



Geothermal Case Study

Interview with Monti Bassett - July 2006

Introduction

Geothermal Energy is a form of renewable energy, typically known as 'green heat' because of its minimal environmental impacts. This technology, which is increasing in popularity across Canada, can be used to heat and cool homes or commercial buildings. There are two ways in which these systems can work. The first design, *closed loop*, uses pipes that run through the ground (or into a lake or pond) in a designated space around the building; coiled horizontally, or vertically. A liquid mix of water and anti-freeze runs through these pipes absorbing the ground temperature. The second design, *open loop*, relies on a water source close to the building such as a lake, a pond, or two wells. In these systems the temperature of the water is used to regulate the temperature in the building. The water that runs through the pipes is put back into the water source (uncontaminated) or in the case of wells there are designated supply and discharge wells. In both designs a *heat pump* can be used to take the heat out of the air and put it into the liquid in the pipes (in cooling systems), or to take heat out of the liquid in the pipes and transfer it into the air (in heating systems). *Hybrid* systems can use a combination of a heat pump and traditional furnaces. From this point the temperature can be distributed by either *forced-air/ duct work*, or *hydronic heating system/ ambient floors*.

Case Study

In 2003 Monti Bassett built a home 15 kilometres outside of Smithers in Driftwood. The property owner had heard a lot about geothermal heating given popularity of the technology in the Bulkley Valley and elsewhere. In light of the increasing costs of traditional forms of heating and the pollution they cause the owner decided to install geothermal heating for the home. The house is three stories high, 3,600 square feet, and the nearest neighbour is approximately 200 meters away.

The owner visited two contractors in Smithers to inquire about setting up the system. He chose to work with Dennis Pelzner from Alpine Plumbing for their reputation and good price. The total cost paid out to install the system and the equipment was \$25,000. He did not take advantage

of any grant programs because he didn't know of any. There is however a PST exemption in BC when you buy any renewable energy system in its entirety, including geothermal.

There were two people who worked on installing the system. The owner was responsible for making the initial payment and being available if the contractor needed decisions made. The contractors worked through most of the details on their own. The house took five months to build and the geothermal was installed in stages throughout the process. Coiled loops were installed horizontally in the ground in front of the home. It took approximately two years for the landscape to recover. They started with a hump on their front lawn but it has slowly settled. They had to put a lot of sand over the pipes to protect them from rocks and help maximize efficiency.

Indoors they have radiant heat in the basement that runs the ambient floor as well as ducts in the rest of the house, which influenced its structure. The ceiling had to have space in order to accommodate the pipes that run through them. This meant that more weight was put on the structure in general. Electricity runs the furnace and pump that blows the heated air throughout the home.

After the system had been installed the only problem they encountered early on was during power outages. Power outages would trip the relay switch and when the power came back on the switch would not reset. This was easily fixed, as the contractor came and replaced the switch in one trip. There has been no ongoing maintenance and the system works autonomously. If there were to be a problem it would be immediately evident as there are pressure gages throughout the system that monitor it to make sure nothing is malfunctioning. The system maintains the temperature at a comfortable 20 to 22 degrees.

Their first electrical bill was high but as time went on, and the ground around the pipes settled, the system became more efficient. According to the owner the system originally had a 12 years payback period, however with rising prices for heating it has dropped to approximately a 7 years payback. The average Coefficient of Performance for horizontal pipe systems is between 3.5-4, or 350% to 400%.





Conclusions

The owner is very satisfied with the system and would never build a home without one. He believes all homes in Canada should have geothermal power because of its efficiency and environmental benefits. He further notes the feasibility of installing geothermal systems on small lots. He would recommend this system to anyone interested in building or renovating their home. The only thing he would have done differently would be to have also installed the geothermal cooling system.

For More Information:

Canadian Geothermal Energy Association - www.geothermal.ca

Canadian Renewable Energy Network - www.canren.gc.ca

Natural Resources Canada. 2004. *Heating and Cooling With a Heat Pump* - <http://oee.nrcan.gc.ca/infosource>

Natural Resources Canada. 2003. *Residential Earth Energy Systems; A Buyer's Guide*. www.nrcan.gc.ca/redi

Next Energy - www.nextenergysolutions.com
A company based in Ontario with case studies and other useful resources on geothermal on their website.

One Sky – Canadian Institute of Sustainable Living
3768 2nd Ave., Smithers, BC
One Sky has a resource library with information on various renewable energy systems that are available for sign-out.

The Wet’suwet’en Community Multiplex in Moricetown has installed commercial geo-thermal. For more information, contact 847-2133.

Companies:

Alpine Plumbing & Heating – 250-847-2820
This company operates as a general contractor

Aqua North Plumbing Ltd. - 250-847-3858
3859 1st Avenue, Smithers
This company has been involved in a couple of commercial projects installing geothermal systems. They get subcontracted under a mechanical engineer, who designs the system, and then Aqua North installs it. Aqua North has not yet started working on residential systems.

Braun Industrial - 847-5564
Kitsegucla Lake Road, Smithers
This company does commercial geothermal projects.

North Central Plumbing & Heating Ltd. - 847-3060
3835 Broadway, Smithers
This company has an abundance of information, resources and skills related to installing geothermal systems, both residential and commercial.

Simpson Controls Ltd. – 847-9497
This company does commercial installations of geothermal and residential installations of air-to-air heat exchangers.



Example of horizontal loop system.

