

# Geothermal systems conserve energy and reduce bills for heating and cooling

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Special to The Star

You may not know anyone with a geothermal heating and cooling system in the house, but you will soon. With tax credits and financial incentives plus lowered utility bills and increased energy efficiency, the numbers of geothermal homes are growing — and homeowners are singing the praises of “going underground.”

James Bose of the International Ground Source Heat Pump Association says commercial and residential installations total 50,000 a year now, up from about 2,500 in 1986.

Dave Wagner, manager of commercial and residential channels at KCP&L, installed a system in his Lee’s Summit home in 1985. He notes that geothermal heat pumps may be unfamiliar, but they aren’t new. “The technology has been around for 30 years or more,” he says.

A geothermal system taps into the consistently moderate temperatures underground. A closed system of pipes looped deep in the earth circulates a liquid that captures the subterranean temperature. A compressor and heat pump system then uses that temperature to treat the air that is circulated through the house.

There is no combustion with this system, and no separate air conditioner.

“We’ve got a constant 55 degrees when we start,” says Dan Thibeaux, owner of ECS Geothermal in Smithville, a company that specializes in installing geothermal systems. “We just need to take it up a little bit for heating or down a little bit for cooling.”

No matter if it’s a sweltering summer day or freezing winter ice storm. Therein lies the advantage.

“It depends on the home and the size of the unit,” says Wagner, “but homeowners can realize anywhere from 40 to 60 percent energy savings and cost reductions with a geothermal heat pump, over a conventional gas or electric system.”

So why aren’t there more converts?

## Up-front costs vs. long-term savings

“There’s a huge financial outlay,” James Reimer says. He and his wife, Piper, had a geothermal heat pump system installed in their Mission Hills home last spring. Total cost? About \$19,000.

“We knew we were going to have to replace a furnace and an air conditioner anyway,” says Piper — the estimates for conventional units came in over \$6,000 — “so it wasn’t that big of a leap.”

James also considered their utility bills in the equation. For the two natural gas furnaces and electric central air conditioner they had, he says, “Our gas bills were \$350 and \$390 in January and February. The highest electric bill in the summer of ’07 was \$260.”

They’re headed into their first winter with geothermal, but they’ve already seen positive indicators. The natural gas usage is way down; they still have a gas stovetop, dryer and water heater, but gas for those runs only \$30 a month, James Reimer reports. Then they reduced peak electrical consumption by eliminating the air conditioner. Even though the geothermal system relies on electricity, their highest electric bill this summer was down by half, to \$126.

Yet another advantage of geothermal is that the compressor heat can be used to “preheat” water then kept in a holding tank. From there, the water heater need only boost the temperature slightly for that steamy shower.

“I think we’ll save \$1,400 a year on utility bills,” Reimer says. He estimates the unit will have paid for itself in about eight years.

### **The big dig**

Another consideration when retrofitting geothermal to an existing home is the drilling and what the large truck needed to perform the drilling does to your landscape.

“In city lots, they’ll have a vertical installation where we drill down anywhere from 150 to 350 feet deep, with a 6-inch hole, and then we put tubing in that hole,” Thibeaux says. “If we’re out where we’ve got more land, we can dig trenches and put them in horizontally, between 5 or 6 feet deep.”

From the vertical well, a 6-foot-deep-trench is then dug to the house, where the tubing connects to the geothermal unit inside. The dig takes about two days. Indoor installation, which can usually incorporate existing ductwork, takes another two.

Wagner says, “There is a bit of a mess, but yards can heal.”

Piper Reimer agrees. “Ours was done in March, and if you drove by our house now you would have no idea.”

### **The lasting impression**

In the long term, a heat pump improves the landscape by eliminating the outdoor AC unit. And because the geothermal mechanical unit is indoors, Wagner says, there's no wear and tear from the elements.

"They say the life expectancy of these units is 25 years," James Reimer says. "The coils in the ground are supposed to last 60 years."

Recommended maintenance includes filter changes every three months, much like a conventional furnace, but because there's no combustion of gas or carbon monoxide risk from faulty equipment, there's no need for annual checkups. No combustion also may eliminate the need for a humidifier, or the energy to run one.

"My first service call in four years was Tuesday," Wagner says. The only adjustment made was adding water to the tubing. The call cost about \$140, including a filter.

Wagner says long-term savings are large. "Forty to 50 percent of the energy use in a house is for heating and cooling, and another 10 to 15 percent is for water heating. So if you're getting heating and cooling at a high efficiency from geothermal, and you're also able to get 60 to 75 percent of your hot water from the system, you've reduced your energy consumption considerably."

For new homes, Thibeaux notes, the benefits are more immediate. "Almost 100 percent of the time we're going to see a positive cash flow — the additional cost of the geothermal on your mortgage is going to be less than what you save in utility bills (each month)."

The Reimers say the choice for them, given the energy efficiency, was easy. "Other than my yard being a disaster for about a month, I can't think of anything bad," James Reimer says.

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## **REBATES AND OTHER INCENTIVES**

KCP&L offers lower utility rates for geothermal, plus rebates for replacing antiquated, not-so-efficient systems; other utilities have similar programs.

"We'll pay you money to reduce your kilowatt hour consumption," says Dave Wagner of KCP&L. "There are a couple of reasons. We're having to build power plant capacity to meet summer peak use. In the wintertime, that capacity may be sitting idle. So we'd like to reduce the summer use, and you can do that by having high efficiency equipment. The idea is to defer the construction of power plants by using energy efficiency and conservation methods."

Even the federal government has added geothermal to its list of renewable energy sources.

"When President Bush signed the Economic Stabilization Act on Oct. 3 — most of us call it the 'bailout' — included in there, for homeowners, for the first time, is a tax credit of up to \$2,000 for geothermal heat pump systems," Wagner says.

For these incentives and others, visit these Web sites:

- Database for State Incentives for Renewables and Efficiency, [www.dsireusa.org](http://www.dsireusa.org)
- KCP&L, [www.kcpl.com/coolhomes](http://www.kcpl.com/coolhomes), [www.kcpl.com/about/ratesrules.html](http://www.kcpl.com/about/ratesrules.html); click on '08 Heat Pump Rate Advantage
- Federal Tax Credits for Energy Efficiency, [www.energystar.gov/index.cfm?c=products.pr\\_tax\\_credits](http://www.energystar.gov/index.cfm?c=products.pr_tax_credits)
- Kansas Energy Efficiency Program, [www.kshousingcorp.org/programs/KEEP.shtml](http://www.kshousingcorp.org/programs/KEEP.shtml)

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### **SOME LOCAL INSTALLERS**

- ECS Geothermal in Smithville

816-532-8334,

[www.geoecs.com](http://www.geoecs.com)

- Directional Systems

in Stilwell in Johnson County

913-897-2394

- Eric Kjelshus Energy, Greenwood in Jackson County

816-537-5100, [www.ericenergy.com](http://www.ericenergy.com)

- GK Smith & Sons, Paola, Kan.,

1-913-294-5379

- Lancaster Brothers, Louisburg, Kan.,

1-913-837-2000

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### **LEARN MORE**

- International Ground Source Heat Pump Association,

Stillwater, Okla., 405-744-5175, [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu)

- A Consumer's Guide to Energy Efficiency and Renewable Energy: Geothermal Heat Pumps,

[http://apps1.eere.energy.gov/consumer/your\\_home/space\\_heating\\_cooling/index.cfm/mytopic=12640](http://apps1.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12640)