

St. Paul's Hospital

Utility costs reduced by 21% annually and dramatic improvements to indoor air quality and ventilation in operating rooms

Participants:

- St. Paul's Hospital (building owner/occupant)
- Honeywell Limited (energy service company or "ESCO")
- Christopher Collett & Associates (indoor air quality consultant)
- B.C. Hydro (PowerSmart funding)

Hospital:

- 450 bed capacity
- Four buildings, 99,700 square metres of floor space
- Baseline (adjusted) energy consumption of \$2,003,354 in 1994

Building Improvements:

- Retrofits performed on four buildings
- Lighting retrofit and redesign
- Installation of zone dampers, variable speed drives, and occupancy sensors to reduce air flow to unoccupied spaces
- Steam control valves installed in the low-pressure steam lines for radiators in two buildings
- Flushometers adjusted to shorten toilet and urinal flush time and reduce water consumption
- Upgrading of existing automated building control system to improve HVAC control
- Airflow for ventilation systems, isolation rooms, and operating rooms checked and balanced

Contract/Financing:

- Performance guarantee period: June 1998 through November 2007
- Guaranteed annual savings: \$475,454 in operating costs (includes annual cost escalation and equipment replacement and maintenance savings)
- \$3,031,800 project cost (less financing and GST), financed through ESCO and a PowerSmart incentive (\$120,000)
- Six-year simple payback

Project Process:

- Contract signed in July 1996, retrofits installed October 1996 through May 1998
- ESCO worked with an indoor air quality (IAQ) consultant to identify and address IAQ problems

Education and Training:

- ESCO provided facilities staff training in automated building control system
- Energy awareness program conducted for department heads and general staff

Results:

- Annual electricity use reduced by 24%, fuel use by 16%
- Actual costs savings are 95% of guaranteed level in year one of the contract
- Greenhouse gas (carbon dioxide) emissions reduced by 600 tonnes (16%) per year
- Substantial improvement in indoor air quality, minimum 25% outdoor air provided
- Better humidity control
- 26,876 hours of labour created for local contractors

Annual Utility Use	Pre-retrofit	Post-retrofit	Saving
Electricity kilowatt-hours	24,050,948	18,331,200	5,719,748 (24%)
Electricity cost	\$1,216,756	\$937,657	\$279,099 (23%)
Steam 000 lbs	66,092	55,669	10,423 (16%)
Steam cost	\$691,456	\$582,493	\$108,963 (16%)
Water m ³	238,304	172,548	65,756 (28%)
Water cost	\$95,142	\$68,909	\$26,233 (28%)
Total utility cost	\$2,003,354	\$1,589,059	\$414,295 (21%)

Note: Pre-retrofit energy use is an adjusted baseline, including a 3% annual escalator for utility costs and adjustments for building/equipment changes. Post-retrofit energy use refers to June 1998 through May 1999 (year one).

Points of Interest:

retrofit addressed indoor air quality problems

- 1 A distinguishing feature of this project was the focus on indoor air quality. Prior to the retrofit, the hospital experienced serious problems with respect to ventilation and room temperatures (e.g., overheating of operating rooms). Occupational Health and Safety became involved and it was requested that an independent IAQ consultant be added to the project team.

ESCO worked with IAQ consultant

- 2 The ESCO and the IAQ consultant conducted two surveys of hospital staff and undertook extensive testing to determine the nature, location, and cause of indoor air quality problems. Follow-up surveys and testing have since been implemented to ensure that all problems were correctly identified and to measure the results achieved from the retrofit.

focus on operating rooms and intensive care units

- 3 Some of the greatest difficulties with air quality were in the hospital's operating theatres and intensive care units. The air systems for these rooms were redesigned and balanced to maintain proper pressure relationships. In addition, each operating room was equipped with local Direct Digital Control and occupancy sensors to improve airflow. More generally, the hospital was rebalanced to meet the needs of each area, with increased inflows of outdoor air. Thermostats and mixing boxes were adjusted to correct problems with room temperature control.

IAQ support a value-added service

- 4 According to IAQ Consultant Chris Collett, indoor air quality expertise is not a normal component of a performance contract. He maintains that "IAQ support can be a useful value-added service to build into contracts on a project-by-project basis."

construction period savings could be capped

- 5 Current Director of Physical Plant Derek Myers stated that most of the projected cost savings have been achieved to date, since a savings shortfall in the first year of the guarantee was made up by construction period savings. He recommended that other hospitals wanting to pursue these kinds of projects take a close look at the construction period savings built into performance contracts. In St. Paul's case, these savings accrued for a period of 18 months. "I'd suggest that other hospitals consider putting a cap on the construction period savings negotiated with the ESCO, by limiting the length of the construction period in the contract language."