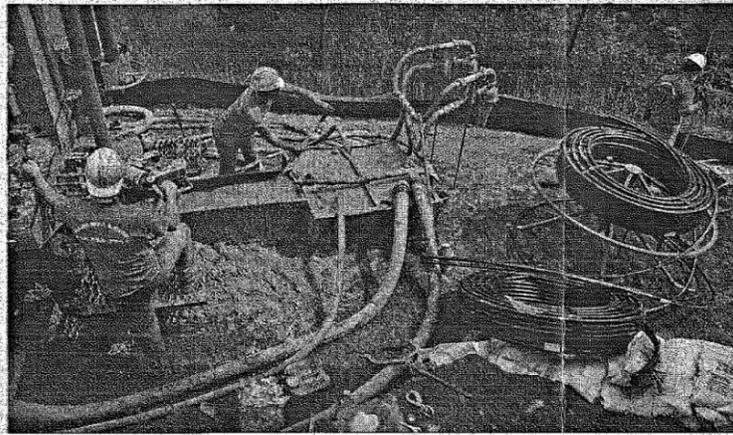


Warming up to a geothermal system



Dave and Monica Borle watching the drilling at their Pasadena home. "It's the right thing to do," says Dave Borle of the switch to a geothermal system.



Geothermal tubing will be placed in the holes that are drilled for the geothermal heating system at the Borles' home. With the system in place, the Borles should start to see utility bills cut by about half. PHOTOS BY LLOYD FOX [SUN PHOTOGRAPHER]



Mud must be removed from the water that is recycled during the drilling of deep holes.

THE POTENTIAL ENERGY SAVINGS ARE TYPICALLY GREATER THAN LOAN REPAYMENTS FOR RETROFITTING OR WHAT'S ADDED TO A MORTGAGE.

The grinding noise of drilling two 400-foot-deep holes in the ground was ear-splitting, never mind the toll the job was taking on the front lawn.

But Monica and Dave Borle leaned over the railing outside the front door of their Pasadena home on a sunny April morning as though they couldn't get close enough to the red flatbed truck with its generator and derrick. Their focus was less on the loud drama and more on what this mess promises: eco-friendly, efficient energy with a financial reward.

They're switching to geothermal heat and air conditioning.

"It's the right thing to do," said computer scientist Dave Borle.

Last summer, having already applied most of the routine energy-saving techniques in their home, they sweated through electric bills topping \$450 a month for their all-electric 2,400-square-foot house. Grimacing at the prospect of monthly electric bills approaching \$600 this summer, the couple researched alternative energy methods. Their conclusion: Use Mother Earth's constant temperature of about 56 degrees to heat and air-condition their house.

An estimated 2,500 or so Maryland homes have geothermal systems, from condos in Ocean City to expansive homes in Harford County.

Skyrocketing home air-conditioning and heating costs, and notably electric rates and fossil fuels, have ignited homeowner interest in the past two years - so much that some well-drillers are finding geo-exchange projects are the mainstay of their work.

The potential energy savings are typically greater than loan repayment for retrofitting or what's added to a mortgage.

"You can look at numbers between 60 and 70 percent of your heating and cooling," said Dustin Owens, sales manager for Owens Comfort Systems, a Bowie-based heating and cooling company, which outfitted the Borles' home.

The most disruptive part of the transition was boring into the ground for two 800-foot-long pipe loops that conduct the ground's heat, work that took a little more than a day. Ensuing work completed this month connected the loops, through pipes laid in trenches, to a specialized heat pump inside the house. The Borles' home already had the forced-air vents.

The Borles aren't terribly concerned about the appearance this spring of the front yard.

"It's grass, it'll grow back," Monica Borle said with a shrug.

Besides, she said, much of the front yard has other landscaping that was untouched. The couple prefer to take this long-term perspective: They are making a \$22,000 investment in their home now. They will start to realize utility bills cut by about half. They'll recoup that upfront outlay, depending on their thermostat settings and utility rates, in 10 years at the outside, but most likely sooner.

"Everything else after that is gravy," she said.

Part of that gravy could flow from the state. Come July 1, the Maryland Energy Administration maximum grant to a homeowner for installing a geothermal system will rise from \$1,000 to \$3,000, and jump to \$10,000 for a commercial use. Officials expect the number of applications for the \$591,000 cash pool that is to be shared with grants for solar-energy systems to continue to climb.

"It will go quickly," said David Cronin, MEA assistant director for renewable resources.

The centuries-old basics of the technology rely on exchanging heat and cold. Water in the pipes naturally transfers heat more efficiently than air does, said Toni Boyd, assistant director of the Geo Heat Center at the Oregon Institute of Technology in Klamath Falls, Ore.

In a closed-loop system, the type used in Maryland, hundreds of feet of pipes circulate a blend of water and often alcohol (sometimes refrigerant), extracting warmth from the ground in the winter. The pipes connect to the heating and cooling system in the house.

A heat pump inside uses the network for a forced-air system that warms the home's air. That's reversed for summer air conditioning, when the home's heat literally gets returned to the ground in an environmentally important exchange, Boyd said.

Based on home size and other factors, heating businesses determine the size of the systems needed inside and outside. Well-drillers site the narrow shafts for the vertical pipe loops and the trenches bringing them into the house, based on geological maps, other utilities, well requirements, and state and local government codes.

Short of extensive property that allows burying Slinky-like pipes close to the surface, vertical is the way to go, whether through mud, sand, rock or water, experts say. Each vertical pipe is a long and narrow U-shape.

That has allowed geothermal systems on rowhouse lots, said Brad Rogers, an owner of Baltimore Green Construction and related companies, who expects to install one in the renovation of a Charles Village rowhouse this summer.

"If you can fit a delivery truck into the area, you can go geo," said Adam Santry, vice president of Allied Geo-Systems, the Baltimore well-drilling company that did the Borles' bores.

There are other considerations. Among them: Retrofitting is disruptive, installation during new-home construction much less so; while the plastic piping doesn't burn fossil fuels, the electricity powering a geothermal system may be a different matter; drilling goes into the ground, and maybe, water, and is subject to well-drilling requirements; components generally have long warranties, but the up-front investment remains higher than for a conventional system.

"It's double the cost," said Matt Shanley, president of JBL Constructions Co., who put a geo-exchange system, along with other energy efficiencies, into a 5,000-square-foot model home in Howard County listed for \$1.29 million.

"I will continue to put the extra money in these houses if the market will bear it," he said.

The cost has largely limited installation in new homes to owners who really want it; conventional wisdom is that a major investment to hold down utility bills helps when it's time to sell a house.

(President George W. Bush has a geo-exchange system in his Crawford, Texas ranch.)

"We are using it on just about every house we build now," said Jon Skarda, president of Shore-Line Construction Enterprises in Middle River, which builds mostly waterfront homes in Baltimore County ranging from \$400,000 to \$1.5 million.

Clients lean toward geothermal as he shows them the math, Skarda said.

His example: On a 4,000-square-foot home, geothermal costs nearly \$40,000 or roughly twice that of a conventional system. On a 30-year fixed mortgage of 7 percent, that additional \$20,000 investment adds a little more than \$150 a month. But the typical utility savings will be closer to \$200 a month. Depending on home heating and electric rates and usage, the difference will balance out in as little as five to seven years, he said.

Spurred by the need to replace their heat pump, George and Lynn Kasch turned to geothermal in February for their all-electric 2,500-square-foot, ranch-style home in Middle River. The replacement cost for the heat pump was approaching half the price of geothermal, and they wouldn't have trimmed their utility bill, they said.

"We checked our bill from this time last year and we saved \$160 for one month," George Kasch said. "Money is money."

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Geothermal tips

For homeowners who are considering geothermal heating and cooling, here is some advice from the experts:

Start with less costly improvements, such as better insulation, energy-efficient appliances and passive solar, says Brad Rogers, a principal in Baltimore Green Construction. "Geothermal is an answer to the question, but it is not a substitution for the question."

Consider the location of your home. It costs more to drill through rock than sandy soil. Costs also depend on how many feet of vertical pipe are needed (it takes about 200 feet of vertical bore to provide 1 ton of

heating/cooling, and most homes need a few tons). A home may need ductwork for forced air and different work for radiant floors.

Deal with professionals who have experience and training. HVAC mechanics and well drillers are state-licensed. The International Ground Source Heat Pump Association, located at Oklahoma State University in Stillwater, Okla., offers training and certification for design and installation. Check warranties on installation and on all components; they should be checked regularly and maintained.

Look for savings. The IRS has builder incentives, but no homeowner incentives at present. The tax code is a moving target, so talk to your accountant.

For more information, start here: eere.energy.gov/geothermal (U.S. Department of Energy).

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Credit: sun reporter