



FROM THE GROUND UP

Facilities staff are the “nuts and bolts” of sustainability at UBC’s Okanagan campus, and Roger Bizzotto, Facilities Manager, has been a key leader in developing the campus’ geo-exchange system.

It all begins with an underground source of water, the foundation of the groundwater technology that is used to heat and cool buildings on campus, with a potential energy cost savings of \$100,000 a year.

“We have a unique advantage on campus in that we are sitting on a large aquifer—a mixture of sands, gravels, silts, and organics suspended in water 60 metres below ground. Approximately 900 metres wide by 3,500 metres long, and 70 metres thick, it spans roughly two-thirds of the campus.”

A water-in, water-out concept makes it all work. The water is extracted from the ground, put through heat exchangers in the buildings, and returned back to the earth. From the heat exchangers, secondary building water is circulated through water source heat pumps powered by a 95 per cent renewable electrical energy source. The system functions at 300 per cent efficiency: for every kilowatt of energy used, three are gained.

Next, the water undergoes a refrigeration process, where heat is either injected into or extracted from the water. Not only is the university fortunate to have this natural resource right beneath the campus, but it is also at a very convenient temperature.

In the summer, the in-ground water temperature hovers around 10.5°C (50°F), the exact temperature required for cooling buildings. Without this convenient coincidence, the water temperature would need to be mechanically adjusted. In the winter, the water is compressed, raising the temperature to about 54°C (130°F) to heat buildings.

“All buildings on campus are now equipped with electric meters and gas sub-meters, which should provide future indications of energy savings on campus,” says Bizzotto. “Early statistics indicate that future savings will be substantial.”

The Charles E. Fipke Centre for Innovative Research, which houses science labs, had a virtually non-existent natural gas and hot water bill this February. At a mere \$750 for a building

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that houses activities typically considered inefficient, the numbers show a great advantage, especially when compared to a fine arts building running on a conventional gas-fired system, with a bill of \$6,000 for the same period.

It isn’t all about dollars and cents though.

“In the past we generally looked at energy-savings from a dollar perspective,” says Bizzotto. “There has been a shift from seeing things from a financial benefit, to taking action because we want to be here tomorrow and have resources available for ourselves, our community, and our kids. We are realizing that not all resources are going to be renewable.”

Two buildings on campus are currently using the geothermal system, with plans underway to expand to a campus-wide system.

“The net energy that will be extracted for the campus is estimated to be about 14,200 gigajoules,” Bozzotto says. “Putting this into perspective, the energy extracted would heat approximately 1,500 average homes.”

Upon completion, the geothermal project at UBC’s Okanagan campus is expected to be the largest university geo-exchange system in North America.

