Geothermal Heat Pump Systems Now Practical for the Residential Market

By John P. Ciovacco

Until recently Geothermal Heat Pump technology was reserved for large institutions or only the highest end of the residential market due to the high cost of installing a ground heat exchanger. **As of January of 2009** the entire installed cost of a geothermal heating and cooling system in a home—including ductwork **is eligible for a full 30% federal tax credit** (in place until 2016). For renovations, **NYSERDA offers an additional 10% rebate up to $3000 for your geothermal installation**.

This is an excellent opportunity to offer your customers a heating and cooling system that **can save them 40-60% on their annual bills.** Payback periods for propane and heating oil customers are less than 5 years; natural gas customers are seeing numbers like 6 to 10 years. Aside from the economic benefits, geothermal is the best way **to eliminate greenhouse gas emissions from a home** by removing the need to burn fuels for the substantial heating season we enjoy in the Northeast.

The technology has been around as long as modern refrigeration. A heat pump moves an environmentally friendly liquid refrigerant through a closed cycle of evaporation (cooling) and compression of refrigerant gas (heating) to heat and cool a building. Pipes in the ground circulate a water solution and carry energy to the heat pump in the winter for heating and expel heat from the house into the ground in the summer. Since so much of the energy in the winter actually comes from the ground, we use relatively little electricity to convert this energy to temperatures that are comfortable inside a home. In the summer we also see greater efficiency than conventional air conditioning since it takes less energy to expel heat into the relatively cool earth than conventional systems that are forced to transfer heat into hot outside air.

What does this mean for builders? New construction is a great time to install a geothermal system for two primary reasons. First, while doing other site work is the best time to bury/install geothermal loop pipes and second, your customer will have to purchase some type of HVAC system that can be used to offset the additional cost of installing a geothermal system. The inside cost of a geothermal heat pump system is in the same range as a conventional furnace, air conditioner with ductwork. Government incentives cover much of the outside ground loop installation.

The geothermal heat pump is a single unit located where a conventional furnace would be, and provides both heating and air conditioning with no part of the system exposed to the elements. When designed and installed properly geothermal heat pumps are extremely efficient, durable and low maintenance. That being said there are differences to conventional systems that needs to be taken into consideration. Site geology and moisture content determine the appropriate ground loop configuration. Also since heat pumps produce lower temperature air than combustion-based systems, they have longer run times and air flow considerations which require different ductwork specifications.

System sizing is very important. Too small and the system will be expensive to operate and/or not achieve the designed indoor temperatures. Too large and the system is more expensive to install, more expensive to run and will not have the run times needed to dehumidify in the cooling mode. A Manual J heat load calculation should be performed to ensure the proper sized heat pump and related ground heat exchanger is installed to meet the needs of the house.

Aztech Geothermal has a solid foundation in professional engineering, geology and environmental sciences from years of successful projects at Aztech Technologies. We offer a comprehensive solution for your geothermal heating and cooling system, removing the risks and added costs of coordination with multiple contractors. From design to financing, we bring sustainable cost savings mated with the most environmentally friendly systems available today.

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