

Promising Practices



Institutions

The Ottawa Hospital puts a priority on energy efficiency

Ontario's hospitals are major consumers of energy, both for heating and cooling and in relation to their other electricity needs. In 2006, the Ontario Hospital Association (OHA) and the Ontario Power Authority (OPA) concluded that average energy use per square metre for hospitals in the province had actually increased from 2003 to 2005 (from 2.59 to 2.65 GJ/m²), and that hospitals were in fact the largest consumers of energy in the institutional sector by a significant margin.¹



Outgoing Hydro Ottawa President and CEO, Rosemarie Leclair (far right) and Mr. Bruce Bibby, Manager of Energy Conservation at Hydro Ottawa (far left), present a cheque for \$69,650.00 to Mr. Cameron Love, Vice President of Planning, Support Services and Clinical Programs at The Ottawa Hospital and Dr. Bob Roberts, President and CEO, University of Ottawa Heart Institute.²

Despite this upward trend in consumption, a number of Ontario hospitals had already embarked on energy conservation programs and several had won awards for their work in

this area. The Ottawa Hospital (TOH) was one of the award winners, having been given the 2005 OHA Energy Efficiency Award, co-sponsored by Natural Resources Canada. Here we summarize TOH's substantial achievements both before and after the OHA award.

The Ottawa Hospital, a multi-facility hospital with three different locations in Ottawa, has been implementing a complex series of energy efficiency improvements as far back as 1991, when they installed a stack flue gas heat recovery system for the boiler plant at the Civic campus.

The hospital's facilities cover over three million square feet in a patchwork of buildings ranging in age from eight to 80 years. In 2003, total annual utility costs (electricity plus gas) were \$14 million. Concern for costs coupled with a desire to improve building comfort, ensure code compliance, reduce environmental impact and manage utility risks, all suggested the need to implement a more comprehensive energy conservation plan.

Administrators recognized that building systems required substantial investments both to bring energy costs in line and building performance up to date. But they simply did not have the capital to make all of the necessary changes. At the same time they wanted to bring their operating costs down and find more money for patient care. Two solutions presented themselves:

1. For major capital investments with long paybacks and relatively high risk, "performance contracting" offered a solution that would deliver energy efficiency upgrades

- without compromising operating budgets.³
2. For smaller investments with more attractive paybacks, the option of obtaining incentive grants from major energy suppliers such as Enbridge Gas and Ottawa Hydro (via the OPA Electricity Retrofit Incentive Program [ERIP]⁴) was considered.

In 2004-5, the hospital undertook a performance contracting project in collaboration with Honeywell Canada, resulting in electricity savings of \$2.7 million per year over a 15-year period. This project covered a variety of retrofits at all three campuses, including:

- Lighting retrofits at all three campuses
- HVAC automation for most air handling units considering occupied periods.
- Replacement of some hot water boilers with more efficient units
- Replacement of HVAC motors with high efficiency motors
- Power factor correction
- Sealing of building envelopes to reduce heat loss by air leakage
- Water conservation through installation of water conserving fixtures and reductions in process water usage.

The work was started in the summer of 2003 and was completed in 2005 for a cost of \$17 million. The relatively long payback period enabled TOH to keep \$1 million in savings each year to add to its operating budget, a bonus since its actual savings exceeded the contractor-estimated amount.⁵

Enbridge Gas Distribution also supported the project with an \$80,000 energy efficiency incentive payment based on the projected first year natural gas savings from boiler replacement. For this improvement, TOH qualified for a Natural Resources Canada incentive for reducing greenhouse gas emissions of 11,833 tonnes. In 2009, Enbridge also assisted the hospital with replacement of some very old (1928) steam boilers, originally

from a scuttled ship. These boilers, originally fired by coal and later by bunker oil, were converted to gas in the 1970s but had operated at relatively low efficiencies compared to the new “English” boilers that replaced them.

The Cyclotron Project

In 2010, responding to a shortage of medical isotopes triggered by the temporary shutdown of Canada’s Chalk River reactor, the University of Ottawa Heart Institute (a section of TOH) purchased a cyclotron, enabling the Institute to generate its own isotopes and to conduct pioneering work in the use of isotope tracers for heart diagnostics.

The cyclotron requires a highly regulated temperature range to operate effectively, and has an estimated cooling load of approximately 10 tonnes.⁶ To maintain this range, the hospital would have had to run its existing 600-tonne chiller unit during the winter months, radically increasing the Institute’s energy bill.

Instead, the Institute chose to install a smaller 15 tonne chiller, enabling it to shut down the 600 tonne chiller during the cooler months. This project was submitted to ERIP, and showed an overall cost for the chiller installation of \$133,315, against which ERIP provided an incentive payment of \$48,000. With annual savings of \$55,845, the payback for this project is only 1.5 years. In this case, TOH itself acted as the project manager, enabling it to receive the full amount of the savings and thus write off its capital investment in a very short period of time.

Apart from this project, additional work was done in 2010 to reduce energy costs for chiller operation at the Civic Campus of TOH. The hospital decommissioned two old chillers with a total capacity of 800 tonnes and then tied in the cooling load to their central cooling system which was upgraded the year before. The savings for this project was estimated at

\$29,995 per year and the hospital received an ERIP grant in the amount of \$21,650. The project cost \$55,588, and with the ERIP grant the payback period was only 1.1 years.

Energy Awareness

In addition to the various technical retrofits undertaken, TOH has also developed a strong Energy Awareness program. For example, as part of the agreement with Honeywell, that company's Building Solutions Division provided TOH with a program to teach general staff energy efficient practices and to train building systems personnel in the efficient operation and maintenance of new and existing equipment. The hospital's 2005 Annual Report noted that this Energy Awareness Program "leads to savings of \$75,000 over and above the \$2.7 million per year the hospital already saves through its energy conservation partnership with Honeywell Ltd." Enbridge Gas Distribution also provides ongoing energy management expertise to the OH.

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References:

¹ Jefferson J. "Energy Efficiency Opportunities in Ontario Hospitals." Sure Solutions Inc. February 2006.
www.oha.com/CurrentIssues/Issues/eHealth/Documents/EnergyEfficiencyOpportunitiesfeb28.pdf. Accessed June 2011.

² Hydro Ottawa. "Incentives Contribute to Energy Efficiency Remedies at The Ottawa Hospital." Press release. 25 October 2010.
www.hydroottawa.com/newsevents/news_display.cfm?LANG=e&act=form&News_ID=196. Accessed June 2011.

³ Performance contracting usually involves a partnership with a major energy efficiency contractor, who agrees to cover the cost of the retrofit project, taking on the debt burden for the investment while guaranteeing stable energy costs over the payback period. Contractors pay back their own costs from the savings; if the savings exceed the amount calculated by the contractor, the facility owner/operator considers the contractor conditions fulfilled and both parties are winners, however, if the savings report show shortage in guaranteed savings, then the contractor pays the owner the difference between the guaranteed savings and the actual savings.

⁴ The OPA, in conjunction with local electricity suppliers such as Hydro Ottawa, has been implementing the ERIP for several years. The objective of the program is to initiate energy conservation and load management projects within the commercial, industrial, agricultural and institutional sectors by offering financial incentives to reduce initial capital costs and improve pay-backs.

⁵ Rashid F. "The Ottawa Hospital Celebrates Green Success." Healthcare Quarterly. Volume 9, no. 2. 2006.
www.longwoods.com/content/18109. Accessed June 2011.

⁶ Chillers (cooling units) in industrial-commercial applications are usually classified by their ability to handle specific cooling "loads": in this measurement, a ton is the amount of heat removed by an air conditioning system that would melt 1 ton of ice in 24 hours. This amounts to approximately 288,000 BTU, or 12,000 BTU/hr.

