
 - Steelton Well Pumping Station
 - Shannon Well Pumping Station
 - Goulais Well Pumping Station
 - Zone 2 Booster Station

The Five Year Plan incorporates the results of these facility audits and assessments. This Plan is a live, evolving document, and can be adjusted accordingly.

GHG BASELINE

The Commission has completed its baseline GHG report filed with the Ministry of Energy on July 1, 2013. This baseline report gathered data from January 2011 – December 2011, with additional evaluations from energy assessments and updates for 2014. The information collected via energy audits at six Commission facilities operated by PUC and extensive analyses, has formed the basis from which targets, activities and measures have been set in the Five Year Plan (see Appendix A and Appendix B).

FIVE YEAR CONSERVATION AND DEMAND MANAGEMENT PLAN

PUC is in the process of evaluating potential energy conservation measures for the Commission's Five Year Plan.

Options of various measures will range from comprehensive energy conservation actions to comply with regulations, reducing emissions, to improving energy efficiency of equipment through retrofits and other upgrades. Further detailed energy studies are required to expand on the energy conservation measures portfolio and to adjust the CDM Plan.

ANALYSIS: MEASURES

ENERGY CONSERVATION MEASURES (ECM)

The energy conservation measures considered in development of this Five Year Plan include:

- ✓ Technical Measures
- ✓ Organizational Measures

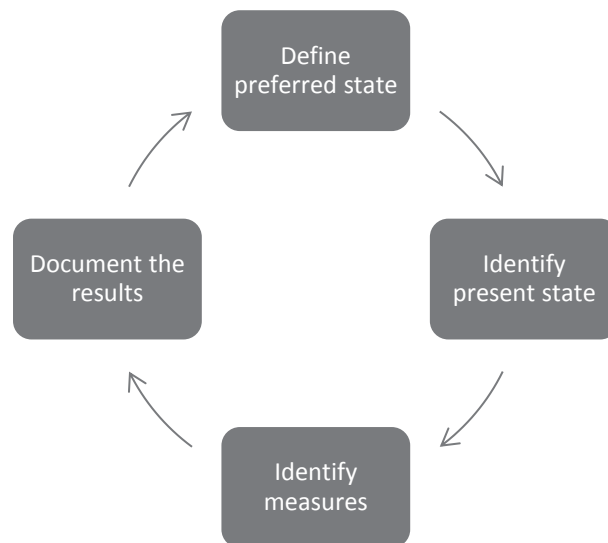
IDENTIFICATION OF CDM MEASURES

Burman Energy conducted energy audits in the water treatment plant and six pumping station buildings, owned by the Commission and operated by PUC. Further discussions and consultations with staff and managers revealed that minimal additional operational/behavioural opportunities are applicable at these sites, as these facilities are not habitually occupied.

The energy audits identified some opportunities for incentives, through accessing the OPA Conservation Programs. Given the status of these programs, and their slated end date of December 31, 2014, those projects identified as eligible for the OPA program incentives, which provide immediate cost savings

and energy conservation target achievement potential, are to be considered as a high priority. Opportunities and energy conservation measures have been identified in the facilities audited.

The Five Year Plan is based on the Ministry of Energy (MOE) guidelines and recommended approach. During the development of the Five Year Plan for the Commission, Burman Energy applied strategic planning tools, process engineering judgement and methodologies. The CDM Planning Process progressed through the following stages:



DEFINE THE PREFERRED STATE

The preferred state sets the long-term direction and vision for energy management for the Commission. This is where the operation wishes to be with respect to energy and energy conservation, and essentially forms the basis used to identify goals and objectives.

IDENTIFY THE PRESENT STATE

The present state identifies the current energy use within Commission facilities, and indicates the variance between current energy usage and preferred energy usage.

IDENTIFY MEASURES

At this stage, specific measures and steps are identified to move from the present to the preferred state of energy management. Priorities are assigned to aid with effective implementation of the Plan.

DOCUMENT RESULTS

The results of the strategic planning sessions should be documented in the CDM Plan.

SUMMARY – ENERGY CONSERVATION MEASURES

The following is a summary of recommended measures, the estimated time those measures will be in place, and prioritization of conservation measures in Commission facilities:

Summary of Energy Conservation Measures

PREFERRED STATE	PRESENT STATE	MEASURES	PRIORITY	TIMELINE
ORGANIZATIONAL MEASURES				
Established Energy Conservation Organizational System	Need to establish a structured CDM Program and designate a CDM Team	Implement sustainable CDM Program and designate roles and responsibilities	High	2015
Consumer information and education provided	Limited information about energy conservation best practices	Explore experiences in other communities and work with the Sault Ste. Marie Municipality and PUC Distribution Inc. to promote energy conservation best practices	Low	2015
TECHNICAL MEASURES				
Energy assessments to establish baseline	Need to establish energy baseline and assess the energy efficiency of existing equipment	Review and refine measures based on energy assessments	High	2015
Optimized energy efficient lighting	Lighting energy consumption in the buildings is high. Energy inefficient T-12, HPS, HID lamps require replacement	Install LED lighting, T-8 lamps and electronic ballast, de-lamp and remove unnecessary light bulbs	Medium	2016
Optimized functional parameters of equipment with energy efficient design	Energy inefficient equipment that needs better control	Install VFDs to optimize the functional parameters and energy consumption of equipment	High	2015
Sustainable low cost renewable generation for local consumption	Rooftop Solar Facilities at Water Treatment Plant and Steelton Pump Station	Install solar generators where possible. Work with stakeholders to enable the renewable generation projects.	Medium	2017

ENERGY MANAGEMENT

The central task of facility management is to reduce costs of energy consumption in the facilities while enhancing the work environment. It is important to keep the excellent level of quality and availability of municipal services, while service life of the equipment and the ease of use should remain the same, or improve. PUC is consistently optimizing facility management practices and aims to minimize the total cost of the energy-related processes by implementing energy efficient techniques and technologies.

Maintenance, testing and inspection schedules by PUC ensure that the facilities operate safely and efficiently, to maximize the life of equipment and sustain energy efficiency.

RENEWABLE GENERATION

PUC is evaluating opportunities to expand the use of Commission land resources for FIT solar projects to generate revenue, and will remain open to considering renewable energy generation, should those pursuits prove economically feasible.

TECHNICAL EFFICIENCY IMPROVEMENTS

PUC is addressing various technical measures for Commission facilities. The following energy conservation measures will be evaluated and implemented where appropriate:

BUILDING ENVELOPE

Improvements include:

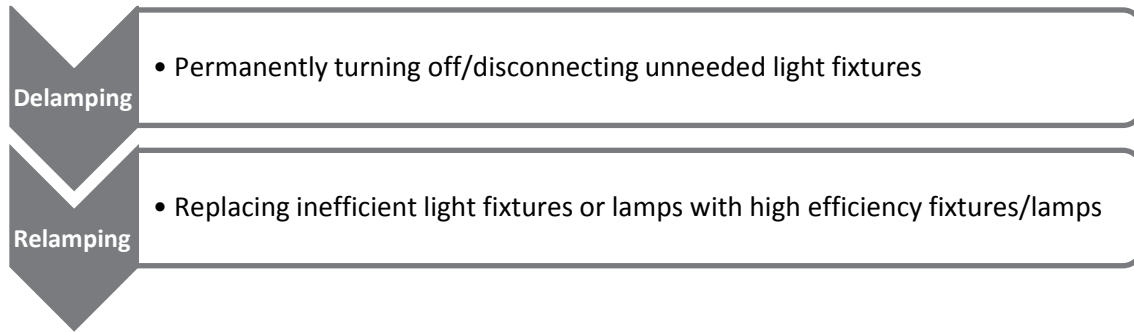
- ✓ Weather/infiltration sealing
- ✓ Increased insulation
- ✓ High performance window replacement
- ✓ Low emissivity reflective window film (to reduce unwanted solar gain in the summer and increase the R-value of windows in the winter)

LIGHTING

Lighting can be the single greatest load for electricity in many offices, and can cost as much as space heating over the year. Reducing heat output from lighting can also reduce air conditioning costs. Without proper lighting, productivity, safety, security and overall aesthetics can be compromised. Good lighting design contributes to employee comfort and health, which in turn can result in greater productivity.

Careful planning of energy-efficient lighting design geared to building utilization needs is an important aspect considered by the PUC. Replacement of existing T12 fluorescent lamps and magnetic ballasts with T8 fluorescent lamps and electronic ballasts can reduce up to 40% of the energy costs, lower maintenance costs, increase the system's life and improve the quality of light.

PUC is also planning to retrofit accent lighting applications. There are two major strategies for reducing energy load from lighting:



Some of the most commonly used energy efficiency lighting measures currently evaluated by PUC are listed below:

- ✓ Convert T-12 fixtures/lamps to T-8 or T-5 Relamp 32 watt T-8 lamps with 28 watt T-8
- ✓ Eliminate incandescent bulbs
- ✓ Convert all exit lighting to LEDs or switch to photo-luminescent signs that require no electricity
- ✓ Avoid retrofitting with indirect lighting that require more fixtures and more wattage
- ✓ Exit signs fixtures shall be rated less than 12 W each
- ✓ Increase reliance on task lighting in order to decrease general illumination without adversely affecting productivity
- ✓ Task lighting (not in the ceiling) shall have a control switch near the workstation.

Additionally, changing existing habits can have a positive effect with developing an energy conservation culture. For instance, lights can be turned off whenever an area is unoccupied; this includes unused common areas in the water treatment plant, such as copy rooms, break rooms, conference rooms and restrooms. If lights can be controlled separately, it is wise to turn off lights whenever there is enough natural light. Posting reminders next to light switches or installing occupancy sensors to keep lights off in unused areas is an important energy savings measure.

Other measures may include:

- ✓ Converting outdoor lighting to LED lighting
- ✓ Eliminating/reducing outdoor decorative lighting
- ✓ Considering LEDs for general indoor and outdoor illumination Considering outdoor solar powered-LED light fixtures (this technology is also almost there)
- ✓ Requiring white or off-white wall paints for maximum light reflectivity; this strategy helps adequate lighting levels can be achieved with minimum lighting wattage
- ✓ When renovating spaces, designing new lighting for less than 1.0 watts per square foot

ROOFTOP UNITS (RTU)

- ✓ Replace RTUs with new high efficiency RTUs
- ✓ Ensure that replacement RTUs are not oversized

AIR CONDITIONING

- ✓ Replace older AC equipment with maximum efficiency models
- ✓ Reduce AC operating hours
- ✓ Do not over-size replacement chillers
- ✓ Turn off reheats and stop controlling humidity levels during the cooling season
- ✓ Clean cooling coils on a regular basis
- ✓ Maximize use of “free cooling” with economizer cycle
- ✓ Use open windows and passive cooling when mechanical air conditioning is not needed
- ✓ Close windows when air conditioning is in operation

TEMPERATURE CONTROLS

- ✓ Reduce temperature settings in winter
- ✓ Increase temperature settings in summer
- ✓ Maximize night, weekend and holiday temperature setbacks
- ✓ Install tamper proof or remote thermostats

MOTORS, FANS AND PUMPS

- ✓ Adjust operating schedule to minimize run hours (review and update periodically)
- ✓ Replace old motors, pumps, and air handling units with high efficiency
- ✓ Control motors serving fans and pumps with variable speed drives (VSDs)
- ✓ Operate VSDs at maximum acceptable turn-down; vary by time of day and occupancy; also vary by season
- ✓ Convert constant volume fan system to variable air volume
- ✓ Reduce outside air volume during morning warm-up cycle and where/whenever possible through damper settings and demand control ventilation
- ✓ Reduce needless pumping by eliminating three-way by-pass valves

ENERGY MANAGEMENT SYSTEMS (EMS)

- ✓ Switch to direct digital control (DDC) systems
- ✓ Purchase EMS systems which are easy to program (so programming capabilities will be fully utilized by facilities staff)
- ✓ Utilize and optimize use of EMS energy conservation programs, e.g.
 - ✓ Optimal start/stop
 - ✓ Night setback
 - ✓ Demand shedding
 - ✓ Remote programmed lighting control

REDUCE SOLAR GAIN

- ✓ Install shades and awnings in the south and west facing windows to prevent overheating and too much glare from the sunlight during the summer

INFORMATION FEEDBACK SYSTEMS

- ✓ Accessible display units that show energy use and savings can have dramatic results in energy use behaviors

SHRINKING THE CARBON FOOTPRINT

PUC targets reducing the carbon impacts in every aspect of its business, by:

- Investing in innovative, energy efficient products
- Making its own operations more energy efficient

UNDERSTANDING THE BENEFITS

Improving energy efficiency can deliver a range of benefits to the Commission. Energy conservation initiatives are often evaluated based on the energy savings they deliver. As a result, the full value of energy efficiency improvements can be significantly underestimated. This also means that energy efficiency policy may not be optimized to target the potential of the full range of outcomes possible.

Non-tangible benefits from the greenhouse emissions reduction include reduced risk to human health and welfare and less global warming and climate change.

This Plan outlines the long-term strategy for managing CDM. The current CDM Plan covers the planned conservation projects in six of the Commission facilities for the next five years (Appendix B). Further evaluation based on energy assessments will result in expanding the project portfolio and the CDM Plan will be revised accordingly

COSTS, SAVINGS AND LIFESPAN OF MEASURES

Appendix B illustrates the expected direct cost and savings estimates for the proposed measures at the Commission Facilities.

RENEWABLE ENERGY

PUC may enhance CDM initiatives by investigating and facilitating future implementation of renewable generation where economically feasible.

Future renewable energy projects may be included in the CDM Plan.

PLAN IMPLEMENTATION

The Five Year Plan considers overall five-year targets for energy consumption reduction at the six facilities. The Plan also includes recommendations as to which measures can be most readily implemented to achieve targets. A schedule has been established for implementations of the measures and timelines.

PUC is seeking to balance economic feasibility with environmental sustainability, which calls for innovation and leadership. PUC is rising to this challenge by improving the efficiency of its operations, and recognizes that it is of critical importance to optimize energy consumption and reduce greenhouse gases, thus improving air quality.

PUC combines the expertise of its people, innovative technology, and collaborative partnerships to create solutions that reduce environmental impact and expand opportunities.

PUC staff will play an essential role in the success of this Five Year Conservation Demand Management Plan. It will be the responsibility of the PUC Executive team to develop and propose the necessary supporting structures, appoint the CDM Team, and obtain required approvals to allocate adequate resources for Plan implementation.

PRIORITIZING OF MEASURES

The priorities are set in several areas based on:

- ✓ Implementation costs and savings and simple payback
- ✓ Ease of implementation and importance
- ✓ Business trends as determined by PUC Services and/or the CDM team

TIMELINES FOR MEASURES IMPLEMENTATION

Timelines are assigned based on measures/facility prioritization. These timelines allow for flexibility during implementation, and will be dependent upon the costs/incentives and business decisions driven by PUC.

RESPONSIBILITY FOR MEASURES

The CDM Team and Senior Staff are responsible for implementation of the conservation measures. Additionally, PUC will establish guidelines, and/or use discretion to determine accountability for implementation.

INTEGRATION OF CORPORATE ACTIVITIES WITH CDM PLAN

PUC is fully committed to make available any information relating to municipal energy conservation initiatives in the community. PUC will work with other stakeholders, agencies and organizations to achieve energy consumption and greenhouse gas emissions reduction. Public dissemination of the CDM Goals and Objectives will encourage successful implementation of the Plan.

MONITORING & EVALUATION

POST- ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN (DUE JULY 1, 2019)

Ontario Regulation 397/11 requires that the Commission report on the results of the Plan at the end of the 5-year planning period. At that time, the Commission will provide an update to include any revisions to the Plan. The Commission submitted and published its 2011 Energy and Greenhouse Emission Report on July 1, 2013 and will continue to do so annually until July 1, 2019. At that time, the revised Plan will provide:

- ✓ A description of current and proposed measures for conserving and otherwise reducing energy consumption and managing its 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 public agency in reaching any targets it has established or forecasts it has made.
- ✓ Any additional Commission initiatives geared towards achieving or establishing new targets

ADMINISTRATION

As per the requirements of O. Reg. 397/11, the Energy Conservation and Demand Management Plan is available for public access through:

- ✓ Publishing the Five Year Plan on the PUC website
- ✓ Printed form, available for the public, at PUC office

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Water systems face many challenges, including but not limited to aging infrastructure, increasing threats to watersheds and aquifers, changing compliance and public-health standards, shifts in population (growth and loss), and higher customer expectations. Energy efficiency can play a role in addressing all

of these challenges by shifting staff resources and system operating cost away from energy bills, operation and maintenance (O&M), and towards infrastructure upgrades, source water protection efforts, treatment technology improvements and community outreach.

By understanding energy consumption and taking advantage of energy conservation opportunities and measures, these facilities can save money, while saving energy. Energy efficiency saves money; it extends the life of existing infrastructure, and reduces greenhouses gas (GHG) emissions.

- ✓ The Commission is on its way to the implementation of a structured Conservation Program
- ✓ Reasonable targets must be set based on analysis through the facility assessments
- ✓ A structured implementation framework has been set to secure the success of the CDM initiative

RECOMMENDATIONS

- ✓ Develop a CDM Program that will allow for the operationalization of the CDM Plan
- ✓ Move forward with the recommended measures in Summary tables (Appendix B-2)
- ✓ Revise Plan as required based on analysis, energy assessments and energy consumption trends
- ✓ Revisit the energy assessments toward the end of the 4th year period to facilitate the planning process in the next stages

APPENDIX

Appendix A*

GHG Report 2011

Appendix A.1*

GHG Report 2012

Appendix B

Conservation and Demand Management Plan Details (Baseline Data)

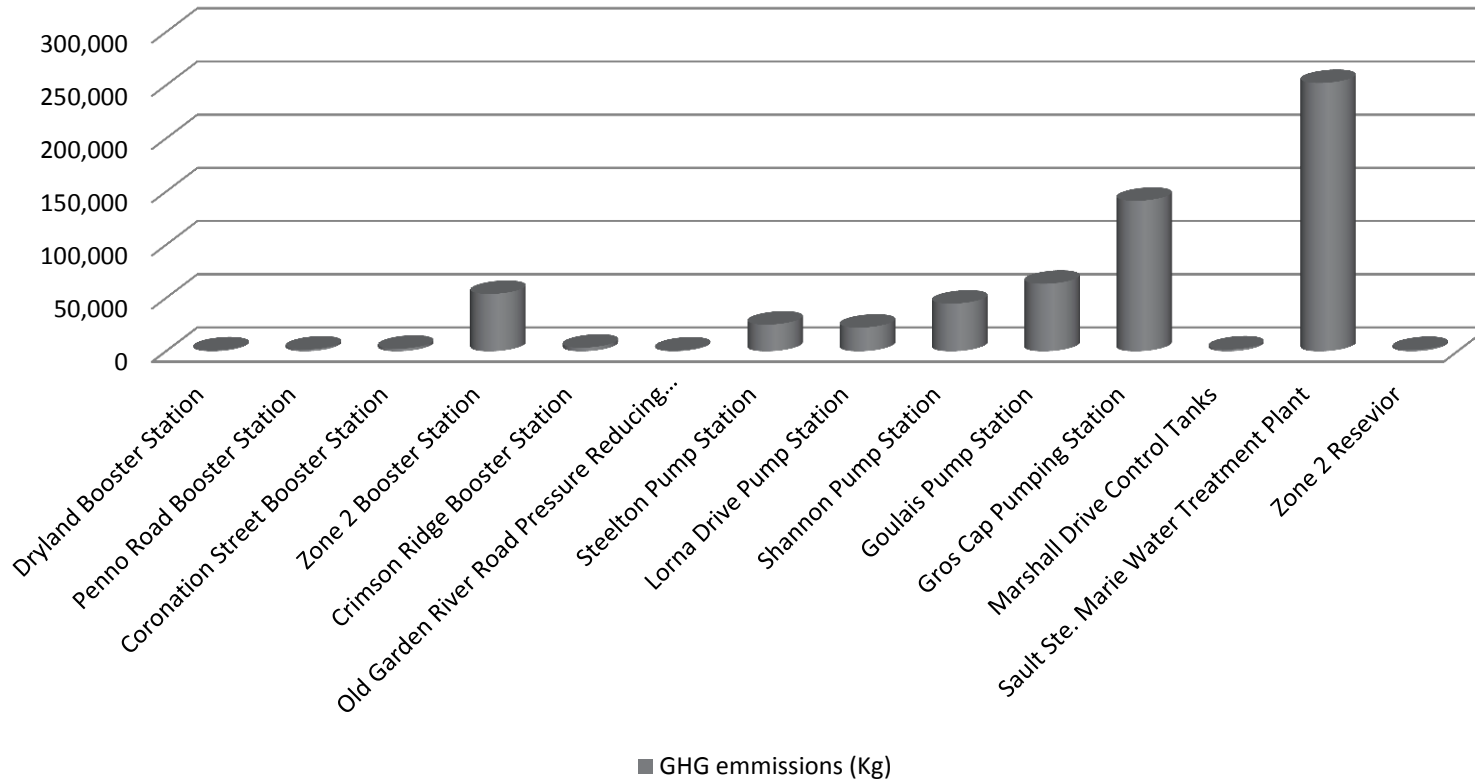
Appendix B-1 – Measures Summary Table

Appendix B-2 – Energy Conservation Measures: per facility

APPENDIX A 2011 GHG EMISSIONS

Energy Consumption and Greenhouse Gas Emissions Reporting - for 2011									
Press TAB to move to input areas. Press UP or									
Confirm consecutive 12-month period (month-year to month-year)	January 2011 - December 2011								
Type of Public Agency (Sector):	Municipal	Please fill in the mandatory fields indicated in red, in addition to submitting data on your energy usage.							
Agency Sub-sector	Municipal Service Board								
Organization Name	Public Utilities Commission of the City of Sault Ste Marie								
Operation Name	Operation Type	Address	City	Postal Code	Annual Flow (Mega Litres)	Amount Purchased and Consumed in		Total (These columns will calculate when file is Saved)	
						Electricity	GHG Emissions (Kg)	Energy Intensity (ekWh/Mega Litres)	
Toronto Booster Pumping Station	Facilities related to the pumping of sewage	900 Bay Street	Toronto	M7A 2C1	794	846,100.00000 kWh		Click above cell to toggle units	
Dryland Booster Station	Facilities related to the pumping of water	1506 Peoples Road	Sault Ste Marie	P6A 0B5	0	11,093.86000 kWh		887.50880	110,938,600.00000
Penno Road Booster Station	Facilities related to the treatment of water	973 Peoples Raod	Sault Ste Marie	P6C 3W1	0	21,110.70230 kWh		1,688.85618	211,107,022,972.97300
Coronation Street Booster Station	Facilities related to the pumping of water	3 Coronation Street	Sault Ste Marie	P6A 0C2	27	30,032.09000 kWh		2,402.56720	1,104.12096
Zone 2 Booster Station	Facilities related to the pumping of water	510 Second Line E	Sault Ste Marie	P6B 4K1	2515	674,046.50000 kWh		53,923.72000	268.01054
Crimson Ridge Booster Station	Facilities related to the pumping of water	465 Brule Road	Sault Ste Marie	P6A 0B5	127	42,783.80139 kWh		3,422.70411	335.66453
Old Garden River Road Pressure Reducin	Facilities related to the pumping of water	617 Old Garden River Road	Sault Ste Marie	P6A 0C9	0	9,634.85418 kWh		770.78833	9,634,854.17722
Steelton Pump Station	Facilities related to the pumping of water	391 Second Line W	Sault Ste Marie	P6A 2A8	729	313,438.93000 kWh		25,075.11440	429.95325
Lorna Drive Pump Station	Facilities related to the pumping of water	1 Lorna Drive	Sault Ste Marie	P6A 6H4	466	278,164.60000 kWh		22,253.16800	596.68926
Shannon Pump Station	Facilities related to the pumping of water	971 Trunk Road	Sault Ste Marie	P6A 5K9	1097	560,275.00000 kWh		44,822.00000	510.75710
Goulais Pump Station	Facilities related to the pumping of water	8 Hare Avenue	Sault Ste Marie	P6C 2C7	1911	793,371.60000 kWh		63,469.72800	415.24301
Gros Cap Pumping Station	Facilities related to the pumping of water	4867 Second Line W	Sault Ste Marie	P6A 6K4	7896	1,768,232.70000 kWh		141,458.61600	223.94380
Marshall Drive Control Tanks	Facilities related to the treatment of water	12 Marshall Drive	Sault Ste Marie	P6A 6K4	0	22,329.82000 kWh		1,786.38560	22,329,820.00000
Sault Ste. Marie Water Treatment Plant	Facilities related to the treatment of water	2059 Second Line W	Sault Ste Marie	P6A 5K6	7662	3,152,657.70000 kWh		252,212.61600	411.45986
Zone 2 Resevior	Facilities related to the treatment of water	1593 Peoples Road	Sault Ste Marie	P6A 0B5	0	15,963.80000 kWh		1,277.10400	15,963,800.00000

2011 GHG emissions (Kg)

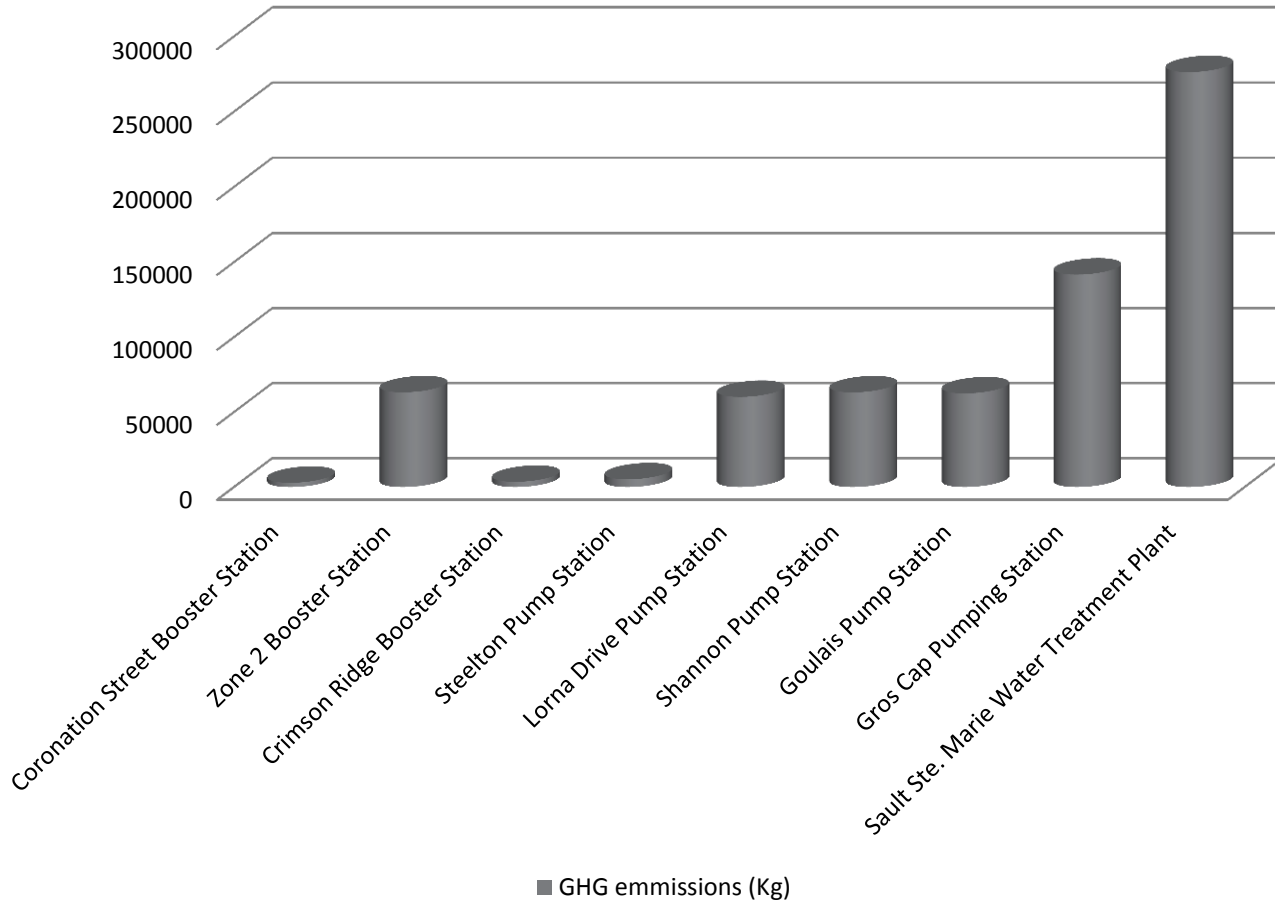


APPENDIX A.1 2012 GHG EMISSIONS

This report is available at www.ssmruc.ca

Energy Consumption and Greenhouse Gas Emissions Reporting - for 2012									
DOWN ARROW in column A to read through									
Confirm consecutive 12-mth period (mth-yr to mth-yr)									
Sector									
Agency Sub-sector	MunicipalServiceBoard								
Organization Name	The Public Utilities Commission of the City of S Please fill in the mandatory fields indicated in red, in addition to submitting data on your energy usage.								
Operation Name	Operation Type	Address	City	Postal Code	Annual Flow (Mega Litres)	Energy Type and Electricity		Total (calculated in)	
						Quantity	Unit	GHG Emissions (Kg)	Energy Intensity (ekWh/Mega Litre)
Coronation Street Booster Station	Facilities related to the pumping of water	3 Coronation Street	Sault Ste Marie	P6A 0C2	27	29794.59	kWh	2861.472424	1103.503333
Zone 2 Booster Station	Facilities related to the pumping of water	510 Second Line E	Sault Ste Marie	P6B 4K1	73	657988	kWh	63193.16752	9013.534247
Crimson Ridge Booster Station	Facilities related to the pumping of water	465 Brule Road	Sault Ste Marie	P6A 0B5	2.457	36395.54	kWh	3495.427662	14812.99959
Steelton Pump Station	Facilities related to the pumping of water	391 Second Line W	Sault Ste Marie	P6A 2A8	54	53954.67	kWh	5181.806507	999.1605556
Lorna Drive Pump Station	Facilities related to the pumping of water	1 Lorna Drive	Sault Ste Marie	P6A 6H4	33	626221.6	kWh	60142.32246	18976.41212
Shannon Pump Station	Facilities related to the pumping of water	971 Trunk Road	Sault Ste Marie	P6A 5K9	35	657548.49	kWh	63150.95698	18787.09971
Goulais Pump Station	Facilities related to the pumping of water	8 Hare Avenue	Sault Ste Marie	P6C 2C7	40.459	650742.9	kWh	62497.34812	16084.0085
Gros Cap Pumping Station	Facilities related to the pumping of water	4867 Second Line W	Sault Ste Marie	P6A 6K4	185.006	1475573	kWh	141714.0309	7975.811595
Sault Ste. Marie Water Treatment Plant	Facilities related to the treatment of water	2059 Second Line W	Sault Ste Marie	P6A 5K6	175	2876829	kWh	276290.6572	16439.02286

2012 GHG emissions (Kg)



APPENDIX B – SUMMARY OF MEASURES

APPENDIX B-1

Operation	Type	MEASURES			IMPORTANCE	LEVEL OF EFFORT
		Lighting Retrofit	Non-lighting Retrofits and Optimization			
			VFD	Replace Pumps/motors		
Water Treatment Plant	Facilities related to the treatment of water and administration offices	X	X		Medium	Medium
Goulais Station	Well pumping	X	X		Medium	Medium
Gros Cap Station	Raw water pumping	X		Evaluate	Low	Easy
Shannon Station	Well pumping	X	X		High	Medium
Steelton Station	Well Pump	X	X		High	Medium
Zone 2	Water Booster Station	X	X	Evaluate	High	Difficult

APPENDIX B-2

SAULT STE. MARIE WATER TREATMENT PLANT

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2013 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	4.58	31876.84	3080.53	1613.01	15431.00	13817.99	4.5	3,068,735	2.7%
VFD	6.71	50387.23	4865.95	5365.00	30000.00	24635.00	5.1		
Sync Belt	0.06	103.40	10.26	40.00	125.00	85.00	8.3		
Totals	11.35	82,367	\$7,956.73	\$7,018.01	\$45,556.00	\$38,537.99	4.8		

GOULAIS WELL PUMPING STATION

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2013 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	0.06	14.00	1.71	22.40	96.00	73.60	43.1	806,529	12%
VFD	13.43	99710.96	9630.16	10694.00	60000.00	49306.00	5.1		
Totals	13.48	99,725	\$9,631.86	\$10,716.40	\$60,096.00	\$49,379.60	5.1		

GROS CAP RAW WATER PUMPING STATION

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2013 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	3.28	7052.76	696.41	1520.40	11700.00	\$10,179.60	14.6	1,576,090	0.4%
Totals	3.28	7,053	\$696.41	\$1,520.40	\$11,700.00	\$10,179.60	14.6		

SHANNON WELL PUMPING STATION

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2011 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	0.36	479.34	48.25	203.82	980.00	\$776.18	16.1	560,275	15.8%
VFD	10.07	87980.26	8485.57	8056.80	45000.00	\$36,943.20	4.4		
Totals	10.43	88,460	\$8,533.82	\$8,260.62	\$45,980.00	\$37,719.38	4.4		

STEELTON WELL PUMPING STATION

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2013 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	0.12	356.64	34.91	33.62	392.00	358.38	10.3	584,818	15.1%
VFD (replacement)	10.07	87980.26	8485.57	8056.80	45000.00	36943.20	4.4		
Totals	10.19	88,337	\$8,520.48	\$8,090.42	\$45,392.00	\$37,301.58	4.4		

ZONE 2 BOOSTER STATION

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2013 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	4.50	2442.40	474.62	2742.40	5066.00	\$2,323.60	4.9	675,242	15.8%
VFD	13.43	93845.61	9068.84	9670.00	60000.00	\$50,330.00	5.5		
Totals	17.93	96,288	\$9,543.47	\$12,412.40	\$65,066.00	\$52,653.60	5.5		

SUMMARY

Energy Conservation Measures	Estimated Demand Savings (kW)	Estimated Electricity Consumption Savings (kWh)	Estimated Annual Electricity Bill Savings	Estimated Incentives	Estimated Capital Cost for Measures	Estimated Capital Cost for Measures with Incentives	Simple Payback with Incentives	2013 Electricity Consumption (kWh)	Est. % Savings (kWh/yr)
Lighting	12.89	42221.97	4336.42	6135.65	33665.00	27529.35	6.3	7,271,689	6.4%
VFD	53.71	419904.30	40536.10	41842.60	240000.00	198157.40	4.9		
Sync Belt	0.06	103.40	10.26	40.00	125.00	85.00	8.3		
Totals	66.66	462,230	\$44,882.77	\$48,018.25	\$273,790.00	\$225,771.75	5.0		