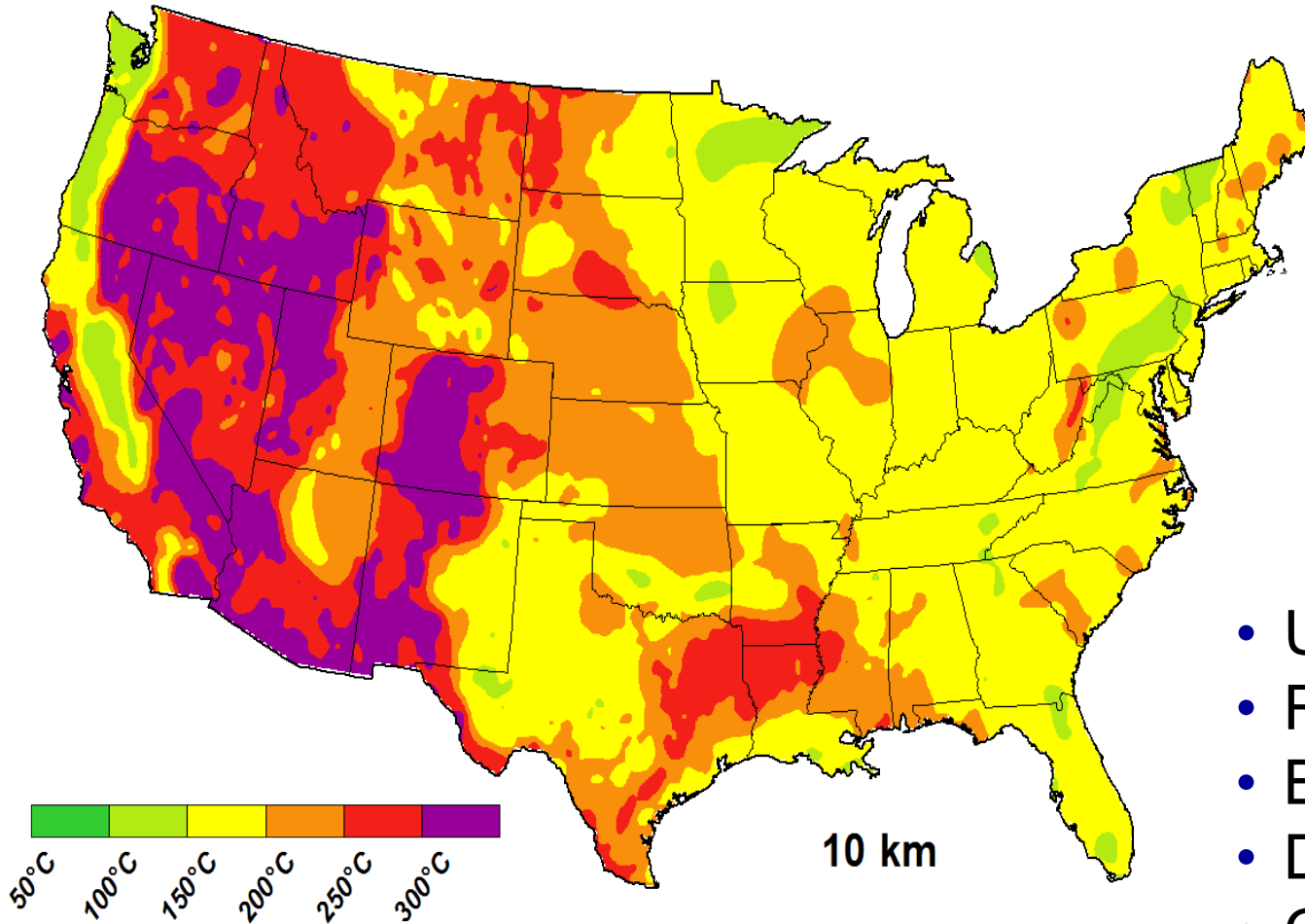


The Geothermal Technologies Program EGS Activities

Hidda Thorsteinsson
Technology Development Manager
July 15, 2009



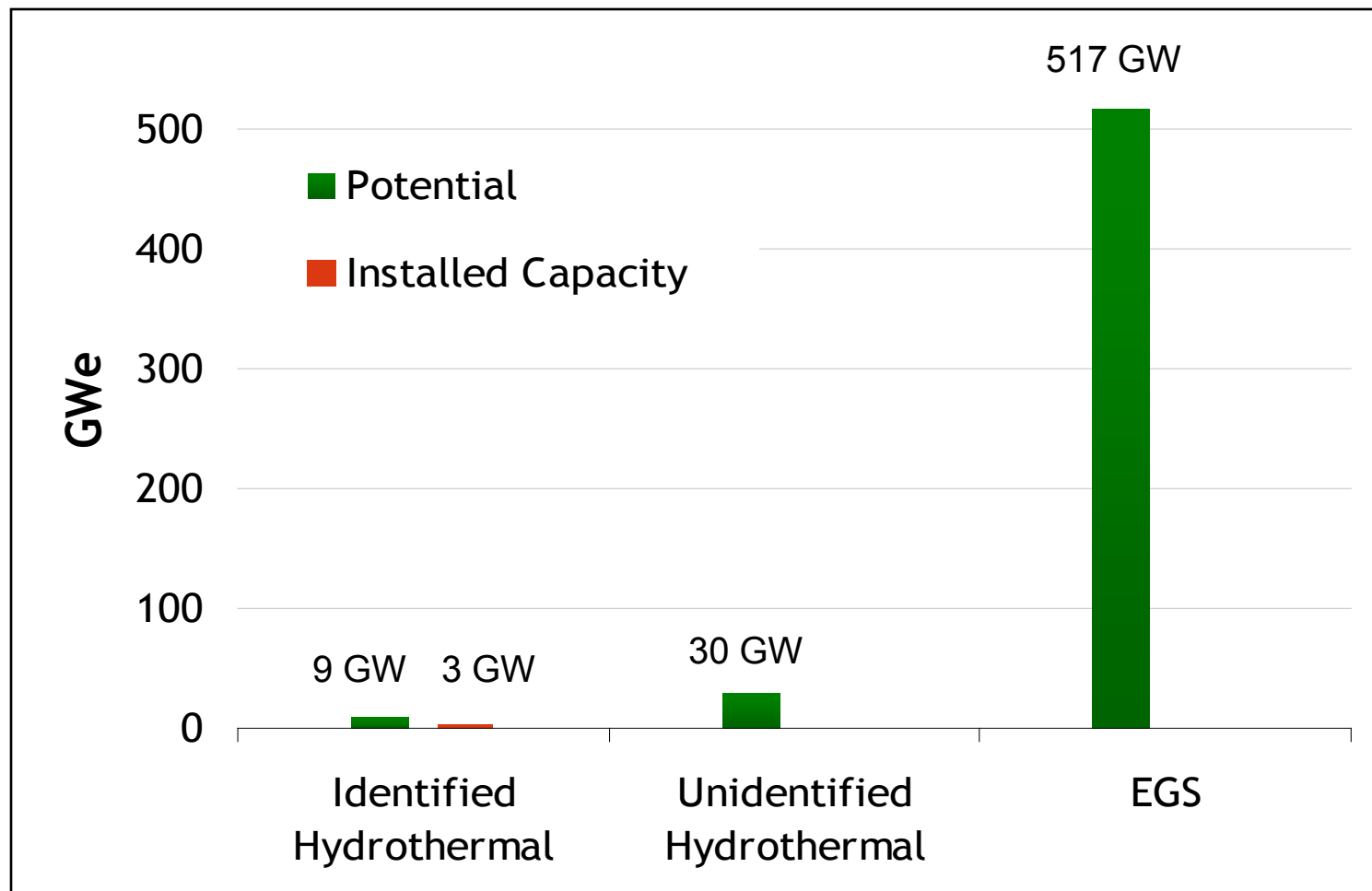
U.S. Geothermal Resource



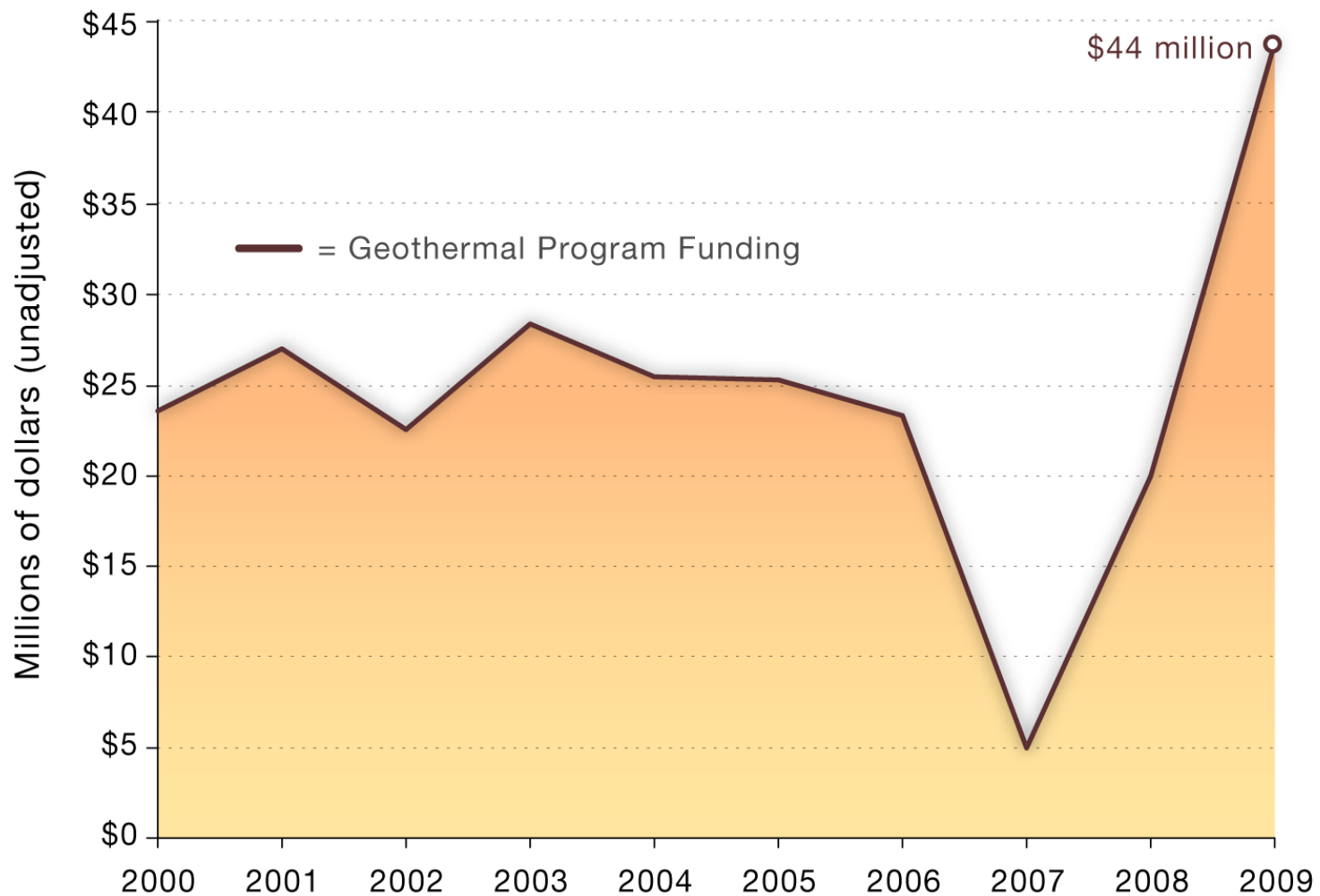
- Ubiquitous
- Renewable
- Baseload
- Domestic
- Clean

* Lower 48 states

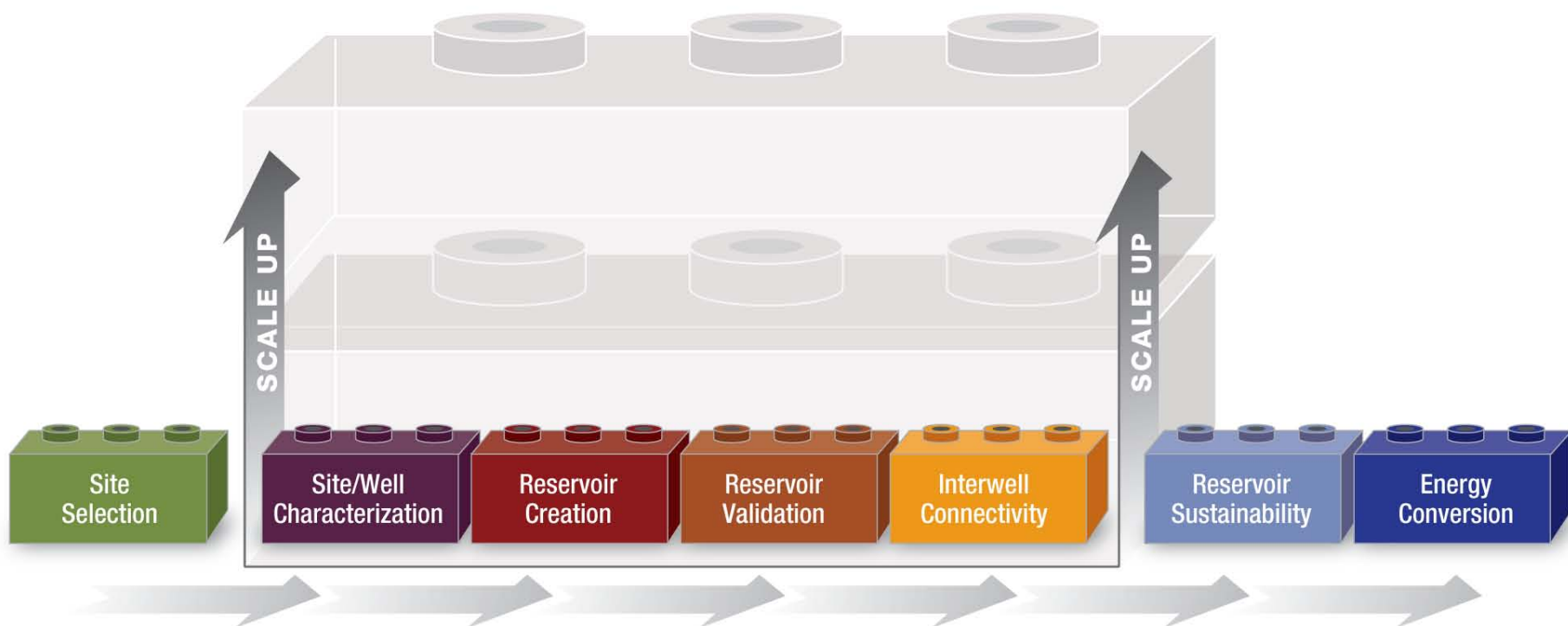
USGS Estimate of Geothermal Resource in the Western US



Budget History



Research, Development & Demonstration (RD&D)



RD,&D goals are to engineer what nature failed to provide:
Fluid and Permeability



GTP Vision and Mission

Vision

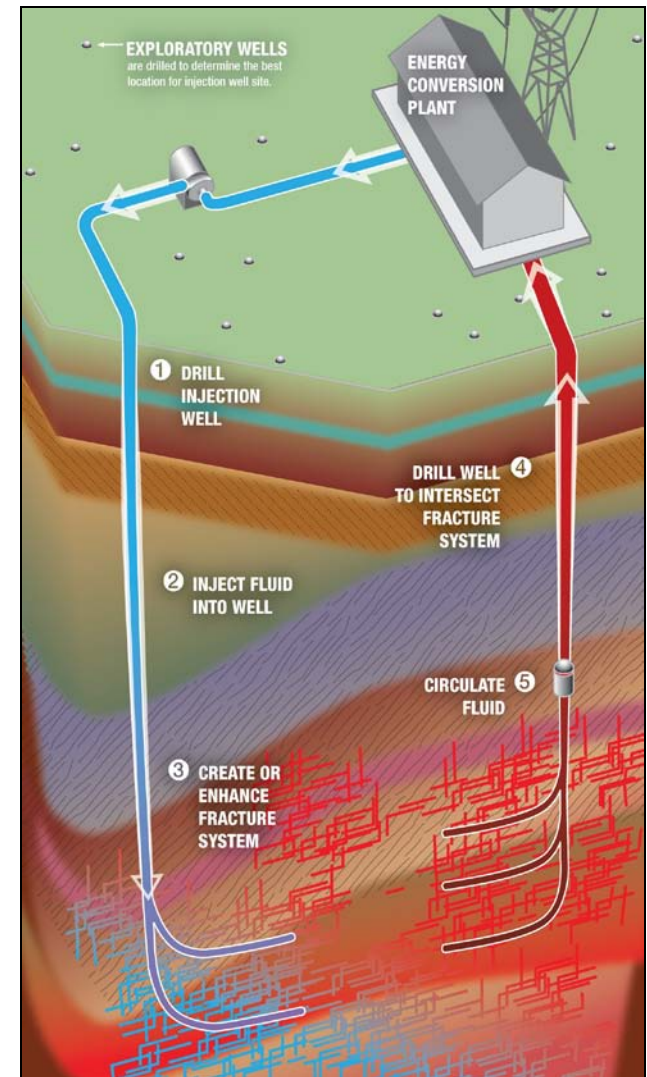
Geothermal energy will be a major source of clean, renewable domestic baseload electricity.

Mission

GTP will conduct research, development and demonstration to establish Enhanced Geothermal Systems (EGS) as a major contributor for electricity generation.

Strategic Goal

Develop the technology base that creates and sustains commercial-scale EGS reservoirs.



Ongoing DOE Projects

| Technology | Number of Projects |
|-----------------------------------|--------------------|
| Downhole pumps R&D | 2 |
| Fracture characterization R&D | 6 |
| High-temperature tools R&D | 4 |
| Imaging fluid flow R&D | 2 |
| Stimulation prediction models R&D | 2 |
| Tracers R&D | 1 |
| EGS Demonstration | 4 |

Other Efforts

- Induced Seismicity Monitoring
- Multi-Year Research, Development and Demonstration Plan
- National Geothermal Action Plan
- International Partnership for Geothermal Technology
- Education and Workforce Development
- Risk Assessment
- Life Cycle Assessment
- Predetermination of Project Viability
- Employment Analysis
- Market Report
- Climate Change Analysis
- Macro and Component Models

American Reinvestment and Recovery Act 2009



- On May 27, 2009, President Obama announced \$350 Million in Recovery Act funding for geothermal technologies
- An additional \$50 million will be made available for projects in ground source heat pumps

"We have an ambitious agenda to put millions of people to work by investing in clean-energy technology like solar and geothermal energy. These technologies represent two pieces of a broad energy portfolio that will help us aggressively fight climate change and renew our position as a global leader in clean energy jobs."--



Secretary of Energy Steven Chu

Enhanced Geothermal Systems

Objective:

Investigate advanced reservoir stimulation techniques for EGS in various geological and geographic settings throughout the United States.

Deployment Strategy:

- Select up to 10 new EGS systems demo projects
- In various geologic formations and geographic regions, including green fields
- Quantitatively demonstrate and validate stimulation techniques that sustain fluid flow and heat extraction rates for 5-7 years that produce up to 50 MWe per year per project site /geothermal reservoir.

Funding: \$90 million

FOA: DE-FOA-0000092

Close date: 7/30/2009



EGS Research and Development and Analysis

Objective:

Accelerate EGS technology development through cost-shared R&D that will allow EGS to be a major contributor for baseload electricity generation.



Deployment Strategy:

- Open funding opportunity announcement (FOA) in 23 topic areas
- DOE selected 10 national laboratories under a lab call that closed February 18, 2009.

Funding: \$80 million

R&D funding is divided:

- \$23 million for lab call projects
- \$57 million for industry projects.

FOA: DE-FOA-0000075

Close date: 7/17/2009



Selected Recovery Act National Lab Projects

| Technology | Number of Projects |
|---|--------------------|
| Air Cooling R&D | 2 |
| Drilling Systems R&D | 2 |
| High-temperature downhole tools R&D | 4 |
| Imaging fluid flow R&D | 2 |
| Induced Seismicity R&D | 1 |
| Integrated Chemical, Thermal, Mechanical, and Hydrological Modeling R&D | 1 |
| Stimulation Predication Models R&D | 2 |
| Supercritical Carbon Dioxide/Reservoir Rock Chemical Interactions R&D | 5 |
| Temporary Sealing of Fractures | 1 |
| Tracers and Tracer Interpretation R&D | 2 |
| Working Fluids for Binary Power Plants | 4 |
| Total | 26 |

Geothermal energy production from oil and gas fields, geopressured fields, and low temperature resources

Objective:

Demonstrate geothermal energy production from oil and gas fields, geopressured fields, and low temperature resources throughout the US.

Deployment Strategy:

- Seek applications from consortia of industry, academia and Federal Labs.
- DOE expects to select up to 20 new geothermal power generation projects.

Funding: \$50 million

FOA: DE-FOA-0000109

Close date: 7/22/2009



National Geothermal Data System

Objective:

The National Geothermal Data System, Resource Assessment and Classification is a three part strategy to assess and classify all geothermal resources and provide links to geothermal data sets to lower the risk of development.

Deployment Strategy:

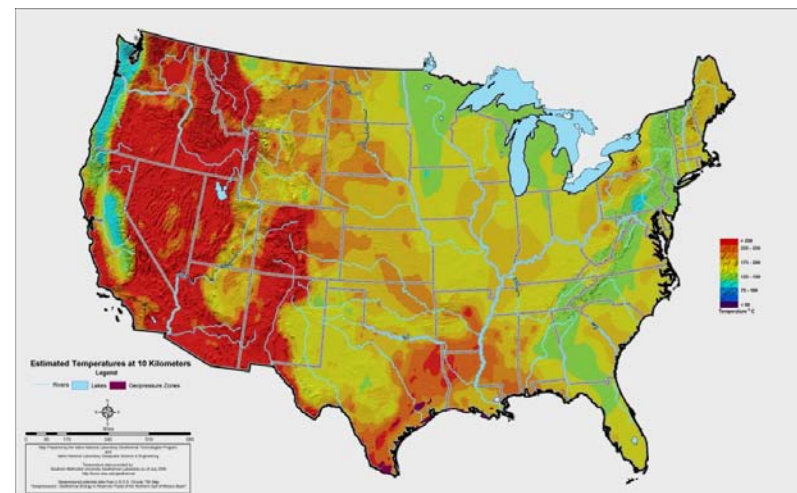
1. Geothermal Data Consortium, led by Boise State, undergoing award negotiations to design, develop; and test the NGDS
2. USGS interagency agreement to assess and classify the geothermal resource:
3. National or Regional Teams to Populate the NGDS - (FOA Open).

Funding: \$30 million

FOA: DE-FOA-0000109,

Close date: 7/22/2009

Selected team or teams will develop, collect, and maintain geothermal data for all 50 states populating the National Geothermal Data System.



Other Recovery Act Topics

Validation of Innovative Exploration Technologies

| | |
|-----------------------------|---|
| Objective: | To discover as much as 400 MWe of confirmed geothermal energy capacity. |
| Deployment Strategy: | DOE plans to award 20-40 projects |
| Funding: | \$100 million |

Ground Source Heat Pumps

| | |
|-----------------------------|---|
| Objective: | Increase national GHP deployment by addressing current market barriers and opportunities |
| Deployment Strategy: | <ol style="list-style-type: none">1. Cost-shared technology demonstration projects2. Data gathering and analysis3. A national certification and accreditation program |
| Funding: | \$50M |

Goals and Metrics

| | |
|------|---|
| 2015 | Demonstrate the ability to create an EGS reservoir capable of producing 5 MWe. |
| 2020 | Validate the ability to sustain an EGS reservoir capable of producing at least 5 MWe. |

New Program Goal

50 GWe of geothermal energy online by 2030



Thank You