



Litli Geysir, a bubbling geyser in southern Iceland, demonstrates the country's unique geothermal activity. The nation's capital, Reykjavík — 'bay of smokes' in Icelandic — was named for abundant steam from local hot springs.

Hot Rocks

Can Michigan follow Iceland's model to power itself with geothermal energy?

STORY & PHOTO BY JAMES CRUGNALE

A steady patch of steam drifts from the chest-high water as Reykjavík businessmen ponder their nation's economic crisis in a communal outdoor hot tub after a day's business. Heat from the earth is one of the few things on which Icelanders can still rely, and this Jacuzzi, like most in the country, is powered from the natural resource.

Iceland's economy may have shattered like an icicle hitting sidewalk, but a little more than half a mile under its cold exterior lies molten rock that some believe could allow the volcanic country to export energy, while regenerating its economy.

Geothermal power is extracted by drilling deep boreholes into the earth's crust and capturing the steam from the hot magma below. This steam spins a turbine, which drives a generator to produce electricity and heat. Iceland's largest geothermal plant, Nesjavellir produces about 120 megawatts of electrical power and delivers more than 475 gallons of hot water per second, pumping through a 16-mile pipeline directly to homes

and businesses in and around Reykjavík.

Iceland is the world's leader in geothermal energy production, according to 2005 United Nations figures. It produces 5,587 kilowatt-hours per person. Its closest competitor, New Zealand produces 696 kWh.

"Eighty-eight percent of homes in Iceland are heated with geothermal (and) 66 percent of primary energy consumption [comes] from geothermal," said Jonas Ketilsson, geothermal specialist from Orkustofnun, the country's national energy authority.

Orkustofnun has monitored contacts between foreign and Icelandic companies who propose building undersea cables that would link power directly to the European electric grid, a potential economic godsend to the bankrupt nation. The cables are projected to be at least 500 miles long and would connect Iceland to Northern Scotland.

"Some experts think there is enough earth energy under Iceland to power all of Europe," consultant Don Hinrichsen reported to the United Nations Environment Programme.

Reykjavík local Fríða Brá Pálsdóttir is proud of her country's dominance in renewable power but has not yet been persuaded by the plan.

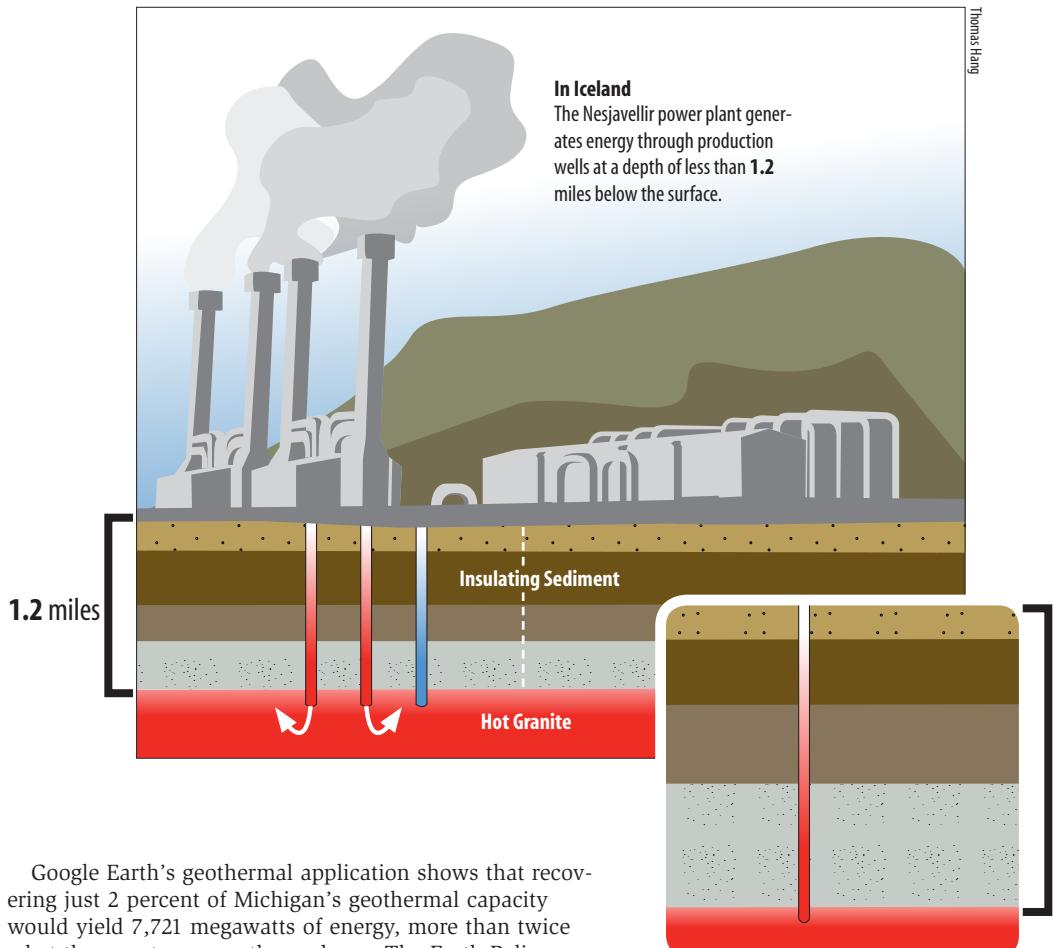
"I think it's excellent that it's possible, but if our energy is harvested too fast it'll take years to recover," Pálsdóttir said. "It must be harvested in harmony with the natural flow of steam and energy in the lower level of the earth. I just hope that we wouldn't do anything stupid out of desperation for a quick fix for our economy."

While Iceland straddles the geologically active Mid-Atlantic ridge, Ketilsson says many other countries could use their own significant geothermal energy capacity.

A 2007 Massachusetts Institute of Technology report showed that harnessing just 2 percent of the heat below the continental U.S. would outpace current energy consumption 2,500 times. The report said this energy would come at competitive prices and with minimal environmental impact.

Michigan has underground heat of its own. ▶

Harvesting geothermal energy at the Nesjavellir power plant



Google Earth's geothermal application shows that recovering just 2 percent of Michigan's geothermal capacity would yield 7,721 megawatts of energy, more than twice what the country currently produces. The Earth Policy Institute estimates the U.S. produces 2,960 megawatts of geothermal power, 86 percent of that from California.

The big catch for the Great Lakes state is the need to drill about 5.5 miles to acquire the energy — about 2 miles deeper than present U.S. geothermal projects have bored, according to U.S. Geological Survey estimates.

Michigan's geothermal development has been slow to gain steam, said Roger Doherty, geothermal point person for Michigan Bureau of Energy Systems. All geothermal activity in the state has been small-scale — residential and commercial buildings. The only commercial geothermal generation facilities are owned by utility companies such as Consumers Energy and DTE Energy.

Michigan Gov. Jennifer Granholm proposed a shift toward renewable energy in February. She directed the Department of Environmental Quality to consider "all feasible and prudent alternatives before approving new coal-fired power plants."

Granholm's action delayed, for now, building permits for five proposed coal plants in the state, including the largest one, an 800-megawatt project put forward by Consumers Power near Bay City.

Bay City resident Patrick Race has lobbied the Bay County Board of Commissioners against this proposed development. He is the secretary of Modular Enhanced Geothermal Systems Organization, a Michigan nonprofit that advocates for geothermal power. He wants a geothermal project to replace the proposed coal plant.

Race gave an impassioned presentation to Bay County

officials last summer to consider harnessing hot rock power from Mount Pleasant, which he considers to have the best potential for geothermal generation in the state based on MIT's study.

"The problem is there's no big lobby for geothermal like there is with coal," he said.

The lead author of the MIT study, professor Jefferson Tester believes much of the media overlooks geothermal. In a recent phone interview, Tester noted that the recent PBS program, "The Big Energy Gamble," neglected to mention the renewable energy.

"It is astonishing to me that it is ignored," he said. "Geothermal tends to get lost in the dust."

While Michigan continues to determine its energy path, President Barack Obama has pledged to double U.S. geothermal generating capacity within three years. Former President George W. Bush proposed cutting further geothermal research in 2007.

In March, U.S. Energy Secretary Steven Chu announced up to \$84 million in funding for geothermal projects. The \$787 billion economic stimulus package Congress passed in February supports geothermal energy, including extending the production tax credit for new geothermal power plants. Doherty said this has created a 30 percent federal tax credit for qualified geothermal heat pumps in residential systems.

Tester remains unconvinced that political leaders will support geothermal. "I'm optimistic but I've yet to see a commitment," he said. ☀

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