Geothermal Energy Research

Research Breakthroughs: What's Needed to Accelerate Path to Market and Achieve California's 2020 Renewable Energy Goals?

Hearing Room A

2/29/2012

Cheryl Closson, P.G.
Energy Generation Research Office
Energy Research and Development Division
cclosson@energy.state.ca.us / 916-327-2312

PUBLIC INTEREST ENERGY RESEARCH
"Research Powers the Future"

Geothermal Renewable Energy

- Geothermal represents ~45% of California's renewable electricity supply.
- Direct use of geothermal heat and fluids can also offset electricity/fossil fuel use.
- California has both high and low temperature geothermal resources throughout state. Higher temperatures (dry steam and liquid >300° F) are used for electrical production. Low to moderate temperatures (~68 – 300° F) can be used directly in residential, industrial and commercial heating and cooling.

Geothermal Potential in California

- **Geothermal currently provides ~2,100 MW of <u>baseload</u> power in California. *Geothermal is currently the only renewable resource that produces electricity 24/7.**
- **Undiscovered resources may provide an additional 3,200 to 25,000 MW.**
- **Many unknown or smaller resource areas currently unexploited for electricity or direct uses.**

PUBLIC INTEREST ENERGY RESEARCH
"Research Powers the Future"

Past and Present PIER Geothermal R&D

- PIER has provided over $6 million for geothermal research, including:
  - Assessment of the structure of the Salton Sea geothermal field from passive seismic measurements.
  - Development of fluid injection strategies for optimizing steam production at the Geysers.
  - Demonstration of an engineering-based cement evaluation method for geothermal wells.

Past and Present PIER Geothermal R&D

- PIER has also provided over $1.1 million to co-fund three ARRA DOE geothermal research projects:
  - Development of a non-contact drilling technology for geothermal wells.
  - Development of technologies for extracting minerals from geothermal fluids.
  - Geothermal exploration and confirmation at Caldwell Ranch in the northern Geysers area.

Geothermal Grant and Loan Program

- In addition to PIER funding, the Energy Commission also supports geothermal research through a grant and loan program funded by the state's Geothermal Resources Development Account (GRDA).
- GRDA funds come from revenues paid to the U.S. government by geothermal developers for leases on federal land in California.
- Since 1981 the program has provided ~ $69 million to over 180 geothermal research, demonstration and development projects.

Discussion Questions

- What is the greatest research need for geothermal energy?
- What public interest R&D can be conducted to support the geothermal industry?
- How can geothermal be integrated with and provide support to other renewables?