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Volcano energy may help meet needs

ALTERNATIVES: Alaska is seeking applications for geothermal leases.

By ALAN BAILEY
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Living next to a volcano might not fit into everyone's comfort zone. But heat from inside the Earth's crust can provide seemingly endless quantities of hot water or electrical power.

Alaska is rich with hot springs and volcanoes that might provide energy to replace at least some use of fossil fuels. For example, last year Chena Hot Springs resort near Fairbanks replaced expensive diesel generators with a 200-kilowatt power plant driven by hot spring water.

And people have long eyed the chain of volcanoes along the Aleutian Islands, the Alaska Peninsula and up toward the Alaska Range as a source of energy. Unalaska in the Aleutians has been investigating the potential for a geothermal power plant tied into the Makushin Volcano. And Naknek on the Alaska Peninsula plans to test drill for a geothermal energy source near the village.

The state Department of Natural Resources is now calling for applications for geothermal leases next to the Augustine Volcano in the lower Cook Inlet and Mount Spurr, an active volcano on the west side of the Inlet.

Geothermal and other alternative energy sources become more viable when oil prices are high, and interest in them rises, said Chris Nye, a geologist with state Division of Geological and Geophysical Surveys.

Oil prices have been historically high for several years, and, according to the Department of Natural Resources, the state has not offered Cook Inlet geothermal leases for about 20 years.

A 1986 University of Alaska Geophysical Institute report discussed Mount Spurr's geothermal potential. The report's timing, however, coincided with a crash in oil prices that year.

NEEDS A MARKET

The economic viability of a geothermal project also depends on access to a market that will buy the energy produced.

Mount Spurr, for example, sits relatively near a good-sized market for electricity in Southcentral. But some well-known hot springs in the remoter Aleutian Islands that seem promising as geothermal energy sources have no obvious energy market.

Nye said there are different types of possible geothermal projects, depending on the underground heat source available.

At the top of the totem pole sit dry steam systems, in which the rocks are hot enough to dispel any underground water. Power can be generated by pumping water into the rocks and then using the resulting steam generation to power a turbine electrical generator.

More likely, as in a situation such as Mount Spurr or Augustine, is a source of underground water hot enough to boil when it reaches the surface.

"The best we can hope to have is a good, robust geothermal system," Nye said.

Again, the boiling water would drive a steam turbine.

BOIL REFRIGERANT

At lower temperatures, the warm underground water might be used to boil some other low-boiling-point fluid such as a refrigerant. The boiling of that secondary fluid would drive a turbine. The technology of this type of application has improved over the years, to the point where remarkably low temperature sources can viably generate electricity. The Chena power plant, for example, uses spring water at just 165 degrees.

"Chena is producing hundreds of kilowatts from the lowest temperature fluid in use anywhere in the world," Nye said.

However, lower temperature geothermal water can also be used to simply heat buildings, rather than generate electricity. The space heating of buildings might seem an improbable application in remote locations such as Mounts Spurr and Augustine but, according to a report by the Division of Geological and Geophysical Surveys, in 1993 the state had leased two tracts near Mount Spurr to a company interested in developing a geothermal hydroponic garden facility.

MOUNT SPURR POTENTIAL

So, what are the prospects of finding a geothermal energy source at Mount Spurr?

"There is a small zone of tepid hot springs that occurs on the south flank of Crater Peak. It's not really a robust geothermal spring system," Nye said. Crater Peak is an active volcanic cone on the south flank of the mountain.

A survey in the 1980s provided tantalizing indications of a layer of warm or hot brine at the entrance to the pass on the mountain's south side. Some soil geochemistry anomalies also pointed to the existence of geothermal water in the area, although other explanations for the anomalies are possible, Nye said.

If the anomalies represent geothermal brine, the brine is perched as a layer within the rocks. It's likely that the geothermal fluids would have flowed up from a deeper level through a crack in the rocks, and then spread out to form a layer rather like a thunderhead, Nye said. In that case, the source of the fluid would be the logical target for an exploration program, either through further geophysical work or through drilling.

"What you really want to find is the feeder zone," Nye said. "If all you have is the wing of the thing, you know that you're not looking at the hottest part of whatever it is and you've got the danger of having a reduced volume of reservoir."

AUGUSTINE UNKNOWN

Nothing is known about the potential of Augustine. There are no hot springs on the flanks to provide evidence of water transferring heat toward the surface.

"Mount Augustine is a volcano and it recently erupted," Nye said. "Therefore, material at many hundred degrees centigrade has moved from somewhere at depth to the surface and has undoubtedly lost some heat. Some of it may be parked somewhere and is still actively losing heat. Whether or not that's enough extra heat in the shallow crust to make a geothermal resource or not, we don't know."

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