

# Geothermal wants a level playing field

Eric Wolff, Escondido North County Times, 11-5-11

When it comes to renewable power, earth really wants to join wind and fire.

Which is to say that geothermal power developers, who tap heat energy from beneath the earth's crust, want a level playing field with burgeoning solar and wind generators.

Geothermal power had its heyday in the 1960s and '70s, and enough plants were built that it made up 21 percent of the state's renewable generation in 2010, according to the California Energy Commission. Solar made up 1.5 percent, and wind 10.3 percent.

Geothermal offers zero-emission power that's available regardless of the weather or the time of day, meaning it can be used to replace coal or natural gas plants. And as it happens, the area near the Salton Sea in Imperial County is a prime location for geothermal, with up to 2,300 megawatts of untapped capacity, developers said.

But geothermal builders must educate a populace that associates their product with earthquakes, and cope with higher taxes and higher costs for construction materials even as their competitors in solar and wind are enjoying the opposite trend.

Despite those disadvantages, geothermal is experiencing a modest renaissance.

"In the 1990s, there was almost no construction of new plants," said Karl Gawell, executive director of the Geothermal Energy Association, an industry group. "Now there's 700 megawatts at different stages of construction nationally."

In an effort to establish energy independence and battle global warming, California required its investor-owned utilities to buy one-third of their power from renewable sources by 2020. And 31 states have similar, if somewhat less aggressive, goals and deadlines for their utilities.

As it happens, the Imperial Valley is one of the best locations for geothermal in the country, thanks to its location at the end of the San Andreas Fault system.

The valley is essentially a thin spot in the earth's crust that makes it economically feasible to drill for the hot water thousands of feet below the surface.

At their heart, geothermal power plants produce electricity in the same way as fossil fuel generators: They use heat to produce steam, which turns a turbine that makes electricity.

But instead of buying natural gas, coal or oil, geothermal drills for hot water. What it does with the water depends on the temperature of the water at that location, officials said.

At CalEnergy Generation's plants in Calipatria, the water reaches 415 degrees Fahrenheit.

At high pressures found underground, it's still in liquid form. The company pumps it up and pipes it to "flash" tanks at its generation plant.

In stages, it lowers the pressure on the water, producing steam that turns the turbine. As the water cools, the company treats it, lets some of the solids fall out, and then pumps it back into the ground.

The closed system loses at most 5 percent of the groundwater, and that's only on the hottest days, said Alex Schriener, CalEnergy's director of geothermal resources.

But finding a location with accessible hot water is rare. Far more common worldwide are the binary plants pioneered and perfected by ORMAT Technologies Inc. The water these plants pump can be only 200 degrees Fahrenheit. They pump it up and run it through a heat exchanger that draws the heat to another tank of water and heats the secondary tank to boiling.

That steam from the secondary tank turns the turbine, and the groundwater is pumped back into the ground.

Officials declined to say whether one system was more efficient than another.

"You have to take what the resource gives you," said Ray Sainz, Imperial Valley Regional Manager for ORMAT.

The power produced from either technology has no carbon emissions or other pollution: Green fields of onions grow up to the boundary of one of CalEnergy's plants, and the Sonny Bono Salton Sea National Wildlife Refuge fills some of the acreage around the wells and plants.

Plus, generators can easily ramp up power production by changing the flow of steam.

"You can use geothermal to replace coal power on a megawatt-for-megawatt basis," Gawell said.

Geothermal also means jobs, Gawell said. Building a plant would require hundreds of skilled workers, and running one would require 55 full-time, highly trained staffers.

Utility-scale solar plants typically require fewer than 10 people to run.

Geothermal tends to set off fears in the general populace, aware of stories of earthquakes caused by geothermal drilling. Developers agree that power generation causes earthquakes: When the plant injects the cooler water back into the reservoir, it causes pieces of rock to shatter, setting off small tremors.

"Most of them could only be felt deep underground, or sometimes very close to the plant," Schriener said. "We have them all the time."

The greater barrier to geothermal is its expense. The exploration process is a risky exploration process analogous to drilling for oil. Companies can spend \$13 million drilling an exploratory well, said Cal Energy's Schriener said.

"There's a 1 in 4 success rate for exploration," he said.

The area around the Salton Sea has had geothermal on it since the 1970s, and it's well mapped, so exploration is less of a concern, but the cost to explore and build a geothermal plant is about \$20 million, Gawell said. And expenses have risen dramatically in recent years, especially the price of specialized steel alloys.

"It's virtually doubled the price of a geothermal power plant, mostly based upon the materials that go into it," he said.

While prices are rising for geothermal, they're falling for solar photovoltaic, executives for San Diego Gas & Electric Co. and Southern California Edison said.

The costs of building solar photovoltaic plants and windmills are hard to find, because utility contracts with generators are confidential.

In the 2000s, panel manufacturers ramped up production for panels to meet demand in Spain and Germany, only to see those countries reduce their subsidies last year. The resulting glut has been a boon for solar photovoltaic plant builders.

At the same time, solar has tax advantages at the federal and state level that allow those developers to reduce their costs, Gawell said.

"That can be a 40 percent difference in price," he said.

When utilities accept bids for renewable power, they find that solar and wind are often cheaper, especially taking into account that those generators produce the most power at times when the utilities need it most, during the day and early evening.

"I would love to get more (geothermal)," said Jim Avery, senior vice president for power supply for SDG&E. "I would say it is not a resource that has been economically feasible for our customers."

Avery said CalEnergy bid a geothermal contract to SDG&E in 2001, but pulled it back. Five years later, CalEnergy bid again, but their prices for power had doubled.

Southern California Edison has been a longtime buyer of geothermal power, and 53 percent of its renewable power comes from geothermal, including much of the energy sold by CalEnergy, said Marc Ulrich, vice president of renewable and alternative power for Edison.

"Half of my renewables are already baseload, so I can afford to balance the mix" with solar and wind, Ulrich said.

Still, both utilities have signed deals for geothermal in recent years. SDG&E signed three contracts for 90 megawatts of geothermal power in the last two years, although both were from plants that had been built.

Edison expects a new plant to come on line this year, and another next year.

But geothermal has to fight a huge field of candidates to win a deal.

"Every year, we go out for competitive renewable bids," Ulrich said. "In June, we got lots of bids, over 500 different projects, and each of those projects may have a couple of different bids to us. You get 500 projects and over 1,500 bids. It's good for our customers."