

Ridge Meadows Hospital:

Collaboration the Key to a Multi-phase Project



What began as the installation of a new condensing boiler and the upgrade of controls on the ventilation system evolved into a multi-phase and collective approach to improving energy efficiency at Ridge Meadows Hospital (part of Fraser Health Authority). The project has resulted in significant energy reductions and operational cost savings, with a 25% reduction in annual greenhouse gas (GHG) emissions from 2015 levels.

Project Summary

Ridge Meadows Hospital is a 23,238 m² health care facility serving Maple Ridge, B.C. and surrounding areas. Like any hospital with around-the-clock operation and specialized equipment, its energy management needs are challenging.

The project consisted of three phases. The first phase began in 2015 with the installation of a new condensing boiler and the upgrade of controls on the ventilation systems. A year of measurement and verification post-installation showed that the estimated savings were achieved, with GHG emissions reduced by 250 tonnes of carbon dioxide equivalent (tCO₂e). The verification and confirmation of savings allowed for the approval of the next two phases.

The following year, Phase 2 involved installing new chillers, heat pumps, and cooling towers to reduce boiler heating demand and improve condensing on the previously installed equipment.

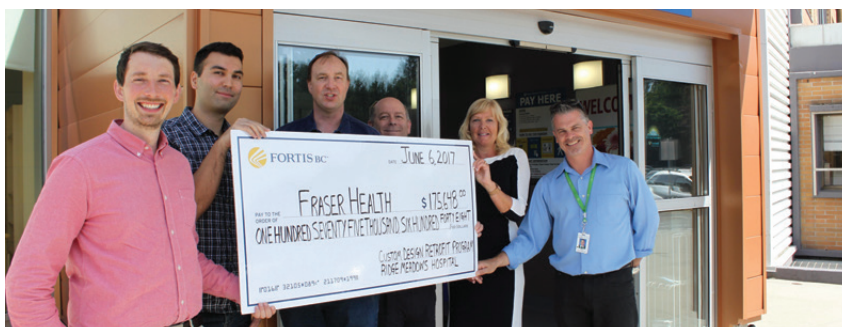
In Phase 3, in early 2018, the hospital installed new domestic hot water heat exchangers and reconfigured existing piping and valves to allow for the recirculation of water by a low temperature header pump. This allows for maximum condensing efficiency and additional heat recovery by tie-in to the high temperature return. Phase 3 measures move Ridge Meadows Hospital further toward optimal energy efficiency.

Collaboration between the Energy and Environmental Sustainability Department and the Facilities Maintenance and Operations Department was a key success factor throughout the project.

Benefits

In addition to reducing GHG emissions, Ridge Meadows experienced the following benefits:

- Lower costs and consumption rates of natural gas and electricity
- Reduced maintenance time and related costs
- Improved air quality with a higher level of oxygen, due to higher proportion of outdoor air in the mix
- Better control of temperatures
- Enhanced working relationships between the Energy and Environmental Sustainability Department, and the Facility Maintenance Operation Department, and other stakeholders



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Commitment and Collaboration

The Ridge Meadows project was a team effort right from the beginning. When originally considering the required upgrades for the heating system, the Energy and Environmental Sustainability Department identified an opportunity to access Fortis incentives. They brought this to the Facility Maintenance Operation team which was immediately on board. Other stakeholders, including clinical practitioners, were kept advised of progress.

Project funding was obtained internally and from the Carbon Neutral Capital Program, supplemented by Fortis BC and BC Hydro incentives. The project was identified as a great opportunity to move Ridge Meadows forward towards its emissions reduction target.

All stakeholders of the site were kept advised of project progress even there was little work completed outside of the mechanical area, Project activities such as planned shutdowns of mechanical systems were needed throughout the project and these had to be carefully planned by the Facilities Maintenance and Operations Department with other department's stakeholder to avoid operational disruptions.

Logistical issues did arise – for example, the mechanical room was overcrowded and there was no way to get the boiler in. This required taking apart the plenum that brought air into the mechanical room, and then using a crane to bring the boiler into the room. And there were a few surprises, such as discovering that the double wall stack economizer originally planned could potentially introduce contamination. The design was then changed to use a single wall economizer.



The Business Case

Phase 1 EES F16 CNCP Project

Scope: New condensing boiler, VSDs on pumps and fans and conversion of HD/CD to VAV

Cost: \$511,241

Annual Cost Savings: \$58,096

Electrical Savings: 183,200 kWh per year

Natural Gas Savings: 5,090 GJ per year

Simple Payback: 5.2 years (including utility incentives)

Phase 2 FMO Capital Upgrade

Scope: New Trane chillers, new heat pumps, cooling towers and variable speed pumps

Cost: \$650,000

Annual Cost savings: \$18,650

Electrical Savings: 58,500 kWh per year

Natural Gas Savings: 1,698 GJ per year

Simple Payback: 35 years (note: simple payback was not the driver for this project, it was capital replacement)

Phase 3 EES F18 CNCP Project

Scope: 3 new DHW Heat Exchangers, space heating heat exchanger, and energy valves

Cost: \$205,000

Annual Cost savings: \$24,200

Natural Gas Savings: 3,010 GJ per year

Simple Payback: 4.4 years (including utility incentives)

Results

Saving metrics looked good from the beginning. For Phase 1, the project team was able to verify that the projected reductions of 5,000 GJ natural gas and 183,000 kWh in electricity had been achieved for a total greenhouse gas emissions reduction of over 250 tCO₂e.

Equally important was the relationship that was formed and strengthened due to the successful collaboration between the Energy and Environmental Sustainability Department and the Facilities Maintenance and Operations Department. With 11 hospitals controlled by Fraser Health, this will have positive implications for many other opportunities.

Since the implementation, the two departments have been meeting quarterly to review the energy performance of the hospital. These engagement sessions provide these main stakeholders with a unique opportunity to continuously review and optimize plant operations. The Ridge Meadows experience has been adopted as a model for other sites to follow.

With the great partnership formed between the Energy and Environmental Sustainability Department and the Facilities Maintenance and Operations Department, we are confident that additional heating plant emissions reduction strategies will be identified and implemented throughout Fraser Health.

Lessons Learned

1. Ask for support. For a project to be successful, you will need cooperation from other departments. If you don't ask, it won't happen.
2. Think in terms of holistic plant design. After the Phase 1 boiler retrofit, a thorough review of all boiler inputs and outputs prompted a more comprehensive design strategy.
3. Constantly review design and be prepared to modify it on the fly. Once underway, every project will reveal new opportunities and open new doors.
4. Be prepared to change your design and seek additional incentives.



Related Resources & Links

Technical Information

- The Consortium for Building Energy Innovation - Converting to variable air volume (VAV)
http://cbei.psu.edu/wp-content/uploads/2016/07/Finding_CAV-to-VAV-AHU-Retrofit.pdf
- National Renewable Energy Laboratory - Condensing Boilers Evaluation: Retrofit and New Construction Applications
<https://www.nrel.gov/docs/fy14osti/56402.pdf>

Government Funding Programs

- Community Energy Leadership Program
www.gov.bc.ca/communityenergyleadershipprogram
- Innovative Clean Energy Fund
www.gov.bc.ca/innovativecleanenergyfund

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Questions and additional support

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