



Glass Buttes, OR (DOE)

Program Manager and Staff

Fiscal Year 2013

Budget Request Briefing

March 13, 2012

Geothermal Technology Program Mission

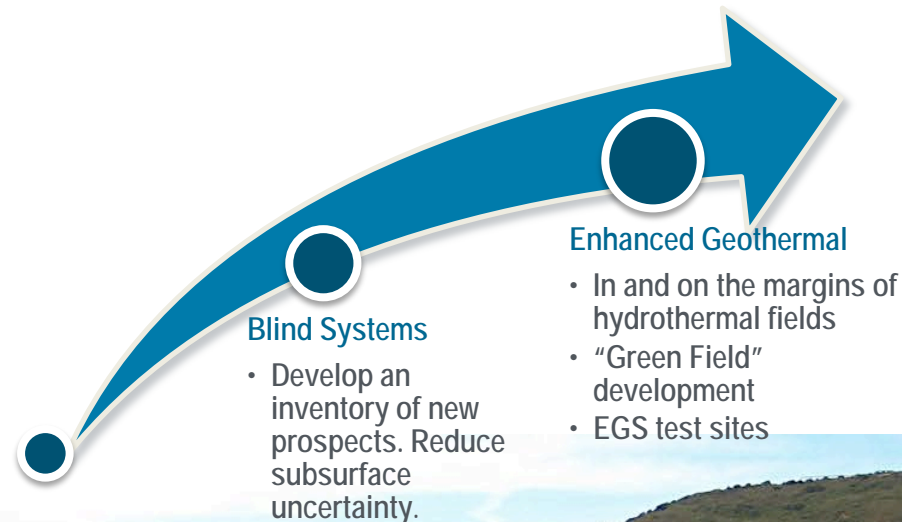
A major contributor to the nation's baseload energy supply

Accelerate Near Term Hydrothermal Growth

- Lower hydrothermal exploration risks and costs
- Lower hydrothermal cost of electricity to 6 cents/kWh by 2020
- Accelerate the development of 30 GWe of undiscovered hydrothermal resources

Secure the Future with Enhanced Geothermal Systems (EGS)

- Demonstrate that Enhanced Geothermal Systems are technically feasible by 2020
- Lower EGS cost of electricity 6 cents/kWh by 2030
- Accelerate the development of 100 GWe by 2050 (MIT) and ultimately demonstrate the full scale of geothermal resource potential

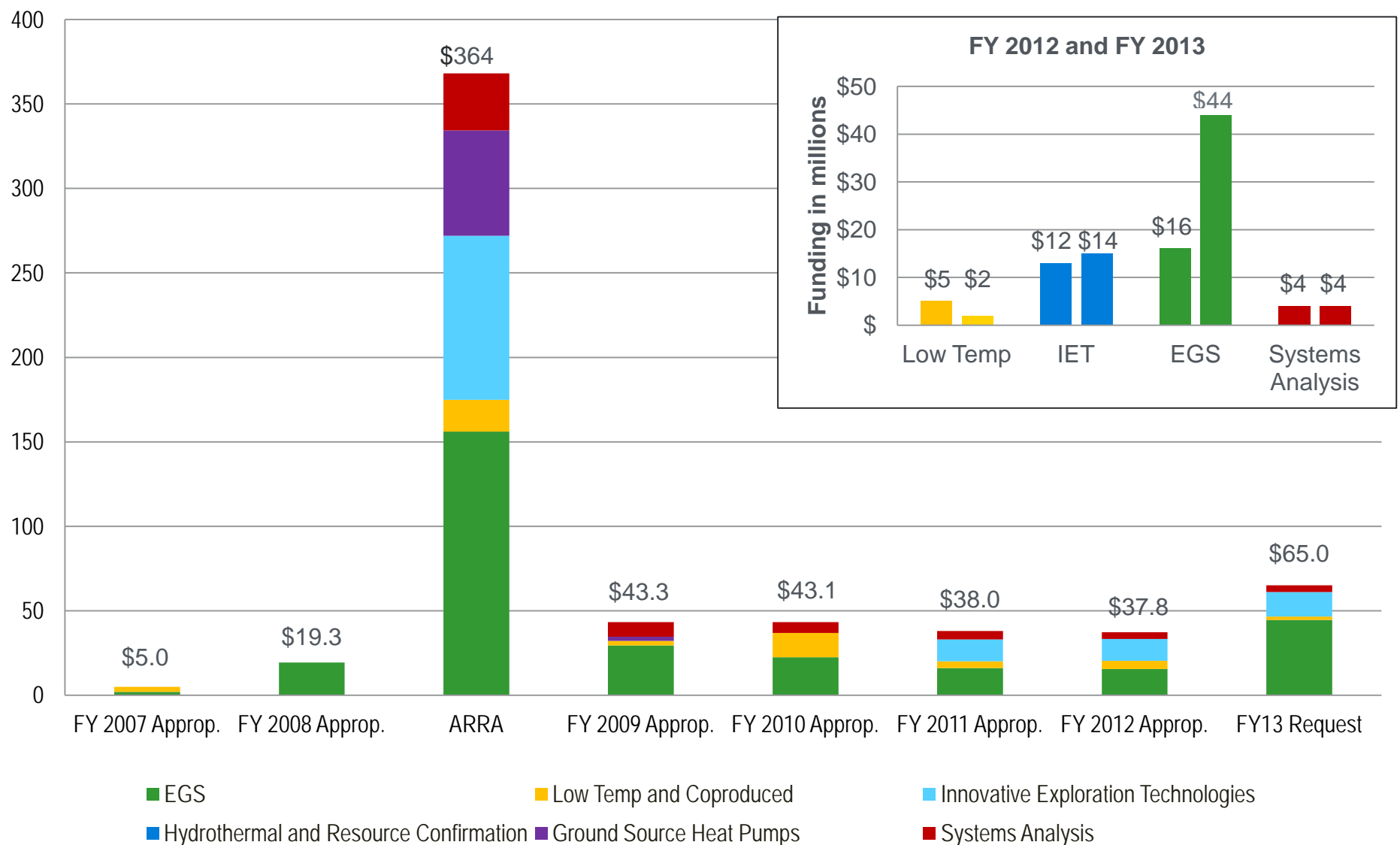


Funding Profile by Subprogram

(thousands of dollars)	FY 2011 Appropriation	FY 2012 Appropriation	FY 2013 Request
Enhanced Geothermal Systems	15,513	15,528	43,627
Hydrothermal & Resource Confirmation			
Innovative Exploration Technologies	12,602	12,483	13,512
Low Temperature & Coproduced Resources	3,877	4,852	2,000
Systems Analysis	5,000	4,000	4,000
SBIR/STTR	1,011	999	1,861
Total for Geothermal Technologies	38,003	37,862	65,000

GTP Budget History

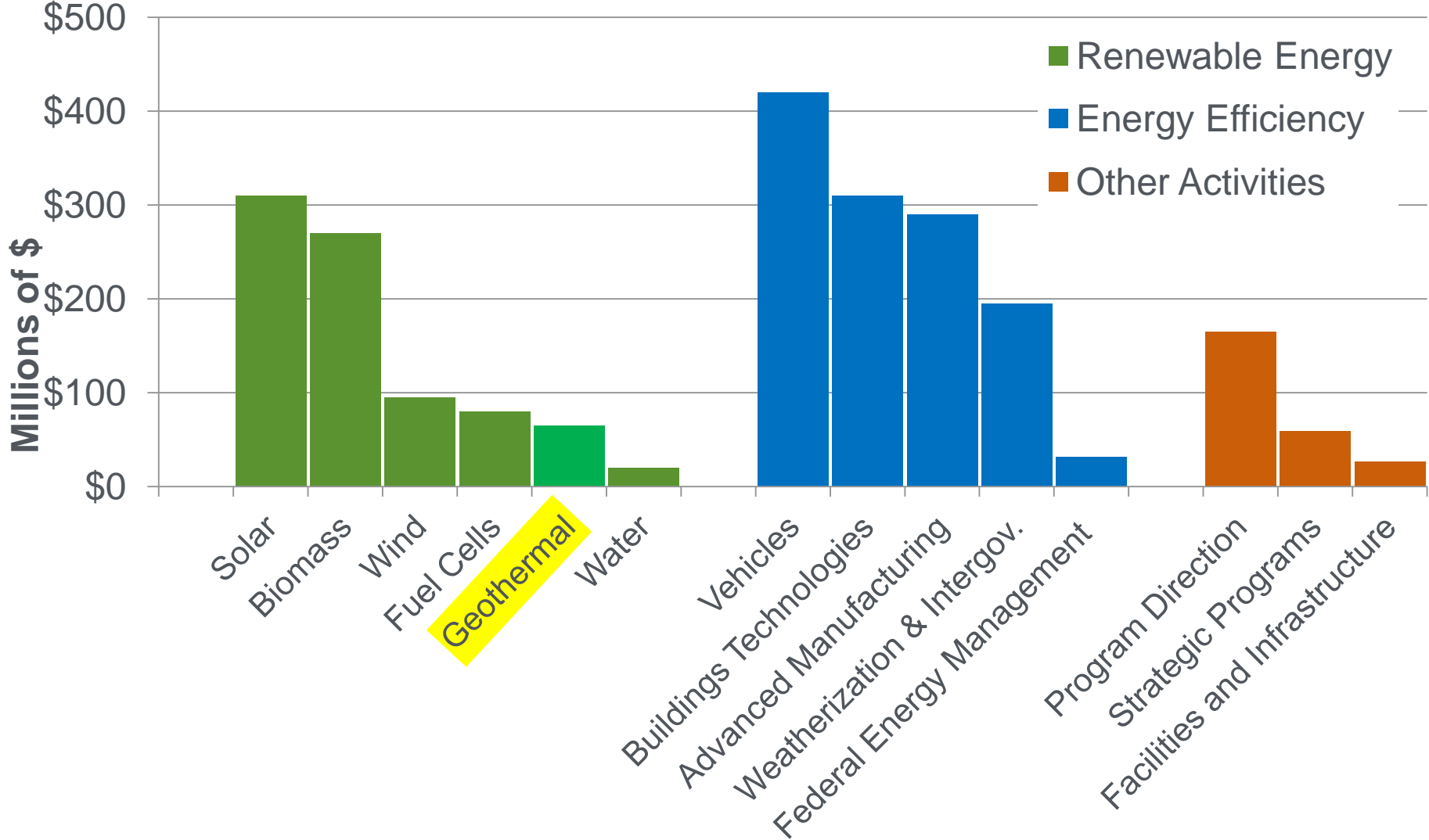
FY13 increase in EGS



EERE Request by Program

Total: \$2.3 billion

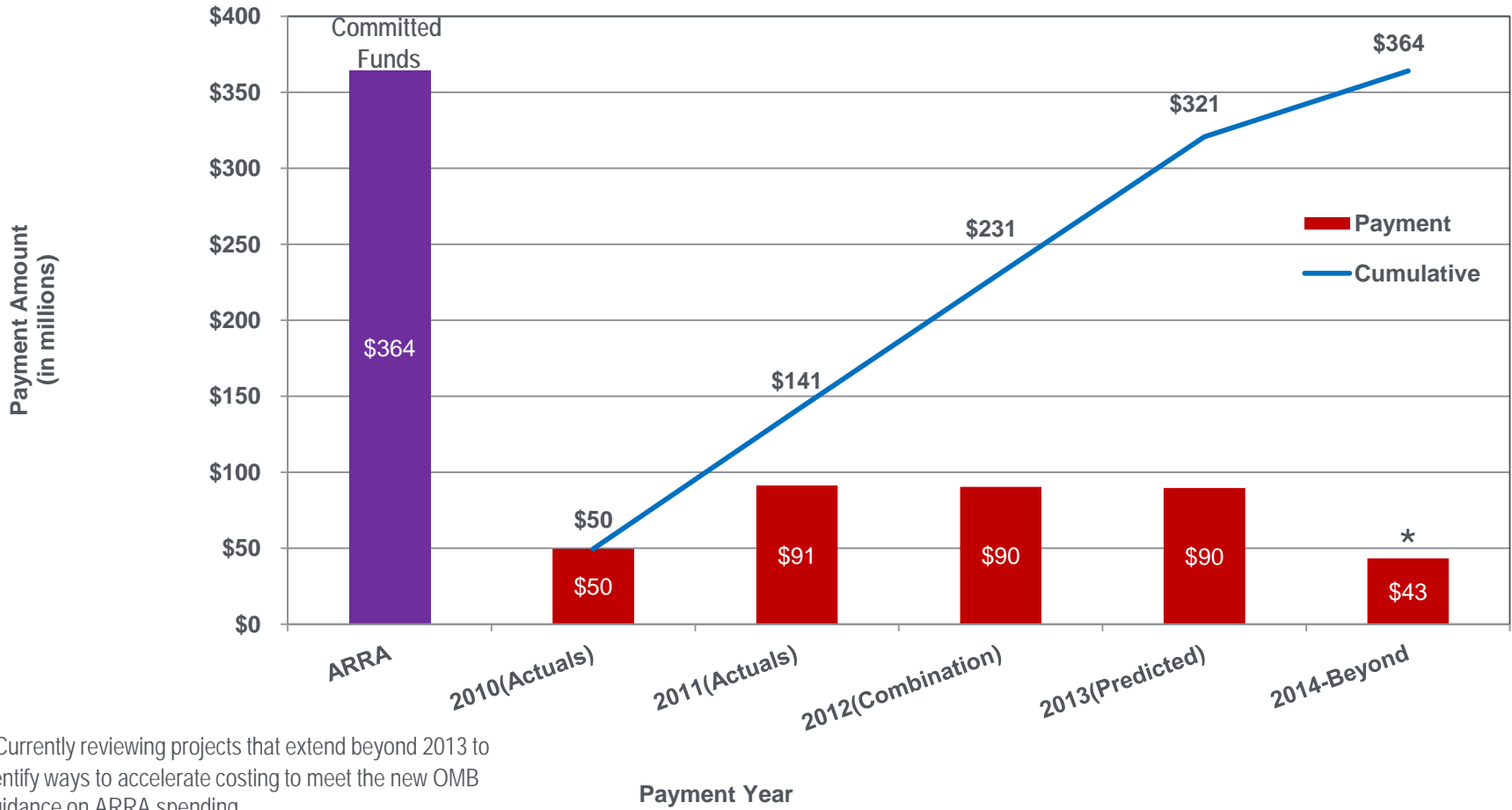
FY 2013 Request



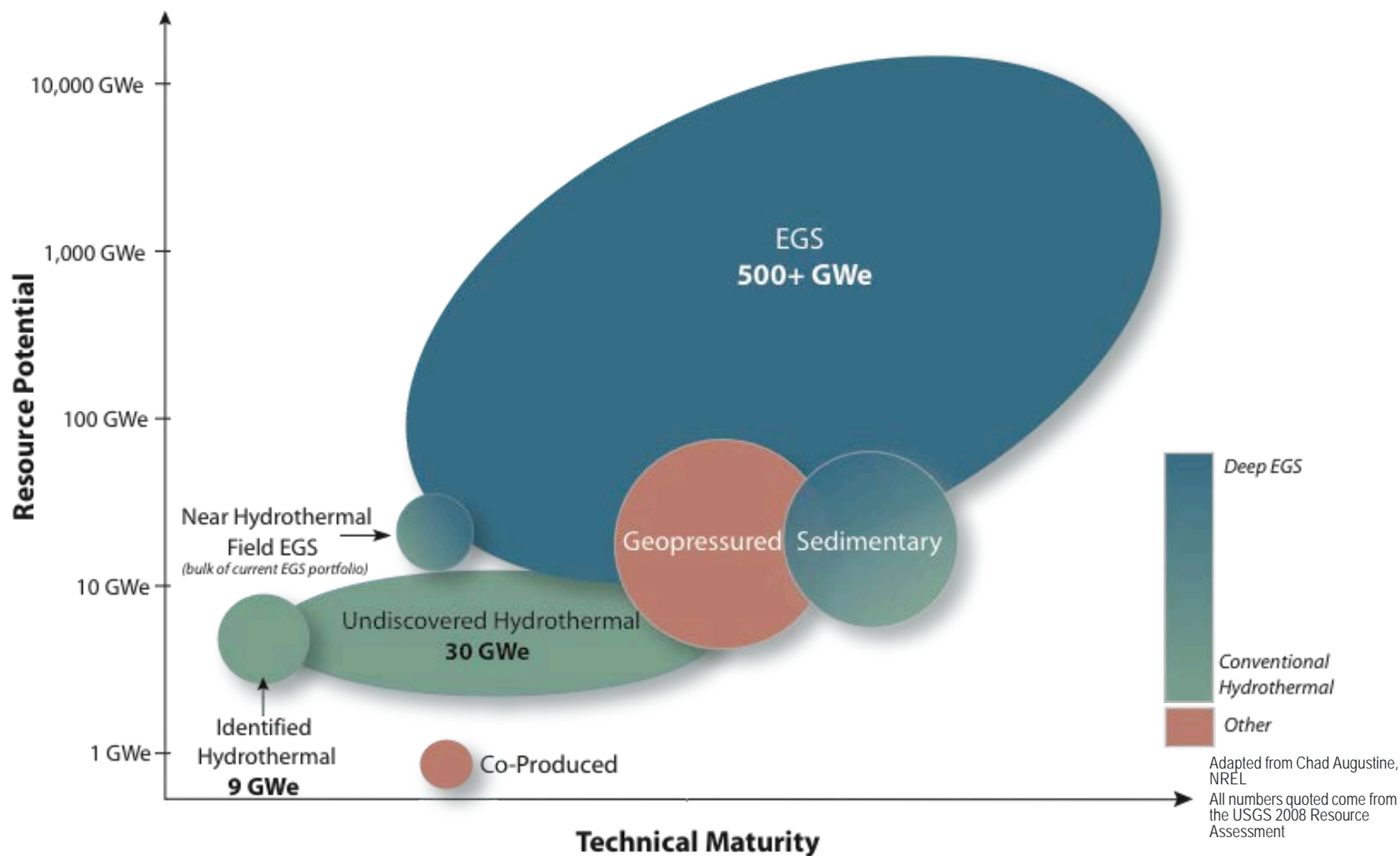
American Recovery and Reinvestment Act

46% Spent

American Recovery and Reinvestment Act Payments



* Currently reviewing projects that extend beyond 2013 to identify ways to accelerate costing to meet the new OMB Guidance on ARRA spending



- ***EGS test sites concept***
 - Most significant new initiative in the program
 - Fast-track planning and scoping in FY12
- ***Resource and opportunity identification***
 - Leverage NGDS, IET investments
- ***Regulatory Roadmaps***
 - Key opportunity for all stakeholders to streamline and optimize
 - Target 1st 8 states complete by 9/30/12
- ***Funding leverage and interagency co-operation***
 - Strength of multiple funding sources and partners
- ***O&G strategic engagement***
 - Deployment of binary turbines to best sites
- ***Programmatic EA***
 - Commenced discussions on scope and utility



The Geysers Prati 5 St-1 (Calpine)

Performer	Project Sites
Ormat Technologies, Inc.	Desert Peak, Nevada
Geysers Power Company, LLC	The Geysers, California
University of Utah	Raft River, Idaho
Ormat Technologies, Inc	Bradys Hot Springs, Nevada
AltaRock Energy Inc.	Newberry Volcano, Oregon
TGP Development Co.	New York Canyon, Nevada
NakNek Electric	NakNek, Alaska

Current Portfolio

- Seven EGS demonstrations to validate reservoir creation in different geologic conditions
- R&D funded by ARRA and in FY11.
 - Key areas: zonal isolation, observation and monitoring tools, well completions, subsurface modeling, induced seismicity, etc.
- Technical roadmapping

FY13

EGS field test sites effort initiated

- Multi-user pre-competitive R&D environment for EGS testing and validation
- Up to 3 geologically unique sites
- Government managed
- Establish the technical and operational settings and parameters where EGS can be commercially successful

R&D

- Focus on reservoir creation and monitoring
- Continue funding FY11 R&D awards as they progress to phase II

Technical Targets: Demonstrate technical feasibility of EGS at commercial scale by 2020 and lower LCOE to 6 cents/kWh by 2030

- **Project Goal:**
 - Testing a distinct and diverse set of sites, demonstrate the techniques and technologies required to make EGS as a commercial, renewable energy source
- **Scope:**
 - Define technical objectives, operating and project plan, schedule and governance plan
- **Priorities:**
 - Technical results and achievement
 - Timeline adherence
- **Key Risks:**
 - Insufficient multi-year funding
 - Improper planning and upfront analysis
- **Governance and Operating Plan:**
 - Open to a variety of approaches and models
- **Government Role:**
 - Ability to advance technologies and assume risk that's not possible in the private sector.



- ***EGS project plan***

- Charter Development – 03/30/12
- Requirements gathering

- ***Site selection criteria***

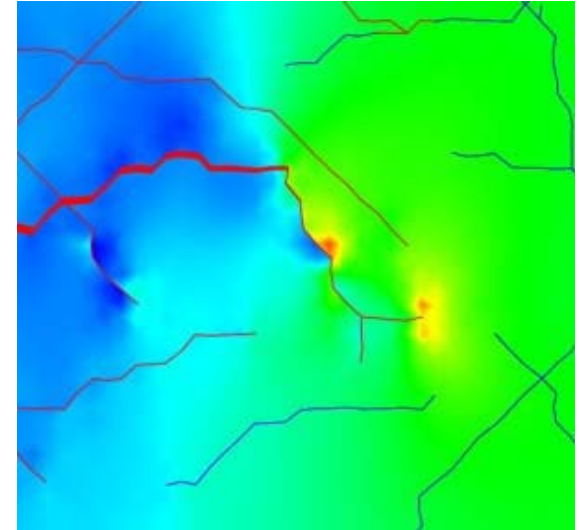
- List site selection criteria – 03/31/12
- Prioritize the list
- Develop scheme for weighting criteria
- Develop decision tree for EGS field test site

- ***Technology baseline and path forward***

- Identify critical technologies – 09/30/12
- Develop necessary performance criteria
- Define success parameters

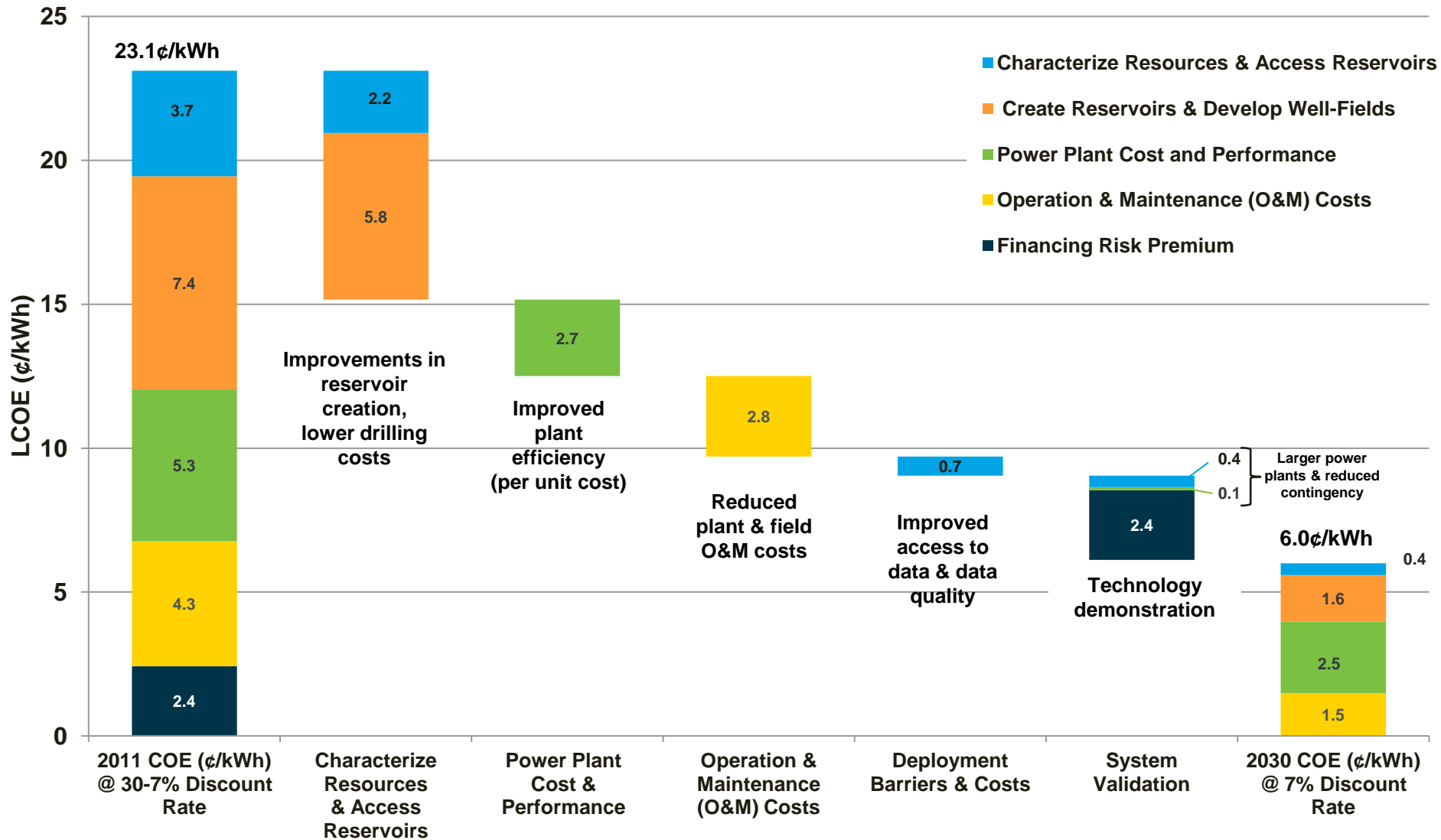
- ***Programmatic environmental assessment***

- Initiate preliminary analysis – 04/30/12
- What is proposed action(s) – 06/30/12
- Analyze impact of the proposed action
- Develop mitigation plan



Hydrofracture allowing interaction
with pre-existing fracture network
(Photo provided by LLNL)

2030 EGS Cost Reduction Goals



Current Portfolio

- ARRA projects to confirm 400 MW of new hydrothermal resources by 2014
- R&D projects focused on increasing exploration success through advanced geophysical, geochemical and drilling methods
- Technology roadmapping
- Exploration data gap analysis
- USGS resource assessment efforts

FY13

R&D to lower exploration risk

- Continue funding FY11 R&D awards as they progress to phase II

Regional Data Gathering

- Using results from data gap analysis



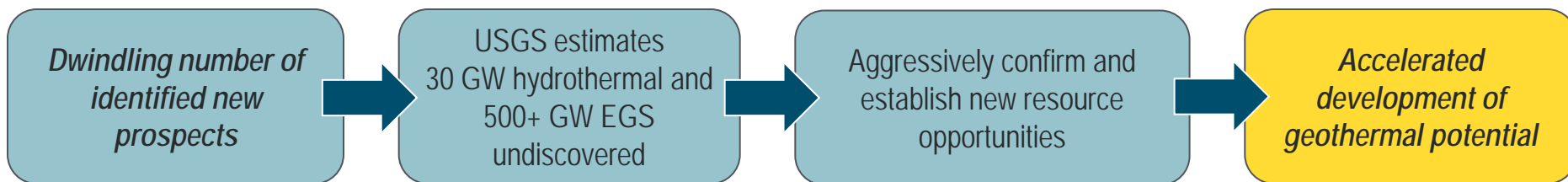
Exploration best practices: Webinar on results of analysis as well as the OpenEI interface developed on April 11th.

Look for announcement and registration on the GTP website next week.

Technical Target: Lower LCOE to 6 cents/kWh by 2020

Geothermal Resource Opportunities

Critical Tool for Industry Growth



Data Gap Analysis

Leverage:

- Ongoing resource assessment
- National Geothermal Data System (NGDS)
- Existing remote sensing databases to identify data gaps

Deliverable: Selected areas for regional data gathering

Data Gathering

- Select innovative tools and methods for regional data gathering
- Leverage exploration R&D to gather new data

Deliverable: New data compiled into NGDS

Compilation

- Integrate new and existing data sources
- Screen and prioritize sites based on results

Deliverable: New geothermal opportunities identified

Current Portfolio

- 17 demonstration projects in progress including low temperature and co-produced resources
- Testing sites at Rocky Mountain Oilfield Testing Center (RMOTC)
- ARRA R&D projects focused on working fluids and efficient cooling
- Collaboration with oil and gas field operators to demonstrate power production in a commercial field

FY13

- Demonstration
 - Continue funding phase II of successful demonstration projects selected in FY10
- Technical headroom for innovation

Project Highlight



Surprise Valley Electrification Corporation: Increasing electricity costs from the Bonneville Power Administration have incentivized rural coops like Surprise Valley to look for other sources of power.

Technical Targets: Lower LCOE to 6 cents/kWh by 2020

Systems Analysis assesses geothermal resources, cost drivers, the impact of policy, and progress toward goals.

Current Portfolio

- National Geothermal Data System design, testing and population
- Regulatory Roadmap
- National Geothermal Academy
- Levelized cost of electricity (LCOE) analysis
- Lifecycle analysis
- Field test site planning, analysis and initial scoping
- Induced Seismicity Protocol

FY13

- Techno-economic and financial analysis
- Environmental impact analysis
- Continued work on regulatory roadmap
- Geothermal data provision
- Intergovernmental and international coordination
- Workforce development
- Induced Seismicity Best Practices



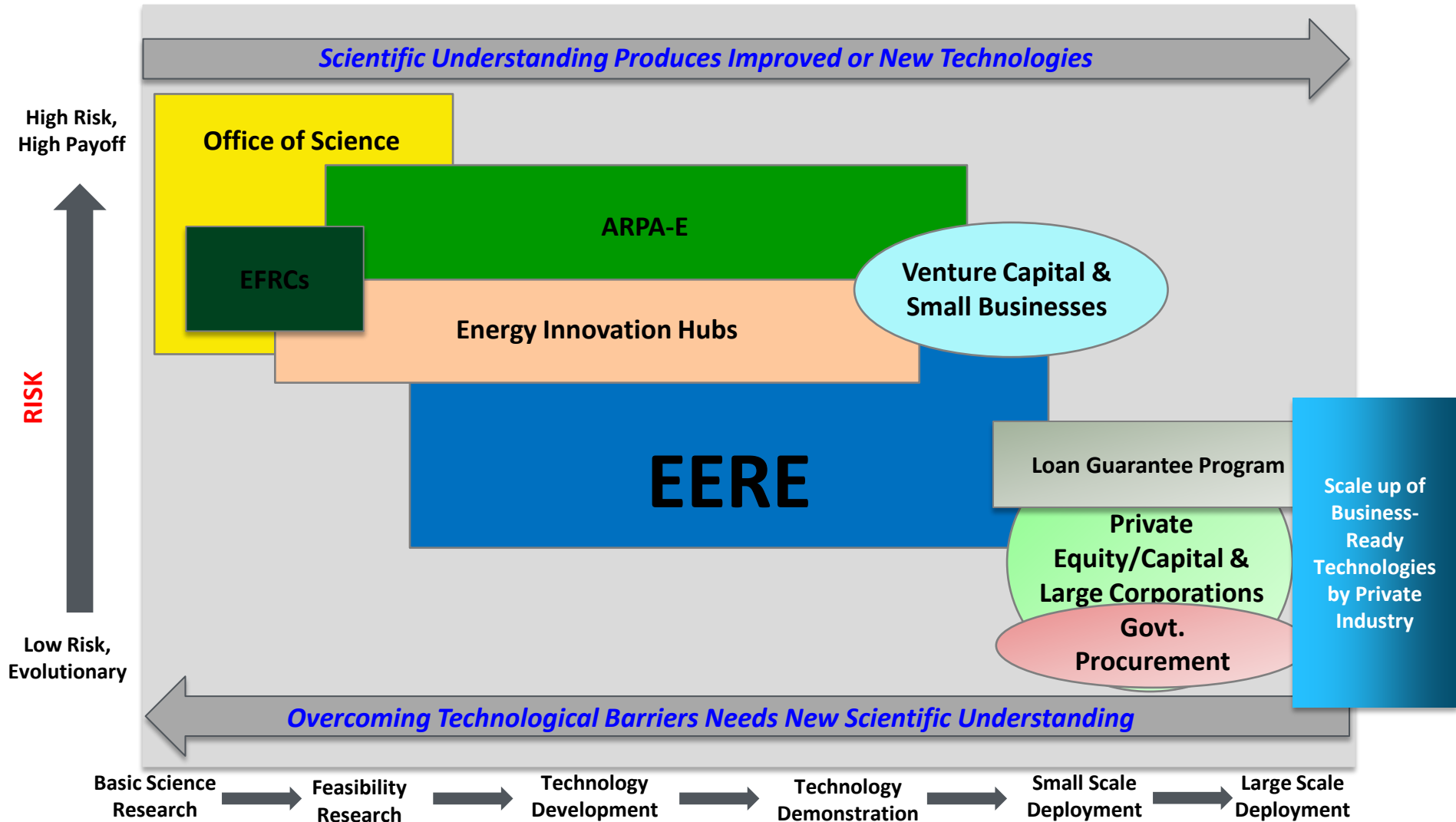
To provide distributed and open source access to geothermal data in order to reduce the risk and cost of geothermal development in the US

Through SBIR/STTR, the Program supports small businesses to advance geothermal technologies.

Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer (STTR)

- In FY 2012, the Geothermal Technologies Program contributed \$778,000 to the SBIR program and \$105,000 to the STTR program for geothermal projects
- In FY13 \$1.86M is estimated for SBIR/STTR

FY12 Phase I	22 Application in review	2-4 awards expected
Phase II	MagiQ Technologies	Downhole High Temperature Seismic Sensor (Year 2)
	Physical Optics Corporation	Fiber Optic High Temperature Seismic Sensor (Year 2)
	Advanced Cooling Technologies, Inc.	Vortex Enhanced Direct Contact Heat Exchanger for Geothermal Cooling (Year 1)
	United Silicon Carbide, Inc.	High Temperature Smart Sensor for Downhole Logging and Monitoring (Year 1)
Phase III	Composite Technology Development, Inc.	Improved High-Temperature ESP Motor Insulation Materials – in partnership with Van Roll and GE (Wood Group) (Year 2)



- To support transformational research in all areas of energy R&D, including **resource identification, extraction, and energy generation.**
- At the end of the project the transformational technology shall be sufficiently advanced and well defined in terms of performance and risk to promote next-stage development or transfer of the project to next-stage developers.
- Total funding \$150 million
- Awards will range from \$250k to \$10 million
- 1 – 3 year projects
- Letter of Intent Submission Deadline: **March 30th**
- <https://arpa-e-foa.energy.gov/>



No Funding Opportunities in FY12

- Congress directed the Program not to put out any funding opportunities until mortgages are less than half of appropriations.
- Mortgages cannot be paid until projects pass go/no-gos.

EGS RD&D

- Initiate EGS field test site activities and R&D
- Balance between funding infrastructure development versus specific projects is fully conditional on actual site selections and designated operating model.

Systems Analysis

- Topic areas may include: R&D impacts on LCOE, identification of critical technology gaps, and calibration of oil and gas temperature data.

Resource Characterization

- Regional data gathering and analysis to identify new hydrothermal prospects and opportunities.

You can sign up to receive notifications when FOAs are released :
www.geothermal.energy.gov

Geothermal Technologies Program 2012 Peer Review

The Westin Westminster Hotel

Westminster, Colorado

- Principal investigators will present the results of their projects for peer review
- Approximately 169 projects will be presented, representing a total DOE investment over \$340 million
- Learn and network with other stakeholders and program staff
- The meeting is open to the public and there is no registration fee but you need to register

For more information and to register, visit:
geothermal.energy.gov/peerreview



Open now: Physical Scientists

- Two positions located in Washington D.C.
- Serve as a technical expert for the Program
- Direct a complex research program for developing the technology base needed for hydrothermal resources and enhanced geothermal systems
- Develops specific requirements, long-term goals and objectives, and schedules
- **Deadline is March 21, 2012**

www.usajobs.gov

Post Doc Research

- Post Doc Research opportunities to work on collaborative applied research with the host facility and the Program
- Awards administered by Oak Ridge Institute for Science and Education (ORISE) in collaboration with EERE
- **Deadline May 1, 2012**

www.eere.energy.gov/education/postdoctoral

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