

Mill Bay Residence Goes Green with Geexchange July 2009

The Project

A Mill Bay resident decided in the early phases of building their new 9,000 square foot home that using renewable energy was imperative to reducing their carbon footprint and saving money. Initially, the residents pursued a company that provided the design and installation using a “Conventional Geothermal” design. However, the payback and capital cost values offered were not favorable enough to be implemented.

CleanEnergy™ was then approached to review and deliver their opinion on the system. CleanEnergy™ offered a solution that resulted in a new design and selection of equipment with equivalent efficiencies, zoning and control with a significant reduction in capital costs from the original offer. To implement the solution, CleanEnergy™ partnered with one of its local dealers, Pro Star Mechanical Technologies Ltd., to provide a complete package from conceptual design, equipment, project management, construction engineering and installation. In total, the residents saved over \$229,000.



Equipment and System Benefits

The 9,000 square foot home features four WaterFurnace geoexchange units totaling twenty (HVAC) tonnes of capacity. This includes three water-to-air units and one water-to-water unit.

To optimize the system, two multi-zone forced air circuits were included. This allowed a single water-to-air unit to control up to four individual zones. The water-to-water unit provides heating for the in-floor heating zones and swimming pool.

The vertically installed closed ground loop is composed of high density polyethylene piping and consists of 36 holes, each 175 feet deep located on the property adjacent to the house. The closed loop serves as a heat exchanger providing both heating and cooling by absorbing heat from the Earth in the winter and transferring heat to the Earth in the warm summer months.

Three of the units in the residence not only supply heating and cooling, but are also equipped with desuperheating coils which capture waste heat from the unit’s condenser and in turn use it for domestic water heating. This additional feature provides over half of the hot water needs using this “free” source of heat.



The WaterFurnace Envision heat pumps provide an efficient, reliable and quiet operation for the Mill Bay homeowners.

The CleanEnergy™ Advantage

The CleanEnergy™ system provided is:

- A quiet system with no outdoor units
- A safe system with no combustion or fumes eliminating the risk of carbon monoxide poisoning from the heating system and reducing the risk of fires
- Higher natural levels of humidity in the winter providing improved comfort
- A steady, even temperature

CleanEnergy™ redesigned the initial system that the competitor proposed with equivalent efficiencies, more zoning capabilities with less capital costs for the equipment and installation. The Mill Bay resident's were so pleased with the savings CleanEnergy™ provided them; they did a complete analysis comparing the costs of using the competitor that initially quoted the geothermal system for their home versus CleanEnergy™'s. The owner of the home came to the conclusion that CleanEnergy™ saved them \$229,000 in initial capital costs.

Economic Benefits

The payback of the project

With the Competitor's Conventional Geothermal Offering as the basis used for operational savings, the CleanEnergy™ system will save an estimated \$44,316.00 in a ten year period. This gives the CleanEnergy™ design a payback of 10 years in comparison to the Competitor's Conventional Geothermal Offering payback of 23 years.

Carbon Emission Reductions

The carbon emission savings is 22.82 tonnes annually for the CleanEnergy™ geothermal system. This is the equivalent of planting fourteen acres of trees¹ or taking 8 cars off the road².

Operating Costs

One advantage of installing geothermal is that it significantly decreases the operating costs of heating and cooling a home. By implementing geothermal, the Mill Bay home owners decreased their heating and cooling operating costs by \$3,139 annually in comparison to using a conventional natural gas system.

	Gas Boilers w/ DX Chiller	"Competitor Offering Conventional Geothermal"	CleanEnergy™ Geothermal
Equipment Capital Costs	\$61,000.00	\$95,000.00	\$46,000.00
Ground Loop Capital Costs	\$0.00	\$84,375.00	\$67,500.00
Controls Capital Costs	\$13,000.00	\$103,000.00	\$9,702.00
Sheet Metal Capital Costs	\$45,000.00	\$115,000.00	\$45,000.00
System COP	0.92	4.00	3.60
Total Cost	\$119,000	\$397,395	\$168,202
Annual Operating Savings (2009)	\$0.00	(\$3,923.75)	(\$3,139.00)
Annual Operating Savings (2019)	\$0.00	(\$9,543.41)	(\$7,634.73)
Carbon Emissions Savings (Tons/Year)	0	(23.02)	(22.82)
Annual Maintenance Costs	\$6,795.00	\$3,861.00	\$2,493.00

¹ US Environmental Protection Agency

² Canadian Geothermal Coalition