



California's clean energy conundrum

Update: The State of U.S. Geothermal Production and Development

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With 2,957.94 megawatts (MW) of installed geothermal capacity, the United States remains the world leader with 30% of the online capacity total. A recent industry update showed an increase in the pace of geothermal production in the U.S., a country that many experts believe should take initiative to shed the expensive, foreign-dependent lifestyle of running on oil and gas and begin to help mitigate the threat of global warming.

Further, new technologies promise increased growth in locations previously not considered, indicating that the future outlook for expanded production from conventional and enhanced geothermal systems is positive.

Geothermal energy, considered by a growing number of renewable energy experts as the best form of renewable energy for its ability to provide continuous, 24-hour, clean, sustainable energy production, has long been an underdog to other technologies. With advances in technology and funding from government and investors, the U.S. can steadily increase development in using the heat of the Earth itself for substantial and widespread energy production.

The U.S. Geothermal Production and Development Update, August 2008, published by the Washington, D.C.-based Geothermal Energy Association, shows a 20% increase in the number of new geothermal power projects under development in the U.S. as of January 2008.

"The surge in new geothermal power development continues," said Karl Gawell, GEA's Executive Director.

The report identified 103 projects underway in 13 states (see Table, below). When developed, these projects could potentially supply up to 3,979 MW of power, meeting the needs of roughly 4 million homes. When we add that number to the 2,957 MW currently online, geothermal power could reach nearly 7,000 MW. At this pace of development, geothermal production could exceed 15,000 MW by 2025, which is significantly more more than the 12,558 MW projected by the Geothermal Task Force in a report that was submitted to the Western Governors' Clean and Diversified Energy Initiative in 2006.

State	New Projects	MW
Alaska	5	53-100
Arizona	2	2-20
California	21	927.6-1036.6
Colorado	1	10
Florida	1	0.2-1
Hawaii	2	8
Idaho	6	251-326
Nevada	45	1082.5-1901.5
New Mexico	1	10
Oregon	11	297.4-322.4
Utah	6	244
Washington	1	Unspecified
Wyoming	1	0.2
Total	103	2885.9-3979.7

August 2008 Results by State

Spurring the Growth: Better Policy, Better Technology

While geothermal remains relatively unknown in the mainstream, experts in the industry recognize the importance and degree of the recent surge. Growth is attributed to increases in state renewable portfolio standards (RPS), growing climate change concerns, higher prices for conventional fuels and the federal production tax credit being extended to geothermal projects.

To complement this, the Bureau of Land Management has been aggressively working through a lease application backlog, with successful new geothermal lease sales in 2007 and 2008, with a total of 245,695 acres sold. A Nevada lease sale this year brought in a record-breaking US \$28.2 million. Other lease sales are scheduled for later this year in Utah and possibly California and Oregon. Expect to see the number of geothermal projects rise with these 2007 and 2008 lease sales.

Projects under development will provide significant economic benefits, according to GEA. "These new projects will result in the infusion of roughly US \$15 billion in capital investment in the western states and will create 7,000 permanent jobs and more than 25,000 person-years of construction and manufacturing employment," Gawell stated.

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With technological advancements, scientists and developers can get more out of resources at lower temperatures and in new locations where production was not feasible in the past. While geothermal growth using current technology stands on its own, two promising newer technologies are Enhanced Geothermal System (EGS) and geothermal co-production.

EGS involves engineering reservoirs so that workable flow rates can be produced in otherwise nonviable resources. This new technology could add an additional 100 gigawatts (GW) or more to the U.S. electricity grid by 2050, according to the 2006 Future of Geothermal Energy report by the MIT. In Nevada, the first commercial project to apply EGS in the U.S. currently being developed by Ormat, is underway. Upon completion, it could add at least 5 MW to an already existing plant and prove the potential of EGS for further projects around the country.

Geothermal co-production, another technology, produces electricity from thermal fluid that flows from oil and gas wells. It is predicted that co-production is capable of providing 1,000-5,000 MW to the seven states in the Texas Gulf Coast Plain alone. A co-production demonstration project is now operating at the Rocky Mountain Oilfield Testing Center in Wyoming, and another demonstration project is set to begin in Florida this year. The capacity of the Florida project is expected to be between 200 kW and 1 MW.

A Burgeoning Industry Still Needs Support

Fortunately, geothermal energy has earned the attention of the media and is establishing itself as a viable power in the finance world. Al Gore included geothermal as an important aspect of his 10-year vision for a 100% renewable energy America. Measures are still needed before more definitive growth will materialize. The U.S. Department of Energy has increased its 2009 federal funding budget for geothermal research by US \$10.2 million; the DOE further committed US \$90 million over the next four years to advance research, development and demonstration of next-generation geothermal energy technology in the United States.

Together, state renewable portfolio standards, federal tax incentives, prioritized leasing and permitting and new research and development support are bringing about a renaissance in geothermal energy. But will this continue long enough to really create the momentum needed to achieve the potential of geothermal energy? Geothermal projects and technology will take years to develop, and the industry needs sustained federal and state support over the next decade to achieve substantial and significant results. If it can sustain this support, what seems today on the verge of impossible is likely to look like conservative thinking in the future.

Recent Developments

In the time since GEA's U.S. Geothermal Production and Development Update came out in August, the U.S. geothermal market has continued to grow. Along with the tax extension legislation being finalized in Congress, the GEA also hopes to also see an increase in research funding before the fall recess.

In addition to developments in the U.S., the U.S. Department of Energy inaugurated an International Geothermal Technology Partnership with Iceland and Australia to enhance international technology development.

Companies have posted their second quarter results and completed rounds of financing, prompting feedback from investors. Google announced US \$10.25 million investments in geothermal, a move that received a flurry of media and public attention. Google has also introduced an interactive map showing EGS potential in each state and finally GE and Google have announced a partnership to help achieve these and other goals.

An additional power plant has opened — the Lightning Dock plant in New Mexico. And to bring all of the players together, the Geothermal Energy 2008 Conference and Expo Guide in Reno, October 5-8, is expected to be the largest international geothermal conference and expo ever held.

