

2014



CONSERVATION & DEMAND MANAGEMENT PLAN

CAMBRIDGE
MEMORIAL
HOSPITAL 

1 Executive Summary

The following Energy Conservation and Demand Management Plan is written in accordance with sections 6 and 7 of the Green Energy Act, 2009, O. Reg. 397/11. Energy management initiatives can produce environmental, economic and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and increasing savings. Our energy efficient capital and operating process improvements are key components to our success and will be outlined in this report.

Sustainable Care is one of Cambridge Memorial Hospital's top priorities—along with providing high-quality care to our patients, and building our new hospital. We currently have admission times that fall below the benchmark in 81% of cases; we are developing innovative plastic surgery solutions for women with cancer; and we continue to produce strong year-end financial performance. We extend our vision of exceptional healthcare to exceptional sustainability and efficiency in our operations. Using this report, we will outline energy efficiency goals, objectives, and targets, geared toward cementing our status as environmental leaders.

Following our analysis we have concluded that our facility consumes 19% less energy than the Ontario healthcare industry average. We have also established a concrete GHG reduction target, looking to lower our emissions by almost 30%. The analysis taking place in this report will assist us in financial decision-making, and generating programs to further reduce our environmental impact and promote a more efficient and effective processes to serve our community.

Goals and Objectives

The goals and objectives of this report, and following an in-depth analysis of our Conservation and Demand Management Plan, are as follows:

- We will strive to maintain our current levels of energy consumption, keeping us well below the industry average for Ontario hospitals.
- We will implement measures toward reducing our greenhouse gas emissions by 10% over the next five years.
- We will continue to our status leaders in energy efficiency for hospitals in Ontario.
- We will breed a culture of sustainability throughout the Cambridge Memorial Community and highlight the importance of individual efforts.

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3 Introduction

MISSION

- ❖ A Progressive acute care hospital and teaching facility committed to quality and integrated patient centered care.

VISION

- ❖ Our vision is to provide exceptional healthcare by exceptional people.

VALUES

- ❖ Caring
- ❖ Respect
- ❖ Innovation,
- ❖ Collaboration
- ❖ Accountability

The purpose of Cambridge Memorial Hospital’s energy management plan is to promote sustainable stewardship.

To obtain full value from energy management activities, and to strengthen our conservation initiatives, a strategic approach will be taken. Our organization will strive to fully integrate energy management into our practices by considering indoor environmental quality, operational efficiency, and sustainably sourced resources into major financial decision-making.



4 Ontario's Green Energy Act – Overview

Ontario's Green Energy Act (GEA) was created to expand renewable energy generation, encourage energy conservation and promote the creation of clean energy jobs.

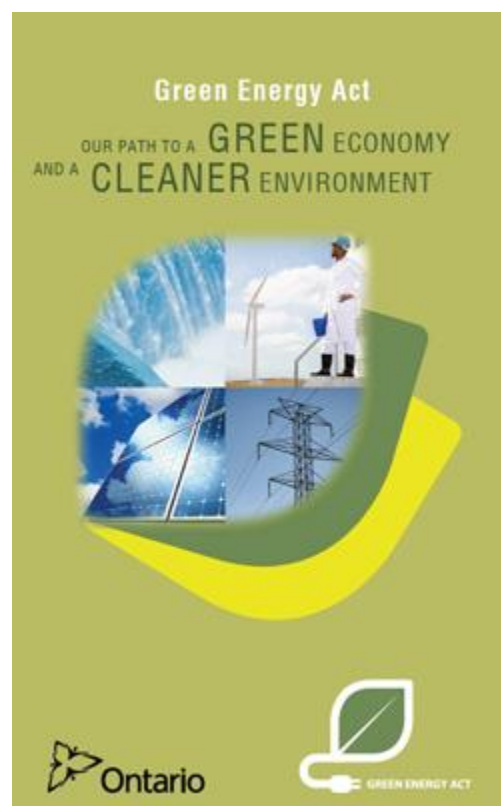
4.1 Promoting Energy Conservation

Conserving energy not only saves money for families and businesses, but it also lowers demand on the electricity system and helps reduce greenhouse gas emissions.

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

The GEA continues to promote conservation by:

- *Making energy efficiency a key element of Ontario's building code*
- *Creating new energy efficiency standards for household appliances*
- *Working with local utilities to reach assigned conservation targets*
- *Protecting low-income Ontarians through targeted conservation programs*



5 Building Survey

Cambridge Memorial Hospital’s facility consists of one building that has been analysed for sustainability. Cambridge Memorial Hospital serves the community of Cambridge, North Dumfries and the region of Waterloo in health promotion, prevention, diagnosis, treatment, research and patient care. The facility provides a unique component of acute care services along with a teaching facility to the Cambridge and surrounding community.

The chart below provides a brief site description of each facility.

Table 5.1: Facility Summary

Cambridge Memorial Hospital	
Type of Facility:	Healthcare Services
Total Number of Buildings	1
Address:	700 Coronation Blvd. Cambridge, ON N1R 3G2
Gross Area (ft ²)	380,000
Facility Use:	The facility provides acute care services



6 Annual Energy Consumption

Energy, in cost and resource stewardship is a significant public policy issue. Hospital facilities are among the most energy intensive buildings in the public sector. Hospitals can substantially reduce energy costs while maintaining or improving the quality of patient care. Knowing where your facility stands in comparison to other buildings in the industry can provide insight into opportunities for improvement. Once a baseline is established, management can decide which energy efficient measures will best suit the needs of their facility.

6.1 Energy Consumption

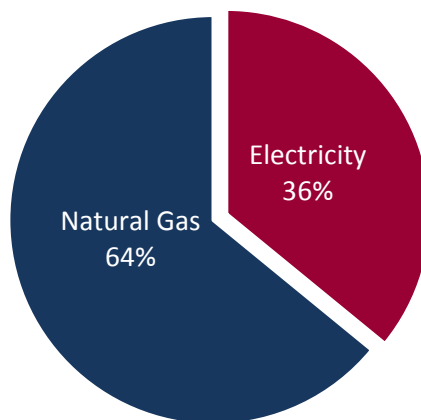
In order to compare different energy sources, within this report, energy will be expressed in units of ekBtu—or equivalent kilo-British thermal units. The energy contained in a cubic meter of Natural Gas, and the energy contained in a kilowatt-hour of electricity will be converted to ekBtu, and consumption or savings will be expressed thusly.

Current utilities supplied for Cambridge Memorial Hospital consists of natural gas, electricity, and water. Utility consumption for each respective utility has been adjusted to fit a regular calendar year (365 days). Water consumption has been excluded from the analysis.

Table 6.1: Utility Consumption Summary for 2012

Energy/Utility Source	Annual Consumption in Units	Annual Consumption (ekBtu)
Electricity (kWh)	7,531,527.00	25,552,590.83
Natural Gas (m ³)	1,248,576.64	45,580,371.09

Proportion of Total Annual Utility Consumption



6.2 Energy Utilization Index

Energy Utilization Index is a measure of how much energy a facility uses per square foot. Breaking down a facility’s energy consumption on a per-square-foot-basis allows facilities of different sizes to be compared with ease.

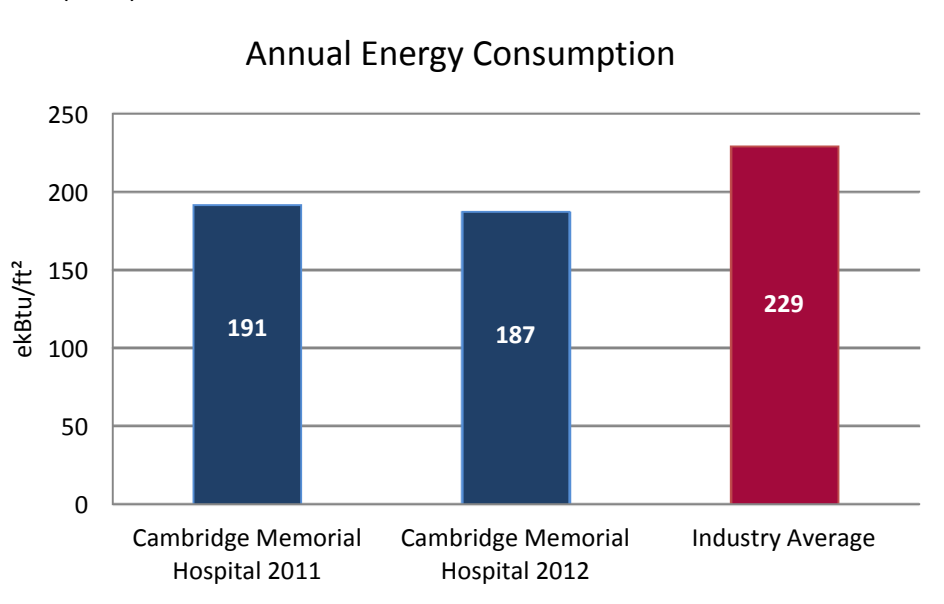
In this case, we are comparing our facility to the industry average for Ontario hospitals, derived from Natural Resources Canada’s Commercial and Institutional Consumption of Energy Survey. The figure below compares our annual energy consumption per square foot to the industry average for Ontario hospitals—228.95 ekBtu/ft^2 —provided by Natural Resources Canada (2007).

Based on NRCan’s 2007 Summary Report of Commercial and Institutional Consumption of Energy Survey, hospitals ranked the highest energy intensity by sector. Such an amount of energy consumed on site per square foot is the result of specialized and sophisticated equipment, as well long hours of operation.

Table 6.2: Energy Use Intensity Comparison to Industry Average

Facility	EUI (ekBtu/ft^2)	Comparison to Industry Average
Cambridge Memorial Hospital	187	Cambridge Memorial Hospital has an EUI that is lower than the Ontario hospital industry average.

The figure below compares our annual energy consumption to the industry average provided by Natural Resources Canada (2007).



7 Greenhouse Gas Emissions

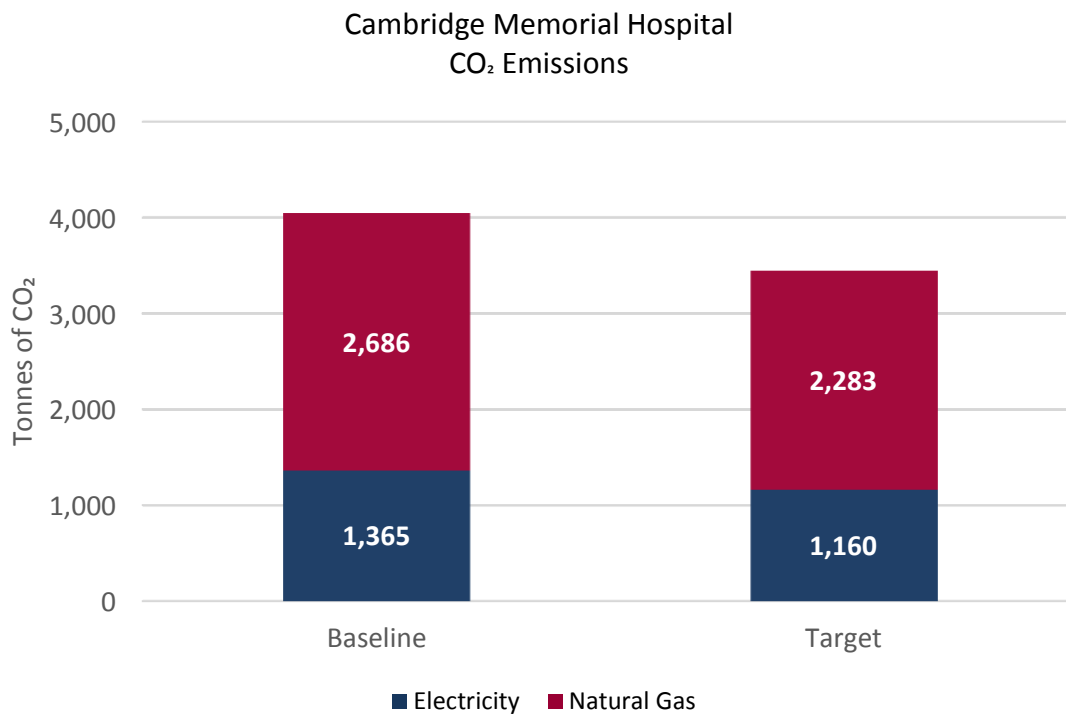
Greenhouse Gas (GHG) emissions are expressed in terms of equivalent tonnes of Carbon Dioxide. The GHG emissions associated with a facility are dependent on the fuel source—hydroelectricity produces fewer greenhouse gases than coal-fired plants, or light fuel oil produces fewer GHGs than heavy.

Electricity from the grid in Ontario is relatively ‘clean’ as the majority is derived from low-GHG hydroelectricity, and coal-fired plants have been phased out. Natural Gas and Electricity consumptions have been converted to their equivalent tons of greenhouse gas emissions in the table below.

The greenhouse gas emissions are calculated based on the energy consumption data analyzed, as following.

Table 7.1: Energy Related Greenhouse Gas Emissions Analysis

Utility Type	Units/Year	Tonnes of CO ₂
Electricity (kWh)	7,531,527.00	1,365.71
Natural Gas (m ³)	1,248,576.64	2,686.42
Total CO₂ Emissions		4,051.13

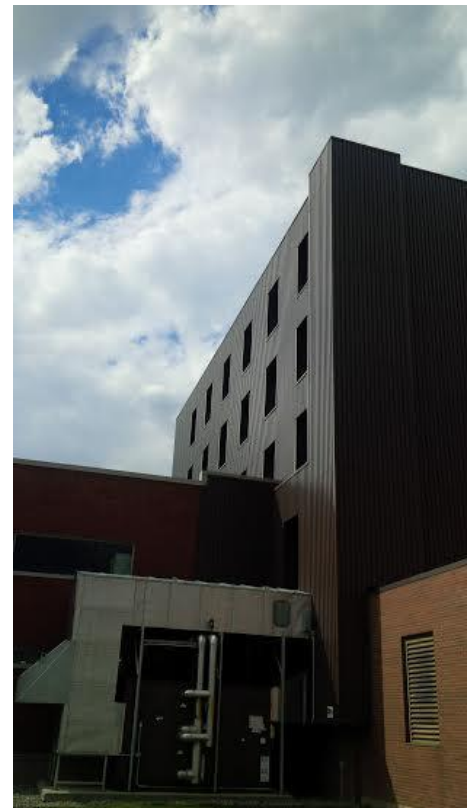


8 Sustainability Successes

8.1 Honeywell

In 2010, Cambridge Memorial Hospital worked with Honeywell Energy Solutions on an *Energy and Facility Renewal* project that saw several aspects of our facility upgraded to more advanced and more efficient technologies. Highlights of the upgrade included:

- All incandescent lighting was upgraded to compact fluorescent
- Vending machine energy misers were installed on all vending machines
- Computer settings were changed so computers reverted to stand-by when not in use
- The existing DDC control system was expanded
- Ventilation was adjusted to match occupancy
- Heating, cooling and humidification sequencing
- Variable speed drives and zone dampers were installed on Air Handling Units
- Variable speed drives were installed on kitchen exhaust hoods
- The air system was switched to mixed air, as opposed to always pulling fresh air
- Heat recovery was implemented with the steam vents
- A steam trap survey was conducted so leaks could be identified; leaks found were replaced or repaired
- Instantaneous, Tank-less Domestic Hot Water heaters were installed
- All mechanical equipment and piping was insulated
- Chiller plant optimization
- Replace door seals and sweeps to improve our building envelope
- Seal mechanical building penetrations
- Implemented solar thermal heat collection through solar walls



9 Conservation & Demand Management Plan

Conservation & Demand Management requires adequate planning in order to produce long-term success. This section of the report outlines the following:

1. **Previously Implemented & Ongoing Conservation Strategies**
2. **Proposed Conservation Strategies**

9.1 Previously Implemented & Ongoing Conservation Strategies

Cambridge Memorial Hospital underwent an extensive energy retrofit program implemented by Honeywell. The results of this retrofit design are:

- Nearly 1,000,000 kWh of electricity saved annually
- Over 200,000 cubic meters of natural gas saved annually
- Nearly \$200,000 saved annually

The existing energy saving initiatives that have previously been implemented, as well as the utilities affected by those initiatives, are summarized in Table 9.1.

Table 9.1: Previously Implemented Energy Saving Initiatives

Item	Affected Utility	Annual Energy Savings
Lighting Retrofit & Redesign	Electricity	107,195 kWh/year
Vending Machine Controls	Electricity	2,770 kWh/year
Computer Stand-by Settings	Electricity	108,358 kWh/year
Expand Existing Controls Systems	Electricity & Natural Gas	121,492 kWh/year 14,026 m ³ /year
VFDs and Zone Dampers on AHUs	Electricity & Natural Gas	223,602 kWh/year 38,124 m ³ /year
Convert Fresh Air Systems to Mixed Air Systems	Electricity & Natural Gas	1,236 kWh/year 8,942 m ³ /year
Heat Recovery for MER-1	Natural Gas	50,306 m ³ /year
Repair and Adjust MER-1	Electricity	38,871 kWh/year
Optimize Chiller Plant Operation	Electricity	392,378 kWh/year
Solar Walls & Boiler	Natural Gas	47,773 m ³ /year
Steam Trap Repairs/Replacement	Natural Gas	7,850 m ³ /year
Tank-less Water Heater Installation	Natural Gas	3,339 m ³ /year
Insulate Mechanical Equipment & Piping	Natural Gas	29,815 m ³ /year
Door Seals, Sweeps, & Weather Stripping	Natural Gas	6,756 m ³ /year



9.2 Proposed Conservation Measures

The energy analysis has revealed several conservation strategies for the facility. The Proposed Conservation Strategies section will outline the following:

1. **Priority Levels Overview**
2. **Proposed Conservation Measures**
3. **Capital Redevelopment Project**

9.2.1 Priority Levels Overview

In the following section there will be mention of Priority Levels with regards to each Conservation Measure (CM). Priority levels are assigned based on several factors including: paybacks and return on investment calculations, rebates and incentives, understanding facility sustainability goals, and analyzing existing equipment remaining life to assist in selecting appropriate sustainable alternatives.

Table 9.1: Explanation of the Priority Level System

Priority Levels	Definition
In Progress	Project is currently underway.
1	These CMs are the highest priority and the process to implementation should begin within the next 12 months.
2	These CMs are a high priority and should be reviewed with the intention of implementation within the next 24 months
3	These CMs are a medium priority and should be reviewed with the intention of implementation within the next 36 months.
4	These CMs are a low priority and should be reviewed with the intention of implementation within the next 36 - 60 months.
5	These CMs are the lowest priority and can be reviewed at a later date.



9.2.2 Proposed Conservation Measures

The following table summarizes the recommended conservation strategies that were discovered through the analysis process and outlines what utility costs would be avoided, listed by category.

Table 9.2: Summary of Proposed Conservation Measures

Measure	Impacted Utility	Priority Level
Upgrade Lighting System	2	\$ 220,000
Water System Upgrade	3	\$ 185,000
Supply fan refurbishment	1	\$ 18,000

9.2.3 Capital Redevelopment Project

In the next 3 to 5 years Cambridge Memorial Hospital is planning on building a new hospital wing that will be approximately 350,000 square feet with all of the newest energy efficient mechanical and electrical equipment including: a high efficiency building envelope, high efficiency lighting, and high efficiency auxiliary motors, all connected to the buildings BAS system to optimize energy consumption. Also included in the Capital Redevelopment Project Cambridge Memorial Hospital has proposed to renovate approximately 150,000 square feet of an already existing wing. These renovations include optimizing the current electrical and mechanical systems to higher efficiency models.



9.3 Energy Commodities Management

Energy management refers to both how energy is purchased and how energy is used for building operations. An important aspect of energy management is putting in place an adaptable energy commodities procurement strategy to be able to adjust to fluctuating commodity prices. We currently work with Blackstone Energy Management Services Inc. to assist us in our energy commodities procurement. Working with Blackstone allows us to meet or reduce our energy commodity budgets. This process ensures that resources can be properly allocated to energy and water saving programs.

Energy Commodities

- Electricity
- Natural Gas



9.4 Cleaning, Sanitization and Disinfection

Cleaning, disinfection and infection control are important aspects of our hospital environment. As part of our Conservation and Demand Management Plan we believe that the right combination of housekeeping and infection control practices can further support our sustainable efforts while improving patient care. As part of our on-going commitment to sustainability, we are currently reviewing the use of different strategies such as microfiber cleaning systems, antimicrobial coatings, and environmentally friendly cleaning and disinfection products.

10 Closing Comments

Thank-you to all who contributed to Cambridge Memorial Hospital’s Conservation & Demand Management Plan. We consider our facility a primary source of giving care, and an integral part of the local community. The key to this relationship is being able to use our facilities efficiently and effectively to maximize our ability to provide the highest quality of healthcare services while integrating environmental stewardship into all aspects of facility operations.

On behalf of the senior management team here at Cambridge Memorial Hospital, we approve this Conservation & Demand Management Plan.

Angelo Presta

Director Capital Redevelopment



This report was prepared through collaboration between the Cambridge Memorial Hospital facilities management, and the Blackstone Energy team.

