GEOTHERMAL TECHNOLOGIES FY14 BUDGET AT-A-GLANCE

Geothermal Technologies accelerates the development and deployment of clean, domestic geothermal energy. It supports innovative technologies that reduce both the risks and costs of bringing geothermal power online. As a key component of our clean energy mix, geothermal is a renewable energy that generates power around the clock.

What We Do

The EERE geothermal technologies portfolio consists of a three-pronged investment approach to facilitate the growth of installed electrical capacity:

- ✓ **Research and Development** invests in innovative technologies and techniques to improve the process of identifying, accessing, and developing geothermal resources.
- ✓ **Demonstrations** enable technologies and techniques to be field tested and validated.
- ✓ **Deployment activities** focus on reducing non-technical barriers and conducting analysis on the impact of our investments.

Program Goals/Metrics

- Demonstrate capability to create and sustain a 5MW Enhanced Geothermal Systems (EGS) reservoir by 2020.
- Lower the levelized cost of electricity from newly developed geothermal systems to $0.06/kWh by 2030.

FY 2014 Priorities

- Launch the **EGS Field Lab** effort to promote transformative, high-risk science and engineering that will create a commercial pathway to EGS. A key distinction between existing private-sector led demonstration projects and the DOE-managed EGS Field Lab is the ability to develop, test, and comprehensively monitor an engineered reservoir at a scale that has not yet been demonstrated, using new technologies in pre-commercial stages of development. The EGS Field Laboratory will stimulate collaborative parterships and data sharing among industry, lab and university users to conduct cutting-edge research, drilling, and testing. This effort will pave the way to rigorous and reproducible approaches to EGS that will reduce industry development risk.
- Launch the **Strategic Minerals Initiative** to explore methods to cost-effectively extract valuable and strategically important minerals from U.S. geothermal brines, thus creating an additional revenue stream from geothermal power production in the near-term. This initiative will leverage the program's highly successful lithium co-production project in the Salton Sea area in California, which is the first demonstration facility to co-produce lithium, manganese, and zinc from geothermal brines. This project is expected to commence production in late FY 2013 or early FY 2014.
- Complete the "**Play Fairway"** resource mapping effort started in FY 2012. This first-in-the-geothermal world effort lowers costly upfront exploration risks for developers by sorting regional data to better isolate geothermal prospects for drilling. The results will help target an estimated 30 GW of hydrothermal reserves nationwide.
- Fully deploy the **National Geothermal Data System** by 2014. Access to high-quality, geothermal-relevant data has been named as the single greatest need in the industry. This initiative aggregates data from all 50 state geological surveys and DOE-funded projects critical to advancing geothermal research and resource development. This is a "best-in-class" data collection and dissemination effort.

(Dollars in Thousands)	FY 2012 Current	FY 2013 Request	FY 2013 Annualized CR*	FY 2014 Request
Geothermal Technologies				
Enhanced Geothermal Systems	15,556	45,000	–	42,000
Low Temperature Co-produced Resources	4,940	2,000	–	2,000
Innovative Exploration Technologies	12,483	14,000	–	12,000
Systems Analysis	4,000	4,000	–	4,000
Total, Geothermal Technologies	**36,979**	**65,000**	**38,094**	**60,000**

*FY 2013 amounts shown reflect the P.L. 112-175 continuing resolution level annualized to a full year. These amounts are shown only at the "congressional control" level and above; below that level, a dash (—) is shown.

Key Accomplishments

- **EGS Demonstrations:** Geothermal Technologies has seen success in three EGS demonstration projects, and two additional demonstrations are underway in FY13.
  - **The Geysers (Northern CA).** The Geysers represents the nation's first sustained EGS demonstration success, following a year-long stimulation along the outer edges of an operating geothermal field. The new and distinct reservoir that was created has successfully yielded enough steam to produce 5 MW of electricity. Because of existing infrastructure, this EGS reservoir demonstrates that stimulating hot rock on the margins of existing hydrothermal fields can secure higher field productivity at low cost.
  - **Newberry Volcano (Bend, OR).** As of January 2013, this project has completed reservoir stimulation and preliminary results suggest that the project successfully created three separate zones of fluid flow from a single well where none existed before—a first-of-its-kind achievement. Data are still being analyzed to confirm this significant technical milestone.
  - **Desert Peak (Western NV).** At this demonstration project, fluid was injected into an existing sub-commercial injection well in over an 8-month multi-stage stimulation. Injectivity increased by several orders of magnitude, and flow rates increased to hundreds of gallons per minute, within range of a commercial well. As of April 2013, this project is now connected to the grid, making it the first EGS project in America to generate commercial electricity: an additional 1.7 MW at the existing wellfield.
  - **High Value Mineral Extraction:** Through funding provided by the American Recovery and Reinvestment Act of 2009, a project based in the Salton Sea area of California built the first demonstration facility to co-produce materials like lithium, manganese, and zinc – extracted from geothermal brines during the power production process. The estimated lithium production could produce enough batteries to power 300,000 to 600,000 electric vehicles per year and make the U.S. a major lithium producer.

- **Low Temperature (Bottoming-Cycle) Demonstrations:** Using Recovery Act funding, Geothermal Technologies funded two low-temperature binary bottoming-cycle demonstrations to validate innovative technologies for geothermal power production and for further development by the private sector.
  - **Beowawe (NV).** Generally not considered viable for utility-scale deployment, nonconventional geothermal resources (at 205°F) were demonstrated at the Beowawe project, demonstrating the first commercial feasibility of low-temperature geothermal electricity resources using a binary technology.
  - **Dixie Valley (NV).** Technical and economic feasibility from nonconventional geothermal resources (at 223°F) were again demonstrated successfully at the Dixie Valley plant with the first commercial supercritical cycle at less than 300°F.

- **Induced Seismicity (IS) Protocol:** DOE commissioned a group of experts to develop an *Induced Seismicity Protocol,* an effort that engaged the United States and international scientific and industry communities to assess the impacts of induced seismic events. Induced seismic events are small-magnitude earthquakes, rarely felt at the surface, that can be attributed to human activities. While IS data allow the industry to better characterize the subsurface, DOE has taken the global lead in establishing procedures that ensure safety at injection sites. DOE released the Protocol in 2012 and adopted its safety guidelines for all DOE-funded EGS demonstration projects. Subsequently, the Protocol was well received by the National Research Council (NRC) and recommended as a "best practice" document for use by all other subsurface technologies.