The 58,000-square-foot Hot Springs Lodge and Pool in Glenwood Springs, Colorado, uses a geothermal heat exchanger system with its hot surface spring to provide space heating, domestic hot water, and snow melting. PIX07931

Low-Temperature Geothermal Resources

The U.S. Department of Energy's (DOE) Geothermal Technologies Program (GTP), with support from DOE's national laboratories, conducts research, development, and demonstration projects throughout the United States on low-temperature geothermal resources. Used widely internationally, direct-use low-temperature installations are gaining ground in the United States.

There are numerous applications for low-temperature geothermal energy, including spas, direct space heating, aquaculture, agricultural drying, snow melting, and power generation.

Low-temperature geothermal resources are more difficult to extract power from since the highest temperature in the power generation cycle has a very strong effect on the overall efficiency. However, low-temperature resources are widely available, and power generation and electricity unit installations have doubled in the United States in the last 15 years.

Chena Hot Springs Resort, in Alaska, uses the lowest temperature geothermal resource for commercial power production in the world by utilizing Organic Rankine Cycle units, shown here. PIX17388

A ground source heat pump system provides heat and cooling to the 9,580-square-foot Business Incubator in Greensburg, Kansas. PIX17206

Because they are so plentiful, low-temperature resources have the potential to contribute largely to the national geothermal portfolio. In fact, the U.S. Geological Survey has identified more than 120,000 megawatts of untapped low-temperature geothermal resources in the United States.

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Project Highlights

In March 2009, DOE issued a funding opportunity announcement using funds from the American Recovery and Reinvestment Act of 2009 calling for enhanced geothermal systems component research and development/analysis, including geothermal energy production from low-temperature sources.

Several projects are underway in the United States, including the following:

Analysis of Low-Temperature Utilization; West Virginia University

Objective: Perform in-depth analysis of low-temperature geothermal resources in the eastern United States.

Possible Impacts: The analysis could lead to better supply and techno-economic estimates for DOE models.

Electric Power Generation from Low-Temperature Geothermal Resources; University of North Dakota

Objective: Demonstrate the technology and economic feasibility of electric power generation from low-temperature geothermal water using binary, organic Rankine cycle (ORC) technology.

Possible Impacts: This project can provide opportunities to test geothermal ORC technology under numerous low-temperature resource conditions in the widely varying climate of North Dakota.

Klamath Falls Geothermal Low-Temperature Power Plant; City of Klamath Falls, Oregon

Objective: Construct a low-temperature geothermal energy production facility to demonstrate technical and economic feasibility of geothermal energy as a resource for combined heat and power.

The city of Klamath Falls, Oregon, uses low-temperature geothermal resources for district heating applications such as this snowmelt tubing installed in slurry backfill under sidewalks. The City uses the system to melt snow on more than 50,000 of its sidewalks and crosswalks. PIX08831

Possible Impacts: The plant, coupled with an existing geothermal district heating system, could lead to economic and community impacts, including reduced unemployment.

Novel Conversion Equipment; Johnson Controls, Inc.

Objective: Develop electricity-generating equipment from low-temperature geothermal resources at a cost at least 20% less than current technology.

Possible Impacts: This equipment could play a leading role in realizing renewable energy and its potential to create new jobs and reduce emissions.

Osmotic Heat Exchange for Energy Production; Oasys Water

Objective: Design, construct, and test performance of osmotic heat engines for low-temperature heat recovery using technology based on existing water desalinization efforts.

Possible Impacts: This technology could have widespread application.

For more information visit GTP's Web site at *www.geothermal.energy.gov*. Find details on projects listed here, and others, in GTP's Projects Database at *www.geothermal.energy.gov/projects/*.

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