

# Geothermal Technologies Program

## Heat and Power for the 21st Century

### The Heat Beneath Our Feet

The western United States contains reservoirs of steam and hot water that provide electricity and heat for thousands of homes and businesses. This heat from the earth, often referred to as geothermal energy, is clean, reliable, and sustainable. Further development of our extensive geothermal resources will increase U.S. energy security and diversify the portfolio of energy technologies. Geothermal power plants are among the cleanest sources of electricity available.

### Clean Energy and Economic Development

The Department of Energy Geothermal Technologies Program works in partnership with U.S. industry to establish geothermal energy as an economically competitive contributor

to the U.S. energy supply. Goals of the Program are to:

- Reduce the levelized cost of geothermal electricity to \$0.03-\$0.05 per kilowatt-hour by 2010
- Double the number of states producing geothermal electricity from four to eight by 2006
- Supply the heat and power needs of 7 million homes and businesses by 2015.

The Program conducts focused research that will: (1) enhance the performance of geothermal systems through the application of advanced technologies; (2) reduce risk and cost through improved drilling technologies; and (3) expand the resource base with improvements in methods for finding new resources and cost-shared exploration with industry.

### Geothermal Energy Today

Geothermal resources supply about 6 percent of the electricity produced in California, 10 percent in northern Nevada, and 25 percent on the Island of Hawaii, as well as significant power in Utah.

Geothermal energy also provides about 600 thermal megawatts of heating capacity for schools, homes, and businesses in the western United States.

The U.S. government receives more than \$40 million annually in royalty and lease payments from geothermal energy production. Since 1967, nearly \$500 million in royalties have been collected.

*The Geysers geothermal field in northern California is the largest geothermal power development in the world. After 25 years of steam production, the field experienced a decline in the underground steam supply, and injection water was needed to supplement the steam supply. With local authorities, DOE co-funded a 29-mile effluent pipeline from Lake County to The Geysers. Effluent injection at The Geysers restored 70 megawatts of power generation and is environmentally superior to surface disposal methods.*



Three national laboratories lead the efforts. The Idaho National Engineering and Environmental Laboratory conducts projects in geoscience and energy conversion; Sandia National Laboratories works at reducing exploration and drilling costs; and the National Renewable Energy Laboratory develops ways to enhance power plant efficiency and reduce operating costs. Research also is supported through competitive solicitations for universities and industry, and cost-shared public-private partnerships.

The Program regularly communicates promising technology to U.S. industry. Its quarterly *Geothermal Technologies* newsletter is distributed via the bulletin of the Geothermal Resources Council, the society of geothermal professionals. The Program also publishes an annual *Geothermal Research Program Update* that discusses each research project. Many projects are co-sponsored with industry, assuring rapid deployment in the marketplace.

GeoPowering the West (GPW), the Program's primary communications and outreach effort, works to eliminate institutional barriers to geothermal development and raise general awareness and acceptance of geothermal energy. GPW brings together industry, State Energy Offices, Federal agencies, American Indian tribes, utilities, and other stakeholders to discuss issues and

exchange ideas. Current activities focus on permitting, environmental impacts, inter-agency cooperation, and regulatory issues.

### Award-Winning Research Leads to Industry Success

DOE-developed technology is adopted rapidly by the market. For example, two DOE national laboratories and their industrial partners were awarded an R&D 100 Award from *R&D Magazine* in 2002 for development of a high-performance polyphenylenesulfide coating for use in heat exchangers and other components exposed to geothermal fluids. The coating prevents build-up of harmful scale, saving tens of thousands of dollars in capital, maintenance, and replacement costs. It is now commercially available to the geothermal, chemical, and refining industries and is being considered for use at several geothermal power plants in California and Nevada.

Together with U.S. industry and all levels of government, the Geothermal Technologies Program is making great strides toward increasing the viability and deployment of geothermal heat and power.

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



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