

Geothermal power search holds promise, threat

David R. Baker, David Perlman, Chronicle Staff Writers
Sunday, August 16, 2009



On a high ridge in the Mayacamas Mountains, a drill slowly bores into the earth to test a new way to generate electricity.

The test, by a Bay Area company called AltaRock Energy, could give the world another source of renewable energy, a valuable weapon in the fight against global warming. It could also trigger earthquakes in a corner of California that already shakes most every day, a prospect that is jangling the nerves of some nearby homeowners.

AltaRock has chosen this ridge to try a new form of geothermal power, using the heat of the Earth to produce energy. The surrounding hills - in an area known as The Geysers, about 70 miles north of San Francisco - hold more than a dozen older geothermal plants that tap underground pockets of steam to turn turbines and generate electricity.

But AltaRock will drill below the steam pockets, burrowing into deep rocks hotter than 500 degrees Fahrenheit. The company, based in Sausalito, will fracture those rocks with high-pressure water, creating a network of cracks. AltaRock will then pump more water into the cracks, using the rocks to heat the water and create steam. Geologists monitoring the \$17 million project say it will create earthquakes, but most will be too small to notice.

If it pans out, the technique could work most anywhere. Geothermal energy, which produces almost no greenhouse gas emissions, would no longer be limited to rare places like The Geysers that have steam or super-heated water underground.

"If this really works, it could change the whole game," said Don O'Shei, AltaRock's chief executive officer, his voice nearly drowned out by the roar of diesel generators and the drill's rhythmic grind. "The issue of renewable power becomes a lot more manageable."

Quake jitters

Downhill from the drill site, Meriel Medrano and other residents of the tiny hamlet of Anderson Springs worry about the repercussions.

SFGate **REALESTATE**
sfgate.com/realestate



Roomy with a view

More in Real Estate

- Still waiting for a price cut on Los Altos mansion
- More households on verge of foreclosure in July
- Clever sales tactic or plain unethical?

Their homes have been rattled by frequent earthquakes for years. The shaking increased after Lake County and the city of Santa Rosa started pumping treated waste water into nearby wells to recharge the underground steam fields.

"It's much more than what it was five years ago, 10 years ago," said Medrano, whose home at the foot of the ridge has suffered cracked windows and tiles. "Our earthquakes are very shallow, very close to the surface, so you really feel them."

Medrano, who has lived there since 1971 and manages the local water company, isn't sure what effect AltaRock's experiment will have on the quakes. That's the problem.

"This is the fear about AltaRock: It's the unknown," she said. "We already have all these problems, and now we don't know what this is going to do."

Fracturing deep rocks for geothermal energy touched off a 3.4-magnitude earthquake in Basel, Switzerland, in 2006. A New York Times article this summer pointing out the similarities between AltaRock's project and the one in Basel prompted the federal Bureau of Land Management and the U.S. Department of Energy to take another look at AltaRock. Although the company has been allowed to continue drilling, the government won't let AltaRock pump water into the well and fracture rock until federal officials are satisfied that the project is safe.

O'Shei said AltaRock isn't drilling as close to big fault lines as the Basel drillers did, and the water pressure the company will use to fracture underground rocks will be lower than in Basel.

Besides, he said, companies have been boring wells in The Geysers for 50 years. Five older geothermal wells already sit on the same ridgetop as AltaRock's drill rig, steadily feeding steam into giant pipes that lead to a power plant nearby.

"People have been thinking about the geology here for a long time," O'Shei said.

Earthquakes are a constant

Small quakes constantly rattle the area's small towns. Data compiled by a local homeowners group counted more than 300 quakes greater than a magnitude 2 hitting each year for the last five years.

Many residents take the quakes in stride, viewing them as a minor price to pay for living in a region of lakes and lush, forested hills.

"People who live here and have been here for years don't think about earthquakes," said Wayne Nelson, a barber in Middletown who considers the controversy over AltaRock to be much fuss about very little. "I think we have a lot of Chicken Littles that have moved up here from the Bay Area."

The number of quakes has been growing in the last decade, a rise many residents blame on the injection of waste water into the steam fields. But some of the area's seismicity is natural, a product of the same geology that created the steam fields. A magma bubble lies just 4 miles below Earth's surface here.

The heat from that magma makes The Geysers an ideal place to test a type of geothermal energy production often called "hot dry rock." Drilling 2 miles down, AltaRock will use high-pressure water to lubricate the rock, allowing natural pressures within the rocks to create a network of cracks that can be used to heat water.

Each fresh fracture inevitably creates new "micro-earthquakes" so tiny they barely register on sensitive seismometers deployed above, according to Stephen Hickman, a research geophysicist with the U.S. Geological Survey in Menlo Park who is monitoring the AltaRock project.

"All geothermal energy efforts of that kind produce natural microseismic activity," he said.

Large earthquakes occur only on active faults, and evidence shows there are no faults in The Geysers area that have been active within the past 10,000 years, said David Oppenheimer with the Geological Survey in Menlo Park. The nearest fault to AltaRock's project - the Big Sulphur Creek Fault - is about 3,000 feet away and has not shown traces of active movement for the past 1.6 million years, according to the survey's data bank.

Usgs assurances

However, Oppenheimer said, "The fault is arguably 'active' right now," because so many small quakes have been induced by recent drilling activity there that some "could arguably be assigned" to that fault.

"They are going to generate earthquakes, mostly with magnitudes less than 2," he said of AltaRock. "The more fractures you create, the more likelihood it is that you'll pick up heat and very small earthquakes."

Most places don't have 500-degree rocks so close to the surface. But "hot dry rock" geothermal power could still work in other parts of the country, provided the wells are drilled much deeper.

"It comes down strictly to economics - the deeper you drill, the more expensive it is," said O'Shei, whose project won financial backing from the federal government as well as Google's philanthropic arm. "We think The Geysers is the best place to do this in the Western United States. Eventually, if you get good enough at it, you could do it anywhere."

Constant stream of power

The benefits for a world grappling with climate change could be huge. The most popular forms of renewable energy - solar and wind power - are notoriously fickle, providing electricity at some

times and not at others. But geothermal plants can run nonstop, producing a steady stream of power.

Local homeowners wary of the AltaRock project say they don't object to geothermal energy. But they have a hard time accepting the company's assurances that the project will be safe, especially after watching the number of quakes increase since the waste water injection project began.

"We'd like to believe that they're right," said Jeffrey Gospe, president of the Anderson Springs Community Alliance. "But I don't think anyone, no matter how good their models are, can tell what's going to happen until they do it."

E-mail the writers at dbaker@sfnchronicle.com and dperlman@sfnchronicle.com.

<http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/08/16/MN5N18UU3J.DTL>

This article appeared on page **A - 1** of the San Francisco Chronicle

© 2009 Hearst Communications Inc. | [Privacy Policy](#) | [Feedback](#) | [RSS Feeds](#) | [FAQ](#) | [Site Index](#) | [Contact](#)