

Geothermal dreams gain steam with leases

Prospects gain steam as state leases geothermal rights

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Want to buy some hot water? A lot of hot water? Maybe even enough to supply Anchorage with cheap, clean, reliable geothermal energy for years to come?

That's essentially the proposition Alaska land managers floated recently while trying to lease geothermal rights to state land on the south slope of Mount Spurr, Anchorage's neighboring volcano. The response was heartening.

A quarter century ago, the state made the same offer -- and no one seemed to care. Only one of 16 tracts in the 1983 Mount Spurr lease sale found a bidder (a contract that was eventually forfeited).

This time, however, the state received offers on all 16 tracts, including \$3.52 million in winning bids from Ormat Technologies Inc., one of the world's largest developers of geothermal power plants.

The sudden show of interest from credible corporations -- including Iceland America Energy Inc., which bid and lost -- both pleased and surprised the state's renewable energy crowd.

"That's big," says Peter Crimp, the alternative energy program manager for the Alaska Energy Authority. "If you're talking about outfits like Ormat or Iceland America putting money down, that means something."

What it might mean to Alaskans coping with high energy costs is that all that talk about the state's geothermal energy potential might finally produce something big and substantial. At least Ormat thinks it might.

In a press release heralding the deal, chief technical officer Lucien Bronicki described the geologic structures surrounding Mount Spurr as promising. Field studies have yet to confirm the existence there of a large geothermic reservoir close enough to the surface to be financially feasible to develop. But if they do find one, he suggested, Ormat would be eager to take the next step.

Said Bronicki: "We're up to the challenge of creating the state's first large-scale geothermal power plant."

CHEAP AND CLEAN

That's not the only encouraging sign on the state's hot-water energy horizon. In late October, the U.S. Department of the Interior announced plans to open to geothermal leasing 190 million acres of BLM and National Forest land in 12 western states, including Alaska.

In seven years, the initiative could lead to the production of an additional 5.5 gigawatts of "cheap and clean" electric energy nationwide, enough to power the big-screen TVs, lights and washing machines of about 5.5 million homes, Interior Secretary Dirk Kempthorne said.

In Southeast Alaska, that same initiative had the immediate effect of advancing a geothermal prospect on Tongass National Forest land on Bell Island -- where developers envision a 20-megawatt geothermal power plant that could easily connect to a neighboring transmission line to Ketchikan, 43 miles to the

south.

The Alaska Energy Authority, meanwhile, is reviewing grant requests from about a dozen additional geothermal prospects that could occur on either state or private land. Among them:

- Mount Makushin, a proven geothermal resource that could supply all the electrical energy needs for Unalaska and Dutch Harbor (earlier this year the AEA issued a \$1.5 million matching grant to Unalaska for more exploratory drilling).
- Akutan Volcano, an unconfirmed geothermal field at Hot Springs Bay Valley (where ground water sometimes rises to the boiling point), which could provide power to Akutan Village and the Trident Seafood Plant.
- Other prospects statewide could provide geothermal power to Wasilla, Willow, Glennallen, Nome, Naknek, Elim, Golovin, White Mountain, Koyuk, Kotzebue, Shishmaref, Manley Hot Springs and Sitka.

SUCCESS STORIES

For all that promise, however, the only existing geothermal power plant in Alaska right now is the relatively modest (400-kilowatt) private plant constructed two years ago at Chena Hot Springs Resort east of Fairbanks.

The resort uses 165-degree water from the surrounding hot springs to heat a fluid that has a lower boiling temperature. The vapor from that secondary fluid, a refrigerant, then drives a turbine that generates electricity -- enough to power the resort. Enough also to displace Chena Hot Spring's formerly hefty consumption of about 150,000 gallons of diesel fuel a year -- which this year penciled out to a savings of about \$540,000, according to project director Gwen Holdmann.

With its \$4 million price tag (\$1.8 million for exploration and \$2.2 million for plant construction), the Chena Hot Springs geothermal project wasn't cheap to build -- though its construction costs were partially offset by a \$1.4 million federal grant and a \$246,000 state grant. And now the annual fuel savings are quickly adding up.

"The (break-even) payback should be about five years, which is pretty good," Holdmann said. "Then it's free fuel. That's what's beautiful about it."

Once built, geothermal power plants can become a source of clean, cheap, home-grown energy that's available 365 days a year for generations. According to the U.S. Department of Energy, electricity generated at the 48-year-old Geysers power plant in Santa Rosa, Calif., is sold at about 3 cents per kilowatt hour, about half the cost of gas-fired electricity in Anchorage. A geothermal power plant built today, the DOE says, would probably require 5 cents per kilowatt hour.

Is geothermal power really everlasting?

Geologists say it's possible to deplete subterranean reservoirs of water, just as it's possible to deplete oil fields. But by pumping the water that powers the turbines back into the ground after its heat has been spent, the system becomes a closed loop. The re-injected water is eventually rewarmed by the earth, and the geothermal-energy cycle continues.

That is if you can find it.

INTO THE UNKNOWN

The great disadvantage of geothermal power is that it's a resource that's found only here and there, Crimp said. And those places where it's found are often not the same places where great numbers of people want to live. Witness the Aleutian Islands.

"It's not like wind energy, for instance, where you have a good resource all through the west coast of

Alaska and the Y-K Delta," Crimp said.

Secondly, geothermal power can be hard to reach. Sometimes reservoirs associated with volcanoes are 20 miles underground.

"It's plenty hot down there, but that doesn't mean it's accessible, because it's too far away," said state geologist Christopher Nye. "It's too expensive to get to."

What about Mount Spurr?

What's known right now about the geothermal potential there is mostly a product of field studies conducted by state geologists in the early 1980s. Nye was one of them. What they found near the site of the recent lease sale -- by pointing an electrical beam into the ground and noting areas and depths of low resistance -- was the image of an underground "anomaly" some 2,000 to 3,000 feet below the surface, Nye said.

It's possible it's an area where a pool of extremely hot water has dissolved certain minerals in the rock. When that happens the water becomes ionized and highly conductive of electrical current. That's one way geologists use to locate prospective geothermal reservoirs. But to know for sure, Nye said, exploratory crews will have to drill a half mile down and maybe farther. That's yet to happen at Mount Spurr.

Simply finding water underground isn't sufficient either, Nye said. The volume needs to be extensive, and the temperature needs to be hot, ideally about 300 degrees. And the cost of getting the power to market has to be economical.

At an AEA-sponsored "Mount Spurr Technical Conference" a year ago in Anchorage, local engineer Lorie Dilley estimated that it could cost \$100 million to \$150 million to construct a 100-megawatt geothermal power plant at Mount Spurr. Adding in road and airstrip construction, along with building a transmission line to the existing power plant at Beluga, could double that figure, Dilley said.

One final factor that just might make a Mount Spurr geothermal prospect more affordable could be the concurrent development of a proposed hydropower project at nearby Chakachamna Lake, says AEA geothermal program manager David Lockard. If that happens, the two projects could share the costs of building a road, a small port, an airstrip and the transmission lines.

But first Ormat will have to find the water. Under terms of the state leases, the corporation has one year to file a proposed plan of exploration. It has nine years to file a plan to develop the resource, or forfeit its leases.

Alaska poses a lot of logistical and technical challenges to developing geothermal power, Bronicki said. But his company is confident. "Our global experience ... will turn this challenge into an opportunity."

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