



Grey Bruce Health Services

Conservation and Demand Management Plan

June 2019

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Introduction

A new provincial regulation – The Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans Act (O. Reg. 507/18) came into force January 1, 2019 – upholding and amending the earlier Green Energy Reg. 397/11 - requiring all broader public sector (BPS) organizations, including hospitals, municipalities, universities, colleges, school boards and municipal service boards (for water and sewage treatment and pumping operations), to:

- Report on their annual energy use and greenhouse gas (GHG) emissions in designated buildings/facilities and make that information available on their website and hardcopy; and
- Develop and implement 5-year energy conservation and demand management plans (CDM) by July 1, 2014, with updates to be done periodically and no later than by July 1, 2019.

The energy use and GHG emissions are reported annually through the Ministry of Energy website and posted on the Ontario Open Data Catalogue as well as the GBHS website and intranet. The 5-year conservation and demand management plan (CDM) is posted on the GBHS website and intranet.

The CDM plan contains conservation efforts such as water and waste, as well as required energy elements as follows: energy consumption data, conservation goals and objectives, proposed measures, cost and savings estimates, length of time measures will be active, description of any renewable energy generation, heat pump or solar technology, and senior management approval.

This Conservation Demand Management Plan has been approved by GBHS Executive Leadership team.

Strategic Energy Management Plan

The purpose of Grey Bruce Health Services energy management plan is to provide a safe, secure and comfortable environment for our patients and health care providers by:

- Encouraging support for improvement in energy efficiency
- Make continuous process improvements, innovations and promote community awareness
- Reducing energy waste
- Reduce our energy consumption and make more effective use of our resources and enable our infrastructure to last longer.

Vision Statement: The Strategic Management Plan will promote good stewardship of our utility usage, be a component of facility infrastructure renewal process, and encourage programs that reduce our carbon footprint and waste streams. In keeping with our Corporate Mission to ensure the most effective delivery of comprehensive healthcare, the GBHS Strategic Energy Management Plan will have goals to reduce operating costs, lengthen the lifetime of infrastructure components, and promote energy conservation in the workplace and at home.

As in any healthcare organization, utility and energy related costs are a significant part of the GBHS Operating & Maintenance budget. GBHS will employ the following principles in energy conservation initiatives:

Informed Decision Making - Energy will be monitored and tracked through an established baseline. All measures must be developed, understood and key metrics communicated to allow informed decisions to be made in regards to energy efficiency, which includes:

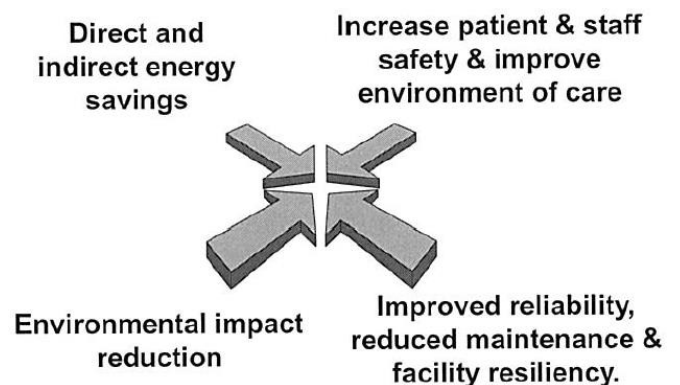
- Assessment of the lifecycle cost analysis
- Evaluation of the return on the investment
- Capital requirements
- Impacts on Hospital services

Procurement - Purchase utilities and equipment strategically to ensure that the lowest lifetime cost is achieved.

The Procurement program at GBHS will include an energy evaluation of any new equipment acquisition.

- HealthPro member –
- HealthPro Energy Advisory Committee member

Energy Management Benefits



Partnerships - Partner with industry and the public to improve energy conservation.

- Enbridge
- Engineering Consultants
- Hydro One

Energy Green Team Reporting

In 2017, as part of a Transformation Back to Balance Initiative undertaken by GBHS — an Energy Green Team was chartered with the mission of identifying projects with energy savings opportunity that meet a GBHS simple payback target of under 5 years. The implementation of the respective projects would reduce energy consumption and hence the respective energy cost. Each project would include an identified measurement process to meet project deliverable. To date,

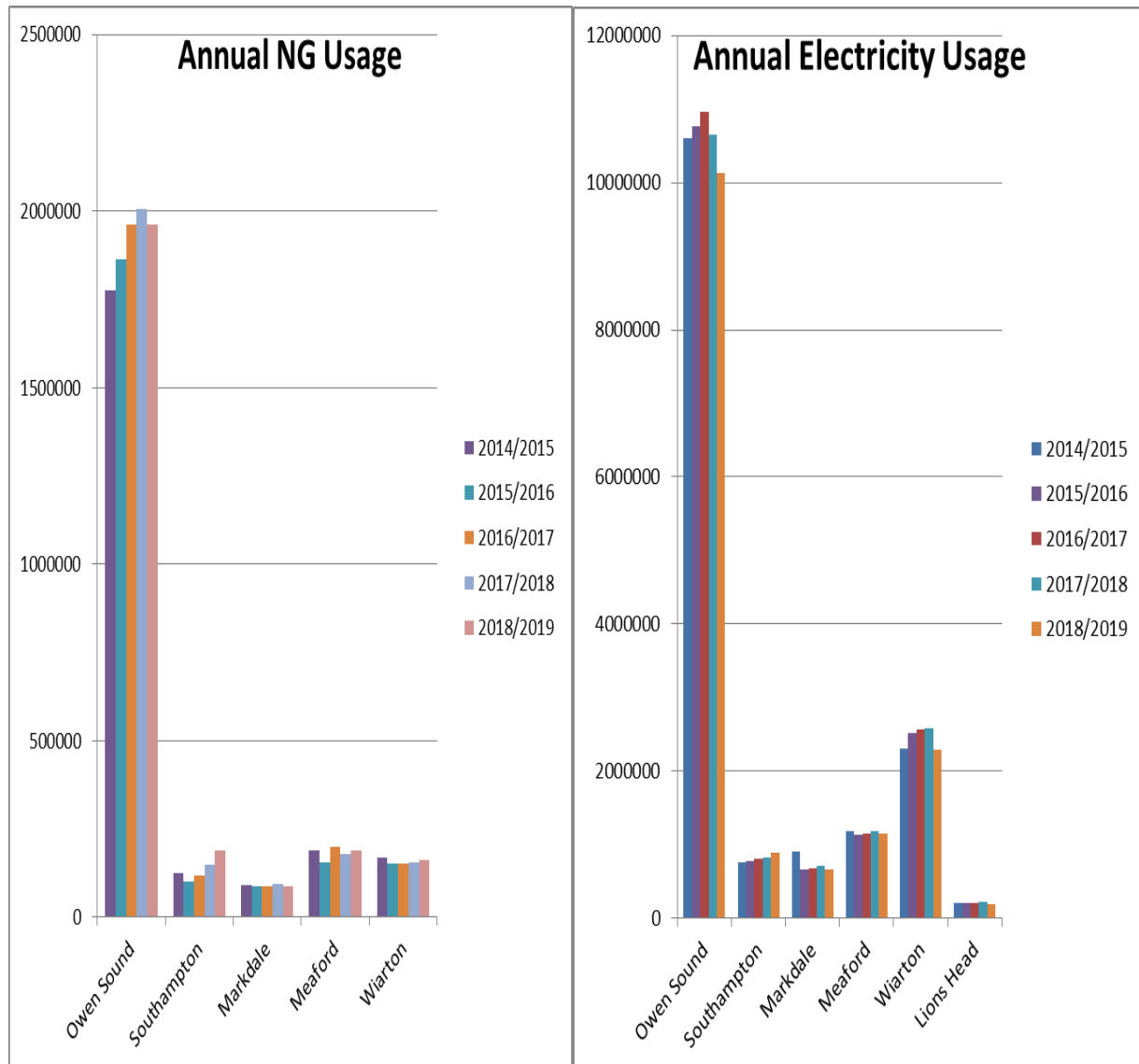
- Energy Management Team has been formed, project charter developed and team meetings have been held.
- 5 energy savings projects were initially identified for more detailed investigation.
- Project costing was undertaken for
 - Exterior lighting upgrade to LED
- Project development of the 8-3 Air Handler return air system integration and control.
- Review of Building Automation systems, upgrading hardware, programs and scheduling optimization.
- In 2017, 6 Exceptional Circumstance Projects (ECP) were submitted to Health Infrastructure Renewal Fund (HIRF) for funding support.
 - 3 of the 6 applications included energy savings as a component of the justification.
- In 2017, 5 Healthcare Energy Efficiency Program (HEEP) were submitted,
 - A window replacement project for Meaford Hospital was approved and implemented during the limited funding window.
- In 2018, 5 Healthcare Energy Efficiency Program (HEEP) were submitted
 - All 5 HEEP applications were energy efficiency related.
 - HEEP program was aborted by residing Provincial Government
- In 2018, 13 Exceptional Circumstance Projects (ECP) were submitted
 - 4 of the 13 ECP applications included energy savings as a component of the justification.
- Business Case developed for energy storage (“Battery in a Box”) to leverage the Industrial Conservation Initiative (“ICI”) program.

Facilities Profile

Grey Bruce Health Services is composed of six hospitals and a clinic located in Owen Sound, Lion's Head, Wiarton, Southampton, Meaford and Markdale. Owen Sound provides regional specialty services across Grey and Bruce counties. Our rural sites offer a wide range of primary and ambulatory care services to their communities and to our many seasonal visitors. The facilities range in age from 23 to 66 years old. The facilities size and energy use is reported annually in the Ministry of Energy template below:

Energy Consumption and Greenhouse Gas Emissions Reporting - for 2017								
Time Reported	January - 2017 to December - 2017							
Type of Public Agency:	Public Hospital							
Agency Sub-sector	Acute/Chronic							
Organization Name	Grey Bruce Health Services							
Operation Name	Operation Type	Total Floor Area of the Indoor Space	Average Hrs Per Week	Energy Type and Amount Purchased			Total	
				Electricity	Natural Gas	Fuel Oil 1 & 2	GHG Emissions (kg)	Energy Intensity (eKWh/ft ²)
GBHS - Lions Head	Facilities used for hospital purposes	1178 m ²	168	214,304 kWh		12,870 Litre	42,818	27.84
GBHS - Markdale	Facilities used for hospital purposes	3419 m ²	168	694,286 kWh	90,520 m ³		195,820	45.01
GBHS - Meaford	Facilities used for hospital purposes	5879 m ²	168	1,171,234 kWh	174,653 m ³		371,838	47.84
GBHS - Owen Sound	Facilities used for hospital purposes	43317 m ²	168	10,540,980 kWh	1,972,953 m ³		4,104,830	67.58
GBHS - Southampton	Facilities used for hospital purposes	5591 m ²	168	794,204 kWh	125,407 m ³		265,331	35.34
GBHS - Wiarton	Facilities used for hospital purposes	7443 m ²	168	2,538,158 kWh	151,839 m ³		377,297	51.82

Annual Energy Consumption – Last 5 Years



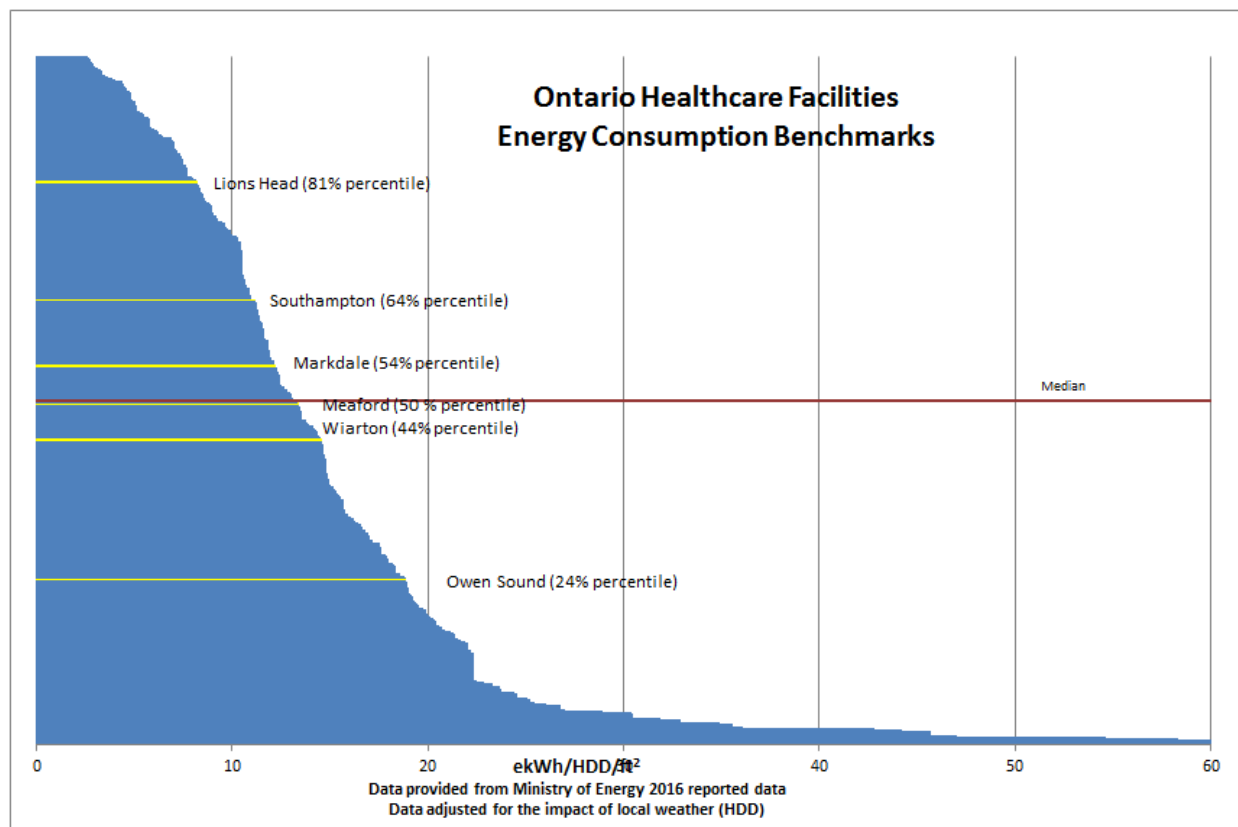
The most significant contributor to Natural Gas usage is Heating Degree Days (HDD) in the winter. Electricity is driven primarily by Cooling Degree Days (CDD) and impacted by program services and patient throughput. Southampton was undergoing a 25% increase in building space these past two years and the increases in conditioned space offset the savings made by the installation of energy efficient boilers, and the addition of advanced building automation control.

Ontario Healthcare Facilities Energy Benchmarks

The chart below illustrates the energy consumption per square foot adjusted for weather of 264 healthcare facilities in Ontario using 2016 normalized data compensated for weather, as available from the Ontario Data Catalog. Facilities are listed from the highest use per square foot at the bottom of the chart rising to the least use at the top. GBHS facilities are generally close to or significantly above the provincial median

Warton and Owen Sound have fully conditioned spaces using chillers for cooling – hence their higher placement. This graph differs year to year on account of different HDD profiles.

2016 Weather Normalized Consumption



Energy and Waste Reduction Initiatives Taken Since 2014

- Owen Sound Roofs – 10 of 12 phased roof replacements completed– reuse/replace insulation and roof ballast and increased R value to meet current building code.
- Warton Roofing Replacements – Part way through phased replacements (3 of 6) - R value increased to current building code.
- Meaford Roofing Replacements – R value increased to current building code.
- Project development and implementation of
 - 8-3 Air Handler return air system integration and control.
 - RetScreen calculations show each cfm of conditioned air costs 3\$ annually at Owen Sound to add heat or cool. Any opportunities to reduce from 100% fresh air when standards allow - maximizing return air flow - will reduce the cost needed to condition the makeup air.

Cost at 100% Fresh Air	Cost at 30% Fresh/70% Return	Projected Annual Savings
\$24,375.81	\$9,973.08	\$14,402.73

- Baseline data has been developed for O.S. air handler schedules
 - Opportunity evaluation and quantification is in process. Building Automation system continues to be upgraded and opportunities to convert systems to DDC control with advanced damper control is in progress.
- Owen Sound Domestic Hot Water Boilers Converted to energy efficient condensing boilers – with reduction of hot water storage to minimize energy losses
- Owen Sound 8 Unit Right sizing domestic hot water storage and converting to instantaneous steam to hot water production.
- Owen Sound Tower Elevators modernized using regenerative braking that creates electricity when braking.
- Continued Building Automation System Upgrades – to extended panel network to newer and faster processors, improving logic, fine tuning control loops to maintain humidity, temperature, and required air changes per CSA and Hospital standards.
- Southampton boilers converted to energy efficient multi stage units
- Southampton expansion using NG fired humidifiers as opposed to electric humidifiers.
- Owen Sound domestic water booster pump package right sized and VFD equipped.
- Exit lights converted to CFL from incandescent bulbs with LED in new builds.

- Parking Lot Lighting Partially Converted and Exterior Lighting as repairs done.
- Annual fuel efficiency testing – all boilers.
- Energy Efficiency audit conducted to identify building energy efficiency opportunities.
- Steam Trap Survey and Upgrades.
- Used battery and fluorescent tube recycling continues.
- Co-generation Feasibility study undertaken.

Facilities Maintenance

- GBHS Engineering staff perform over 25,000 work orders annually in the care and maintenance of hospital buildings and equipment.
- Opportunities are taken to improve energy efficiency through component replacements such as energy efficient motors and lighting, variable speed drives on pumps and fans, water conservation measures, building envelope components
- PM program on all building HVAC, boilers, chillers, electrical and envelope is scheduled and reviewed for effectiveness.
- Adjust HVAC operation to meet hospital air quality requirements and codes.
- Lighting upgrades to LED are performed as lighting fixtures fail.
- Exterior parking lot and road lighting is being replaced with LED lighting over time.
- Utility usage is reviewed and shared with Engineering staff to monitor trends and identify issues for investigation or potential opportunities for improvement in building operation.
- Measure, Trend and review all utility utilization and performing corrective action as required optimizing usage.
- Engineering infrastructure audits are performed to ensure systems are working effectively and identify the preferred renewal options.
- Partnerships with external service providers and utilities leverage expertise.

Industrial Conservation Initiative

Owen Sound has qualified for this program since the eligibility thresholds were lowered in 2017. We opted in after careful consideration of past performance and review. When compared to the projected cost of the prior means of computing the Global Adjustment, Owen Sound has avoided costs of:

17-18		\$122,565
18-19	Projected	>\$90,000

Energy Efficiency Goals and Objectives Next Five Years

- Main Steam Plant Replacement at Owen Sound
- 5% Water reduction target
 - Reduced water to drain by replacing water cooled refrigeration compressors with energy efficient DX cooled units
- Markdale Hospital design includes
 - Energy modeling analysis to optimize HVAC system cost, future operating cost and GHG emissions
 - Predicted energy use intensity is 27.22 ekWh/ft² which represents a 50% improvement over the average EUI for Ontario Healthcare facilities (57.04 ekWh/ft²)
 - Design Features
 - Low flow plumbing fixtures to reduce potable water consumption
 - The orientation and geometry of the building is designed to respond effectively to solar energy and optimize the location and extent of exterior glazing
 - Building envelope meets performance metrics of OBC SB-10
 - Air to air energy recovery on ventilation units c/w set back for unoccupied hours
 - LED lighting c/w controls for occupancy and daylight efficiency
 - Dedicated heat recovery chiller to meet simultaneous heating and cooling
 - High efficiency condensing heating water boilers
 - High efficiency condensing domestic water storage heaters
 - Roof structural design capacity for future renewable energy
 - Energy metering with real time reporting and graphics capability
- Continued phased roofing replacements at all sites while replacing comprised insulation and adding insulation. Generally, the intent is to bring the effective R value over 30 when practical/cost feasible.
- Right sizing Air handling units and incorporating VFD drives and VAV control to reduce conditioned air to minimum levels in areas not operating after hours. Savings of \$3 per cfm/annually is typical.
- Replacement of kitchen air handling unit with higher efficiency heat reclamation from exhaust stream and VFD drive.
- Installation of a new energy efficient cooling system for the main data center to replace aged DX and water cooled units

- Replacement of electric humidification with efficient NG fired humidifiers.
- Building entrances redesigned to minimize wind from blowing directly into building by adding or redesigning vestibules to face differently.
- Opportunities are taken to improve energy efficiency through component replacements such as energy efficient motors and lighting, variable speed drives on pumps and fans, water conservation measures, building envelope components
- Lighting upgrades are performed to LED as lighting requires repair.
- Exterior parking lot and road lighting is being replaced with LED lighting over time.
- Review facility benchmark data and scorecards from available sources, such as Siemens Building Controls, Ontario Data Catalog, Canadian Healthcare Engineering Society, etc.
- Building commissioning and recommissioning as required to ensure systems are operating correctly, as designed

Infrastructure Renewal

GBHS participates in the Ministry of Health and Long-Term Care (MOHLTC) Facilities Condition and Assessment Program that identifies and prioritizes infrastructure renewal projects to maintain the reliability and safety of all hospital buildings.

Future projects that include an energy or conservation component:

- Roof Replacements
- Hot Water Heating Boiler Replacements
- Steam Boiler Replacements
- Air Handling Unit Replacement
- Data Center Cooling
- Lighting
- Window Replacements
- Water cooled refrigeration unit conversion to air DX

Ensuring that facility systems are efficiently operated and maintained contributes to the control of energy consumption and cost. Well engineered infrastructure renewal will reduce future energy consumption and prolong system lifecycle while controlling escalating operating cost