Implementing a 5 year Energy Conservation and Demand Management Plan

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The journey to energy self-sufficiency is underway at the Queensway Carleton Hospital with significant upgrades to their cogeneration engine and heating loop, as well as supporting energy efficiency opportunities in day-to-day and long-term operational planning.

“We, at the Queensway Carleton Hospital, are very energy conscious all the way from the technicians to the CEO, and with the help of today’s technology we can enjoy savings that were unattainable 10 years ago.”

– Gilles Lecuyer, Plant Services Manager

Parking lighting retrofits reducing electricity consumption

Redesigning James Beach building heating loop
The Queensway Carleton Hospital (QCH) is a 282-bed patient and family-oriented acute care facility situated in the west end of Ottawa. The Hospital opened in 1976 as a 240,000 ft² facility, before eventually expanding the facility to 680,000 ft² through a series of redevelopment projects over the years.

The recent 10-year expansion plan allowed for significant growth in the Emergency Department, which is the busiest in Eastern Ontario with almost 78,000 visits in 2017, and improvements to QCH facilities by introducing several new systems and equipment.

In an effort to ensure that their facilities are running at optimum efficiency, QCH has thoroughly committed to tracking and monitoring their energy consumption for the past 10 years.

However, due to the introduction of new equipment with steep learning curves, and new systems that have limited coordination with the older systems, the Hospital’s Building Operators found it exceedingly challenging to adapt to these changes.

This led to an overall decline in energy efficiency in recent years, which prompted the Hospital to come up with a 5-year comprehensive Energy Conservation and Demand Management (ECDM) plan beginning in the 2014/15 fiscal year.

The Hospital invested around $15 million to implement a list of projects highlighted in the ECDM. One of these projects was the Parking Lighting Project, which saw the replacement of the parking lot’s T8 fixtures with high efficiency LED fixtures with occupancy sensors. This reduced electricity consumption by 263,000 kWh per year.

In 2004, the Hospital added a 1 MW cogeneration (cogen) system that generated 6,600,000 kWh of electricity to the facility. In recent years, the system’s performance has been hindered by redevelopment projects that interrupted the cogen’s normal operation.

With the aim of improving the cogeneration runtime performance from 75% to 85%, the cogeneration engine was replaced in 2015.

Maintenance schedules were planned such that they align with Hydro Ottawa to minimize remote transfer trips that halt generation capability.

Moreover, the Hospital identified room for improvement in the James Beach building. The project successfully redesigned the heating loop by connecting the supply side of the loop to the Hospital’s main heating loop and matching the control sequence of both loops. This will enable the distribution of heat generated by the cogeneration unit to the James Beach building, resulting in a 155,000 m³ reduction in natural gas per year, effectively eliminating 5 redundant boilers.

Other measures include fitting existing pumps with Variable Frequency Drives (VFD) and replacing six aging Air Handling Units (AHUs) with energy efficient units that are also equipped with VFDs on supply and return fans. Prior to energy conservation measures, the AHUs ran around the clock regardless of occupancy. This is no longer the case since some of the AHUs are on schedules with night setback temperature setpoints (26°C in the summer and 18°C in the winter).
3 RESULTS

Energy results: In 2016, the cogen runtime capability reached 86%, generating 7,000,000 kWh of electricity[3]. Furthermore, the heating loop redesign contributed to the reduction of 3.5% of the Hospital’s total gas consumption. Overall, the Hospital was successful in reducing its Energy Use Intensity by 6 kWh/ft², leading to annual savings of over $160,000[3].

GHG reduction: The expected annual impact of reduced emissions resulting from the implemented retrofits is approximately 1,400 tonnes of carbon dioxide equivalent (tCO₂e) per year, which is similar to the annual emissions from over 150 homes.

4 CONCLUSIONS & REFLECTIONS

The Queensway Carleton Hospital has enjoyed great success with its energy management plan, and demonstrated resilience in the face of adversity. These retrofits have taken the Hospital a step closer to fulfilling their goal of becoming a provincial leader when it comes to energy efficiency within the healthcare sector.

Identifying new conservation opportunities remains a continuous priority for the Hospital. The ECDM plan will be updated as soon as new initiatives are developed and put in place in order to build upon previous success[2]. Currently, the Hospital is looking at the feasibility of purchasing a second 1MW cogen engine, which would make the Hospital self-sufficient given that its total demand is 1.6 MW[3].

REFERENCES