



Glass Buttes, OR (DOE)

Geothermal Resources Council
2011 Annual Meeting

Doug Hollett, Program Manager

October 24, 2011

Department of Energy & the Office of Energy Efficiency and Renewable Energy

Stationary

- **By 2035, generate 80% of electricity from a diverse set of clean energy sources**
- **Make non-residential buildings 20% more energy efficient by 2020**

Transport

- **Reduce oil imports by 1/3 by 2025**
- **Put 1 million electric vehicles on the road by 2015**

Environmental

- **Cut GHG emissions 17% below 2005 levels by 2020, and 83% by 2050**

Federal leadership

- **Reduce Federal Greenhouse Gas emissions by 28% by 2020**

Security

- **Advance domestic energy resources**
- **Diverse supplies**

Environment

- **Achieve 80% reduction in Greenhouse Gas Emissions**
- **Improve water and air quality (indoor and outdoor)**

Economy

- **Low cost energy services**
- **Clean energy business opportunities**
- **Clean energy jobs**

“How should the Department choose among the many technically viable activities it could pursue?”

Report issued September, 2011: Analytic, assessment, and fundamental engineering activities can be judged by:

Maturity

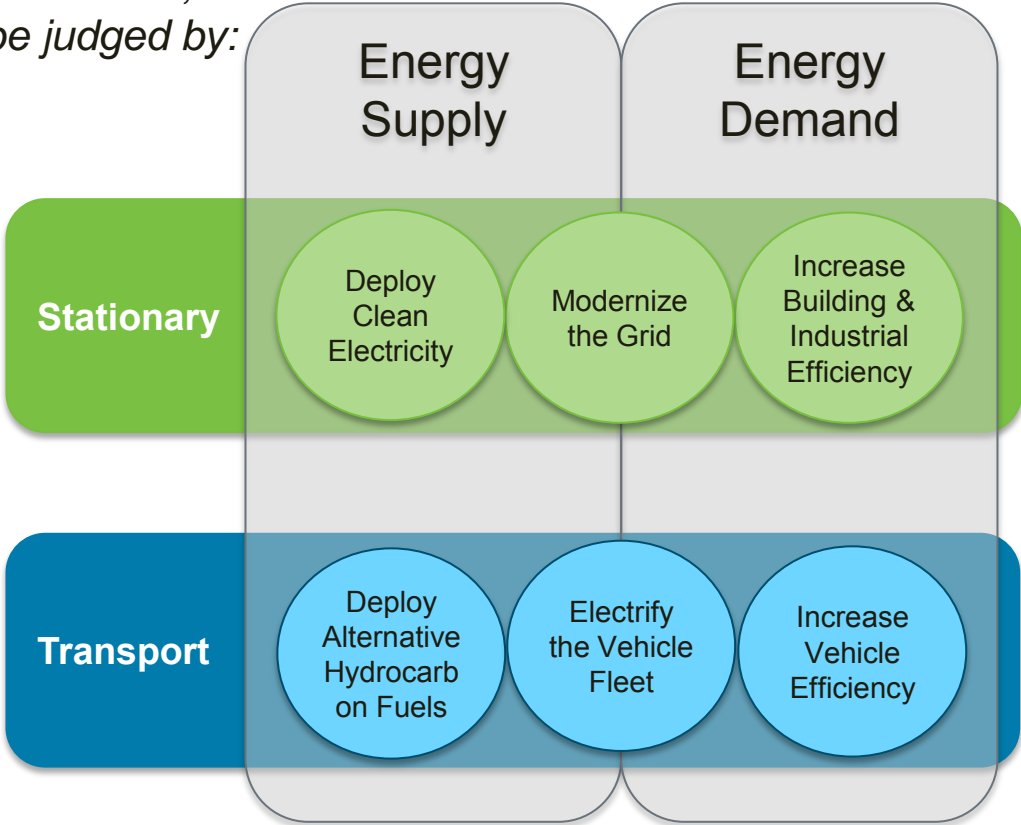
Significant technical headroom, yet can be demonstrated at commercial scale within a decade

Materiality

Consequential impact (roughly 1% of primary energy) on meeting national energy goals in two decades

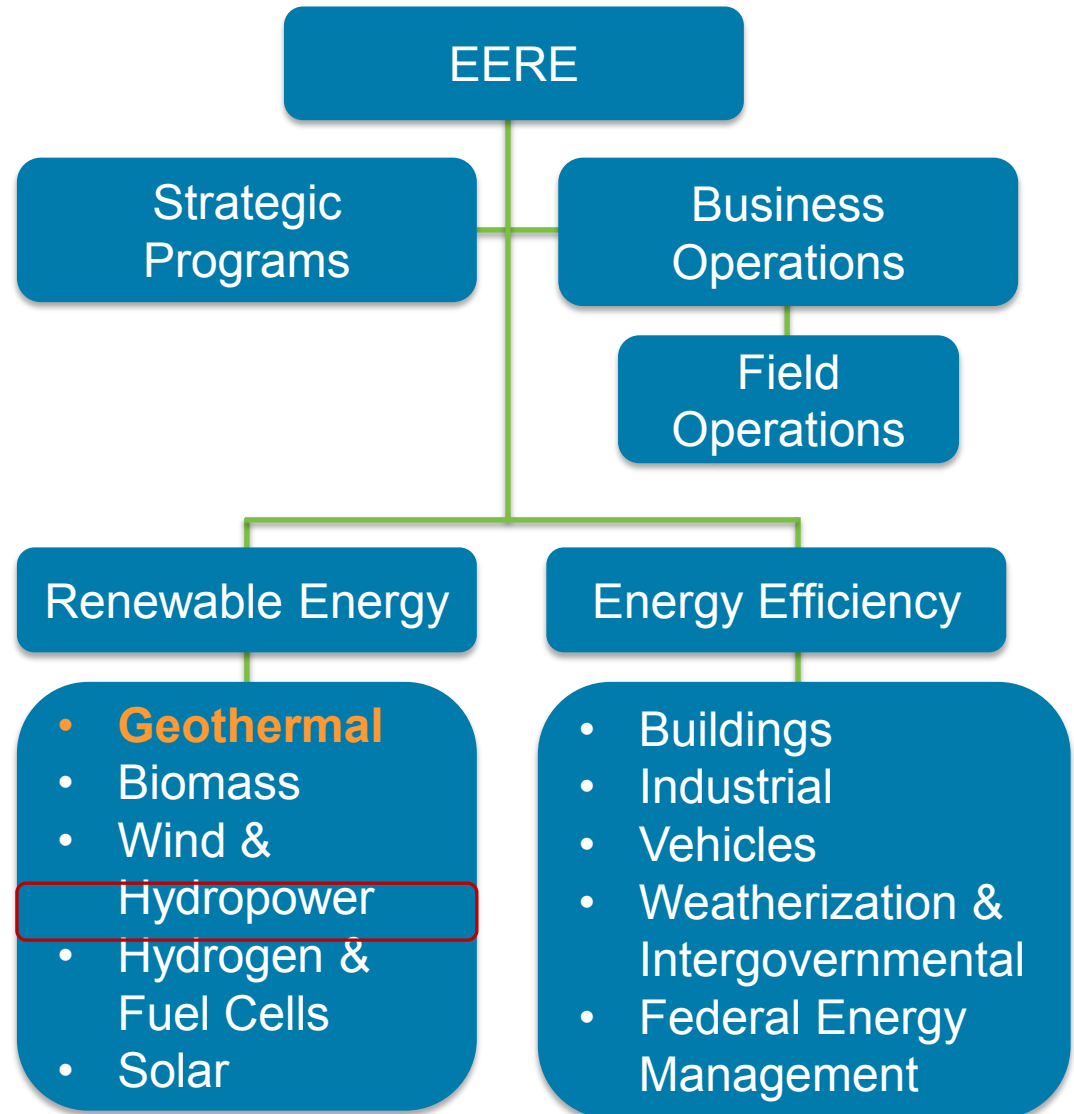
Market Potential

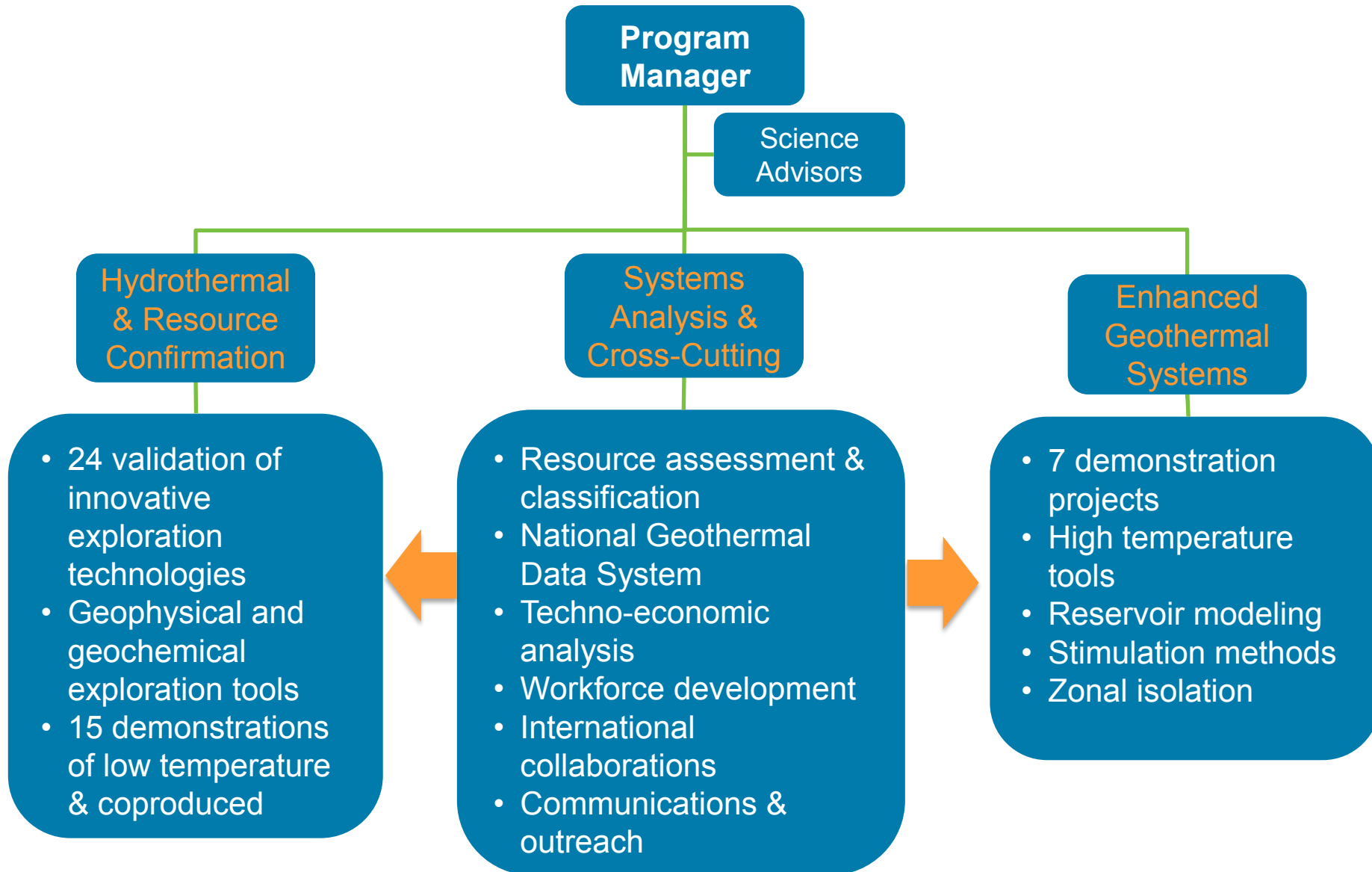
Expected to be adopted by the relevant markets, understanding that these markets are driven by economics, but shaped by public policy



The Six Strategies to address national energy challenges

- **Focus:**
 - **Enhance energy efficiency and productivity**
 - **Bring clean, reliable and affordable energy technologies to the marketplace**
- **Fiscal Year 2011 budget of \$1.8 billion**
- **Geothermal budget accounted for 2% of 2011 total EERE funding**





Accelerate Near Term Hydrothermal Growth

- Lower development & exploration risks and costs
- Lower levelized cost of electricity (LCOE) to 6 cents/kWh by 2020
- Accelerate development of 30 GWe of undiscovered hydrothermal resources

Secure the Future with Enhanced Geothermal Systems (EGS)

- Demonstrate 5 MW reservoir creation by 2020
- Lower LCOE to 6 cents/kWh by 2030



In March 2011, the Program assembled a panel of geothermal experts to:

- Identify the obstacles to geothermal energy growth
- Recommend priority research and development areas
- Discuss the appropriate role of DOE

Exploration

- Develop an inventory of high-quality prospects
- Improve exploration technologies

EGS

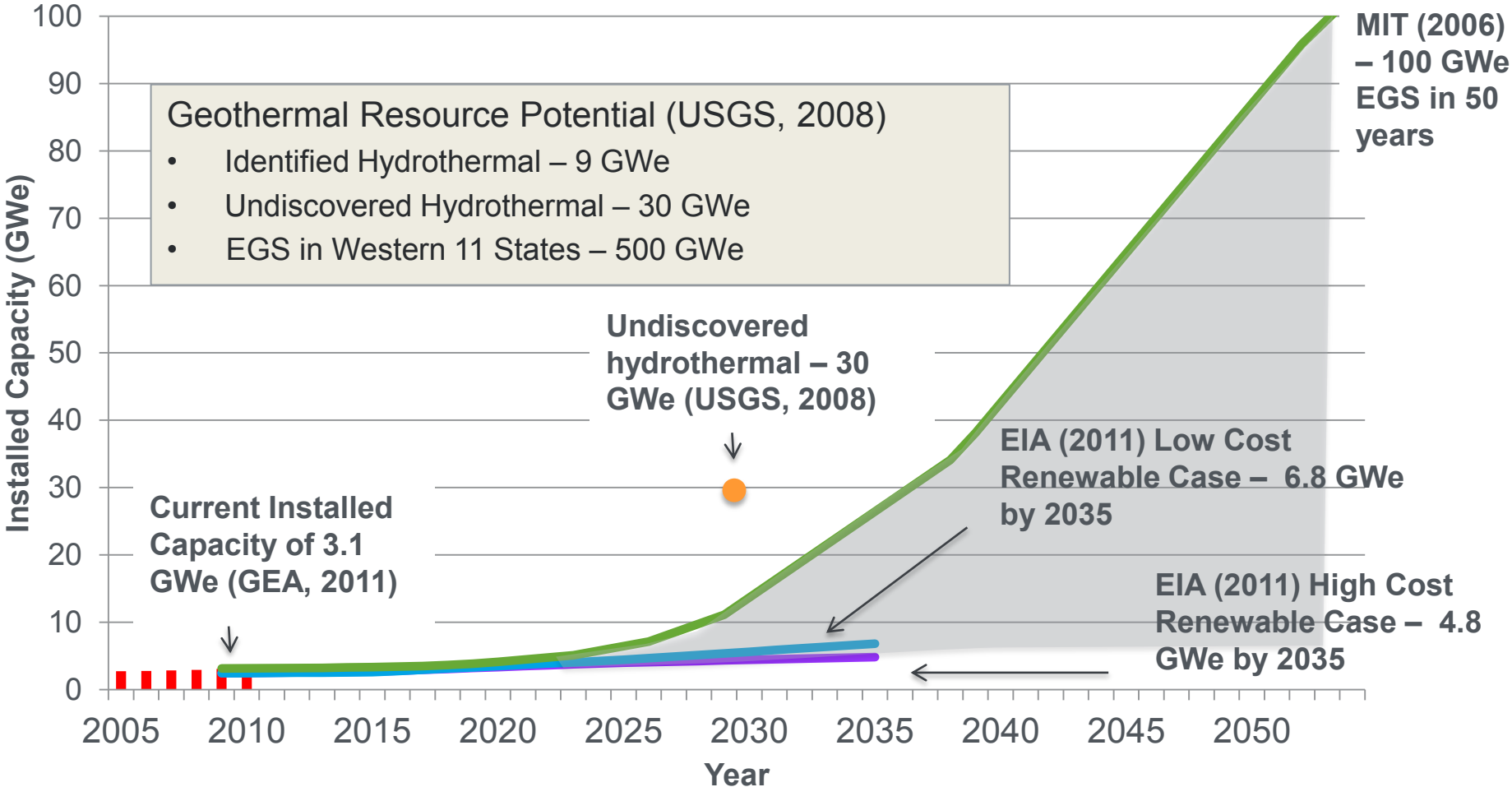
- Define optimal conditions for EGS & identify the best prospects
- Model feasibility of reservoir creation
- Develop tools to optimize power production
- Demonstrate ability to create and maintain a reservoir



Salton Sea (NASA,
STS-92, 2000)

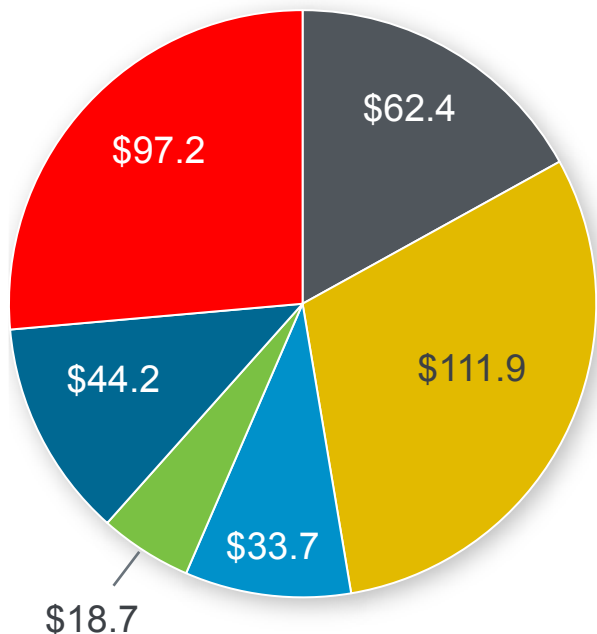
What Is The Potential?

- Near-term potential through hydrothermal
- Long-term, EGS can be significant



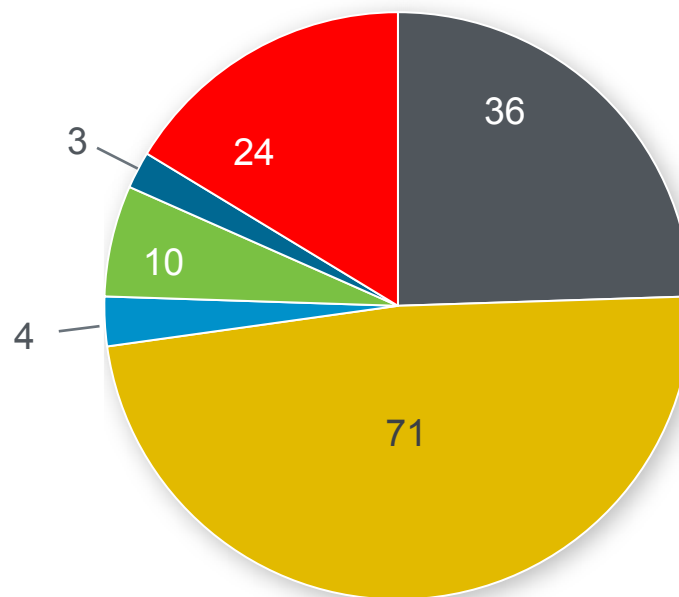
Recovery Act Awards

\$368.1 Million Total
(Millions)



Recovery Act Awards

148 Total Projects
(Number of Projects)



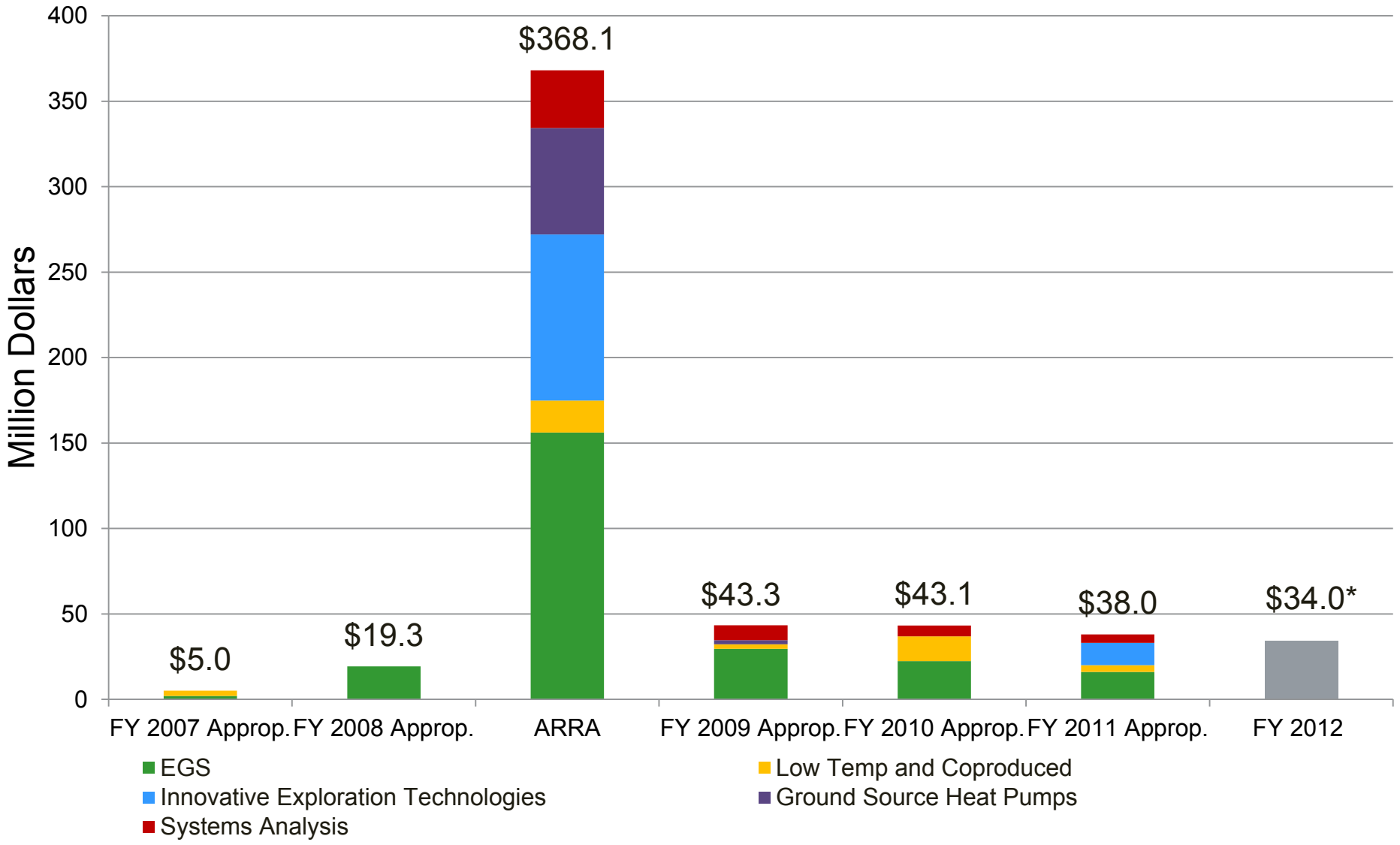
- Ground Source Heat Pumps
- Low Temperature & Coproduced
- Cross-cutting R&D
- EGS Demo
- National Geothermal Data System
- Innovative Exploration Technologies

As of October, 2011:

- All projects have commenced
- 38% of total funds spent

Geothermal Technologies Program

Recent Budget Trend



Maturity

- Technological solutions needed to lower upfront costs & risks
- Hydrothermal can make an impact now
- Demonstrate a 5 MW EGS reservoir by 2020



Materiality

- Locate and bring undiscovered hydrothermal online
- Demonstrate commercial viability and scalability of EGS resources
 - What can we see in 10 years? 20 years?

Market Potential

- Baseload renewables are desired
- Ability to compete with other energy sources

Recent Awards

- Ramp up Innovative Heat Recovery Awards
- Finalize FY11 R&D Awards (up to \$38 million for 32 projects)

Ongoing Projects

- ARRA projects (\$368 million for 147 projects)
- FY10 low temperature demos (\$8.2 million for 5 projects)

Upcoming Projects

- Analysis funding opportunity

Other Work

- Technology roadmapping
- Economic analysis & decision support
- Continue to leverage international work and encourage learning across borders
- Communicate successes



Snake River Plain (Utah State University)



Geysers (Calpine Corporation)

Total Portfolio: 273 projects, approximately \$474 million in DOE awards