June 2014

ENERGY CONSERVATION & DEMAND MANAGEMENT PLAN

The Corporation of the City of Sault Ste. Marie

Prepared by:

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& Municipal Environmental Initiatives Committee

Executive Summary

The Province of Ontario introduced the *Green Energy and Green Economy Act, 2009,* which requires public sector agencies to collect and report on their annual energy consumption. The Regulation outlines requirements for energy conservation and demand management plans in an effort to forgo the expensive construction of new generation stations, secure adequate supply, and improve system reliability.

The City of Sault Ste. Marie's Energy Conservation and Demand Management Plan was compiled using the expertise and knowledge of municipal staff, best practices from communities across Ontario, and the assistance of a consulting firm for energy saving estimates. The Plan considers past and future projects related to the organizational integration of energy, data management, supply management, infrastructure improvements, renewable energy, operations and maintenance, and education and awareness.

City staff have set realistic goals and objectives that are in line with the Municipality's vision, mission, and values. This report will assist the City in meeting these goals, including a 5% energy reduction target over the next 5 years. Municipal facilities, outdoor lighting, and the transportation and treatment of wastewater utilize over 223,343 GJ of energy at a cost of approximately $4.5 million. Energy management is a critical piece of municipal operations and service delivery, and provides an opportunity to create efficiencies and cost savings for local tax payers.

This plan will meet the City's legislative requirements, and act as a guiding document for the implementation of energy efficiency projects and programs between 2014 and 2019. An update to this document will be required every 5 years and will remain flexible to accommodate the ever changing complexity of municipal operations.

Acknowledgements

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- Catherine Taddo, Land Development and Environmental Engineer, Engineering and Construction Division; and
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Table of Contents

Executive Summary 2
Acknowledgements 3
Table of Contents 4
List of Tables 4
List of Figures 4
List of Acronyms 5
Introduction 6
Background Information 7
Methodology 8
Vision, Mission and Values 10
Target 10
Measurement of Progress 10
Goals 11
Corporate Energy Team 12
Present State of Corporate Energy 13
Future State of Corporate Energy 22
Conclusion 25
Appendices 26

List of Tables

Table 1: S.W.O.T. Analysis Results 9
Table 2: Corporate Energy Team 12

List of Figures

Figure 1: GJ Breakdown (2008) 13
Figure 2: Cost Breakdown (2008) 13
Figure 3: Distribution (2008) 13

List of Acronyms

AMO	Association of Municipalities of Ontario
CDD	Cooling Degree Days
CDM	Energy Conservation and Demand Management Plan
FIT	Feed-In-Tariff
GEA	Green Energy Act
GHG	Greenhouse Gas
GIS	Geographic Information System
GJ	Gigajoule
HDD	Heating Degree Days
HOEP	Hourly Ontario Energy Price
HVAC	Heating, Ventilation and Air Conditioning
kW	kilowatt
kWh	kilowatt hours
LAS	Local Authority Services
LED	Light Emitting Diode
m^3	Cubic Metres
MECO	Municipal Energy Conservation Officer
NRCan	Natural Resources Canada
NOMEN	Northern Ontario Municipal Environmental Network
OPA	Ontario Power Authority
RFP	Request for Proposals
RPP	Regulated Price Plan

Introduction

Ontario's Long Term Energy Plan (2013) outlines a Conservation First policy that focuses on an energy savings target of 30TWh by 2032[1] in an effort to defer major capital investments in generation and transmission infrastructure. Given that municipalities are the second largest consumers of electricity[2], it is critical that local governments take action to be in line with Provincial goals. "Municipalities pay more than $680 million for electricity and $275 million for natural gas per year" and consume over 6.6 billion kWh per year[3]. By conserving energy, municipalities will reduce associated greenhouse gas (GHG) emissions, energy related costs, and interruptions in Ontario's energy supply.

Regulation 397/11 under the *Green Energy and Green Economy Act, 2009* (*GEA, 2009*), published on August 25, 2011, requires municipalities to report on their consumption and GHG emissions annually. The intent is to help local government better understand and manage energy, participate in conservation and demand management programs, and facilitate provincial benchmarking.

The Municipality is also required to "prepare, publish, make available to the public, and implement energy conservation and demand management plans" every five years beginning on July 1, 2014. The plans should be composed of the Municipality's annual consumption and GHG emissions, and a summary of past and future projects directed at conserving energy and improving demand response[4].

This report presents the Energy Conservation and Demand Management Plan (CDM) for the Corporation of the City of Sault Ste. Marie for 2014 through 2019, and provides a strategy to reduce energy consumption in municipal facilities and operations, associated costs, and the corporate carbon footprint. There are significant advantages to having a CDM, including freeing up funds that could be better directed towards essential services and assist in branding the community as environmentally conscious. The CDM will be an evolving document that will meet regulatory requirements and increase the City's long term efficiency and effectiveness.

1 Government of Ontario. 2013. Achieving Balance: Ontario's Long-Term Energy Plan. P.21.

2 Independent Electricity System Operator. 2008. Ontario Municipalities: An Electricity Profile. [Online]. Accessed on: 02 June 2014. Available at: https://www.ieso.ca/imoweb/pubs/sector-specific_research/Ontario_Municipalities-An_Electricity_Profile.pdf

3 Government of Ontario. 2013. A Guide For Public Agencies on Completing the Energy Consumption and Greenhouse Gas Emissions Template. Ontario Ministry of Energy. Pg. 3.

4 *Green Energy and Green Economy Act: Regulation 397/11* Energy Conservation and Demand management Plans. [Online]. Date Accessed: 16 June 2014. Available at: http://www.e-laws.gov.on.ca/html/source/regs/english/2011/elaws_src_regs_r11397_e.htm

Background Information

Sault Ste. Marie is a city in Northern Ontario, located on St. Marys River in the heart of the Great Lakes with a population of 75,000 residents. The community's reputation in the energy sector has been long standing as the "Alternative Energy Capital of North America".

The City of Sault Ste. Marie has been a leader in the provision of efficient, affordable and quality services supporting a progressive and sustainable community for over a century. Employing over 970 full-time employees corporate wide (including Sault Ste. Marie Police Service and Sault Ste. Marie Public Library), the City provides essential services to the community related to: emergency response; public works and transportation; waste; community services; recreation and culture; museum and libraries; planning and development; building permits and by-law enforcement; social services; immigration and settlement; road construction; and wastewater treatment.

The City is committed to not only being fiscally responsible, but also a government that values environmental stewardship and minimizing the footprint of its activities. In 2007, City Council passed a resolution establishing the Municipal Environmental Initiatives (Green) Committee made up of Councillors, City staff and representatives from the Local Distribution Company (PUC Services Inc.) to identify current environmental activities and develop a plan to reduce the corporate carbon footprint. The Green Committee works to develop project ideas, identify potential funding opportunities, and implement initiatives that will achieve these goals.

Part of the Green Committee's responsibility is to develop a CDM in an effort to reduce the energy use in City-owned facilities and to meet the public sector requirements under *Regulation 397/11*. This Regulation can be found in Appendix A.

The City of Sault Ste. Marie reports energy consumption for 28 major facilities, including maintenance and storage garages, 2 major wastewater treatment facilities, 5 large pumping stations, and 16 small pumping stations. The first annual submission was made on July 1, 2013, and can be found in Appendix B. These facilities cover approximately 73,000 square meters (785,600 square feet) with the average age being 40 years. In 2012, over $4.5 million (before the HST rebate) was spent on powering and heating these and other non-reportable facilities, outdoor lighting, and wastewater pumping and treatment, and represents 2.5% of the total municipal budget.

Methodology

The Environmental Initiatives Coordinator reviewed the Ministry of Energy's "Guide to Preparing Conservation and Demand Management Plans" which provides an outline on how to meet the legislative requirements; report on energy consumption; develop goals and objectives; develop energy saving measures; report on renewable energy; report on the results, and administer the plan.

Staff reviewed City policies to ensure the goals and objectives of the CDM fit well with the corporate directives and Strategic Plan. Plans and best practices from other municipalities were also explored, including the City of Barrie, Town of Caledon, City of Greater Sudbury, Town of Milton, City of North Bay, City of Oakville, City of Thunder Bay, City of Timmins, Town of Richmond Hill, City of Toronto, and City of Waterloo.

In 2013, the City of Sault Ste. Marie undertook a major facility asset management review to assist staff in capital planning for the next 20 years. This process was critical due to the condition of aging municipal infrastructure, and will help with project prioritization in years to come. The recommended improvements for the next 5 years were reviewed, and several were selected for additional analysis to determine the possible energy savings, The energy savings estimates have been included in Appendix C of this report.

In 2007, the City began an annual energy audit program, which has identified various energy efficiency opportunities in 7 municipal facilities. These opportunities were determined though walkthroughs by the consultant and discussion with the facility managers, accompanied by a review of energy dependent equipment. The recommendations outlined in these energy audits are presented in Appendix D, and were reviewed with the appropriate building manager to determine what has been completed to date and what is outstanding. It is important to note that not all recommendations made through the energy audit will be implemented.

The Environmental Initiatives Coordinator collected energy data from the City's utility bills and inputted it into the Provincial templates provided. The remaining content of the plan was provided by City staff. Involving building managers is essential, given that they have the experience and expertise to identify energy saving opportunities and implement projects in their respective facilities. City staff have been engaged in the process from the beginning and provided much of the content for the plan.

Methodology

Interviews were conducted with the facility managers and a S.W.O.T. (strengths, weaknesses, opportunities, and threats) analysis was completed on February 10, 2014, with City staff that are involved in energy management. The results of the S.W.O.T. are highlighted in Table 1.

Table 1: S.W.O.T. Analysis Results

Strengths	Weaknesses
Success of projects to date; established baseline data; completed energy audits; asset management facility review; staff experience, expertise, and knowledge; Council and senior management buy-in; relationship with utilities; and the existence of the Green Committee and subsequent budget.	**Aging infrastructure and facilities; lack of funding; funding application process; no dedicated budget for energy projects; staff resistance to change; limited budget; limited ability to track real time energy use; and limited building automation.**
Opportunities	**Threats**
Funding programs from upper levels of government; legislative requirements; new technology, innovations and businesses; recommendations from audits and asset management program; lessons learned from previous projects; and Provincial Feed-in-Tariff program for renewable energy projects.	**Weather; variability of internal and external funding; aging population and tax base; rising cost of energy; staff turnover; and changes in government.**

The information collected was inputted into a draft document and circulated to the members of the Green Committee for review and appropriate feedback. The CDM is meant to act as a guide for staff, but is an evolving document that will need to be flexible and adaptable to the meet the City's needs. An annual review of the document will be completed and updated as necessary, which will facilitate the comprehensive update required in 2019 and every five years thereafter.

Vision, Mission, and Values

The City of Sault Ste. Marie's **vision** is to be a leader in the provision of efficient, affordable and quality services supporting a progressive and sustainable community. Our **mission** is to provide quality and cost-effective municipal services in a responsible and supportive manner. The City **values** environmental stewardship through the wise use of resources to maintain and create a livable city for future generations, minimizing the footprint of our activities on the environment.

Target

Reduce energy consumption by 5% by 2019 through the implementation of cost-effective energy management initiatives.

Measurement of Progress

The measurement of progress will be based on a variety of indicators:

1. Establish a Corporate Energy Team;
2. Establishment of an improved energy monitoring and tracking system;
3. Measure the difference in GHG emissions and energy consumption from baseline year;
4. Achieved savings or avoided costs;
5. Number of staff trained and educated in the area of energy conservation and demand management; and
6. Number of conservation measures implemented.

Goals

The Corporation of the City of Sault Ste. Marie has identified the following goals to be achieved through the CDM:

1. Establish energy as a municipal priority through Council recognition and advocacy;
2. Become leaders in the energy movement and promote success to the public;
3. Establish an Corporate Energy Team to advise Council and guide implementation of energy management projects;
4. Establish a comprehensive and flexible corporate CDM through which energy conservation, GHG emissions reduction, waste energy reduction, and other goals might be met;
5. Monitor, evaluate, and measure corporate energy use.
6. Establish realistic, but aggressive energy reduction targets;
7. Identify low-cost opportunities and cost effective capital upgrades to achieve cost savings and/or avoidance;
8. Identify and implement the use of innovative energy efficiency technology;
9. Research and apply for available funding for energy projects;
10. Increase the comfort and safety of staff and patrons of municipal facilities;
11. Improve municipal service delivery, asset management, and employee morale, awareness, and productivity; and
12. Develop an energy awareness campaign for staff and provide recognition to those committed to a culture of conservation.

Corporate Energy Team

In order to achieve the goals and objectives of this plan and integrate energy as a priority across the Corporation, a Corporate Energy Team was established. The Team consists of cross-sectional set of leaders from across the municipality representing various departments and divisions. The following staff have been identified to meet regularly to identify ways to integrate energy management in their respective areas and across the Corporation:

Table 2: Corporate Energy Team

Title	Department / Division
Environmental Initiatives Coordinator	Engineering & Planning / Engineering & Construction
Land Development and Environmental Engineer	Engineering & Planning / Engineering & Construction
Building Supervisor	Engineering & Planning / Building Services
Manager of Equipment & Building Maintenance	Public Works and Transportation /
Area Coordinator – Parks	Public Works and Transportation
Shop Foreman	Public Works and Transportation / Transit
Assistant Fire Chief – Operations	Fire Services / Support Services
Facility Coordinator – Maintenance, Facilities Administration	Community Services / Community Centres
Supervisor – Community Services	Community Services / Recreation & Culture
Manager of Audits and Capital Planning	Finance
Manager of Information Technology	Finance / Information Technology
Manager of Purchasing	Finance / Purchasing
Conservation and Demand Management Officer	PUC Services Inc.

Present State of Corporate Energy

The City of Sault Ste. Marie recognizes that energy management is essential for the efficient and effective operation of municipal facilities and service delivery. The City currently utilizes natural gas, electricity and a relatively small amount of fuel oil to power and heat corporate facilities, operate outdoor lighting, and treat and transport wastewater.

Energy Usage

The City of Sault Ste. Marie completed an energy inventory utilizing data retrieved from utility bills in 2008 and found that use was 34,690,582 kWh of electricity, 2,554,385 m^3 of natural gas, and 24,639 L of fuel oil. This total consisted of 223,343 GJ at a cost of approximately $4,577,664 (before HST rebate).

Electricity represents 51% of total energy usage (GJ), natural gas represents 39%, with fuel oil representing the remaining 10% (Figure 1). Electricity represents 74% of total energy costs, natural gas represents 26%, and fuel oil represents less than 1% (Figure 2).

Municipal facilities are responsible for 60% of the Corporation's energy consumption (GJ), with wastewater treatment representing 26% and outdoor lighting representing the remaining 14% (Figure 3).

Figure 1: GJ Breakdown (2008)

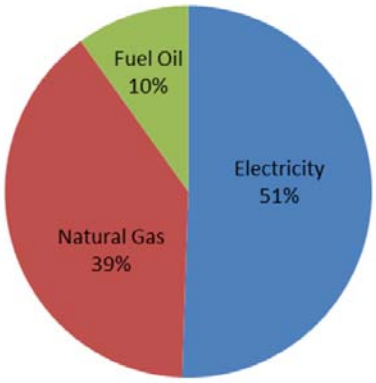


Figure 2: Cost Breakdown (2008)

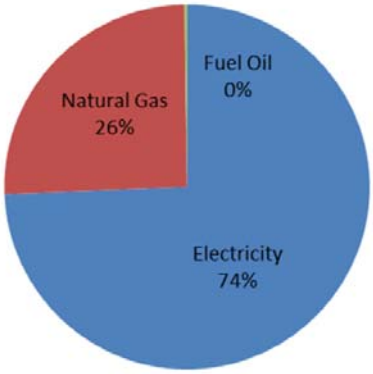
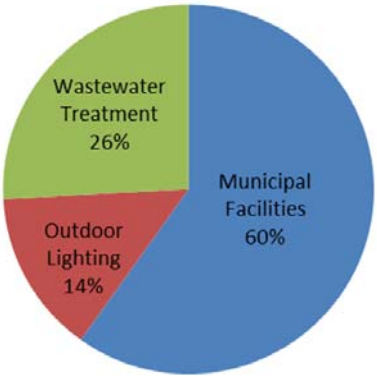


Figure 2: Distribution (2008)



Present State of Corporate Energy

Suppliers

Electricity is supplied by PUC Distribution Inc.; natural gas is supplied by Union Gas; and fuel oil is supplied by McDougall Fuels. Fuel utilized for emergency generation was not included in this report, as it is relatively small and insignificant. Most municipal facilities only have one meter for electricity and one meter for natural gas, which provides total energy consumed for the site.

Variables

Energy consumption can vary from year to year depending on the weather, and from building to building depending on occupancy and condition. If the community experiences more heating degree days (HDD) or cooling degree days (CDD) than normal, heating and cooling demands will vary. Furthermore, the more occupants in facility can result in a higher demand for energy. Municipal facilities offer a variety of services to the public making occupancy of facilities irregular, especially during special events. Regulating temperature can also be challenging in certain types of buildings (i.e. pools and arenas). For example, customer service is critical to municipalities and keeping a pool at a comfortable temperature may be rated more important than the subsequent energy costs. Indicators such as employee comfort are also difficult to quantify.

Changes in the number of facilities in the municipal portfolio or service delivery will play a significant role in the energy consumed and GHG emissions produced. For example, the Municipality moved the Korah Branch Library from its original location (built in 1960) to the Northern Community Centre (built in 2011). Energy consumption will no longer be recorded at the old location because it was considered surplus property and sold. However, energy utilized at the new facility may cause a variance in consumption data. It is important to understand that progress must be measured on energy consumed over sheer cost savings given the cost of energy is continually rising. Cost avoidance with play a critical role in understanding overall success.

Present State of Corporate Energy

Variables Continued

Energy costs will depend on whether the utility account qualifies under the Regulated Price Plan (RPP) or the whole sale rate. RPP customers are normally small accounts that will pay tiered prices or time of use prices if a smart meter has been installed[5]. Whole sale customers are normally larger consumers and pay market price for electricity or the Hourly Ontario Energy Price (HOEP) if an interval meter has been installed.

Costs are also influenced by other charges including the regulatory, debt retirement, delivery, Global Adjustment (previously Provincial Benefit) and Ontario Clean Energy Benefit. Global Adjustment "accounts for differences between the market price and the rates paid to regulated and contracted generators and for conservation and demand management programs"[6], where the Ontario Clean Energy Benefit "is helping Ontario families, farms and small businesses through the transition to a cleaner, modern electricity system by providing a 10 per cent rebate on applicable electricity charges and taxes"[7].

Concerns

Climate change, pollution, protecting the environment, and reducing the dependence on fossil fuels are all relevant concerns for society today. Energy reliability and reducing vulnerability is also critical in the face of major events, like the 2003 blackout, Montreal and Toronto ice storms, and local flooding events.

Renewable energy is part of creating a sustainable future, and the City of Sault Ste. Marie has been exploring rooftop solar projects for the past 5 years. However, restrictions to transmission capacity has limited project development in the Algoma region. If no upgrades are made to the infrastructure in the region this will continue to be a challenge .

Electricity prices are predicted to rise over the next two decades and any means to mitigate costs will benefit the City's bottom line. Energy pricing can be volatile and market dependent creating a challenge to City staff during the budgeting process. An increase of 3.5% to electricity prices could add $107,000 to the approximately $3 million that is already spent.

5 IESO. Price Overview. [Online]. Date Accessed: 28 January 2014. Available at: http://www.ieso.ca/imoweb/media/md_prices.asp.

6 IESO. Global Adjustment. [Online]. Date Accessed: 28 January 2014. Available at: http://www.ieso.ca/imoweb/siteshared/electricity_bill.asp.

7 Ministry of Energy. Ontario Clean Energy Benefit. [Online]. Date Accessed: 28 January 2014. Available at: http://www.energy.gov.on.ca/en/clean-energy-benefit/#.Uufhvfk042w.

Present State of Corporate Energy

In an effort to maintain the City of Sault Ste. Marie's current energy budget and improve the condition of corporate facilities a number of projects have already been pursued.

Organizational Integration

In September 2007, City Council approved an initial budget of $150,000 to develop energy related projects and hire a staff complement to implement said projects. Identification and guidance on projects would be provided by the Municipal Environmental Initiatives Committee, also known locally as the Green Committee, with staff representatives from relevant departments across the Corporation.

In January 2009, the Environmental Initiatives Coordinator was hired to support and develop corporate programs within municipal operations to reduce the corporate carbon footprint, including the development and implementation of the CDM.

In May 2009, City Council passed a resolution designating the Environmental Initiatives Coordinator Position as the Municipal Energy Conservation Officer (MECO) responsible for being the local energy champion and creating a culture of conservation throughout their respective communities. MECO's have been designated in 24 communities across Ontario, which provide access to a greater network of individuals working towards a common goal.

The Environmental Initiatives Coordinator worked alongside the Energy Analyst from the City of Thunder Bay to establish the Northern Ontario Municipal Environmental Network (NOMEN). This group stemmed from the dissolution of the MECO working group. NOMEN provides an open forum for municipal staff to communicate ideas about environmental and energy initiatives undertaken in their respective communities.

The network has representatives from communities across Northern Ontario that discuss their success and challenges. Through teleconferences, guest speakers, webinars and face-to-face meetings the group is helping northern municipalities identify opportunities for improved sustainability.

Present State of Corporate Energy

Energy Data Management

City staff collected energy consumption and cost data dating back to 2007 from vendor invoices. This data is continuously inputted into a database to establish historical trends. Quality control measures have been implemented to ensure the best possible data. Active and real time data analysis is not currently being undertaken.

The initial review and establishment of the energy database resulted in the discovery of old municipal locations that no longer required service, including unrented community rinks. Service can be restored to the locations if they became rented in the future.

The City utilizes the PUC Services Inc. and Union Gas online account systems to download information and enter it into databases to meet the reporting requirements of *Regulation 397/11*. Consumption data for the year 2011 was submitted on July 1, 2013, and will assist in measuring the City's energy management progress. Consumption data for the year 2012 is currently being prepared in parallel to the CDM for submission on July 1, 2014.

Energy bills are forwarded to the appropriate Department for review and signature, and then to Accounts Payable for payment.

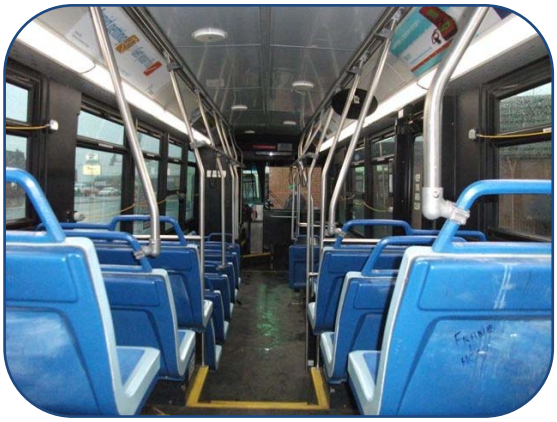
Interval meters have been installed on several facilities, including Public Works and Transportation, Civic Centre, John Rhodes Community Centre, Essar Centre and the East End Wastewater Treatment Facility to track hourly electricity consumption. The intent is to increase the accuracy of the electricity bills at these facilities and find potential opportunities for load shifting and demand response. The information is not currently used for active and real time monitoring.

Facility and energy data has also been collected for benchmarking programs, including Statistics Canada, AMO, and the Townhall Challenge. Energy benchmarking helps local governments compare buildings within their municipalities and with other municipalities across the province. It is important to note that comparison of facilities should be made against others of similar category. For example, a wastewater treatment facility has a very different purpose than a museum or administration building. Benchmarking can assist in identifying buildings with higher than average energy consumption and highlight the best performing facilities.

Present State of Corporate Energy

Energy Supply Management

The City of Sault Ste. Marie is currently purchasing energy on the spot market from PUC Services Inc. for electricity and Union Gas for natural gas. Staff moved away from long term contracts for natural gas in an effort to take advantage of lower spot market prices. City staff regularly review relevant information for price increases and opportunities for savings.



Operations and Maintenance

A professional consultant was hired to complete energy audits on several municipal facilities to better understand: energy consumption and demand; opportunities for savings; potential funding sources; and innovative technologies. An initial review of the energy consumption data was completed, followed by an on-site visit to complete an inventory of equipment and building components. Information that was collected was reviewed by the consultant and brought back to the appropriate staff for review and suggestions. The consultant worked closely with the building managers given that they are responsible for daily operations at their respective facilities.

Present State of Corporate Energy

Infrastructure Improvements

The City of Sault Ste. Marie typically implements energy efficiency projects with a 5 year payback, particularly when funding programs are utilized to improve the business case. Many benefits beyond cost savings and/or avoidance can be achieved, including modernization of the facility, reduced maintenance costs opportunities to staff to improve knowledge of innovative technology, and improving comfort of the facility.

Lighting retrofits have been the primary focus, including installing T8 and T5 lamps, electronic ballasts, LED EXIT signs, and improving lighting controls through the use of occupancy sensors in facilities across the Corporation. Lighting is not only an energy saving opportunity, but often improves the working conditions for employees.

The Information Technology Division replaced all the CRT monitors with LED/ LCD versions and upgraded to energy efficient PC workstations.

In 2013, the City of Sault Ste. Marie participated in the Ontario Power Authority's (OPA) Small Business Lighting Retrofit Program. This allowed qualifying locations to receive up to $1,500 towards energy efficient lighting and equipment upgrades. City staff worked with a local contractor to identify qualifying sites, complete audits, and complete the installation.

Outdoor lighting has also been the target of retrofits and solar applications, including a complete upgrade of traffic lights to LED technology, utilizing solar stop lights at applicable four way stops, and installing 2 solar powered lighting units at Bondar Marina and Bellevue Park.

In 2010, the City of Sault Ste. Marie participated in the Union Gas enerSmart program for 8 municipal facilities which resulted in the installation of 51 kitchen aerators, 19 bathroom aerators, and 31 low flow showerheads. Three facilities all received Energy Star rated commercial programmable thermostats through the same program. These thermostats were added to improve the control of heating and cooling in the buildings in an effort to reduce energy consumption.

Facilities across the Corporation have had major upgrades including, windows, ventilation system, HVAC, air handling units, chiller replacement, hot water heaters, natural gas infrared heaters replacing electric in-floor heating, boiler replacement, automated garage doors, roof replacement, refrigeration unit upgrade, and insulation (including weather stripping and sealants). Estimates on energy and cost savings from the completed projects have generally been provided through the energy audits, but real energy and cost savings have not been pursued to date.

Present State of Corporate Energy

Renewable Energy

Ontario has made a commitment to eliminate the use of coal and develop the renewable energy sector. The City of Sault Ste. Marie currently does not own or operate any major renewable energy projects. However, the City leased the roof at the Northern Community Centre to PUC Services Inc. to install a 250 kW solar photovoltaic system on the roof if a contract is received through the OPA Feed-In-Tariff (FIT) 3.0 program. A number of facilities have been reviewed for potential solar applications, and City staff will continue to investigate other opportunities to participate in the renewable energy sector.

The City of Sault Ste. Marie provided funding for the development of the Sault Ste. Marie Innovation Centre's Smart Energy Strategy, which includes the results of in-depth community discussions, interviews, stakeholder sessions and analysis of clean technology trends. Priority areas include: accelerated activity in conservation, energy efficiency, and heat recovery; alternative energy and development of an integration regional grid; creation of a community investico and ensuring retention of investment throughout the region; and community branding and outreach. The City continues to support the priority areas through investment of staff time.

Staff Education & Awareness

Over the years the City has encouraged the community to participate in provincial and global initiatives, including Energy Conservation Week and Earth Hour. The City has also participated in several regional tradeshows to educate the public about municipal initiatives, including the East Algoma Stewardship Council's Green Expo, Green & Healthy Living Expo, ULERN's Renewable Energy Workshop, and the Sault Ste. Marie Region Conservation Authority's Community Environmental Education Family Fun Day. Staff have presented best practices to peers at the LAS Connections Symposium, Great Lakes Power Transmission, Rotary Club, Lake Superior State University, Steam Engineers President's Ball, and Zion Lutheran Church. Through these events, the Green Committee has raised the City's profile as an environmental leader.

City staff have attended the Dollars to $ense Workshops offered by Natural Resources Canada (NRCan) where they learned best practices for developing an integrated energy management plan, identify energy saving opportunities, energy monitoring, and energy efficiency financing options.

Present State of Corporate Energy

Staff Education & Awareness Continued

Other events that staff have attended to include the Region of Peel Energy Summit, LAS Connections Symposium, LightSavers Canada Advanced LED Workshop, and OPA's Integrated Regional Energy Planning & Siting consultation.

The Green Committee has invited a number of guest speakers, including Gord Miller, Environmental Commissioner of Ontario; Peter Love, Ontario's Chief Energy Conservation Officer; Glenda Gies, Executive Director of Waste Diversion Ontario; Peter Gorrie, Free-lance Journalist – Electric Vehicles; and Paul Gregory, Outreach Officer for the Green Municipal Fund.

Team Green, an interdepartmental group of summer students, has implemented an annual corporate engagement event called Green Days. Since 2008, the students have incorporated vegetable and flower gardens, commemorative trees, and decorative rocks into the event; and raised staff awareness through environmentally themed tradeshow displays and trivia challenges that give staff an opportunity to win green prizes and raise money for local charities including Clean North, Canadian Tire JumpStart program, Red Cross Community Garden, Heart and Stroke Foundation, and the YMCA Strong Kids.

Over the past two years (2012 & 2013) Team Green extended their presence into the community by participating in the Kids Being Kids summer recreational program for families residing in Sault Ste. Marie Housing Corporation units. The one day program titled "Kids Being Green" allowed children aged 6-14 to participate in fun, engaging, and environmentally themed activities.

The City of Sault Ste. Marie engaged the Sault Ste. Marie Innovation Centre's Community Geomatics Centre to develop the Environmental Initiatives Map. The Map is a highly-detailed and interactive Cloud-based platform supported by ESRI that highlights green projects throughout Sault Ste. Marie. The Map is an awareness-building tool for the community and an innovative marketing strategy to promote the City's claim as the "Alternative Energy Capital of North America".

The City of Sault Ste. Marie has received two OPA Community Conservation Awards. In 2012, the City received a top three nomination for the applicable population category. In 2013, the City of Sault Ste. Marie was designated the winner of the Award in the 50,000 to 150,000 population category for the Environmental Initiatives Map.

Future State of Corporate Energy

The City of Sault Ste. Marie is always seeking new opportunities to improve the operations of facilities, delivery of service, and build capacity for staff to excel in energy management. It is clear that the municipality is off to a great start, but still has a long journey down the energy road.

The following section describes future ways in which the City can take their journey. It is by no means all encompassing, given that a lot can change in a 5 year time frame, but rather it will act as a guiding light.

The Environmental Initiatives Coordinator reviewed the energy audit documents, asset management documents, and interviewed staff both individually and as a group to determine projects on the 5 year horizon. Recommendations are categorized below.

Organizational Integration

The Corporate Energy Team will review current processes, procedures and plans to find ways to integrate energy conservation and efficiency into the daily responsibilities of staff. The acceptance and support of the CDM by Council and Senior Management is the first step to begin the process. Energy is everyone's responsibility, and staff ownership over its management is critical to success.

Data Management

City staff are always hearing "you can't manage what you don't measure". In order to improve the management of energy, the City is currently investigating software to improve the current bill tracking and verification system. It is the intent of staff to draft an RFP to procure an energy management system that will assist in up to date monitoring and verification of energy bills. This will potentially allow staff to improve operations and develop innovative projects. The energy management system will also look to include alerts for excessive variations in consumption, and statistical analysis that will account for weather. Access would be provided to City staff that manage corporate facilities improving organizational integration.

Energy audits will continue to be completed when deemed necessary. Future energy audits should focus on outstanding facilities that are responsible for the highest amount of energy consumption, including the Essar Centre, Transit Office and Garage, Police Services, RESC, Centennial Library, and Ontario Works. Facilities that have already been audited should be reconsidered once all the major facilities have been completed.

Future State of Corporate Energy

Data Management

The City of Sault Ste. Marie and PUC Services Inc. are working with the Sault Ste. Marie Innovation Centre's Community Geomatics Centre to complete energy density mapping for the community. The intent is to identify energy reduction opportunities throughout the community, and visualize energy consumption utilizing GIS.

Supply Management

The City's Purchasing Division will continue to monitor the procurement programs available to the Municipality, including hedge programs and spot market prices. Commodity pricing will have an impact on the business case for energy retrofits and the type of retrofits that will be considered.

Operations & Maintenance

City staff will continue to evaluate opportunities to find operational efficiencies related to energy, including any potential for load shifting to take advantage of off-peak electricity rates. Specific areas of interest include the identification and elimination of waste energy, better control of global heating and cooling systems, centralized printing, and server virtualization and consolidation.

The City of Sault Ste. Marie is also required to report on energy consumed at municipal wastewater facilities. A water-energy nexus exists for the treatment and pumping of sewage. If the City can reduce the amount of wastewater flowing through the system, then the amount of energy required to treat it would also be reduced. One way to reduce the flow is to limit the amount of inflow and infiltration entering the system. The City of Sault Ste. Marie has recently began an Inflow and Infiltration Pilot Study to identify possible problem areas where mitigation efforts could be identified and implemented. The Pilot Study will utilize alternative methods to those used in the past for inflow and infiltration identification.

Future State of Corporate Energy

Infrastructure Improvements

Significant energy savings can be achieved through major and minor infrastructure improvements. Indoor and outdoor lighting retrofits will continue to be a major focus of Green Committee efforts, including the movement towards T5 and T8 interior upgrades, and LED streetlighting, parking lot lighting, and exterior lighting for buildings.

The Corporate Energy Team needs to have greater involvement in project prioritization and the purchasing process. Energy efficiency projects need to be identified during any future asset management reviews. A full list of retrofits out of the 2013 review is available in Appendix C.

During the construction of new facilities, City staff will continue to consider energy saving elements. The City has future plans to upgrade the West End Wastewater Treatment Plant.

The Green Committee will continue to complete pilot projects to determine their effectiveness to implement corporate wide.

Renewable Energy

The City of Sault Ste. Marie will continue to explore renewable energy opportunities, including rooftop solar projects and landfill gas-to-energy. Roof conditions, building codes, transmission capacity, and provincial programs will all play a role.

Staff Awareness

Educating City staff about conservation opportunities, in conjunction with efficiency projects, can result in additional energy savings. A corporate education and awareness campaign will be developed to inform as many staff as possible about energy conservation and energy savings opportunities, both at work and at home. Some of the elements of the education campaign could include: corporate webpage, newsletter and email blasts with energy conservation and efficiency updates and tips; lunch and learn series; posters for the bulletin boards; and the development of a corporate and/or community recognition program.

Future State of Corporate Energy

Financial Implications

Implementation of initiatives will be subject to future budget deliberations and approvals, especially with the current financial pressures and priorities facing the municipality. Energy budgets require special attention given that the Ontario Long Term Energy Plan predicts an average residential electricity price increase of approximately 3.5% per year over twenty years[8]. Natural gas rates are also currently on the rise, and must also be closely monitored. Departments will need to continue to work together to improve the way in which utility bills are managed and processed.

Education and awareness about eligible funding programs will be provided to facility managers to build a better business case for energy projects. Current energy efficiency funding programs available include the OPA's saveONenergy program and Union Gas' enerSmart program. Regular communication with utility representatives will be made in an effort to understand program requirements and opportunities. Incentive money that is received by the Corporation is currently placed against the cost of the initiative to improve the business case.

Conclusion

The City of Sault Ste. Marie has been a energy leader with a proven track record of success. The reputation that the municipality has built over the last 7 years in the alternative energy and conservation sectors will keep the momentum going in future years.

The CDM has been developed to meet the legislative reporting requirements of *Regulation 397/11*, but will also need to be a flexible living document that guides staff to succeed. The Corporate Energy Team will continue to meet regularly to review the content and action items outlined in this plan to ensure that the Municipality is on track to meet the outlined goals and objectives. A full review and update to the report will be made in 5 years' time.

Energy management is a corner stone to effective and efficient municipal operations and service delivery. Rising energy costs will continue to place pressure on local governments to explore new innovations and technologies to keep consumption at a minimum. The short-term actions taken as a result of this plan will have long-term impacts on the municipal budget, workplace, environment, and economy.

8 Government of Ontario. 2013. Achieving Balance: Ontario's Long-Term Energy Plan. P.21.

Appendix A

ONTARIO REGULATION 397/11

made under the

GREEN ENERGY ACT, 2009

Made: August 17, 2011
Filed: August 23, 2011
Published on e-Laws: August 25, 2011
Printed in The Ontario Gazette: September 10, 2011

ENERGY CONSERVATION AND DEMAND MANAGEMENT PLANS

Definitions

1. In this Regulation,

"municipal service board" means,

(a) a municipal service board or joint municipal service board established or continued under the Municipal Act, 2001,

(b) a city board or joint city board established or continued under the City of Toronto Act, 2006, or

(c) a joint board established in accordance with a transfer order made under the Municipal Water and Sewage Transfer Act, 1997; ("commission de services municipaux")

"post-secondary educational institution" means a university in Ontario, a college of applied arts and technology in Ontario or another post-secondary educational institution in Ontario, if the university, college or institution receives an annual operating grant; ("établissement d'enseignement postsecondaire")

"public hospital" means,

(a) a hospital within the meaning of the Public Hospitals Act, or

(b) the University of Ottawa Heart Institute/Institut de cardiologie de l'Université d'Ottawa; ("hôpital public")

"school board" means a board within the meaning of the Education Act. ("conseil scolaire")

Application

2. Sections 4, 5 and 6 apply only to public agencies prescribed by section 3.

Public agencies

3. The following are prescribed as public agencies for the purposes of the Act:

1. Every municipality.
2. Every municipal service board.
3. Every post-secondary educational institution.
4. Every public hospital.
5. Every school board.

Energy conservation and demand management plans

4. (1) A public agency shall prepare, publish, make available to the public and implement energy conservation and demand management plans or joint plans in accordance with sections 6 and 7 of the Act and with this Regulation.

(2) An energy conservation and demand management plan is composed of two parts as follows:

1. A summary of the public agency's annual energy consumption and greenhouse gas emissions for its operations.
2. A description of previous, current and proposed measures for conserving and otherwise reducing the amount of energy consumed by the public agency's operations and for managing the public agency's demand for energy, including a forecast of the expected results of current and proposed measures.

Summary of annual energy consumption and greenhouse gas emissions

5. (1) Subject to subsection (2), a summary of the public agency's annual energy consumption and greenhouse gas emissions must include a list of the energy consumption and greenhouse gas emissions for the year with respect to each of the public agency's operations that are set out in Table 1 of this Regulation for the type of public agency to which the public agency belongs and that are conducted in buildings or facilities the public agency owns or leases that,

(a) are heated or cooled and in respect of which the public agency is issued the invoices and is responsible for making the payments for the building or facility's energy consumption; or

(b) are related to the treatment or pumping of water or sewage, whether or not the building or facility is heated or cooled, and in respect of which the public agency is issued the invoices and is responsible for making the payments for the building or facility's energy consumption.

(2) If only part of a building or facility where an operation is conducted is heated or cooled, the public agency's summary referred to in subsection (1) must only include energy consumption and greenhouse gas emissions for the part of the building or facility where the operation is conducted that is heated or cooled.

(3) The public agency's summary referred to in subsection (1) must be prepared using the form entitled "Energy Consumption and Greenhouse Gas Emissions Template" that is available from the Ministry and must include the following information and calculations for each of the public agency's operations:

1. The address at which the operation is conducted.
2. The type of operation.
3. The total floor area of the indoor space in which the operation is conducted.
4. A description of the days and hours in the year during which the operation is conducted and, if the operation is conducted on a seasonal basis, the period or periods during the year when it is conducted.
5. The types of energy purchased for the year and consumed in connection with the operation.
6. The total amount of each type of energy purchased for the year and consumed in connection with the operation.
7. The total amount of greenhouse gas emissions for the year with respect to each type of energy purchased and consumed in connection with the operation.
8. The greenhouse gas emissions and energy consumption for the year from conducting the operation, calculating,
    i. the annual mega watt hours per mega litre of water treated and distributed, if the operation is a water works,
    ii. the annual mega watt hours per mega litre of sewage treated and distributed, if the operation is a sewage works, or
    iii. per unit of floor space of the building or facility in which the operation is conducted, in any other case.

(4) If a public agency conducts, in the same building or facility, more than one operation set out in Table 1 of this Regulation for the type of public agency to which the public agency belongs, it shall make a reasonable allocation of the amount of energy purchased and consumed for the year among each of those operations.

(5) In preparing its annual Energy Consumption and Greenhouse Gas Emission Template, a public agency may exclude its energy consumption and green house gas emissions relating to its temporary use of an emergency or back-up generator in order to continue operations.

(6) On or before July 1, 2013, every public agency shall submit to the Minister, publish on its website and intranet site, if it has either or both, and make available to the public in printed form at its head office the public agency's Energy Consumption and Greenhouse Gas Emission Template for operations conducted in 2011.

(7) On or before July 1 of each year after 2013, every public agency shall submit to the Minister, publish on its website and intranet site, if it has either or both, and make available to the public in printed form at its head office the public agency's Energy Consumption and Greenhouse Gas Emission Template for operations conducted in the year following the year to which the last annual Template related.

(8) The following information, if applicable, must also be submitted, published and made available to the public with every Energy Consumption and Greenhouse Gas Emission Template:

1. If the operation is a school operated by a school board,

i. the number of classrooms in temporary accommodations at the school during the year, and

ii. whether there is an indoor swimming pool in the school.

2. If the public agency is a public hospital, whether a facility operated by the public hospital is a chronic or acute care facility, or both.

Energy conservation and demand management measures

6. (1) On or before July 1, 2014, every public agency shall publish on its website and intranet site, if it has either or both, and make available to the public in printed form at its head office,

(a) the information referred to in subsection 6 (5) of the Act with respect to each of the public agency's operations set out in Table 1 of this Regulation for the type of public agency to which the public agency belongs;

(b) the information referred to in paragraph 2 of subsection 4 (2) of this Regulation with respect to each of the public agency's operations set out in Table 1 of this Regulation for the type of public agency to which the public agency belongs; and

(c) the following information:

(i) information on the public agency's annual energy consumption during the last year for which complete information is available for a full year,

(ii) the public agency's goals and objectives for conserving and otherwise reducing energy consumption and managing its demand for energy,

(iii) the public agency's proposed measures under its energy conservation and demand management plan,

(iv) cost and saving estimates for its proposed measures,

(v) a description of any renewable energy generation facility operated by the public agency and the amount of energy produced on an annual basis by the facility,

(vi) a description of,

(A) the ground source energy harnessed, if any, by ground source heat pump technology operated by the public agency,

(B) the solar energy harnessed, if any, by thermal air technology or thermal water technology operated by the public agency, and

(C) the proposed plan, if any, to operate heat pump technology, thermal air technology or thermal water technology in the future,

(vii) the estimated length of time the public agency's energy conservation and demand management measures will be in place, and

(viii) confirmation that the energy conservation and demand management plan has been approved by the public agency's senior management.

(2) In addition to publishing and making available the required information with respect to the operations mentioned in clauses (1) (a) and (b), a public agency may also publish information with

respect to any other operation that it conducts.

(3) On or before July 1, 2019 and on or before every fifth anniversary thereafter, every public agency shall publish on its website and intranet site, if it has either or both, and make available to the public in printed form at its head office all of the information that is required to be published and made available under subsection (1), the Energy Consumption and Greenhouse Gas Emission Template that is required to be submitted and published on or before July 1 of that year and the following information:

1. A description of current and proposed measures for conserving and otherwise reducing energy consumption and managing its demand for energy.
2. A revised forecast of the expected results of the current and proposed measures.
3. A report of the actual results achieved.
4. 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.

(4) If a public agency initiated energy conservation measures or energy demand management measures before July 1, 2014, the public agency may also include in its first plan information on the results of those measures.

TABLE 1

Column 1	Column 2	Column 3
Item	Type of public agency	Operation
1.	Municipality	1. Administrative offices and related facilities, including municipal council chambers.
		2. Public libraries.
		3. Cultural facilities, indoor recreational facilities and community centres, including art galleries, performing arts facilities, auditoriums, indoor sports arenas, indoor ice rinks, indoor swimming pools, gyms and indoor courts for playing tennis, basketball or other sports.
		4. Ambulance stations and associated offices and facilities.
		5. Fire stations and associated offices and facilities.
		6. Police stations and associated offices and facilities.
		7. Storage facilities where equipment or vehicles are maintained, repaired or stored.
		8. Buildings or facilities related to the treatment or pumping of water or sewage.
		9. Parking garages.
2.	Municipal service board	1. Buildings or facilities related to the treatment or pumping of water or sewage.
3.	Post-secondary educational institution	1. Administrative offices and related facilities.
		2. Classrooms and related facilities.
		3. Laboratories.
		4. Student residences that have more than three storeys or a building area of more than 600 square metres.

		5. Student recreational facilities and athletic facilities.
		6. Libraries.
		7. Parking garages.
4.	School board	1. Schools.
		2. Administrative offices and related facilities.
		3. Parking garages.
5.	Public hospital	1. Facilities used for hospital purposes.
		2. Administrative offices and related facilities.

Commencement

7. This Regulation comes into force on the later of January 1, 2012 and the day it is filed.

Français

Back to top

Appendix B

Energy Consumption and Greenhouse Gas Emissions Reporting - for 2011				
Confirm consecutive 12-month period (month-year to month-year)	January 2011-December 2011			
Type of Public Agency (Sector):	**Municipal**			
Agency Sub-sector	**Municipality**			
Organization Name	The Corporation of the City of Sault Ste. Marie			
Operation Name	**Operation Type**	**Address**	**City**	**Postal Code**
Operation Name	**Operation Type**	**Address**	**City**	**Postal Code**
Essar Centre	Indoor ice rinks	269 Queen Street East	Sault Ste. Marie	P6A 1Y9
John Rhodes Community Centre	Indoor ice rinks	260 Elizabeth Street	Sault Ste. Marie	P6A 6J3
John Rhodes Community Centre	Indoor swimming pools	260 Elizabeth Street	Sault Ste. Marie	P6A 6J3
McMeeken	Indoor ice rinks	616 Goulais Avenue	Sault Ste. Marie	P6C 5A7
Steelton Senior Centre	Community centres	235 Wellington Street West	Sault Ste. Marie	P6A 1H6
Senior Drop-In Centre	Community centres	619 Bay Street	Sault Ste. Marie	P6A 5X5
Maycourt Daycare	Community centres	13 Salisbury Street	Sault Ste. Marie	P6B 1L6
Jesse Irving Daycare	Community centres	84 Ruth Street	Sault Ste. Marie	P6C 2E6
Civic Centre	Administrative offices and related facilities, including municipal council chambers	99 Foster Drive	Sault Ste. Marie	P6A 5X6
Ontario Works	Administrative offices and related facilities, including municipal council chambers	540 Albert Street East	Sault Ste. Marie	P6A 7A7
Social Services Building II	Administrative offices and related facilities, including municipal council chambers	180 Brock Street	Sault Ste. Marie	P6A 3B7
Public Works Administration Building	Administrative offices and related facilities, including municipal council chambers	128 Sackville Road	Sault Ste. Marie	P6B 4T6
Public Works Equipment Storage	Storage facilities where equipment or vehicles are maintained, repaired or stored	128 Sackville Road	Sault Ste. Marie	P6B 4T6
Public Works Equipment Storage	Parking garages	128 Sackville Road	Sault Ste. Marie	P6B 4T6
Landfill Administration	Administrative offices and related facilities, including municipal council chambers	402 Fifth Line East	Sault Ste. Marie	P6A 5K8
Landfill Garage	Parking garages	402 Fifth Line East	Sault Ste. Marie	P6A 5K8
Transit Services Office	Administrative offices and related facilities, including municipal council chambers	111 Huron Street	Sault Ste. Marie	P6A 5P9
Transit Services Garage	Storage facilities where equipment or vehicles are maintained, repaired or stored	111 Huron Street	Sault Ste. Marie	P6A 5P9
Number 1 Fire Hall	Fire stations and associated offices and facilities	72 Tancred Street	Sault Ste. Marie	P6A 2W1
Number 2 Fire Hall	Fire stations and associated offices and facilities	363 Second Line West	Sault Ste. Marie	P6C 2J6
Number 3 Fire Hall	Fire stations and associated offices and facilities	100 Bennett Boulevard	Sault Ste. Marie	P6A 6L2
RESC	Ambulance stations and associated offices and facilities	65 Old Garden River Road	Sault Ste. Marie	P6A 5K7

RESC Garage	Ambulance stations and associated offices and facilities	65 Old Garden River Road	Sault Ste. Marie	P6A 5K7
Police Services	Police stations and associated offices and facilities	580 Second Line East	Sault Ste. Marie	P6B 4J8
Police Services Garage	Parking garages	580 Second Line East	Sault Ste. Marie	P6B 4J8
Ermatinger Clergue Historic Site	Cultural facilities	831 Queen Street East	Sault Ste. Marie	P6A 2A8
Sault Ste. Marie Museum	Cultural facilities	690 Queen Street East	Sault Ste. Marie	P6A 2A4
Centennial Branch Library	Public libraries	50 East Street	Sault Ste. Marie	P6A 3C3
Churchill Branch Library	Public libraries	301 Lake Street	Sault Ste. Marie	P6A 4B5
Korah Branch Library	Public libraries	496 Second Line West	Sault Ste. Marie	P6C 2K4
East End Wastewater Treatment Plant	Facilities related to the treatment of sewage	2221 Queen Street East	Sault Ste. Marie	P6A 7B5
West End Wastewater Treatment Plant	Facilities related to the treatment of sewage	55 Allen Side Road	Sault Ste. Marie	P6C 5P4
River Road Pump Station	Facilities related to the pumping of sewage	61 River Road	Sault Ste. Marie	P6A 6C4
John Street Pump Station	Facilities related to the pumping of sewage	291 John Street	Sault Ste. Marie	P6A 1E6
West End Treatment Plant Pump Station	Facilities related to the pumping of sewage	55 Allen Side Road	Sault Ste. Marie	P6C 5P4
Pim Street Pump Station	Facilities related to the pumping of sewage	816 Bay Street	Sault Ste. Marie	P6A 3G4
Clark Creek Pump Station	Facilities related to the pumping of sewage	1677 Queen Street East	Sault Ste. Marie	P6A 2G8
Huron Pump Station	Facilities related to the pumping of sewage	99 Huron Street	Sault Ste. Marie	P6A 1R3
McGregor Pump Station	Facilities related to the pumping of sewage	McGregor Avenue	Sault Ste. Marie	P6A 7B7
Pine Pump Station	Facilities related to the pumping of sewage	48 Pinte Street	Sault Ste. Marie	P6A 6K5
Lower Lake Pump Station	Facilities related to the pumping of sewage	Lake Street	Sault Ste. Marie	P6A 4A6
Muriel Pump Station	Facilities related to the pumping of sewage	3 Muriel Drive	Sault Ste. Marie	P6A 6X4
Mary Pump Station	Facilities related to the pumping of sewage	31 Mary Street	Sault Ste. Marie	P6B 5P5
Fort Creek Pump Station	Facilities related to the pumping of sewage	39 Fort Creek Drive	Sault Ste. Marie	P6C 5T7
Industrial Park Pump Station	Facilities related to the pumping of sewage	96 Industrial B Court	Sault Ste. Marie	P6B 5Z9
Tallack Pump Station	Facilities related to the pumping of sewage	99 Tallack Boulevard	Sault Ste. Marie	P6C 3C4
Upper Lake Pump Station	Facilities related to the pumping of sewage	1120 Lake Street	Sault Ste. Marie	P6B 6J2
Millwood Pump Station	Facilities related to the pumping of sewage	19 Millwood Street	Sault Ste. Marie	P6A 6T1
Gore Pump Station	Facilities related to the pumping of sewage	50 Gore Street	Sault Ste. Marie	P6A 1A2
Frontenac Pump Station	Facilities related to the pumping of sewage	665 Frontenac Street	Sault Ste. Marie	P0S 1C0
Landfill Pump Station	Facilities related to the pumping of sewage	402 Fifth Line East	Sault Ste. Marie	P6A 5K8
Varsity Pump Station	Facilities related to the pumping of sewage	56 Varsity Avenue	Sault Ste. Marie	P6A 5T9
Bonney Pump Station	Facilities related to the pumping of sewage	765 Bonney Street	Sault Ste. Marie	P6C 4X5

Total Floor Area of the Indoor Space in which Operation is Conducted		Average # Hours Per Week	Annual Flow (Mega Litres)	Energy Type and Amount Purchased and Consumed in Natural Units						Total		
				Electricity		Natural Gas		Fuel Oil 1 & 2		GHG Emissions (Kg)	Energy Intensity (ekWh/sqft)	Energy Intensity (ekWh/Mega Litres)
Total Floor Area	Unit1	Average Hours Per Week	Annual Flow	Electricity	Unit2	Natural Gas	Unit3	Fuel Oil 1 & 2	Unit4	GHG Emissions (Kg)	Energy Intensity (ekWh/sqft)	Energy Intensity (ekWh/Mega Litres)
134,075.00	Square feet	86		2,642,651.98452	kWh	290,374.40005	Cubic meter			760,401.83961	42.72748	
86,999.95	Square feet	137		2,502,082.87147	kWh	394,199.27862	Cubic meter			945,450.42927	76.91436	
38,957.15	Square feet	137		1,120,391.76075	kWh	176,515.98550	Cubic meter			423,357.22898	76.91436	
29,722.00	Square feet	40		380,308.57143	kWh	34,358.58272	Cubic meter			95,383.94989	25.08122	
8,431.00	Square feet	40		99,057.33333	kWh	12,691.15911	Cubic meter			31,918.83475	27.74714	
14,470.00	Square feet	35		201,499.42857	kWh	15,064.30397	Cubic meter			44,600.93410	24.98960	
3,711.00	Square feet	50		41,455.17839	kWh	10,483.09684	Cubic meter			23,136.04019	41.19299	
6,735.00	Square feet	50		89,875.98030	kWh	22,230.54015	Cubic meter			49,219.73785	48.42423	
93,510.00	Square feet	40		2,610,088.10323	*kWh*					208,807.04826	27.91240	
23,678.00	Square feet	40		504,982.85714	kWh	66,632.00993	Cubic meter			166,374.90562	51.23461	
8,466.00	Square feet	40		170,143.55048	kWh	2,123.45401	Cubic meter			17,626.14353	22.76295	
10,595.00	Square feet	40		89,978.97369	kWh	23,628.91719	Cubic meter			51,871.78671	32.19460	
69,751.00	Square feet	123		592,366.53080	kWh	155,558.33911	Cubic meter	6,939.31034	Litre	360,418.43513	33.26685	
21,804.00	Square feet	123		185,172.39663	kWh	48,627.17418	Cubic meter			106,749.64016	32.19460	
1,962.00	Square feet	49		47,244.31379	kWh	3,899.53242	Cubic meter			11,152.10639	45.20269	
7,840.00	Square feet	49		128,385.97701	kWh	28,884.85318	Cubic meter			64,881.36148	55.53160	
4,060.00	Square feet	40		36,332.27407	kWh	7,194.07452	Cubic meter			16,507.89345	27.78061	
42,060.00	Square feet	150		376,388.04120	kWh	74,527.77689	Cubic meter			171,015.27053	27.78061	
18,120.00	Square feet	168		369,681.83251	kWh	20,530.48743	Cubic meter			68,390.04046	32.44345	
4,311.00	Square feet	168		61,396.51875	kWh	5,546.60854	Cubic meter			15,398.28936	27.91571	
4,311.00	Square feet	168		63,029.81379	kWh	4,468.72531	Cubic meter			13,491.07783	25.63731	
25,502.00	Square feet	168		341,478.88770	kWh	76,797.29490	Cubic meter			172,513.35028	45.39500	

13,818.00	Square feet	168		185,026.87123	kWh	34,343.59908	Cubic meter			79,733.08539	39.80482	
42,113.00	Square feet	40		1,083,530.88634	kWh	26,738.31071	Cubic meter			137,234.64308	32.47690	
4,800.00	Square feet	168		123,499.82795	kWh	3,047.60742	Cubic meter			15,641.87512	32.47690	
5,928.00	Square feet	49		57,047.41071	kWh	8,342.36275	Cubic meter			20,336.08912	24.57965	
17,672.00	Square feet	41		264,682.28571	kWh	18,730.07257	Cubic meter			56,586.16377	26.24159	
33,525.00	Square feet	62		504,068.57143	kWh	68,599.39783	Cubic meter			170,021.35943	36.78233	
4,574.00	Square feet	37		77,328.16667	kWh	11,422.37281	Cubic meter			27,781.69977	43.44613	
4,096.00	Square feet	37		36,085.31862	kWh			6,777.70000	Litre	21,372.36514	26.64401	
		168	11518.04100	5,069,844.23226	kWh	484,253.39954	Cubic meter			1,321,130.09060		886.98950
		168	6275.77800	1,217,453.20197	kWh	149,354.95833	Cubic meter			379,770.77297		446.91899
		168	2490.56800	151,498.28571	kWh	13,053.36246	Cubic meter			36,798.90237		116.53025
		168	1137.41500	250,073.49754	kWh					20,005.87980		219.86126
		168	6275.77800	549,759.90148	kWh					43,980.79212		87.60028
		168	5411.25000	537,668.57143	kWh					43,013.48571		99.36125
		168	9026.13000	758,208.00000	kWh					60,656.64000		84.00145
		168	6.70600	13,724.64258	kWh					1,097.97141		2,046.62132
		168	0.28900	6,041.66667	kWh					483.33333		20,905.42099
		168	3.60100	11,890.05914	kWh					951.20473		3,301.87702
		168	0.81800	6,193.00000	kWh					495.44000		7,570.90465
		168	1.35700	8,911.20170	kWh					712.89614		6,566.83987
		168	0.49700	4,774.14483	kWh					381.93159		9,605.92521
		168	2.99900	14,528.73218	kWh					1,162.29857		4,844.52557
		168	1.35700	10,421.65517	kWh					833.73241		7,679.92275
		168	0.32300	6,336.85000	kWh					506.94800		19,618.73065
		168	3.70300	19,764.12874	kWh					1,581.13030		5,337.32885
		168	1.87000	11,806.56989	kWh					944.52559		6,313.67374
		168	1.87500	7,457.38710	kWh					596.59097		3,977.27312
		168	0.20000	1,860.09045	kWh					148.80724		9,300.45227
		168	31.93000	155,617.14253	kWh					12,449.37140		4,873.69692
		168	0.97200	5,128.44194	kWh					410.27535		5,276.17483
		168	19.88300	18,774.70968	kWh					1,501.97677		944.25940

Appendix C

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
01 Main Library	9	B2010 Exterior Walls - Metal Siding		The top of the building is clad with horizontal metal siding including soffits. The finish of this siding has weathered, some panels have warped and many perimeter base pieces were missing.	1965	Replacement at end of service life is recommended. Remaining life extended due to condition, and repairs timed to coincide with window replacement.	We have assumed an existing wall U-value of 0.405 based siding with foam insulation. New U-value of 0.203 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.
01 Main Library	10	B2020 Exterior Windows		The windows are prefinished aluminum with fixed sealed double-glazed panes. The date stamps of the sealed glazing units were varied including many stamped as 1965, 1979 and 1993. The frame finishes are faded, but there were no complaints about drafts or water penetration except from window (Invoicing room) near the loading room. Spray foam was noted at the window exterior mullion indicating a patch repair in attempts to stop the water penetration. Many glazing panes had failed with severe fogging noted within the glazing panes of the back study room floor to ceiling windows.	1965	Windows have reached the end of their service life.	We have assumed an existing U-value of 0.55 based on aluminium windows and a new U value of 0.48 for double panel low e and thermally broken windows. Saving is 1.5-3.0% of heating energy consumption.
01 Main Library	27	D303001 Chilled Water Systems	Boiler room	Two Trane reciprocating chillers generate chilled water for building cooling. Based on the age of the chillers, they may be using a banned refrigerant (R-11). The unit is long past its expected service life, and is likely difficult to service.	1967	Replace the chillers as soon as practicable. If the chillers fail in service the entire library will be without air conditioning. You may also wish to consider redesigning the cooling systems, as all most of the equipment requires replacement as described below.	We assume the existing units operate at approximately 1.25kW/ton, to be replaced by one or two units operating at 0.8 KW/ton. If combined with the cooling tower below, replacing the chiller and cooling tower with new equipment can yield annual electricity savings of up to 30% for building cooling during summer.
01 Main Library	28	D303001 Chilled Water Systems	Roof	One Marley cooling tower rejects heat from the chillers to the atmosphere. The unit is past its expected service life.	1987	Replace the cooling tower as soon as practicable. If the cooling tower fails in service the entire library will be without air conditioning.	We assume the unit has on/off control only, and no VFD, and that a new unit would include a VFD. A correctly programmed VFD can reduce energy consumption by 10%.
01 Main Library	29	D304008 Air Handling Units	Boiler room	AC #1 uses chilled water to cool offices and rooms in the basement.	1967	Replace AC#1 at the end of its service life. If AC#1 fails in service the areas of the building it serves will be without air conditioning.	We assume the unit has on/off control only, and no VFD, and that a new unit would include a VFD. A correctly programmed VFD can reduce energy consumption by 10%.
01 Main Library	30	D304008 Air Handling Units	Boiler room	The main library air handling unit conditions the air for all public areas of the building.	1967	Maintain the unit by replacing fans and heating and cooling coils as required. If the air handling unit fails in service the majority of the library will be without air conditioning.	We assume the unit has on/off control only, and no VFD, and that a new unit would include a VFD. A correctly programmed VFD can reduce energy consumption by 10%.
01 Main Library	31	D304008 Air Handling Units	Penthouse mechanical room	The return air fans for the main library air handling unit are two inline axial fans.	1967	Replace the fans at the end of their service life. If the return air fans fail in service the heating and air conditioning system that serves the library will operate at greatly reduced capacity.	We assume the unit has on/off control only, and no VFD, and that a new unit would include a VFD. A correctly programmed VFD can reduce energy consumption by 10%.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
01 Main Library	34	D304008 Air Handling Units	Penthouse mechanical room	A Trane air handling unit supplies conditioned air to the lobby area. The unit is long past its expected service life.	1967	Replace the air handling unit at the end of its service life. If the air handling unit fails then heating and cooling to a large part of the library will be lost.	We assume the unit has on/off control only, and no VFD, and that a new unit would include a VFD. A correctly programmed VFD can reduce energy consumption by 10%.
01 Main Library	32	D305004 Fin Tube Radiation	Throughout	The perimeter of the building interior is heated with hydronic radiators.	1967	Replace the radiators at the end of their service life. If radiators fail in service then some heat to the area of the building served will be lost.	There is little to no savings for replacing the radiators, but we assume the radiators have basic thermostat controls only. The use of programmable thermostats to control the radiators can reduce heating bills by approximately 1% for every degree of temperature setback. The heating water temperature could also be set back at night, if not already done. Savings by setting back the water temperature would be approximately equal to using programmable thermostats.
01 Main Library	33	D303002 Direct Expansion Systems	Main floor mechanical room	A Carrier air conditioning unit cools part of the main floor. The unit rejects heat to a water cooled condenser. The unit is long past its expected service life.	1967	Replace the air conditioning unit at the end of its service life. If the unit fails then cooling to that part of the building will be lost.	We assume the system operates at approximately 1.25kW/ton, and a new system with new rooftop cooling unit could operate at 0.9 KW/ton. This could result in up to 28% savings on electricity used for cooling with this unit.
01 Main Library	50/51	D502002 Lighting Equipment	Throughout	Lighting on the lower floor consists mainly of older fixtures using T8 lamps.	1980	Replace the fixtures at the end of their service life. Install motion detectors on the lighting systems on the lower floor.	Using LED T8s with occupancy sensors and assuming a schedule of 10 hours per week day and 6 hours on Saturday, a 52% savings on lighting electricity consumption is possible.
02 Steelton	27	D304008 Air Handling Units	New Wing Roof	There are four York electric packaged heating and cooling units serving the new wing: two model number D2PF030A060A and two model number D2PF036A25A, showing signs of age.	1983	Replace at end of lifespan. The units are beyond their expected service life and could fail at any time. Other units can supplement heating over the short term, but this will affect air quality, occupant comfort and reduce overall building heating and cooling capability. As all units will be replaced at the same time, we have included an engineering allowance to evaluate alternatives.	We assume the existing units operate at approximately 1.25kW/ton cooling, and new equipment could operate at 0.9 KW/ton cooling. This could result in up to 28% savings on electricity used for cooling with these units. Converting from electric to natural gas heating could reduce heating costs by approximately 60%.
02 Steelton	32	D304008 Air Handling Units	Library	The maintenance contractor reported there are two air handling units in the ceiling of the 2nd floor of the library, served by heating equipment in the lobby furnace room and cooling equipment at the lobby roof. They could not provide further data. Site staff were unaware of these concealed units.	Unknown	Replace at end of lifespan. We have used a placeholder for cost and timing.	There was no data available to analyse these units.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
02 Steelton	35	D3050 Terminal & Package Units	Hot Water Radiators	There are perimeter radiators at the new wing and one radiator at the library basement. Assumed to be original.	1968	Replace the radiators at the end of their life span. The work may be deferred until failures begin.	There is little to no savings for replacing the radiators, but we assume the radiators have basic thermostat controls only. The use of programmable thermostats to control the radiators can reduce heating bills by approximately 1% for every degree of temperature setback. The heating water temperature could also be set back at night, if not already done. Savings by setting back the water temperature would be approximately equal to using programmable thermostats.
03 Seniors Drop-in	15	B3010 Roof Coverings - BUR	Upper	Built-up asphalt and gravel roof with prefinished metal flashings, and area drains. Some UV deterioration at upturns to mechanical units. No leakage reported.	1984	Complete localized repairs at a cost below report threshold. Replace roofing at end of lifespan. Service life extended due to good condition.	We have assumed an existing U-value of 0.514 based on built-up asphalt and gravel roof with concrete deck. New U value of 0.25 with additional 2" of insulation. Saving is 0.5-1.0% of heating energy consumption.
03 Seniors Drop-in	20	D304008 Air Handling Units	Middle & Upper Roofs	There are three Lennox forced air furnaces with cooling units, two model GCS9-513-150C-2Y, rated at 150,000 Btu/hr input, and approximately 12.5 tons cooling capacity, and one model GCS9-413-120C-2Y, rated at 120,000 Btu/hr input, and approximately 9 tons cooling capacity. All units show heavy cabinet corrosion consistent with age. The maintenance contractor reports interior components are rusted and the parts are obsolete.	1984	Replace at end of lifespan. These units are beyond their expected service life and could fail at any time, causing service interruptions and possible higher costs for emergency replacement.	We assume the system operates cooling at approximately 1.25kW/ton, and heating at 80% efficiency. A new unit could operate at 0.9 KW/ton cooling and 85% efficiency heating. This could result in up to 28% savings on electricity used for cooling with this unit, and a 5% savings in natural gas used for heating.
03 Seniors Drop-in	24	D202003 Domestic Water Equipment	Old Wing	Domestic hot water is generated and stored in a Rheem Ruud electric heating & storage tank with 85 US gallon capacity.	1993	Replace at end of lifespan at a cost below the threshold.	Converting to natural gas could save approximately 60% off the cost to heat domestic water.
03 Seniors Drop-in	25	D202003 Domestic Water Equipment	Addition	Domestic hot water is generated and stored in a John Wood electric heating & storage tank with 60 US gallon capacity.	1986	Replace at end of lifespan at a cost below the threshold.	Converting to natural gas could save approximately 60% off the cost to heat domestic water.
04 Jesse Irving	18	D305006 Package Units		There is a Carrier Weathermaker rooftop air handling unit with natural gas heating and electric cooling. The data plates are illegible. However, drawings call for a Carrier Model 48DP020-5 gas heat and 18 tons cooling. Heated and cooled air is circulated through central ducting in the ceiling. Gas piping to the unit shows surface corrosion and requires repainting during the work.	1988	Replace unit at end of lifespan. The unit is beyond its expected service life and could fail at any time, causing service interruptions and possible higher costs for emergency replacement.	We assume the system operates cooling at approximately 1.25kW/ton, and heating at 80% efficiency. A new unit could operate at 0.9 KW/ton cooling and 85% efficiency heating. This could result in up to 28% savings on electricity used for cooling with this unit, and a 5% savings in natural gas used for heating.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
05 Maycourt	8	B201008 Exterior Soffits		The cantilevered concrete bay window seats are reported to be very cold. The base of the wall and the soffit are exposed concrete slabs with minimal insulation at the interior per drawings, located inboard of the heating ductwork.	1971	Insulate exposed concrete walls and soffits from the exterior including framing, siding and trim to improve occupant comfort and reduce energy loss from the heating system.	From an envelope perspective, insulating this small area would result in approximately 1% savings on heating energy. Energy savings from insulating the ductwork should be greater, but it is difficult to estimate without air flow information.
05 Maycourt	19	D3050 Terminal & Package Units		There are two Carrier Weathermaker I rooftop units. The data plates are largely illegible. However. we estimate the cooling capacity of each at approximately 5 tons. The units are serviceable but the heating is reported to be uneven. Heated and cooled air is circulated through central ducting to in-floor-slab ducting to perimeter vent grilles.	1989	Replace units at end of lifespan. The units are beyond their expected service life and could fail at any time, causing service interruptions and possible higher costs for emergency replacement.	We assume the system operates cooling at approximately 1.25kW/ton, and heating at 80% efficiency. A new unit could operate at 0.9 KW/ton cooling and 85% efficiency heating. This could result in up to 28% savings on electricity used for cooling with this unit, and a 5% savings in natural gas used for heating.
06 Bondar Park	8	D302003 Furnaces	Furnace Room	There is a gas-fired high-efficiency Carrier Weathermaker furnace identified on drawings as model 58SXC120 condensing furnace rated at 132MBtu/hr input and 2,110 cfm. Drawings do not identify cooling as part of the system or building equipment, but we observed a rooftop condensing unit.	1990	Replace at end of lifespan, extended due to low usage.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 5% reduction in gas consumption for this unit.
06 Bondar Park	53	D305005 Electric Heating		Drawings identify 11 electric heaters, most flush-mounted inserted in the ceilings, apart from the wall-mounted blower at the electrical room.	1990	Replace at end of lifespan.	Converting to natural gas could save approximately 60% off the cost to heat domestic water.
06 Bondar Park	56	D502002 Lighting Equipment	Exterior	There are 15 exterior soffit light fixtures.	1990	Replace at end of lifespan with new LED type fixtures.	Electricity usage for exterior lighting can be reduced by approximately 71% based on the following wattage reductions (existing to new LED): 50 to 7; 100 to 35; 400 to 120.
07 Civic Centre	32	D305003 Fan Coil Units	Throughout	The interior perimeter is heated and cooled with approximately 530 floor mounted fan coil units. We understand approximately 50% have already been replaced as-needed.	1974	Replace the fan coil units at the end of their service life. This work can be phased over several years. The areas served by individual fan coil units will become uncomfortable if a unit fails.	There is little to no savings for replacing the fan coils, but we assume the units have basic thermostat controls only. The use of programmable thermostats to control the radiators can reduce heating bills by approximately 1% for every degree of temperature setback.
08 PW Admin	16	B2020 Exterior Windows	Original - Second Floor	At the second floor, there are continuous strip windows around the entire perimeter. Half of the windows appear original, with anodized aluminum frames and operable windows. The glass has a dark tint.	1970	Budget for eventual replacement of windows at end of service life.	We have assumed an existing U-value of 0.55 based on insulated aluminium windows and a new U value of 0.48 for double panel low e and thermally broken windows. Saving is 1.5-3.0% of heating energy consumption.
08 PW Admin	17	B2020 Exterior Windows	Ground Floor North Offices, Entrance Lobby	Ground floor north offices and the entrance lobby have original aluminum windows with insulated glass units. Some of the original operable awning windows have been removed to install window air conditioners.	1970	Replace original windows for improved thermal performance.	We have assumed an existing U-value of 0.55 based on aluminium windows and a new U value of 0.48 for double panel low-e and thermally broken windows. Saving is 1.5-3% of heating energy consumption.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

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08 PW Admin	28	D304008 Air Handling Units	Rooftop	There are two packaged Carrier rooftop units that supply forced air heating and cooling for the second level only. The units appear to each have a 4 ton cooling capacity and a 92,000Btu heating capacity.	1994	Replace rooftop units at end of service life to maintain reliability.	We assume the system operates cooling at approximately 1.25kW/ton, and heating at 80% efficiency. A new unit could operate at 0.9 KW/ton cooling and 85% efficiency heating. This could result in up to 28% savings on electricity used for cooling with this unit, and a 5% savings in natural gas used for heating.
09 PW Garage A	8	B2010 Exterior Walls - Metal Siding	North and West Sides	The exterior walls of the building are clad entirely with corrugated metal cladding with exposed mineral fibre insulation with vinyl vapour barrier at the interior, except the lowest 10 feet where there is a galvanized steel liner panel. At numerous locations on the east and south elevations, there is corrosion and mechanical damage throughout. At some locations, missing cladding has been replaced with plywood.	1970	The appearance and condition of the metal cladding is such that we recommend complete replacement with insulated metal panels, consisting of two skins of metal with foam insulation in between. The consequence of not doing this would be continuously higher space heating costs, uncomfortable drafts, and ongoing water penetration.	We have assumed an existing wall U-value of 0.405 based two layers of metal panel with foam insulation in between. New U-value of 0.203 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.
09 PW Garage A	19	D302002 Hot Water Boilers	Main Boiler Room, northwest corner	Space heating for the building and for the adjacent administration building is provided by 2 large capacity boilers located in a room on the mezzanine, at the northwest corner of the building. The boilers are manufactured by Napanee Boiler Works, and are original to construction. The boilers each have a rated capacity of 3,244 MBtu/h. We understand both boilers continue to operate.	1970	The boilers have long exceeded their expected service life. Continued operation may be subject to more frequent and longer breakdowns. We recommend replacement in the next year.	We assume the existing system heats with 65% efficiency and new boilers would be 88% efficient. This would result in a saving of approximately 26% of gas consumption for this unit.
09 PW Garage A	22	D202003 Domestic Water Equipment	Main Boiler Room, northwest corner	Domestic hot water for the change rooms and washrooms near the northwest mezzanine is provided by an 85 gallon gas-fired storage tank manufactured by Ruud. The tank appears to be older. Water is also stored in an adjacent tank. An additional tank located nearby is abandoned and no longer used.	1995	Replace gas fired storage tank, and adjacent storage tank to maintain reliability. Postponing replacement may result in unpredictable failures and possible water damage.	New and old equipment operate with the same technology and same efficiencies. There are little to no energy savings in replacing this equipment.
12 Fire #1	25	D3030 Cooling Generating Systems	Low roof	A Carrier 50TJ-005---501QE rooftop unit heats and cools the dormitory with direct expansion cooling and electric heating. Cooling capacity appears to be approximately 5 tons.	1997	Replace at end of lifespan.	Converting to natural gas could save approximately 60% off the cost to heat domestic water.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

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12 Fire #1	28	D305004 Fin Tube Radiation	Office & Staff Areas	Perimeter fin tube radiators are controlled by thermostat.	1985	Replace at end of lifespan. Units can be replaced as-needed as they fail.	There is little to no savings for replacing the radiators, but we assume the radiators have basic thermostat controls only. The use of programmable thermostats to control the radiators can reduce heating bills by approximately 1% for every degree of temperature setback. The heating water temperature could also be set back at night, if not already done. Savings by setting back the water temperature would be approximately equal to using programmable thermostats.
12 Fire #1	31	D202003 Domestic Water Equipment		Domestic hot water is generated and stored in two 310L Rheem Ruud storage-type gas-fired water heaters. Site staff recalled the units being replaced 8-10 years ago, but we have shown year of acquisition based on data plate information.	1997	Replace at end of lifespan.	New and old equipment operate with the same technology and same efficiencies. There are little to no energy savings in replacing this equipment.
12 Fire #1	41	D502002 Lighting Equipment	Site & Exterior	There are five single- and double-head bollards at the parking lot and wall-packs above the bay doors. Staff reported lights are problematic.	1985	Investigate the system for faults. Unless the investigation shows localized repairs will be sufficient, plan to replace to coincide with pavement replacement. This work requires excavation within the parking lot, and should be completed with pavement replacement to reduce costs. If not completed at this time, the system could fail completely within the next few years, causing safety hazards and costing substantially more to replace.	Electricity usage for lighting can be reduced by approximately 44% based on the following wattage reductions (existing to new LED): 75 to 31; 150 to 70.
13 Fire #2	16	D302004 Fuel-fired Unit Heaters	Garage	The garage is heated by two Duomatic Olsen gas-fired heaters rated at 160 MBH maximum input.	1989	Replace both heaters at end of lifespan.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.
13 Fire #2	28	D502002 Lighting Equipment	Exterior	Exterior lighting includes high-power sodium discharge wall packs, sconces at doors, and one pole-mounted light at the parking lot.	1989	Replace at end of lifespan. Timing is discretionary.	Electricity usage for exterior lighting can be reduced by approximately 44% based on the following wattage reductions (existing to new LED): 100 to 22; 150 to 70.
14 Fire #3	16	D302004 Fuel-fired Unit Heaters	Garage	The garage is heated by two Duomatic Olsen gas-fired heaters rated at 160 MBH maximum input.	1989	Replace both heaters at end of lifespan.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.
14 Fire #3	28	D502002 Lighting Equipment	Exterior	Exterior lighting includes high-power sodium discharge wall packs, sconces at doors, and one pole-mounted light at the parking lot.	1989	Replace at end of lifespan. Timing is discretionary.	Electricity usage for exterior lighting can be reduced by approximately 60% based on the following wattage reductions (existing to new LED): 100 to 22; 150 to 70.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
15 Fire #4	19	D304008 Air Handling Units	Lower roof, HRV #1	There is a Venmar CES heat recovery ventilator, with a Neptronic controller attached. Age unknown, but drawings indicated this unit was originally intended to be replaced, so we assume it is now past its expected lifespan.	Unknown	Replace unit at end of lifespan (estimated)	New and old equipment operate with the same technology and same efficiencies. There are little to no energy savings in replacing this equipment.
15 Fire #4	23	D302002 Hot Water Boilers	Boiler Room	There are eight Weil-McLain gas-fired boilers in two banks, each loop with expansion tank and 7.5hp circulation pumps, and a shared bypass feeder. The boilers, pumps and humidifiers are controlled by a Carrier BAS. This hydronic heating system serves the garage. Site staff advised three of the eight boilers are not working and the system still provides adequate service. Age estimated; equipment largely predates the 2007 renovation.	1988	Replace the boilers at the end of their service life. New boilers may be as much as 10% more efficient than the existing boilers, reducing the annual cost to heat the garage by a similar amount.	We assume the existing system heats with 75% efficiency and new boilers would be 88% efficient. This would result in a saving of approximately 15% of gas consumption for this unit.
15 Fire #4	25	D304008 Air Handling Units	Upper roof	There is a Temprite air handling unit with indirect gas-fired heater Model GTDM55-CBW, rated at 687,500 Btu/hr max input.	1995	Replace unit at end of lifespan. This unit supplies fresh air to the building, and is required for ventilation.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.
15 Fire #4	29	D202003 Domestic Water Equipment	Boiler Room	Domestic hot water is generated and stored in two 100 gallon A.O. Smith storage-type gas-fired water heaters. The system includes a potable water expansion tank and a circulating pump.	2007	Replace at end of lifespan.	New and old equipment operate with the same technology and same efficiencies. There are little to no energy savings in replacing this equipment.
15 Fire #4	64	B3010 Roof Coverings - Exposed Modified Bitumen		The roof is a two-ply modified bitumen membrane. The membrane is ridged and shows surface degranulation. There are many soft spots indicating leakage and wet insulation. There is some staining visible at the interior, mostly at the top of walls, and brick deterioration at the exterior. Based on minimal staining at the interior, the original vapour barrier appears to be intact and functioning as a backup membrane. Age estimated.	1986	Replace the roof membrane, including an allowance for localized deck repairs (see item B102003 above). If replacement is deferred, leakage will likely continue or accelerate, causing increased damage to the roof deck and more costly repairs.	We have assumed an existing U-value of 0.389 based on two-ply modified bitumen membrane with concrete deck. Proposed U-value of 0.194 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.
15 Fire #4	67	D3050 Terminal & Package Units	Rooftop	There is one Temprite make-up air unit with indirect gas-fired heater, Model GTDM25-CAW, rated at 243,750 max Btu/hr. The exposed rooftop gas lines show surface corrosion. Age estimated.	1995	Repaint gas piping as part of roof replacement above. Replace unit at end of lifespan. This unit supplies fresh air to the building, and is required for ventilation.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

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16 Transit Depot	13	B203004 Overhead and Roll-up Doors	Storage Garage, Wash Bay, Mechanic's Shop, Body Shop	There are a 4 large overhead doors at the rear of the storage garage that allow busses to exit the garage. A separate single door allows busses to enter the garage. There are also 3 other doors allowing access to the wash bay, body shop and mechanic's shop. We understand the doors are original and have been repaired numerous times after being struck by vehicles.	1981	Replace overhead doors to maintain reliability and a weather-tight enclosure. Consideration should be given to high-speed overhead doors at the storage garage.	We have assumed a 1000 CFM unit heater per door with the existing doors open for 3 hours per day and the high speed roll up doors open for 2 hours per day. Estimated savings are about 1% of heating energy consumption.
16 Transit Depot	18	B3010 Roof Coverings - Coal Tar Pitch	Wash Bay, Shops, Storage Roofs	Roofs at the wash bay, storage garage and over the shop areas are built-up with coal tar pitch and pea gravel. The roofs appear to be original to construction. We understand there have been several areas of recent leaks that have been locally repaired. We noted several areas of ridging, blisters in the roof membrane, as well as "blueberries" suggesting an aged roof.	1981	Replace original roof membranes to maintain a reliable, weather-proof enclosure. We have phased replacements, and assumed ongoing local repairs would be completed in the interim.	We have assumed an existing U-value of 0.270 based on two-ply modified bitumen membrane with steel deck. Proposed U-value of 0.135 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.
16 Transit Depot	23	D304008 Air Handling Units	Body Shop	There is a make-up air unit on roof level supplying heat to the body shop area below. The unit is manufactured by Reznor, Model RPV-PAK2, Serial 3AGL104-OC8, and appears to be original	1981	Replace make-up air unit to maintain reliability and improve energy efficiency.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.
16 Transit Depot	24	D304008 Air Handling Units	Storage Garage	The drawings indicate there are 2 make-up air units in the ceiling of the storage garage. We were unable to verify the presence of these units, however we have assumed they are in place and original. Drawings indicate they have a heating capacity of 320 MBH.	1981	If units are original, they are at the end of their service life. We recommend replacement for improved energy efficiency and to maintain reliability.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.
16 Transit Depot	27	D304001 Air Distribution, Heating and Cooling	Offices	Rooftop units over the offices space supply air to ductwork buried below the slab-on-grade to diffusers throughout the floor. Occupants reported spacers are frequently too cold in winter, and several reported using space heaters to maintain comfort.	1981	Consideration should be given to routing supply air ductwork through the drop ceiling space. We have provided a preliminary budget for these modifications.	We assume the existing system heats with 70% efficiency and a new system would be 85% efficient. This would result in a 18% reduction in gas consumption for this unit.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
16 Transit Depot	40-45, 58	D502002 Lighting Equipment		Lighting at offices consist mostly of recessed 2-bulb T12 fluorescent fixtures that appear to be original. Lighting at the storage garage and maintenance shop is a combination of low pressure sodium, metal halide and fluorescent fixtures. Most fixtures appear to be original, however some fluorescent fixtures have been converted to T8 Fixtures. Site lighting consists of a number of high pressure sodium wall packs, as well as some pole-mounted luminaires. Some pole-mounted fixtures appear to have been converted to LED. There are a few poles around the site with 3 streetlight-type high pressure sodium fixtures per pole.	1981	Replace existing lighting with LED	Electricity usage for office lighting can be reduced by approximately 70% overall based on the following wattage reductions (existing to new LED): 40 to 17; 64 to 30; 150 to 70; 192 to 60; 250 to 70; 300 to 120; 500 to 150.
16 Transit Depot	46	D509005 Electrical Heating	Body Shop and Wash Bay	The body shop and wash bay have an electrical heating system, consisting of a mesh of heating cables buried in the floor slab. We understand both systems are functional. We were not aware of the total heating capacity, however given the size both rooms, they are likely 15kW to 20 kW each.	1981	Replace the in-floor heating system as it fails. Consideration could be given to a gas-fired glycol heating system which may reduce energy costs.	We have assumed a new system of would include a boiler and buried glycol piping if gas is available. Converting to natural gas could save approximately 60% off the cost to heat domestic water.
17 Transit Terminal	12	B3010 Roof Coverings - Exposed Single-Ply	Main Roof	The building has a flat roof covered with a single-ply, loose-laid EPDM roof membrane. At numerous locations, the seams have debonded and there are penetrations through the membrane. Tenting and wrinkling is apparent at the perimeter, indicating shrinkage of the membrane. At one of the roof drains, the drain cage is missing and there is organic growth within the drain.	1983	The roof membrane is well beyond its normal expected service life. There is a high risk of leakage at any time. The construction of the roof is such that leaks will be difficult to isolate and repair. We recommend immediate replacement with a two-ply modified bitumen roof membrane.	We have assumed an existing U-value of 0.338 based on two-ply modified bitumen membrane. Proposed U-value of 0.165 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.O72
17 Transit Terminal	15	D304008 Air Handling Units	Main Roof	Space heating is provided by a gas-fired, forced air rooftop heating unit. There is no provision for cooling. Return air is located in the main space only, and we understand the driver's lounge is stuffy. Original drawings indicate a heating capacity of 150 000 Btu/h. The unit appears to be original, and we understand is still functioning as intended.	1983	The rooftop furnace unit is operating well beyond its normal expected service life. There is a high risk of failure at any time. We recommend replacement within the next year to maintain reliability. Consideration should be given to installing a cooling coil. Budget provided is for a package rooftop heating unit with separate condenser/ cooling coil.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
17 Transit Terminal	35	G4020 Site Lighting	Pole-Mounted Fixtures	There are a few poles around the site with 3 streetlight-type high pressure sodium fixtures per pole.	1983	Additional cost to replace with LED fixtures to reduce energy costs.	Electricity usage for site lighting can be reduced by approximately 72% based on the following wattage reductions (existing to new LED): 250 to 70
18 Police HQ	10	B2020 Exterior Windows	Original building	The windows are prefinished aluminum with casement operating and fixed sealed double-glazed panes. Glass block glazed units were noted at the west and north elevation of the walkout basement and ground floor levels. There are many complaints about drafts or water penetration through the window frames. The casement operating portion of the windows are sealed closed. Water penetration was noted at various window perimeters. Most of the damages was at the stained adjacent ceiling tiles and sill interior finishes. Two glazing panels were shattered at the south west corner of the building near the roof access stairwell.	1967	Windows have reached the end of their service life.	We have assumed an existing U-value of 0.55 based on aluminium windows and a new U value of 0.48 for double panel low e and thermally broken windows. Saving is 1.0-1.5% of heating energy consumption.
18 Police HQ	21	D304008 Air Handling Units	Roof	HVAC unit #1 is a 10 ton Carrier Weathermaker rooftop unit that serves the second floor of the old wing.	1967	The unit should be replaced immediately to ensure reliable service. If the rooftop unit fails then the area it serves will become uncomfortable.	We assume the system operates at approximately 1.2kW/ton, and a new system could operate at 0.8 KW/ton. This could result in up to 33% savings on electricity used for cooling with this unit.
18 Police HQ	23	D304008 Air Handling Units	Roof	HVAC unit #3 is a 10 ton Carrier Weathermaker rooftop unit that serves the first floor of the old wing.	1967	The unit should be replaced immediately to ensure reliable service. If the rooftop unit fails then the area it serves will become uncomfortable.	We assume the system operates at approximately 1.2kW/ton, and a new system could operate at 0.8 KW/ton. This could result in up to 33% savings on electricity used for cooling with this unit.
18 Police HQ	24	D304008 Air Handling Units	Roof	HVAC unit #4 is a 15 ton Carrier Weathermaker rooftop unit that serves the east side of the new wing.	1967	The unit should be replaced immediately to ensure reliable service. If the rooftop unit fails then the area it serves will become uncomfortable.	We assume the system operates at approximately 1.2kW/ton, and a new system could operate at 0.8 KW/ton. This could result in up to 33% savings on electricity used for cooling with this unit.
18 Police HQ	25	D304008 Air Handling Units	Roof	HVAC unit #6 is a 20 ton Carrier Weathermaker rooftop unit that serves the west side of the new wing.	1967	The unit should be replaced immediately to ensure reliable service. If the rooftop unit fails then the area it serves will become uncomfortable.	We assume the system operates at approximately 1.2kW/ton, and a new system could operate at 0.8 KW/ton. This could result in up to 33% savings on electricity used for cooling with this unit.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
18 Police HQ	30	D305006 Package Units	Interior perimeter	Incremental units with electric heating and direct expansion cooling are located around the interior perimeter of the building. The cooling sections from the units have been removed and the exterior wall penetration has been repaired, leaving only the electric heating sections.	1967	Replace the incremental units to ensure reliable service. The incremental units have been replaced with wall mounted electric convection heaters, which appear to be performing adequately. If an incremental unit fails then the area it serves will become uncomfortable.	There are no savings to direct replacement.
18 Police HQ	37	D202003 Domestic Water Equipment	Basement utility room	Domestic hot water is generated in one AO Smith gas fired water heater rated at 670 MBH.	1990	Replace the water heater at the end of its service life. If the water heater fails the building will be without domestic hot water for handwashing and other uses.	New and old equipment operate with the same technology and same efficiencies. There are little to no energy savings in replacing this equipment.
19 Ontario Works	15	B3010 Roof Coverings - BUR	Main Roof	The main building roof is finished with a built-up asphalt roof membrane covered with pea gravel. There were numerous locations of local repairs. Maintenance staff reported the last repairs were completed in 2010. We have estimated the roof age based on its appearance.	1985	Replace roof within the next 3 years to maintain reliability.	We have assumed an existing U-value of 0.135 based on built-up asphalt roof membrane covered with pea gravel. Proposed U-value of 0.270 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.
19 Ontario Works	20	D304008 Air Handling Units	Rooftop Mechanical Room	There is a Trane Air Handling unit in the rooftop mechanical room, Model 25MPVBVU that we understand provides tempered air for the 3rd floor only. This unit appears to have a hydronic heating coil and separate direct expansion cooling condenser on the roof. The unit appears to be original and is powered by a 15 horsepower supply air fan.	1964	Replace or refurbish air handler as it is operating beyond its normal service life. Replace supply air fan with improved controls and variable frequency drive to match supply air to suit building needs, and reduce energy costs.	There was no data available to analyse these units.
19 Ontario Works	36	D3030 Cooling Generating Systems	Rooftop	There is an outdoor condensing unit manufactured by Trane, Model RAUA-2506-MD that provides cooling to the lab on the 3rd floor. Based on the serial number, the unit appears to date to 1980.	1980	The condenser is operating well beyond its normal service life. We recommend replacement for improved efficiency and reliability. If replacement is deferred, equipment may fail when most needed.	We assume the system operates at approximately 1.2kW/ton, and a new system could operate at 0.8 KW/ton. This could result in up to 33% savings on electricity used for cooling with this unit.
19 Ontario Works	41	D302002 Hot Water Boilers	Basement Mechanical Room	Domestic hot water is provided by a 380 MBH, natural gas atmospheric boiler, model CWX380C-N, manufactured by Rheem and located in the basement mechanical room.	1992	Replace boiler at end of service life.	New and old equipment operate with the same technology and same efficiencies. There are little to no energy savings in replacing this equipment.
21 John Rhodes	39	D304008 Air Handling Units	Roof, Pad 2	AC-8 is a Carrier rooftop unit that provides 26 tons of direct expansion cooling and has a maximum heating gas input of 360 MBH. AC-8 serves the Gym.	1998	Replace AC-8 at the end of its service life.	We assume the system operates cooling at approximately 1 kW/ton, and heating at 80% efficiency. A new unit could operate at 0.8 KW/ton cooling and 85% efficiency heating. This could result in up to 20% savings on electricity used for cooling with this unit, and a 6% savings in natural gas used for heating.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
21 John Rhodes	58	F104005 Ice Rinks	Compressor room	Chilled glycol for ice making is generated in three Frick ammonia chillers. Two chillers are equipped with 100 hp compressors and one is equipped with a 60 hp compressor. The equipment is controlled by a Cimco control panel.	1999	Replace the chillers at the end of their service life. Ice making capability will be lost if the chillers fail.	We assume the existing units operate at approximately 1 kW/ton, and new units could operate at 0.8 KW/ton cooling. This would allow a 20% reduction in electricity use for ice making equiment.
24 SSM Museum	12	B3010 Roof Coverings - BUR		The low slope roof has two levels and is a built-up asphalt roof membrane with prefinished metal perimeter upturn and copper flashings. The roof areas are drained with area drains. The top roof level has wood catwalks. Leakage reported and stains noted near the top roof level access ladder. Another leak was noted within unit 303. A roof drain was observed above that area. We were informed that an extensive roof leak occurred after our site review during a heavy rain storm. The roof over the stairwell structure is a single ply membrane; a missing drain cover was noted. The roof over the elevator enclosure is single ply membrane with stone ballast. The roof over the clock tower is sloped copper roofing. The roof over the top roof level is sloped metal panel roofing; this metal roof was rusted. Various poorly-completed previous patch repairs were noted at the lower roof level flashing.	1977	Replace low-slope roofs as they have reached the end of their lifespan. Localized copper metal roofing and flashing repairs are also required at the same time. If repairs are deferred, deterioration will likely continue or accelerate, causing increased repair costs.	We have assumed an existing U-value of 0.135 based on built-up asphalt roof membrane covered with pea gravel. Proposed U-value of 0.270 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.
24 SSM Museum	16	D302002 Hot Water Boilers	Basement mechanical room	Hot water for heating is generated in two gas fired boilers manufactured by Rheem. The boilers are each rated at 576 MBH maximum gas input.	1977	Replace the boilers at the end of their service life. The building will lose its source of heat if the boilers fail.	We assume the existing system heats with 75% efficiency and new boilers would be 85% efficient. This would result in a saving of approximately 10% of gas consumption for this unit.
27 PW Storage G	11	B3010 Roof Coverings - Built Up Asphalt	Main Roof	The main building roof was viewed from the adjacent shop roof, as there is no other access. The roof appears to be a built-up asphalt roof membrane. Staff reported ongoing problems with water penetration. We understand there are plans to replace the roof in the coming year.	1985	Replace roof to maintain a watertight roof enclosure. If replacement is deferred, leakage will likely continue or accelerate, causing increased repair costs, staining and/or mold at the interior, and possible damage to the roof deck. Consideration should be given to installing a permanent fixed ladder for maintenance access.	We have assumed an existing U-value of 0.135 based on built-up asphalt roof membrane covered with pea gravel. Proposed U-value of 0.270 with additional 2" of insulation. Saving is 0.75-1.0% of heating energy consumption.

The Corporation of the City of Sault Ste. Marie
Energy Conservation Estimates for Capital Projects Projected 2014-2019

Building	line #	ID	Location / Type	Description & History	Actual or Estimated Year of Acquisition	Recommendation	Assumption and Calculations
27 PW Storage G	15	D302004 Fuel-fired Unit Heaters	Main Garage Area	Space heating for the garage is provided by 12 gas-fired suspended unit heaters manufactured by Olsen. The heaters have a nominal capacity of 200000 Btu/hr @ 80% efficiency. One of the units is no longer operational. All units appear to be original.	1985	Replace suspended unit heaters to maintain reliability.	We assume the existing system heats with 80% efficiency and a new system would be 85% efficient. This would result in a 6% reduction in gas consumption for this unit.
27 PW Storage G	25	D502002 Lighting Equipment	Garage	Lighting inside the garage consists of 4-bulb, T-8 high output fixtures. We have assumed bulbs were recently updated.	2011	Replace bulbs with LED bulbs to reduce energy costs.	Electricity usage for garage lighting can be reduced by approximately 22% based on the following wattage reductions (existing to new LED): 160 (4x40) to 125
27 PW Storage G	30	G4020 Site Lighting	Wall-Mounted Fixtures	There are a total of 18 metal halide wall pack fixtures above overhead doors on each of the east and west elevations.	2005	Replace site lighting with LED fixtures to reduce energy costs.	Electricity usage for site lighting can be reduced by approximately 72% based on the following wattage reductions (existing to new LED): 250 to 70

CANTEEN - BELLEVUE PARK, SAULT STE MARIE, ON

Subject	Date	By	Page
Savings Summary Table	18-December-12	IBS Inc.	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interrelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
R(1)	Lighting Retrofit - T12 to T8 [1]		685		0.2	$ -	$ 70	$ 70	$ 1,050	15.0
R(2)	Lighting Retrofit - Incandescent to CFL [1]		221		0.0	$ -	$ 20	$ 20	$ 25	1.3
R(3)	Lighting Retrofit - Exterior HPS and MH Lighting to LED [1]		4,640		1.0	$ -	$ 460	$ 460	$ 5,500	12.0
R(4)	Convert Domestic Hot Water Heating to Natural Gas	-3,246	2,759		0.0	-$ 110	$ 280	$ 170	$ 1,050	6.2
R(5)	Convert Canteen Heating to Natural Gas	-27,414	23,302		0.1	-$ 920	$ 2,330	$ 1,410	$ 4,500	3.2
R(6)	Convert Canteen Fryer to Natural Gas	-2,795	2,096		-0.1	-$ 90	$ 210	$ 120	$ 800	6.7

The following table represents the estimated combined annual savings from implementing the noted opportunities. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended - All	-33,455	33,703	0	1.3	-$ 1,100	$ 3,400	$ 2,300	$ 12,925	5.6
% of Utility Saved	N/A	35%	N/A	13%					

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Current Facility Characteristics	0.0	14.0	14.0	9.7
Facility Characteristics with Recommended Energy Project	10.6	3.3	13.9	8.4

1. No labour cost has been carried for this opportunity as it may be performed by either facility staff or by the City Electrical Department.

Greenhouse - Bellevue Park, Sault Ste Marie, ON

Subject	Date	By	Page
Savings Summary Table	15-April-13	IBS Inc.	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interrelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
R(1)	Lighting Retrofit - T12 to T8 [1]		269		0.1	$ -	$ 25	$ 25	$ 130	5.2
R(2)	Lighting Retrofit - Incandescent to CFL [1]		638		0.1	$ -	$ 60	$ 60	$ 65	1.1
R(3)	Lighting Retrofit - Exterior HPS and MH Lighting to LED [1]		1,809		0.4	$ -	$ 180	$ 365	$ 2,090	5.7
R(4)	Convert Domestic Hot Water Heating to Natural Gas	-6,956	5,913		0.0	-$ 230	$ 590	$ 360	$ 1,400	3.9
R(5)	Overnight Temperature Setback in Greenhouse Potting Room	17,605	0		3.2	$ 600	$ -	$ 600	$ 2,500	4.2
R(6)	Insulate Greenhouse Knee Wall	33,610	0		6.1	$ 1,100	$ -	$ 1,100	$ 4,000	3.6
AD(1)	Lighting Retrofit - Propigating Greenhouse MH to Induction Grow Lighting	0	1,095		0.2	$ -	$ 110	$ 110	$ 1,600	14.5
AD(2)	Greenhouse Night Curtain	42,000	0		7.7	$ 1,400	$ -	$ 1,400	$ 17,800	12.7
AG(1)	Solar Thermal Space Heating	117,559	-600		21.4	$ 4,000	-$ 60	$ 3,940	$ 173,600	44.1
AG(2)	Geothermal Heat Pump	307,000	-74000		39.9	$ 10,400	-$ 7,400	$ 3,000	$ 213,000	71.0
AG(3)	Greenhouse Glass Replacement	4,900	0		0.9	$ 170	$ -	$ 170	$ 12,000	70.6

VER 2.0

The following table represents the estimated combined annual savings from implementing the noted opportunities. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
Recommended - R(1), R(2), R(3), R(4), R(5), R(6), & AD(1)	44,258	9,724	0	10.2	$ 1,500	$ 1,000	$ 2,685	$ 11,785	4.4
% of Utility Saved	13%	18%	N/A	14%					

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Current Facility Characteristics (Greenhouse & Canteen)	32.7	5.1	37.8	74.5
Facility Characteristics with Recommended Energy Project	28	4.1	32.6	64.2

1. No labour cost has been carried for this opportunity as it may be performed by either facility staff or by the City Electrical Department.

Subject	Date	By	Page
Savings Summary Table	28-August-08	RB	1 of 1

	Description	ENERGY SAVINGS (kWh)					SAVINGS IN DOLLARS				TOTAL Savings	Est Cost	SIMPLE PAYBACK
		Reclaim Htg (kWh)	kWh Clg	kWh Htg	kWh Ele	kW	kWh Htg	kWh Clg	Other	Electric			Years
1	Tighten Air Handling Unit Belts				16,977		$ -	$ -		$ 1,222	$ 1,222	$ 2,100	1.7
2	Disconnect All Unused T12 Ballasts			-17,920	49,669		-$ 1,290	$ -		$ 3,576	$ 2,286	$ 5,500	2.4
3	Zone Lighting			-28,731	80,000		-$ 2,069	$ -		$ 5,760	$ 3,691	$ 4,800	1.3
4	Lighting Automation			-59,541	165,000		-$ 4,287	$ -		$ 11,880	$ 7,593	$ 14,400	1.9
5	Building Automation System		13,332		211,083		$ -	$ 960		$ 15,198	$ 16,158	$ 137,500	8.5
6	Demand Load Rolling of Heating System					259	$ -	$ -		$ 1,588	$ 1,588	$ 12,500	7.9
7	Demand Controled Ventilation		6,968		174,287		$ -	$ 502		$ 12,549	$ 13,050	$ 54,000	4.1
8	Temperature Setbacks		16,745	65,251			$ 4,698	$ 1,206		$ -	$ 5,904	$ 8,400	1.4
9	Vending Machine Control				1,700		$ -	$ -		$ 122	$ 122	$ 900	7.4
10	Lighting Retrofit: Incandescent to CFL				19,232		$ -	$ -		$ 1,385	$ 1,385	$ 1,250	0.9
11	Lighting Retrofit: T12 Fluorescent Fixtures to T8		4,275	-81,619	226,655		-$ 5,877	$ 308		$ 16,319	$ 10,750	$ 102,750	9.6
12	Radiant Heaters for Receiving Bay			-12,479	9,359	50	-$ 534	$ -		$ 977	$ 443	$ 9,800	22.1
13	Water-Source Heat Pump for Heating			624,000	-15,768		$ 44,928	$ -		-$ 1,135	$ 43,793	$ 168,500	3.8
14	Ice Storage for Building Cooling		19,232				$ -	$ 1,385		$ -	$ 1,385	$ 76,000	54.9
15	Solar Domestic Hot Water System			12,235			$ 881	$ -		$ -	$ 881	$ 22,000	25.0
	TOTALS			501,196	938,194		**$36,450**			**$69,441**	**$110,251**	**$620,400**	**5.6**

Projected based on Benchmark & Screen Report N/A

Total Utility (Composite Year): 0 3,049,855

Percentage of Utility Saved: 47% **(SEE NOTES)**

Benchmark Analysis:	Existing	New	BM Avg
ekWh/ft^2	30.7	16.2	

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Some savings are interrelated. Each savings value presented in this table represents the savings for each individual opportunity. Interelation refers to combining opportunities, which may have a positive or negative financial impact on each respective opportunity. This impact must be evaluated seperately prior to implementation to ensure accurate financial projections.

Subject	Date	By	Page
Savings Summary Table	22-July-11	IBS Inc.	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interrelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
R(1)	Garage: Electric Slab and Infrared Heating to NG Radiant Heaters[1]	-270,000	228,000	290	1	-$ 7,400	$ 19,200	$ 11,800	$ 50,000	4.2
R(2)	Adjust Boiler Room Space Temperature Set Point	3,400			1	$ 100	$ -	$ 100	N/A	0.0
R(3)	Replace Administration RTU and Living Quarters MUA Unit	38,000			7	$ 1,000	$ -	$ 1,000	$ 28,000	28.0
R(4)	Boiler Loop OAT Reset	11,300			2	$ 300	$ -	$ 300	$ 1,000	3.3
R(5)	Retrofit Fluorescent T12 Fixture Ballasts and Lamps to T8	-5,400	7,000	150	1	-$ 100	$ 1,900	$ 1,800	$ 5,100	2.8
R(6)	Vending Miser		900		0	$ -	$ 100	$ 100	$ 200	2.0
R(7)	Improve Existing Boiler OAT Lockout Control		600		0	$ -	$ 40	$ 40	$ 200	5.0
AD(1)	Install Interval Meter and Load Shift Electric Slab Heating[1]			300	0	$ -	$ 4,200	$ 4,200	$ 1,000	0.2
AG(1)	Replace Pneumatic Controls with Centralized DDC Control System	13,900	3,200		3	$ 400	$ 200	$ 600	$ 45,000	75.0

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all listed opportunities except R(3), AD(1), AG(1). Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
Recommended - All except R(3) AD(1) AG(1)	-269,600	243,200	440	4	-$ 7,400	$ 21,700	$ 14,300	56,500	4.0
% of Utility Saved	-146%	66%	48%	4%					

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Current Facility Characteristics	8	17	25	115.0
Facility Characteristics with Recommended Energy Project	21	6	26	110.9

Notes:

1. The implementation of either opportunity R(1) or AD(1) affects savings related to the other. Due to the degree of interrelation between the two opportunities, AD(1) has not been included in the recommended project. If full implementation of R(1) will take more than three months from the start of the heating season (due to budgeting, tendering, or permits), opportunity AD(1) should be implemented as it will pay for itself and then produce a positive cash flow within three months of implementation. Upon implementation of R(1), AD(1) will no longer havings savings associated with it.

Subject	Date	By	Page
Savings Summary Table	20-October-11	IBS Inc.	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interrelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
R(1)	Incandescent to CFL	-2,300	3,000		0	-$ 60	$ 330	$ 270	$ 200	0.7
R(2)	Retrofit Fluorescent T12 Fixture Ballasts and Lamps to T8	-5,700	7,400		1	-$ 200	$ 800	$ 600	$ 4,200	7.0
R(3)	Vending Miser		500		0	$ -	$ 50	$ 50	$ 200	4.0
AD(1)	Natural Gas Boiler for DHW and Supplementing Heat Pump	-13,500	12,800		0	-$ 400	$ 1,400	$ 1,000	$ 12,000	12.0
AD(2)	High-Efficiency Condensing Natural Gas Unit Heaters	8,094			1	$ 200	$ -	$ 200	$ 10,000	50.0

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing opportunities R(1), R(2), R(3). Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
Recommended - R(1), R(2), R(3)	-8,000	10,900	0	1	-$ 200	$ 1,200	$ 1,000	$ 4,600	4.6
% of Utility Saved	-14%	16%	0%	4%					

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Current Facility Characteristics	15	18	32	25.7
Facility Characteristics with Recommended Energy Project	17	15	32	24.8

Notes:

Subject	Date	By	Page
Savings Summary Table	14-April-11	IBS Inc.	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interrelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
R(1)	Optimize Floodwater Temperature	50,000			9	$ 1,900	$ -	$ 1,900	$ 250	0.1
R(2)	Low-Flow Push Button Shower Faucets	386,000			71	$ 14,800	$ -	$ 14,800	$ 37,500	2.5
R(3)	Dectron Unit For Aquatics Zone Dehumidification	1,396,000	-229,000	-300	216	$ 53,700	-$ 20,200	$ 33,500	$ 140,000	4.2
R(4)	Low-e Ceiling for Each Arena		127,000		23	$ -	$ 10,200	$ 10,200	$ 75,000	7.4
R(5)	Floodwater Treatment System	61,000			11	$ 2,300	$ -	$ 2,300	$ 35,000	15.2
AD(1)	Optimize Aquatics Zone Conditions		200,000		36	$ -	$ 16,000	$ 16,000	$ 2,500	0.2
AD(2)	VFD for Throttled Pool Pumps		92,000		17	$ -	$ 7,400	$ 7,400	$ 35,000	4.7
AD(3)	Occupancy Sensor Control for Lighting in All Change Rooms		28,000	75	5	$ -	$ 2,700	$ 2,700	$ 20,000	7.4
AD(4)	Floating Refrigeration Condensing Pressure		67,000		12	$ -	$ 5,400	$ 5,400	$ 15,000	2.8
AD(5)	Halogen Pot Lights to LED		40,000	60	7	$ -	$ 3,600	$ 3,600	$ 7,500	2.1
AD(6)	Retrofit Arena MH Fixtures with High-Output T5 Fluorescent Fixtures		66,000	110	12	$ -	$ 6,100	$ 6,100	$ 85,000	13.9
AD(7)	Retrofit Aquatics MH Fixtures with High-Output T5 Fluorescent Fixtures		41,000	60	7	$ -	$ 3,700	$ 3,700	$ 38,000	10.3
AD(8)	Atmospheric to Condensing Boilers for Arena DHW and Floodwater	94,000			17	$ 3,600	$ -	$ 3,600	$ 30,000	8.3
AD(9)	Outdoor Wallpack HPS Light Fixtures to LED		13,000	24	2	$ -	$ 1,200	$ 1,200	$ 13,000	10.8
AG(1)	Deleted From Scope of Work									
AG(2)	Turbidity Meter for Pool Filtration		125,000		23	$ -	$ 10,000	$ 10,000	$ 50,000	5.0
AG(3)	Moved To POI									
AG(4)	Full Plant Heat Recovery	1,117,000			206	$ 43,000	$ -	$ 43,000	$ 302,000	7.0
AG(5)	Building A/C via Refrigeration Plant		93,000		17	$ -	$ 7,400	$ 7,400	$ 175,000	23.6
AG(6)	Moved To POI									

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all listed opportunities except AD(2), AD(6), AD(7), AG(5). Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended - All except AD(2), AD(6), AD(7), AG(5)	3,104,000	371,000	-216	638	$ 119,400	$ 28,300	$ 147,700	$ 727,750	4.9
% of Utility Saved	54%	11%	-3%	38%					

Ver 5.0

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Current Facility Characteristics	43	26	69	1,700.6
Facility Characteristics with Recommended Energy Project	20	23	43	1,062.3

Notes:

1. Noted savings and cost estimates are for screening only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.

Sault Ste Marie City Works Facility, Sault Ste Marie ON
Facility Summary

Subje	Date	By	Page
Savings Summary Table	9-October-09	RB	1 of 1

Recommended Energy Project Summary

The following table represents the estimated combined annual savings from implementing each of the building's Recommended Energy Projects. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended Energy Project: Administration Building	162,700	15,400	8	33	$ 7,604	$ 1,197	$ 8,802	$ 438,200	49.8
Recommended Energy Project: Main Building	613,300	137,600	136	138	$ 28,664	$ 11,103	$ 39,768	$ 460,300	11.6
Recommended Energy Project: Carpentry Shop	12,800	13,900	11	5	$ 598	$ 1,104	$ 1,703	$ 10,100	5.9
Recommended Energy Project: Test Lab	0	10,100	2	2	$ -	$ 765	$ 765	$ 1,550	2.0
Recommended Energy Project: North Storage Garage	304,000	27,600	20	61	$ 14,208	$ 2,181	$ 16,390	$ 206,500	12.6
Total Savings	1,092,800	204,600	177	238	$ 51,075	$ 16,351	$ 67,427	$ 1,116,650	16.6
% of Utility Saved	43%	19%	9%	5%	46%	18%			

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Existing Conditions	22	9	31	663.0
With Implementation of Recommended Energy Project	12	8	20	425.0

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.

SAULT STE MARIE CITY WORKS FACILITY, SAULT STE MARIE ON
ADMINISTRATION BUILDING

Subje	Date	By	Page
Savings Summary Table	9-October-09	RB	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK	INCLUDE IN ENERGY PROJECT? (YES / NO)
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*	
	Routine										
1	Building Envelope: Replace / Install Exterior Door Seals	6,300			1	$ 294	$ -	$ 294	$ 850	2.9	YES
2	Building Envelope: Window Replacement	92,500	4,500		18	$ 4,323	$ 335	$ 4,659	$ 78,000	16.7	YES
3	Controls: Efficient Vending Machine Controller	-1,300	1,900		0	-$ 61	$ 142	$ 81	$ 500	6.2	YES
4	Controls: Occupancy Sensor Control for Lighting in Record Room		400		0	$ -	$ 30	$ 30	$ 100	3.4	YES
5	Lighting: T12 Fluorescent Fixtures to T8 with Electronic Ballasts	-1,900	2,400	8	0	-$ 89	$ 229	$ 140	$ 1,750	12.5	YES
	Advanced										
6	Building Envelope: Insulation Upgrade	20,700			4	$ 967	$ -	$ 967	$ 27,000	27.9	NO
7	Building Envelope: Administration/Garage Link Insulation	10,000			2	$ 467	$ -	$ 467	$ 14,000	30.0	YES
8	HVAC: Retro-Commission HVAC Equipment	11,900	6,200		3	$ 556	$ 462	$ 1,018	$ 15,000	14.7	YES
9	Controls: Install Direct Digitial Control System	50,300	3,800		10	$ 2,351	$ 283	$ 2,634	$ 65,000	24.7	YES
	Aggressive										
10	HVAC: New Central HVAC System				0	$ -	$ -	$ -	$ 175,000	n/a	YES
11	HVAC: Solar Domestic Hot Water System	11,700			2	$ 547	$ -	$ 547	$ 18,000	32.9	YES
12	HVAC: Solar Wall for Pre-heating Ventilation Air	12,000			2	$ 561	$ -	$ 561	$ 22,000	39.2	NO
13	HVAC: Install Dedicated Condensing Boiler for Perimeter Heating	50,000			9	$ 2,337	$ -	$ 2,337	$ 45,000	19.3	YES
14	Controls: Demand Control Ventilation	17,500	4,700		4	$ 818	$ 350	$ 1,168	$ 25,000	21.4	YES

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all included opportunities together in a single energy project. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended Energy Project	162,700	15,400	8	33	$ 7,604	$ 1,197	$ 8,802	$ 438,200	49.8

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Existing Conditions	22	12	34	66.4
With Implementation of Recommended Energy Project	7	10	17	33.7

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.

SAULT STE MARIE CITY WORKS FACILITY, SAULT STE MARIE ON
MAIN BUILDING

Subje	Date	By	Page
Savings Summary Table	9-October-09	RB	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK	INCLUDE IN ENERGY PROJECT? (YES / NO)
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*	
	Routine										
1	Building Envelope: Replace / Install Exterior Door Seals	41,100			8	$ 1,921	$ -	$ 1,921	$ 3,200	1.7	YES
2	Building Envelope: Insulation Upgrade	81,400			15	$ 3,804	$ -	$ 3,804	$ 75,000	19.7	YES
3	Controls: Install Light Switches for HID Lighting Control	-72,000	76,200		0	-$ 3,365	$ 5,677	$ 2,312	$ 2,600	1.1	YES
4	Lighting: T12 Fluorescent Fixtures to T8 with Electronic Ballasts	-28,000	29,600	68	0	-$ 1,309	$ 2,631	$ 1,322	$ 10,000	7.6	YES
	Advanced										
5	HVAC: Radiant Heaters Above Garage Doors	41,800			8	$ 1,954	$ -	$ 1,954	$ 34,000	17.4	YES
6	HVAC: Natural Gas Fired Make-up Air Unit	-46,900	35,200	80	-2	-$ 2,192	$ 3,124	$ 932	$ 18,000	19.3	NO
7	Lighting: HID High Pressure Sodium to T5 HO Fluorescent Fixtures	-18,400	19,500	6	0	-$ 860	$ 1,490	$ 630	$ 8,000	12.7	YES
8	Lighting: HID Metal Halide to T5 HO Fluorescent Fixtures	-88,000	93,100	62	1	-$ 4,113	$ 7,324	$ 3,211	$ 15,500	4.8	YES
	Aggressive										
9	HVAC: Boiler Retrofit	344,500			63	$ 16,101	$ -	$ 16,101	$ 72,000	4.5	YES
10	HVAC: Solar Wall for Pre-heating Ventilation Air	340,800	-7,100		61	$ 15,928	-$ 529	$ 15,399	$ 240,000	15.6	YES
11	Lighting: Skylights for Vehicle Bays with Daylight Harvesting	-53,500	56,500		0	-$ 2,500	$ 4,209	$ 1,709	$ 107,500	62.9	NO

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all included opportunities together in a single energy project. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended Energy Project	613,300	137,600	136	138	$ 28,664	$ 11,103	$ 39,768	$ 460,300	11.6

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Existing Conditions	18	10	28	420.8
With Implementation of Recommended Energy Project	11	8	19	283.1

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.
5. Thermal savings associated with waste oil burning have been excluded in totals.

SAULT STE MARIE CITY WORKS FACILITY, SAULT STE MARIE ON
CARPENTRY SHOP

Subje	Date	By	Page
Savings Summary Table	9-October-09	RB	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK	INCLUDE IN ENERGY PROJECT? (YES / NO)
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*	
	Routine										
1	Building Envelope: Replace / Install Exterior Door Seals	8,200			2	$ 383	$ -	$ 383	$ 700	1.8	YES
2	Building Envelope: Window Replacement	7,200			1	$ 337	$ -	$ 337	$ 7,500	22.3	YES
3	Controls: Programmable Thermostats	8,800			2	$ 411	$ -	$ 411	$ 150	0.4	YES
4	Controls: Occupancy Sensor Control for Lighting	-2,600	2,900		0	-$ 122	$ 216	$ 95	$ 450	4.8	YES
5	Lighting: T12 Fluorescent Fixtures to T8 with Electronic Ballasts	-3,200	3,600	11	0	-$ 150	$ 337	$ 188	$ 1,300	6.9	YES
	Advanced										
6	HVAC: Electric Resistance Heating to Gas Fired Heating	-6,500	7,400	11	0	-$ 304	$ 620	$ 316	$ 6,000	19.0	NO

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all included opportunities together in a single energy project. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended Energy Project	12,800	13,900	11	5	$ 598	$ 1,104	$ 1,703	$ 10,100	5.9

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Existing Conditions	16	10	25	19.2
With Implementation of Recommended Energy Project	13	6	19	14.3

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.

SAULT STE MARIE CITY WORKS FACILITY, SAULT STE MARIE ON
TEST LAB

Subje	Date	By	Page
Savings Summary Table	9-October-09	RB	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK	INCLUDE IN ENERGY PROJECT? (YES / NO)
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*	
	Routine										
1	Building Envelope: Replace / Install Exterior Door Seals		4,300		1	$ -	$ 320	$ 320	$ 300	0.9	YES
2	Building Envelope: Building Envelope Sealing		1,400		0	$ -	$ 104	$ 104	$ 400	3.8	YES
3	Controls: Programmable Thermostats		5,100		1	$ -	$ 380	$ 380	$ 150	0.4	YES
4	Lighting: T12 Fluorescent Fixtures to T8 with Electronic Ballasts		1,100	2	0	$ -	$ 94	$ 94	$ 700	7.4	YES
5	Equipment: Test Tank Insulation and Cover		400		0	$ -	$ 30	$ 30	$ 400	13.4	NO
	Advanced										
4	HVAC: Air Source Heat Pump		12,000		2	$ -	$ 894	$ 894	$ 12,000	13.4	NO

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all included opportunities together in a single energy project. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t* CO_2	Fuel *$*	Electric *$*			*Years*
Recommended Energy Project		10,100	2	2	$ -	$ 765	$ 765	$ 1,550	2.0

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Existing Conditions	0	41	41	8.6
With Implementation of Recommended Energy Project	0	33	33	6.8

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.

SAULT STE MARIE CITY WORKS FACILITY, SAULT STE MARIE ON
NORTH STORAGE GARAGE

Subje	Date	By	Page
Savings Summary Table	9-October-09	RB	1 of 1

Opportunity Savings

Values given in the following table represent the savings for implementing each individual opportunity against current operating conditions. Savings for some measures, if implemented together, are interrelated. Interelation refers to combining opportunities that may have a positive or negative financial impact on each respective opportunity.

	OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK	INCLUDE IN ENERGY PROJECT? (YES / NO)
		Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*	
	Routine										
1	Building Envelope: Replace / Install Exterior Door Seals	206,200			38	$ 9,637	$ -	$ 9,637	$ 6,000	0.6	YES
2	Building Envelope: Overhead Door Replacement	305,200			56	$ 14,264	$ -	$ 14,264	$ 120,000	8.4	YES
3	Building Envelope: Insulation Upgrade	123,500			23	$ 5,772	$ -	$ 5,772	$ 34,000	5.9	YES
	Advanced										
4	HVAC: Radiant Heaters Above Garage Doors	94,900			17	$ 4,435	$ -	$ 4,435	$ 42,000	9.5	YES
5	Controls: Overhead Door Controls	39,200			7	$ 1,832	$ -	$ 1,832	$ 36,000	19.6	NO
6	Lighting: HID High Pressure Sodium to T5 HO Fluorescent Fixtures	-26,300	27,600	20	0	-$ 1,229	$ 2,181	$ 952	$ 4,500	4.7	YES
	Aggressive										
7	Lighting: Skylights for Vehicle Bays with Daylight Harvesting	-15,000	15,800		0	-$ 701	$ 1,177	$ 476	$ 45,000	94.5	NO

Recommended Energy Project

The following table represents the estimated combined annual savings from implementing all included opportunities together in a single energy project. Interrelation between individual opportunities has been taken into consideration when determining these values.

OPPORTUNITY DESCRIPTION	ESTIMATED ANNUAL CONSUMPTION SAVINGS				ESTIMATED ANNUAL COST SAVINGS		TOTAL ESTIMATED SAVINGS	ESTIMATED COST	SIMPLE PAYBACK
	Fuel *kWh*	Electric *kWh*	Demand *kW*	GHG *t*CO_2	Fuel *$*	Electric *$*			*Years*
Recommended Energy Project	304,000	27,600	20	61	$ 14,208	$ 2,181	$ 16,390	$ 206,500	12.6

Benchmark & Screening Report

ENERGY USE INTENSITY	Fuel ekWh/ft^2	Electric ekWh/ft^2	Total ekWh/ft^2	Total GHG tCO2
Existing Conditions	38	3	41	147.8
With Implementation of Recommended Energy Project	23	2	24	86.8

Notes:

1. Noted savings and cost estimates are for reference only and are not guaranteed
2. Budgets and estimates represent the highest level of accuracy that can be achieved without further engineering study. The proposed project does not include any contingency or project management fees.
3. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings it is important not to start the retrofit project or incur eligible costs until receiving written approval from Natural Resources Canada.
4. NOTE: If applying for funding from ecoENERGY Retrofit Incentive for Buildings, caps may be placed on savings calculations. See note in main report regarding benchmarks.