



BOMA BC Case Studies: Energy & Environment Series

Developed by BOMA BC's Energy & Environmental Committee



Heat Recovery Initiative

The project was commissioned in December 2014 and has exceeded savings expectations for natural gas with a load reduction of roughly 5,000 GJ. As a result, Vancity head office has slashed its natural gas consumption by 95%, with an overall reduction in greenhouse gas emissions by 75%.

Executive Summary

When considering replacement of their existing Chiller plant, Vancity realized that a tremendous amount of waste heat (roughly 400,000 Btu / hour) was being rejected to their cooling towers 24 hours per day due to the operation of a large data centre. In collaboration with Fortis BC, Vancity decided to engage SES Consulting to conduct a gas conservation study to determine the viability of capturing this waste heat to be used in the building.

While this project involved a relatively large capital upgrade that was incrementally more cost than a straight forward chiller replacement, the benefits of a heat recovery chiller (HRC) could be evaluated based on heating savings and reduced environmental impact. Potential incentives from Fortis would help to offset these incremental costs, making it more attractive for Vancity to make the decision to move forward.

Key Team Members

The key team members in this heat recovery initiative were: Vancity (e.g., Property Manager, Building Operator), SES Consulting (subject matter expert), Trane (technology expert), and Fortis BC (providing incentive funds).

Key steps

Reviewing feasibility of heat recovery was key to determine if this building could take advantage of low grade heat. SES worked with Vancity to test their secondary heating systems at lower water temperatures to ensure they could provide the necessary comfort under these conditions. Once determined to be technically possible, the financial analysis provided in the energy study confirmed financial payback and enabled an incentive from Fortis BC.

Typical Workflow:

1. Apply to Fortis to participate in the program
2. Complete Fortis BC Energy Study
3. Receive and sign Incentive Letter
4. Complete Engineering Design
5. Tender and Award Contract
6. Install HRC Chiller with Piping and Controls Modifications
7. Obtain Incentive from Fortis BC

Barriers

With the Vancity building located in a high-pedestrian, high-traffic area, with a Sky Train line running beneath, the installation faced many challenges. A team worked through into the early hours of the morning until 4am to remove and installed the new system. Using a crane, workers hoisted the 5,500-pound heat-reclaim-chiller some 13 stories in the air, onto the roof. With its compact size of 34" by 120", the narrow piece of equipment fit through the rooftop mechanical room's 41"-inch doorway.

Summary of Results

SES Consulting completed an Energy Study for the Fortis BC Custom Gas Conservation program, showing that the Cost of roughly \$251,000 to install an 80 Ton Heat Recovery Chiller would result in gas savings of roughly 4,000 GJ per year. Fortis evaluated this Study and offered Vancity \$85,000 to Incent the use of this technology over the standard efficiency replacement.

SES completed design documents, and Trane was awarded a contract to complete the installation of this new Heat Recovery Chiller, along with the controls and piping modifications necessary to take advantage of this new source of low grade heating water (50°C). As the building was already equipped with hot water heating coils in Air Handling Units, and reheat coils in VAV Boxes, it was possible to deliver the captured waste heat into the existing secondary heating loop, while keeping the existing boiler plant as a back-up if the HRC system could not keep up.

Conclusion

The project was commissioned in December 2014 and has exceeded savings expectations for natural gas with a load reduction of roughly 5,000 GJ. As a result, Vancity head office has slashed its natural gas consumption by 95%, with an overall reduction in greenhouse gas emissions by 75%.

The new sequence now requires the HRC to run slightly longer than the previous chiller did, as it makes more sense to use the HRC than free cooling when heat is required in the building. In addition, the existing cooling tower and condenser water pump run time has reduced significantly as they no longer have to run to reject waste heat for a portion of the winter. This said, a modest increase in electricity usage of 20,000 kWh has occurred because of this new strategy, but reduced cooling tower load has also resulted in 20% savings in domestic cold-water consumption.

For more information about this and other sustainability topics visit the BOMA BC website – www.boma.bc.ca/greenbuildings, contact our office at 604-684-3916.

