



Economic Impact Analysis for EGS

May 18 2010

Principal Investigator : Dr. Raymond Levey

Presenter Name : Varun Gowda

**Organization: Energy & Geoscience
Institute(EGI), University of Utah**

Track Name

Analysis, Data system and Education

Timeline <ul style="list-style-type: none">• Percent complete	12/29/2009-12/28/2012 10%
Budget <ul style="list-style-type: none">• Total project funding• DOE Share• Awardees' share• Funding received in FY09• Funding for FY10	- \$ 754,160 - \$ 603,230 - \$ 150,930 - \$ 603,230 - \$ 393,440
Barriers	Commercial deployment of EGS and technology readiness for cost-competitive power production
Partners	-Bureau of Economic and Business Research (BEBR) at the University of Utah

Objective

- To conduct an economic impact study for EGS and to develop a Geothermal Economics Calculator (GEC) tool to quantify (in economic terms) the potential job, energy and environmental impacts associated with electric power production from geothermal resources.

Impact

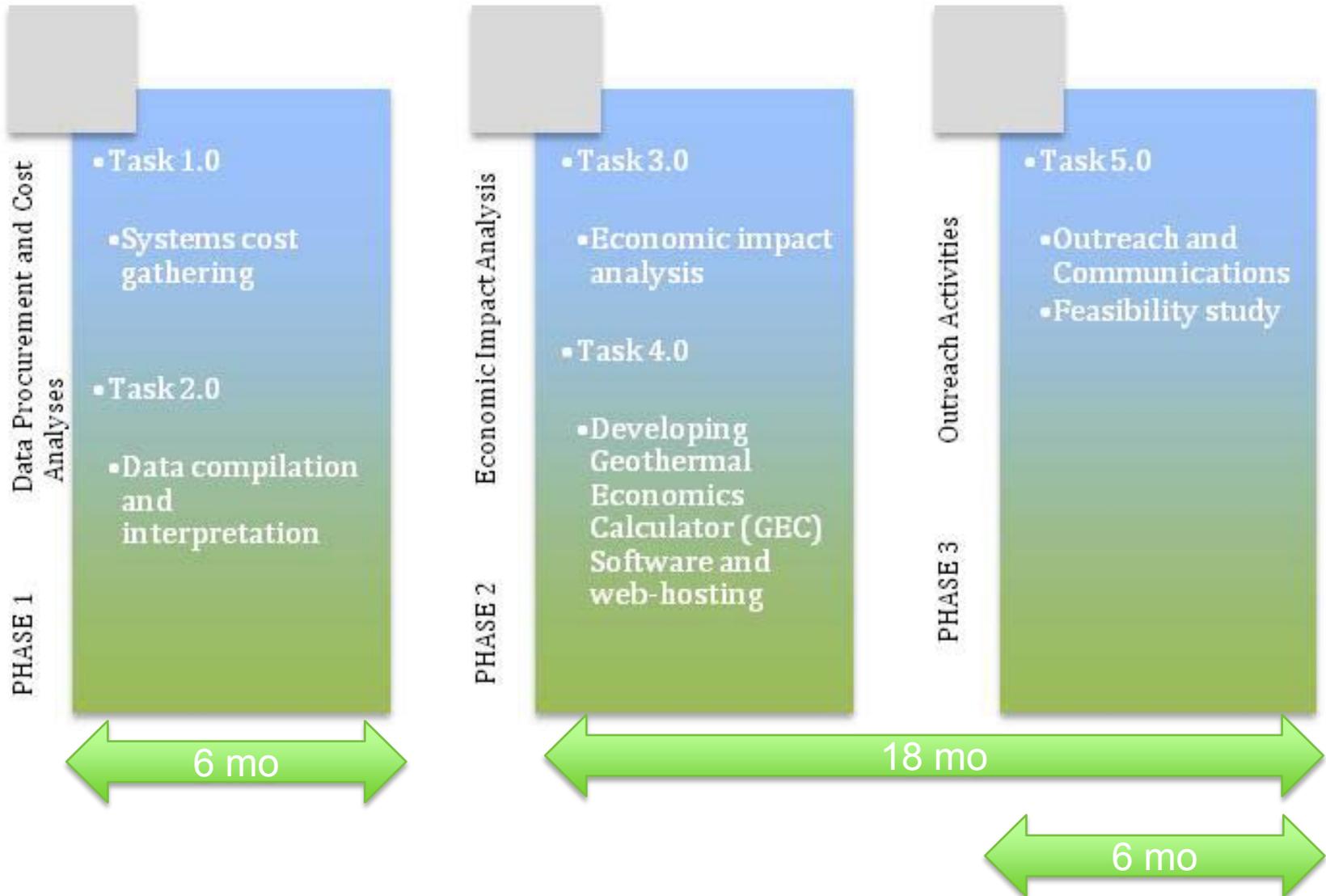
- The project will have a direct impact on shaping emerging federal and state geothermal energy policies to support quick EGS development.
- Will address better understanding of several critical requirements and supporting elements for increased deployment of EGS power generation facilities from an economic standpoint.

- In particular, this research will enable better decision making in the system validation and strategic planning and analysis elements of the Geothermal Technologies Program (GTP) –MYRDD Plan
 - In addition to employment benefits, risk and climate change mitigation can also be quantified for Program Analysis using the results of this study and the GEC tool developed.
 - Avoided costs of CO₂ permits/taxes will be used to quantify environmental benefits
- The results from this study will help the Program analyze key elements required (from an economic standpoint) for commercial deployment of EGS for cost-competitive power production from EGS resources. This will enable the Program in its long-term goal to develop a commercialization roadmap for EGS with a better understanding of the economics and its impact.

- Phase 1 of the project would involve studying identifying cost drivers for geothermal project development and procuring cost data and LCOE with a special focus on studying EGS economics
- Economic impact analysis will involve constructing a model of trade between industries, and the flow of funds between industry, households, and government for EGS associated impacts for EGS development.
- The model will take a given EGS development scenario as its input, and give as output an estimated number of total jobs (and income) created—including those indirectly created because of inter-industry dependencies and feedback between industry, households, and government.

- *Scenario data* - A specification of the economic activities associated with EGS deployment leading up to an operational facility
- *National and regional economic data* characterize the broad economic context in which the associated development would take place
- Data that describe national inter-industry dependencies (Bureau of Economic Analysis-BEA, IMPLAN) Regional data that describe the departure of regional inter-industry dependencies from those of the nation (BEA, IMPLAN, Bureau of Labor Statistics, Census Bureau)
 - * *Bureau of Economic and Business Research will collect national/regional economic data, construct the economic impact model and use the model to evaluate the economic impacts in each scenario*

Technical Approach- Planned Milestones



- Currently working with GEA to send out a data requisition for over 20 geothermal projects that have gone online since 2007. This effort will be focused on gathering geothermal project specific information for gathering:
 - Exploration costs
 - Drilling and Reservoir management costs
 - Plant costs
 - O&M costs
- Scenarios will be developed for different cases using this specific information gathered
- EGS specific data will also be gathered by GETEM simulations

- LCOE's data has been compiled for conventional hydrothermal cases employing both flash and binary technologies
 - LCOE range (5c/kWh ~35c/kWh) – hydrothermal
- LCOE for EGS will be compiled and cost data available for further economic impact model development by the end of next quarter
- Gathering costs of key aspects of EGS- reservoir management, stimulation and re-drilling will be facilitated by GETEM model (gaps will be identified)
 - technical assumptions will be validated by the EGI team of geothermal experts (Dr. Joseph Moore and Dr. John McLennan are serving on the expert panel and will review key technical aspects of this study)

- Spending Plan**

	Task	Year 1	Year 2	Total(2Yrs)
Phase 1	Task 1.0 Systems cost gathering	\$ 118,032	-	\$ 118,032
	Task 2.0 Data compiling and interpretation	\$ 216,392	-	\$ 216,392
Phase 2	Task 3.0 Economic and Environmental Impact Analysis	\$ 59,016	\$ 234,468	\$ 293,484
	Task 4.0 Producing the Impact Analysis Software and hosting it on a web server	-	\$ 54,108	\$ 54,108
Phase 3	Task 5.0 Outreach and Communications	-	\$ 72,144	\$ 72,144
	Total	\$ 393,440	\$ 360,720	\$ 754,160

- Phased approach will enable us to adhere to the milestones and effectively monitor and manage progress on the project.
- Standard project management guidelines and practices will be adhered to during the course of the project execution
- Sound risk management and mitigation plan in place to ensure resource optimization, coordination and timely completion of project

- Our expected outcome this FY is to gather all relevant cost data for EGS.
- Extrapolate any limited data to fill the gaps in data collection using GETEM and other data collection efforts from industry
- Compile and interpret cost data to construct different scenarios which will then be used to construct economic models of different scales
- Economic multipliers deduced from this effort will be the key aspects of this study and will give us the associated economic impacts and these will be verified during the feasibility study and corrected for efforts
 - Gaps in actual cost data availability will also be addressed by gathering all available project cost data from demonstration projects (for eg: such as the one at Raft river)

- This study will identify the associated economic benefits of EGS deployment.
- GEC will be developed as a tool to quantify (in economic terms) the employment benefits, energy and environmental impacts as a result of EGS development
- Utah wide multi-county feasibility study will ensure an accurate study and provide a window for having a feedback mechanism and implementing corrections if any
- Results and the tool will be delivered to the industry through an extensive and well planned outreach effort

- List any publications and presentations that have resulted from work on this project. Use at least 12 point font- Overview project (none so far)

Note: This slide is for the use of the Peer Reviewers only – it is not to be presented as part of your oral or poster presentation. These Supplemental Slides will be included in the copy of your presentation that will be made available to the Reviewers.