

SAULT AREA HOSPITAL ENERGY CONSERVATION AND DEMAND MANAGEMENT (ECDM) PLAN



2019-2024

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Introduction

The purpose of Sault Area Hospital's energy conservation and demand management (ECDM) plan and policies is to promote good stewardship of our environment and community resources. In keeping with our mission of Exceptional People Working Together to Provide Outstanding Care in Algoma, Sault Area Hospital's energy conservation and demand management program will reduce overall energy consumption, operating costs, and greenhouse gas emissions. It will also enable us to provide compassionate care to a greater number of patients in our community through Operational Efficiency.

Sault Area Hospital (SAH) is a community hospital approximately 600,000 square feet in area, located in Sault Ste. Marie and serving mostly residents of the Algoma District. The building is quite new, having been constructed from 2007 to 2010, with the hospital taking occupancy in March 2011 and beginning operations.

SAH is party to a Project Agreement with Hospital Infrastructure Partners (HIP) consortium, which requires HIP to build, finance, and provide specified services (including maintenance, plant operations, and energy management) over a thirty-year term. The service provider partner in the HIP consortium is EllisDon Facilities Services.

As a recently built P3 (public-private-partnership) hospital, our infrastructure was designed and built to current standards. Most components will not reach end-of-life for quite a few years and premature replacement could not be justified. The hospital is currently investigating the installation of an automated battery energy storage system to provide electrical demand management.

This plan will be in effect until July 1, 2024, at which time an update will be prepared. The Project Agreement provisions referenced below will be in effect until October 15, 2040.

This plan has been approved by Sault Area Hospital Senior Management.

2013/2017 Energy Consumption and Energy Use Intensity:

Year	Electricity Consumption (kWh)	Gas Consumption (m3)	Total ekWh	Total kg CO2e	ekWh/ft2
2013	18,566,405	3,759,131	57,661,367	7,788,413.90	96.10
2017	18,581,490	3,585,001	55,865,499	7,458,268.74	93.11

Through past conservation and demand initiatives, from 2013 to 2017, Sault Area Hospital has achieved the following results:

- 1,795,869 ekWh (3.1%) reduction in overall energy use
- 15,085 kWh (0.08%) increase in electricity consumption
- 174,130 m3 (4.6%) decrease in gas consumption
- 330 tonne reduction in carbon dioxide equivalent (tCO₂e) emissions

Today, utility and energy related costs are a significant part of overall operating costs. Sault Area Hospital's annual energy consumption and related costs/emissions for 2017 were:

- Utility costs were \$3.52M annually.
- The Hospital's Energy Use Index (EUI) was 93.11 ekWh/ft²

- Energy related emissions for 2017 equaled 7,458.27 tCO₂e.

With energy management an integral part of business decisions, Sault Area Hospital can expect to achieve the following targets by 2024:

- 2.0% reduction in energy use
- 400 tonne reduction in carbon equivalent emissions
- \$500,000 annual operating cost reduction (\$2.5 million over 5 years)

To further strengthen and obtain full value from energy management activities, a strategic approach will be taken: the organization will fully integrate energy management into its business decision-making, policies, and operating procedures.

Active management of energy related costs and risks in this manner will provide a significant economic return to the organization and will support other key organizational objectives.

Results of Previous Measures from ECDM Plan Posted July 2014

In July 2014, Sault Area Hospital developed goals and devised green initiatives in an effort to decrease the facilities annual energy consumption and resulting greenhouse gas emissions. The following activities, completed between 2014 and 2019, are associated with managing overall energy consumption, lowering annual operating costs, and reducing greenhouse gas emissions. These activities may, or may not, have been included in the Sault Area Hospital's 2014 ECDM plan and include the following:

Past ECDM measures

Building Pressurization:

- Building over-pressurization has been a concern since the building systems were commissioned. This problem has manifested itself primarily through the building air pressure holding certain exterior doors open at times, and through higher-than-expected air movement velocities within some hospital corridors and through the exterior doorways. Over the past 5 years, SAH and Project Co have tried various means to reduce the over-pressurization. In 2014 the return air volumes on specified AHU's were increased in an effort to bring the supply and return air volumes closer to a balanced position. This did not have the intended effect. Several studies were conducted to determine the path forward but the parties were not able to come to a resolution. This work continues in this ECDM plan with a good path forward.

Cooling Towers:

- The cooling tower fans were upgraded (using slightly more electrical energy) in order to reduce the use of municipal water for cooling. Municipal water is now only used on the hottest and most humid days when the cooling plant is at maximum capacity and more cooling is required (only a few hours per year).

Biomedical Waste Management:

- SAH reviewed options for disposing of biomedical waste in order to stop using a steam chamber autoclave. Once the analysis was completed, it was determined that an external vendor could more efficiently deal with the biomedical and pharmaceutical waste, having high steam savings.

Joining Class A Industrial Conservation Initiative:

- In July 2017, the Class A requirements under the ICI dropped to a demand of 1MW from 5MW, allowing SAH to join. Without making any operational changes, this resulted in cost savings of approximately \$500,000 per year.

Energy Management Vision

“We consider our facilities a primary source of giving care, an integral part of the healing environment, and key to this equation is the ability to use our facilities efficiently and effectively.” (As borrowed from St. Charles Medical Center in Bend, OR)

Guiding Principles for Strategic Energy Management

Sault Area Hospital's energy management will be guided by the following principles:

Taking A Strategic Approach:

While Sault Area Hospital actively manages energy costs by implementing opportunities as they are identified, by acting strategically, Sault Area Hospital can significantly improve its energy-related performance. Internalizing energy management into our organization's every-day decision-making, policies, and operating procedures will help assure substantial and long-lasting reductions in energy, operating costs, and environmental impact.

Supporting Mission-Critical Goals:

Strategic energy management will directly support Sault Area Hospital's mission-critical goals of caring for the environment and the community, improving the healing and working environment, and improving the hospital's management of operating costs- by reducing unnecessary energy costs. It will also serve to optimize the capacity of existing energy systems to meet current and expanding operational needs, while improving the operational resiliency of the organization. The impacts of Sault Area Hospital's energy management efforts on those goals will be tracked and reported wherever possible.

Pursuing Long-Term Change to Core Business Practices:

The core of a strategic approach is the consistent incorporation of energy management into our organization's everyday practices and decision making. It also needs to be an integral part of the strategic planning and budgeting processes. Change in energy-related business practice will cover all applications of energy management – new construction and major renovations, existing facility operations and upgrades, and the economic analysis and procurement practices underlying these practices.

Fostering Organizational Commitment and Involvement:

Executive and organizational commitment and involvement is critical to successful strategic energy management. The Senior Management Team at Sault Area Hospital will work with Facilities Management, EllisDon Facilities Services, and other key staff to ensure that adequate organizational support and resources are provided to maximize the benefits of energy management to Sault Area Hospital. Energy management will also be integrated into the strategic planning and capital budgeting processes.

Obtaining Solid Economic Returns:

Energy management investments will yield solid economic returns that meet Sault Area Hospital's standard internal rate of return requirements applied through the hospital's capital budgeting process. Sault Area Hospital will apply consistent financial analysis methods, including life-cycle costing, in order to reduce total cost of facility ownership and operation.

Using Available Resources and Assistance:

Use of national, regional, and local sources of strategic, technical, and financial assistance to help to achieve the organization's energy management goals. These include utility, municipal, provincial and national government programs. It also includes established best practices through a community of practice approach.

The Business Case for Strategic Energy Management

Below are the central business arguments for Sault Area Hospital's pursuit of strategic energy management. The following section then presents the business proposition – the results of analysis of the energy efficiency opportunities and their associated costs and internal rate of return.

Strengthened Community Leadership and Environmental Stewardship

Energy management is a visible, public commitment to the community and environment. Through energy management, the hospital can provide leadership in promoting sustainable communities, efficient business practices, and environmental stewardship. Faced with the continual challenge of doing more with less,, this is an excellent opportunity to provide leadership and reduce costs at the same time.

Enhanced Healing and Working Environment

In existing facilities, efficient operating practices improve patient, as well as employee, comfort with more stable environmental control, and better indoor air quality and lighting. In new facilities more daylight and personal control of comfort contribute to a healing and patient-focused environment, for an improved environment of care. For instance, recent research has found that natural light eases surgical pain and contributes to substantial savings in pharmacy costs.

Improved Financial Health and Operating Cost Reduction

Strategic energy management presents a highly leveraged opportunity to reduce operating costs. Dollars of operating cost savings directly improve the hospital's ability to repurpose dollars to direct patient care. Further, investments in energy projects typically have a lower risk of performance over time, relative to other investments, and savings from energy projects are easier to forecast reliably than savings or revenue increases expected from more variable investments.

Optimization of Capacity to Meet Current and Expanding Operational Needs

Energy efficiency optimizes inefficient or poorly designed and operated equipment/systems so wasted energy system capacity can be reclaimed for current and expanding operational needs. This "free capacity" can eliminate the need to add major new energy capacity and be much less expensive.

Business Proposition

Sault Area Hospital was recently constructed through a P3 dBFM project and as such, SAH does not propose to include significant infrastructure investments in this ECDM plan. Our Project Agreement includes a Lifecycle Plan to ensure the Project Co will deliver a “new hospital” to SAH at the end of the 30-year Project Agreement. As equipment is changed out through the Lifecycle Plan, energy efficiency will be a guiding factor.

That being said, the projects below are expected to reduce operating costs and environmental impact.

Battery Energy Storage System and Demand Management:

- SAH became a Class A customer under the Industrial Conservation Initiative in July 2017, which alters how Global Adjustment on electrical bills are paid.
- Global Adjustment covers the cost of building new electricity infrastructure in the province, as well as delivering Ontario’s conservation programs – ensuring that enough electricity supply will be available over the long term.
- As a Class A customer, SAH pays Global Adjustment based on a ratio of the electrical demand to Ontario’s demand during the five peak hours per year. If the demand during those peak hours is reduced from approximately 3MW to near zero, our Global Adjustment charges will decrease.
- SAH’s annual Global Adjustment charges are approximately \$1.36M.
- Several companies are proposing the installation of a Battery Energy Storage System attached to the existing substation on the property at no capital cost to SAH that will allow the hospital to automatically drop our electrical demand during peak hours with no impact to hospital operations. With an expected savings of 40%, SAH expects to save almost \$550K annually.
- With the Battery Energy Storage System located behind the meter, the Local Distribution Company will be offering GHG reduction credits for all customers participating in the Customer Energy Management Program.
- As an additional benefit, the Battery Energy Storage System will provide back-up power for the entire facility for several hours in the event of a power outage, adding another layer of electrical redundancy.

Building Envelope and Brickwork Remediation

- Several years ago, a white, salty substance called efflorescence was noticed on the exterior brickwork and blockwork of SAH. Through investigation and study, it was discovered that the vapour barrier underneath the bricks, blocks, and siding had many perforations. These were concentrated mainly around windows, shelf angles (where two floors come together), and exterior electrical connections where the vapour barrier was not properly sealed. As interior, warm, humidified air is pushed out through the perforations in the vapour barrier, it enters the bricks and blocks, carrying salt to the exterior of the brick, where it is left once the water evaporates.

- In order to repair the vapour barrier, all exterior bricks, blocks, and siding must be removed. Much of the siding can be reused but due to logistics, the bricks and blocks will be replaced with new masonry.
- With the perforations in the vapour barrier, it is known that heated, cooled, humidified, and dehumidified air is being forced out of the building, causing increased energy use. Throughout the four-year project (2018-2022) and in cooperation with the Building Pressurization Project, SAH expects to see a drop in energy use. Due to how widespread the issue is, the extent of the savings is still unknown.
- The original constructor is completing the repair work at no cost to SAH.

Building Pressurization

- As outlined above under the “Past CDM Measures” section, building over-pressurization has been a concern since the building systems were commissioned. Several attempts have been made to mitigate this problem but the trends do not show any improvement. Sault Area Hospital and Project Co are working cooperatively to bring about a resolution that could have significant energy savings.
- The energy management provisions of the Project Agreement stipulate the method of establishing a two-year energy consumption baseline. Due to the building over-pressurization, both SAH and Hospital Infrastructure Partners (Project Co) have agreed to postpone the two-year energy consumption baseline that would establish the Annual Energy Target. Once the pressurization issue is dealt with and the baseline is established, the Project Agreement provides incentives for both parties to reduce energy consumption.
- The two parties have established a mandated Utilities Management Subcommittee, which tracks utilities consumption and identifies and implements improvements.

Operational

The Project Agreement includes suggested Good Housekeeping Measures (Appendix 1), which are communicated to staff as part of an energy-awareness program and intended to improve energy-efficiency.

Energy Management Goals

The following are proposed measures that Sault Area Hospital intends to implement:

Goal: Energy Conservation and Demand Management Plan Approval

- Executive approval and resources.
- Support from key staff (financial management, purchasing/procurement, construction, building operations, etc.).
- Creation of mechanisms/processes to make resources available.
- Clarification and communication of staff roles and responsibilities, performance goals, and energy management reporting.

Goal: Implement Financial Practices and Decision-Making Processes

- Money spent to achieve energy efficiency is viewed as an investment, not a cost.
- Financial decision makers consistently use life cycle cost analysis (LCCA) on all new construction, major renovations, and equipment replacements over as part of the Variation Procedure outlined in Schedule 22 of the Project Agreement.
- Decisions about energy management investments will be part of Sault Area Hospital's high-level, long-range process of budgeting for capital and operations.

Goal: Implement Strategic Energy Management Practices

Establish Purchasing Specifications for Energy Efficient Equipment & Services

- Establish and consistently use purchasing specifications that minimize life-cycle costs for energy efficient equipment and services.
 - Establish efficiency specifications for standard equipment routinely replaced (e.g. lights, motors, and unitary HVAC equipment).
 - Establish efficiency guidelines that apply LCCA for custom equipment purchases (e.g. chillers).
 - Establish efficiency standards for design and construction, and for building operations and maintenance services.

Implement Enhanced Design & Construction (D&C) Practices

- Implement improved new construction practices in all projects over \$5 million that specify early team collaboration and “integrated design” (ID).
 - Integrated design required for funding.
 - RFPs, contract terms & conditions, & fee structures will support ID.
 - Apply LCCA and financial hurdle rates described above to design decisions.
 - Apply established purchasing procedures and specifications.
 - Include incentives and tax credits wherever available.
 - Educate all owner's project managers or construction managers and contractors on integrated design and their respective roles in master planning pre-design, design, construction, testing, commissioning, and monitoring.
- Set and meet clear energy performance targets for new buildings; measure and improve over time.

- Establish baseline for measuring performance goals (e.g. code, or national reference standards like ASHRAE 90.1).
- Set target for each building.
- Measure performance and improve over time.
- Specify commissioning as a standard procedure.
 - Retain the services of an independent third-party commissioning agent.
 - 100 percent of fundamental building systems and elements will be designed, installed, and calibrated to operate as designed.
 - Design team, commissioning agent, and building operators will work closely throughout the design process and occupancy to ensure good transition.

Improve Building Operating Performance

- Equipment tune-up and improved operations and maintenance (O&M) will achieve the following results while supporting patient care, and facility comfort and safety.
 - Achieve reductions in operating costs for existing facilities by an average of 5% over five years.
 - Reduce the system-wide EUI from 93.11 ekWh/ft² to 91.25 ekWh/ft² by 2024. The EUI will be adjusted for variances in patient days and IT intensity.
 - Reduce energy consumption by 75,000 kWh per year.

Implement Cost-Effective Facility Upgrades

- Implement equipment and system upgrades where justified by life-cycle cost analysis.
- Expand use of qualified service providers as needed. Develop standard RFP documents, contract terms, and reporting standards.

Actively Manage Energy Commodity

- Minimize utility costs and exposure to market risks. Utility costs include natural gas, electricity, water, and sewer.
- Participate in the energy/utility regulatory process.

Goal: Monitor, Track, and Reward Progress

- Track progress on the CDM plan
- Track energy reductions annually.
- Reward staff for successes.

Appendix 1 – GOOD HOUSEKEEPING MEASURES (Schedule 20, Project Agreement)

LIGHTING

- Switch off lights when they are not needed or when natural light is adequate (with due consideration to Health and Safety).
- Use only local task lighting where provided.
- Switch off lights when leaving a room unoccupied
- Use lower levels of lighting for night time and security staff.

WATER

- Turn off hot and cold taps when they are not needed.
- Report leaking and dripping taps.
- Report excessive hot water temperatures.

OFFICE EQUIPMENT

The SAH will actively encourage staff to switch off all electrical appliances including computer, printers and photocopiers at the plug when not in use or overnight whenever practicable and appropriate. The SAH will instruct its staff and SAH Parties not to use their own personal heaters or toasters, and will encourage its staff and SAH Parties not to use their own personal kettles, coffee makers, and items of personal electrical equipment.

SPACE HEATING AND AIR CONDITIONING

The SAH shall ensure that its staff and SAH Parties:

- report excessive temperature to the Helpdesk;
- in Summer time, switch off equipment and lighting not in use in order to reduce heat gains where appropriate;
- are aware that the use of unauthorised portable electric heating equipment and toasters are not permitted;
- do not obstruct radiators or heaters;
- switch off non-automatic free standing fans when rooms are unoccupied;
- close curtains and blinds at the end of daylight;
- turn off (non-automatic) heating when the room is unoccupied where practicable;
- report under/overheating; and
- are aware that the use of unauthorised portable air cooling units are not allowed.

PATIENTS' PERSONAL ELECTRICAL ITEMS

- The SAH shall actively discourage the use of patients' personal electrical items and advise them accordingly prior to their attendance at the Hospitals.