

Underground Cash

Emily Lambert 06.04.07



Michael and Beth Yerke

He figures the pump is saving him \$2,000 a year, enough to recoup the installation cost in eight years.

Want a nice dividend so you can cover your heating bill? You could buy a utility stock, or you could put the money into a geothermal system.

February was brutal in Chicago. Temperatures fell below zero on eight days. But Michael Yerke, vice president of Midwest booking for Live Nation, spent only \$250 that month heating his 4,650-square-foot home in the tony Lincoln Park neighborhood. He got help from a heat pump stored in a utility closet in his basement and hooked up to a loop of pipes buried underneath his home.

Geothermal systems are quiet, long lasting and fashionably green. The 150-year-old technology is being rediscovered, inspiring more urbanites and suburbanites to tap into the power supply under their feet. But if you dig, avoid a few pitfalls.

Geothermal systems gather energy present beneath the earth's surface, where the temperature averages 55 degrees (higher in Texas, lower in North Dakota), and concentrate it to provide space heating. In a big suburban back yard you might have the pipes installed horizontally, at a depth of 5 feet or so. On Yerke's tiny lot they went in vertically, to a depth of 75 feet. The pipes are filled with a water-antifreeze mix. A water pump brings the fluid indoors. It passes by a heat pump, which is in effect an air conditioner run in reverse. By sucking 55-degree heat out of the ground and concentrating it, the heat pump is able to deliver 110-degree heat into the warm air ducts of a central heating system. In summer the reverse process takes place: The (comparatively) cool earth becomes a waste dump for unwanted heat that accumulates inside the house.

The heat in the earth is not exactly a free lunch. The process of concentrating it consumes energy, in the form of electricity. But the energy consumed is much less than the energy delivered into the ductwork. A typical home geothermal system consumes, every month on average, 750 to 1,000 kilowatt-hours of juice per 1,000 square feet.

Philip Jeffers, founder of Energy Design Systems, a software design and consulting firm for the air-conditioning and gas-appliance industries, calculates the cost of replacing the conventional heating system in his 2,352-square-foot home in Exton, Pa. with a geothermal one at \$17,700. But a state-of-the-art conventional replacement (which he installed four months ago) cost \$12,500.

Jeffers paid \$371 a month for heating, cooling and hot water. With the new conventional system, his bills dropped to \$172, but with a new geothermal system, his bills would have been \$83 a month. The incremental \$5,200 cost of a ground-assisted heat pump would yield a dividend of \$89 a month, or \$1,068 a year. If the geothermal system is, conservatively, destined to last ten years, a \$520 depreciation charge should be taken off the annual heating bill benefit, for a net benefit of \$548 a year. That's still a pretty good return on a \$5,200 chunk of capital, certainly better than the yield you can get in the stock market. The heat pump dividend is tax free.

There are a few catches. Heat pumps sometimes break, and they can have a hard time quickly boosting the temperature when you raise the thermostat. Before buying any expensive equipment, patch up your home. David Dwyer, the contractor who built the Yerke family's home and installed their geothermal system, says that if you have an old and drafty house you should, before putting in a

fancy heating system, put in new windows, seal leaks and add insulation. Steven Baden, the executive director of Residential Energy Services Network, which writes guidelines for home energy audits, says most homes can reduce heating and cooling bills by 30% that way.

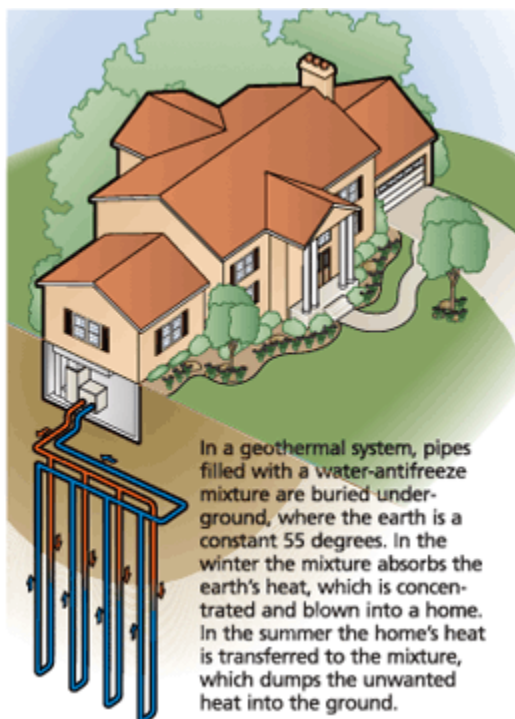
Be wary of inexperienced contractors attracted to the high price tags associated with geothermal. Ask potential contractors what training they've had and how many geothermal installations they've done. Manufacturers such as Waterfurnace provide lists of trained installers. Call references. Make sure the contractor is accredited by associations such as the International Ground Source Heat Pump Association. To come up with a quote, a good contractor will do a heat-load calculation to determine what size unit and how much piping to install.

Get a few bids and run the numbers. "I know they're being overpriced because everybody thinks they're magic, and they're selling it as magic," says James Bose, a professor at Oklahoma State University and executive director of the International Ground Source Heat Pump Association. But value experience. Florida contractor Mark Barrett put in geothermal to power his own home, pool and whirlpool. He chose an installer based on the advice of a trusted mechanical engineer.

Thirty years ago some contractors used brittle PVC pipes that burst when they froze. These days you should be getting high-density polyethylene pipes. Craig Funke, chief executive and part owner of Equiguard, which provides warranties to the heating and cooling industries, says geothermal units' failure rates, including both equipment failure and bungled installs, are equal to those of conventional equipment. You might pay 10% more for a warranty. Parts and repairs are pricier.

A geothermal system should work anywhere regardless of the weather and provide a quicker return on investment than solar panels do, but it gets only a \$300 federal tax credit (solar panels get you up to \$2,000). The most recent federal energy bill allowed for a \$3,000 tax rebate for geothermal, but that remains unfunded.

Some utilities offer rebates and discounted electric rates. Those can come and go. Yerke has been paying a discounted rate to Exelon-owned ComEd, but that rate is being phased out. "I didn't expect to get the lower rate," Yerke says. "It was kind of a bonus." Even without the discount, he figures, he would get back the \$16,000 incremental cost of his heat pump in eight years.



Payback
A geothermal system can cost more up front but can pay for itself in four years and then save \$129 a month. It can also, if financed, generate immediate cash flow savings. For a 2,352 square-foot house in Pennsylvania:

System Type	Price	Average Monthly Cost	Efficiency	Should Last	Savings in 60 Months
Geothermal	\$17,700	\$83	25.1 EER	20 years	\$21,129 ¹
Conventional System	\$10,000	\$212	16.5 SEER/12.6 EER	13 years	\$11,678

¹Savings over older conventional system. Assumes fuel prices rise 10% a year. Source: Energy Design Systems.

In a geothermal system, pipes filled with a water-antifreeze mixture are buried underground, where the earth is a constant 55 degrees. In the winter the mixture absorbs the earth's heat, which is concentrated and blown into a home. In the summer the home's heat is transferred to the mixture, which dumps the unwanted heat into the ground.