

Alternative Source: Geothermal Energy System Built from the Ground Up

By: David Huck | February 16, 2010

There are wood stoves straight out of a Norman Rockwell painting, oil furnaces that hold homeowners' budgets hostage to fluctuating prices, and outdoor wood furnaces that have come under fire for creating pollution.

For homeowners looking to upgrade or make a heating system change, geothermal-based heating systems are increasingly becoming a popular alternative to more traditional options.

Once installed, these systems, praised by advocates for their incredible energy efficiency, can produce heat, air conditioning, and hot water. Plentiful federal and state tax incentives and rebates also make geothermal systems attractive to homeowners looking to switch to a more environmentally friendly and cost-effective heating and cooling system.

Geothermal energy taps into heat that has been stored within the Earth's crust from millions of years of mineral decay and solar energy absorption.

A geothermal heating system installation involves tubes filled with a refrigerant buried in the ground, designed to capture the 50 to 55 degree Fahrenheit temperature of the Earth's soil or ground water. A compression heat pump is then used to boost the air to a suitable temperature for use within a home.

It's a system that leaves virtually any unsightly housing boxes behind. The system is not completely self-sustainable though, as electricity is still needed to run the heat pump.

"If I put \$1 into the ground, I can get back \$3 to \$5 in energy. It is such an efficient system," said Sam Johnston, program manager of Massachusetts-based [Terraclime Geothermal](#), when



Larry Tracey and Sam Johnston II, of [Terraclime Geothermal](#), pose next to geothermal unit in Tracey's basement in Enfield on Monday February 8, 2010. (Leslloyd F. Alleyne/ Journal Inquirer).

comparing geothermal energy to the inefficiency of oil-based systems.

The system can be installed in virtually any geographic area. Johnston said the typical homeowner needs about an 8-foot by 10-foot piece of land to accommodate the system.

The typical cost for a system is between \$5,000 to \$6,000 per ton of BTU, a measurement of a unit's power capabilities. Johnston said the typical home averages a need for a 3-ton BTU geothermal heating system, resulting in a total cost of around \$15,000 after installation. There are also additional costs for homeowners who have radiators and need to install ductwork for the air-based system.

"We try to design the system so that people can use zero oil," Johnson said.

Larry Tracey of Enfield recently had a Terraclime Geothermal system installed for his 2,200-square-foot home after home heating oil hit record prices.

"The year that did it was when I was paying \$4,800 a year for heating and \$300 each month during the summer for three air conditioning units," Tracey said.

Tracey now pays roughly \$1,500 a year for his heating, cooling, and hot water costs. Tracey said the total cost of his system, after rebates and retrofits, was around \$22,000.

For Tracey, the change has been beyond his expectations. The energy savings, the hot water heater upgrade from 30 to 60 gallons, the disappearance of dry and stiff indoor air, the addition of a central cooling system, and the reduced environmental impact has been worth the price tag.

"We, as a society, need to address these issues. We need to get off of fossil fuels. I believe the future is in alternative energy," Tracey said. "I want cleaner air for my grandchildren."

Tracey said he was also attracted to alternative energy because he is retiring soon from his executive director position at the North Central Connecticut Chamber of Commerce, and he wanted fixed energy costs for peace of mind. The cost-saving system will also be a selling point for his home in the future, Tracey said.

Gary Prior, also an Enfield resident, was previously spending upward of \$3,300 per year on oil alone to heat his home. After the installation of a Terraclime Geothermal System, he now spends an average of \$600 per year, an 82 percent savings, on combined heating, cooling and hot water costs.

When compared to solar-powered energy systems, Johnston said the photovoltaic cells usually

have to be replaced after 20 years.

“Solar needs a little bit more time to evolve technologically,” Johnston said.

Johnston said a typical geothermal heating compressor lasts about 35 years. The air filter also needs to be changed a few times a year or as needed, Johnston said.

Johnston estimates that within the last four years, Terraclime Geothermal has installed more than 50 geothermal heat pump systems across New England and New York State.

“I think the biggest driving force is the volatility of oil, especially after \$4 a gallon heating oil,” Johnston said.

Homeowners who install a geothermal heating pump may qualify for up to a 30 percent federal tax credit. The Connecticut Clean Energy Fund, created in December 2009, also provides for \$4.5 million in incentives for residents and business owners who qualify under the Geothermal Heat Pump Incentive program.