CASE STUDY

University Health Network Toronto General Hospital

R. Fraser Elliot Building, Toronto, Canada

University Health Network

PROJECT OVERVIEW

Throughout North America most large medical institutions have separate wings or buildings that house the necessary staff and infrastructure to manage an enterprise with annual revenue and expenses in the hundreds of millions of dollars. Within hospitals, non-patient and common areas (laboratory, administrative, research, hospital services and indoor parking) provide an excellent opportunity for significant savings in lighting energy. This opportunity was identified by the environmental manager and the senior management of University Health Network in Toronto.

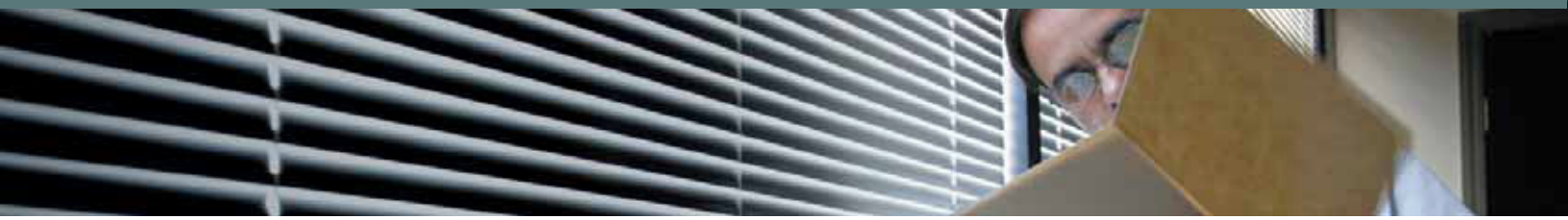
The R. Fraser Elliot Building is a six story 175,000 mixed use commercial building which houses the hospital's executive offices, administration, research facilities, food service and emergency medical services. The building was constructed in 2001 and was originally equipped with the best available fluorescent lighting technology of the time. The existing lighting system consisted of TT5 direct/indirect and T8 2'X4' deep cell parabolic light fixtures equipped with electronic ballasts. The building also had a basic lighting control system.

CHALLENGE

At the outset, the hospital, working with Encelium's engineers set five clear objectives for the project:

- To reduce lighting energy consumption by 50% and deliver a simple payback from energy savings of less than five years
- Reduce lighting demand by 35% and provide demand responsive load shedding capabilities
- Maintain illumination levels consistent with IES standards and customer requirements and eliminate over-lighting where appropriate
- Provide computerized control of lighting from a central software application
- Provide personal lighting control for individuals in the office areas

CASE STUDY TORONTO GENERAL HOSPITAL - R. FRASER ELLIOT BUILDING



DESIGN APPROACH

Installation of the Encelium Energy Control System (ECS) included retrofitting the existing fixtures with electronic dimming ballasts and high performance lamps, and installing occupancy sensors, photo sensors, low voltage controllers and Encelium control hardware and software in approximately 95,000 sq. ft. of the building. The retrofit area included the following elements:

- 1232 Fixtures
- 1220 Dimming Ballasts
- 148 Occupancy Sensors
- 28 Photo Sensors
- 340 PCs with Personal Control Software

SOLUTIONS AND RESULTS DELIVERED

ECS delivered energy savings exceeding customer expectations through the deployment of the following energy management strategies:

Personal Control - Control of personal lighting space from the desktop PC

Task Tuning - Tuning light levels to suit the particular task or use in a workspace

Daylight Harvesting - Adjusting artificial light based on ambient natural light contribution

Smart Time-scheduling - Time scheduled switching based on zones as small as an individual workspace

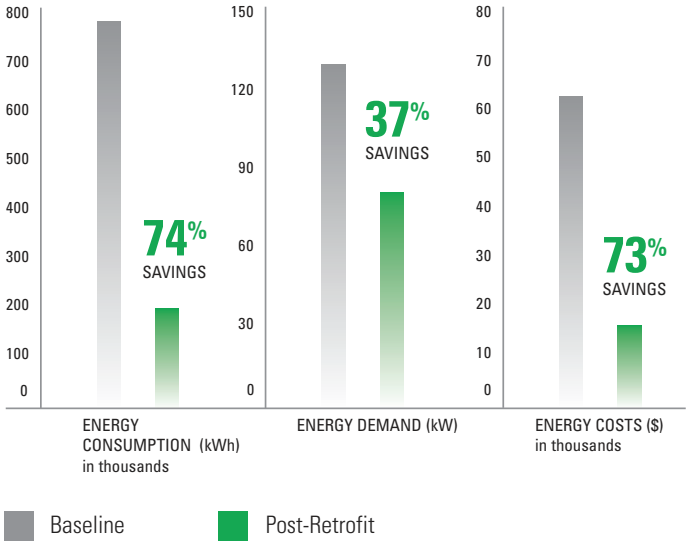
Occupancy Sensing - Switching of dimming lighting based on occupancy

Variable load shedding - Intelligent management of peak/non-peak lighting energy demand from central control software

Lighting quality was improved by elimination of over-lighting in many areas. Individuals were able to control the light levels in their workspace by use of the personal control software and in fact, generally tended to reduce already task tuned light levels through this feature.

The project realized the following results:

- Lighting energy consumption reduction of 74% (588 MWh/yr.)
- Lighting energy demand reduction of 37% (49 kW)
- Improved light quality and workplace ergonomics
- Maintained IES recommended light levels
- Annual energy cost reduction of $47,000 or $ 0.45/sq.ft.
- Simple payback from energy savings of 4 years (net payback of 3.2 years with incentives)
- Positive environmental impact - 177 tonnes of CO2 emissions eliminated



MEASUREMENT AND VERIFICATION

One floor of the building, consisting of approximately 25,000 sq. ft. was used as a control area for the purpose of measurement and verification. This floor was comprised of typical administrative and office use and was representative of typical use throughout the building. Prior to installation of the Encelium system, the lighting circuits of the Control Area were sub-metered with a Revenue Canada certified electrical meter to establish an energy consumption baseline. Energy consumption and demand were recorded prior to system retrofit for a period of 60 days. After installation and activation of the system, energy data was recorded in the Control Area for two sample periods of 7 consecutive days over the course of 2 months. Overall consumption (kWh) was reduced by 74% while peak demand (kVA) was reduced by 37% from the pre-retrofit baseline. The summarized results are an extrapolation over the entire building based on the data recorded for the Control Area.

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