

Geothermal energy plant planned for Klamath wildlife refuge

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If all goes as planned, the Klamath Basin National Wildlife Refuge will be the site of a geothermal plant that can generate power from low-temperature resources.

A geothermal power plant planned in the Klamath Basin National Wildlife Refuge Complex would be the first in the U.S. to tap a new technology that can efficiently convert lower-temperature geothermal resources into electricity.

The plant, which will be developed by Klamath Falls-based Entiv Organic Energy, will use technology developed through a partnership between French energy giant Technip and geothermal specialists Mannvit of Iceland.

The basic system is known as the Kalina Cycle. The plant pulls hot water out of the ground and uses it to heat another liquid, a mixture of water and ammonia that carries a lower boiling point, which in turn creates the steam to power a turbine and generate power.

The closed-loop system can make use of water heated to between 180 degrees and 300 degrees Fahrenheit — geothermal resources previously deemed too chilly to generate power.

In the Klamath River basin, where both water and energy prices are hot topics, such technology holds extraordinary promise.

Take, for example, the Klamath Basin National Wildlife Refuge. The complex has been perpetually short on water in recent years and a jump in power costs in 2004 has made pumping water to replenish wetlands prohibitively expensive.

Drilling in 2002 established a geothermal well with water heated to around 200 F — too hot for the wetland habitat but prime for this new type of low-temperature geothermal power technology.

Ron Cole, refuge manager, learned about the technology from Mike Noonan, president of Entiv.

Noonan, an organic farmer in the basin, formed his company with an eye toward working with Technip to develop a handful of geothermal plants in the region. A participant in the refuge's "Walking Wetland" program — which has farmers hosting temporary, bird-friendly wetlands on their land — Noonan also knew of the refuge's need for a power resource.

Cole estimates that in 2001 it cost 33 cents to pump an acre-foot of water onto the refuge. The cost to do the same today is \$9.20.

"We had a need for cheaper power, they wanted to put this technology to work," Cole said.

The plant will cost more than \$10 million to build — the total cost is offset somewhat by the fact that the wells have already been drilled.

"This technology needs to be implemented because it will help out with all kinds of power issues and water

issues," Noonan said. "This one here is a win-win for everybody involved."

Noonan said Entiv has investors lined up and aims to move forward with the project as quickly as possible. The environmental review process is underway and if all goes smoothly construction could begin before the end of the year.

Noonan is meeting next month with the CEO of Organic Valley — Noonan Farms is a supplier to the brand — and Noonan said the company has expressed support for the project.

"It's nice to have them on our side," he said.

Technip, which has its U.S. headquarters in Houston, is guaranteeing the plant will generate at least 3 megawatts of power, though some estimates have the plant generating as much as 6 megawatts.

"This plant will be the first of its kind," said Michael Mugerwa, program director for renewables at Technip USA. "We are looking at, at least, 10 to 15 percent more power (than similar plants)."

Mugerwa said Technip is betting big on the improved geothermal technology, which is based on a version of the Kalina system that's been in place in Germany since 2009, but has been improved with further efficiencies through the partnership with Mannvit.

If the refuge site implementation is successful, Noonan said Entiv has four other sites in the region in mind for a similar plant.