

## Energy from the Earth

### Congress shows some geothermal interest

By Colleen M. Sullivan *Special to the Telegram & Gazette*

WASHINGTON— As oil prices skyrocket and global warming melts Arctic ice from under the polar bears, lawmakers and consumers are searching for green energy alternatives. The answer, according to advocates of geothermal technology, may be under their feet.

Geothermal technology uses the Earth's molten core. Hot water or steam from within the planet is pumped to the surface, where it is used to warm buildings or generate electricity. Because the Earth provides the energy, no oil or gas is burned, meaning no greenhouse gases are emitted.

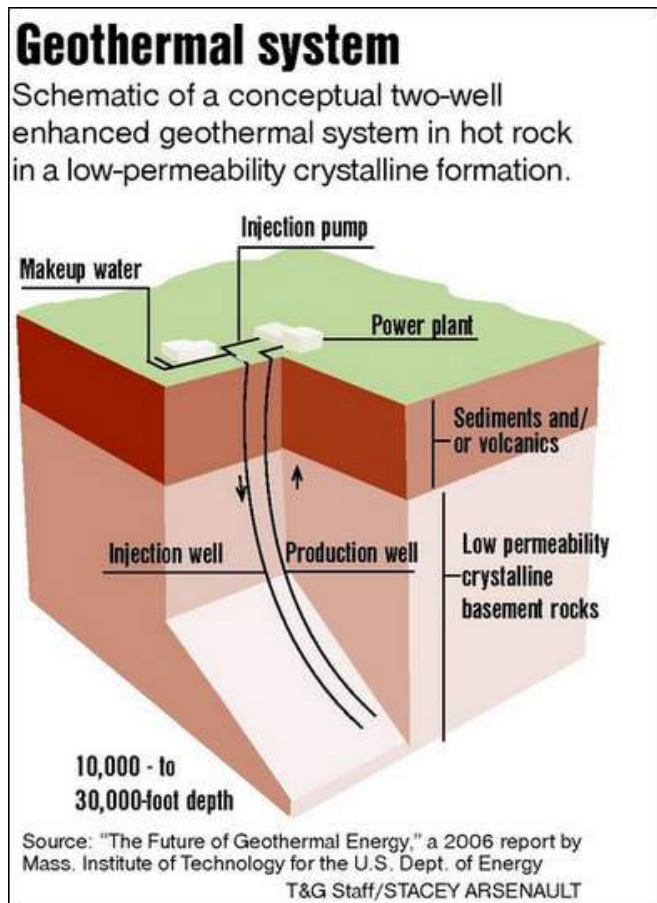
An MIT study published this year contends that existing technologies could tap into millions of gigawatts of geothermal energy, providing 10 percent of the United States' energy needs by 2050.

A bill in the Senate aims to provide that investment, targeting \$75 million to geothermal technology next year, and \$110 million a year from 2009 to 2013.

The National Geothermal Initiative Act of 2007 would require the money to be used to conduct research and begin pilot geothermal projects in at least 25 states, with a goal of converting 20 percent of U.S. energy production to geothermal sources by 2030.

At a hearing on the bill before the Senate Energy and Natural Resources Committee last week, President Ólafur Ragnar Grímsson of Iceland said his country, with its plethora of geysers and volcanoes, has developed the most advanced geothermal industry in the world.

"Iceland has transformed its energy system from being based on peat, imported coal and oil, to one in which 100 percent of its energy production is coming from clean energy resources," Mr. Grímsson said. "All of this has happened in the lifetime of a single generation."



Representatives from the U.S. Department of Energy and the U.S. Geological Survey who also testified at the hearing were not nearly so enthusiastic. The Bush administration eliminated funding for geothermal technology in the budget it submitted earlier this year.

"The department has significant concerns with the feasibility of the national goal established in this legislation," Alexander Karsner, assistant secretary for energy efficiency and renewable energy, said in his testimony before the Senate committee.

Although geothermal technology has been around for decades, it's only now that rising energy costs and environmental concerns have brought about a renewed interest. Several Massachusetts firms have been active players in the field.

"We started bringing (the technology) to clients, but now, more and more, they're bringing it to us," said Brian Smith, a project engineer with Allied Consulting Engineering Services of Sudbury. The company has been installing geothermal units since 1998.

Geothermal options are increasingly on the table as new home plans are drawn up, along with solar and wind energy, as "part of the greening of the building industry," Mr. Smith said.

A primary growth area has been the high-end residential market, where up to 40 percent of the firm's clients are having the system installed. Such customers can afford the large up-front costs of well-drilling and enjoy the savings later.

"We see 20 to 40 percent energy (cost) savings," Mr. Smith said. "Your electric bill goes up, but you have no gas or oil bill." Geothermal boosters say that such energy cost savings mean that the system pays for itself in 2 to 10 years.

Retrofitting an existing home with the technology also is becoming more popular. "If you're planning to install central heating and air conditioning, the costs are pretty comparable," he said.

Homeowners converting to geothermal can often take advantage of subsidies and incentives when making the transition. SELCO, the town-owned electric and cable company in Shrewsbury, offers no-interest loans of up to \$10,000 to customers converting to geothermal.

Large institutions also are switching to geothermal. Since bigger, older buildings often require customized solutions when updating their heating systems, the additional cost of geothermal equipment is a lesser percentage of the total, while the energy savings are larger.

Trinity Church in Boston had geothermal wells installed in 2002. The private Noble and Greenough School in Dedham went geothermal last year. Harvard University's new campus in Allston will have geothermal heat in all of its buildings.

MassInnovation, a Fitchburg development company led by Robert Ansin, is converting an old mill in Lawrence into a complex of 600 condominiums as well as shops and business, all of which will be heated geothermally, making it the largest residential geothermal project in the United States.

"To heat and cool your average 1,200-square-foot apartment, a one-bedroom loft, is \$700 a year. And that's at the current energy prices," said Constantine Valhouli, a principal with Hammersmith Group, which is consulting on the project.

But there are some apparent drawbacks.

A federal study in 1978 estimated that conventional geothermal resources could produce 23,000 megawatts of electricity in the United States.

The Department of Energy estimated that an additional 142,000 megawatts would have to be produced from unconventional resources by 2030 to meet the requirements of the National Geothermal Initiative Act of 2007.

"With the exception of one small co-production generator, none of these unconventional resources are being used currently to generate commercial power," according to Mr. Karsner. As a result, he said, the goals established by the bill may be "technically unattainable."

U.S. Sen. Jonathan Tester, D-Mont., remained unswayed.

"You're quoting studies from 1978. That's nearly 30 years ago. When I was in high school debate, if I had cited a 30-year source for my substantiation for evidence, I'd have lost every damn debate I was in," he told Mr. Karsner.

Geothermal technology has been in use for decades in places where volcanoes and hot springs naturally bring heat close to the surface.

A 1904 experiment in Italy first demonstrated that geothermal heat could be used to generate electricity. In Iceland, where volcanoes and geysers are abundant, 90 percent of homes are heated geothermally.

In places without geysers or volcanoes, one must drill miles deep into the earth to reach the kind of heat that can run power plants.

# telegram.com

But recent drilling technology advances — originally developed by oil companies to tap the ocean floors — have made it possible for the rest of the world to access geothermal energy on a commercial scale, supporters argue.

But, they add, you don't need to drill for miles to take advantage of geothermal energy. Even a few feet below the frost line, the Earth maintains a constant temperature of 50 degrees Fahrenheit.

According to a 2005 study by the Western Governors' Association of 140 hot spots in places such as Nevada, Arizona and New Mexico that are particularly suited to geothermal production, 5,600 megawatts of energy, mostly for generating electricity, could be brought online as early as 2015 with suitable investment. That would be enough electricity to power a small city.

*Telegram & Gazette intern Colleen Sullivan is enrolled in Boston University's Washington Journalism Center.*