

8.0 Program Management and Operations

8.1 Program Staffing

The following organizational chart provides an outline of the GTP staff structure.

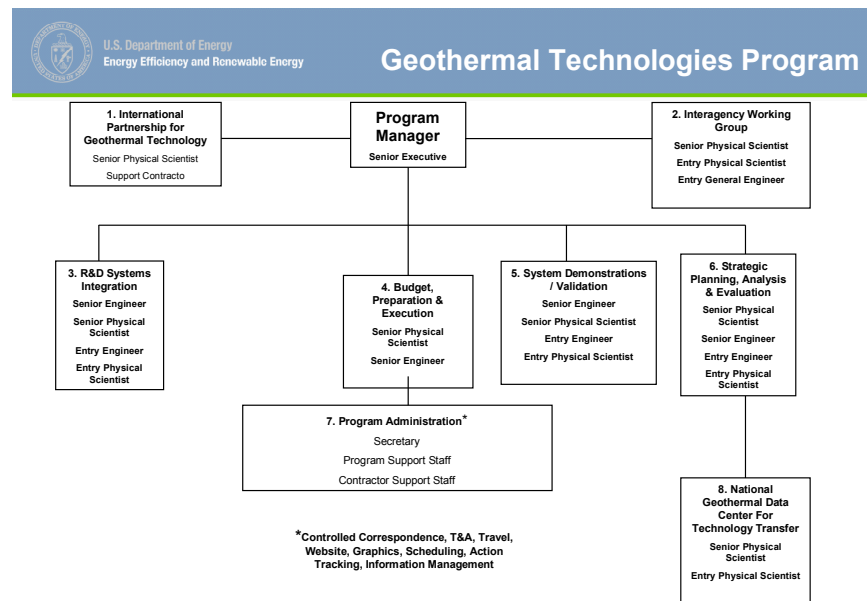


Figure 8.1 U.S. Department of Energy Geothermal Technologies Program Staff Organization

8.2 Program Management

Core GTP RD&D fall under R&D Systems Integration (3) and System Demonstrations and Validation (5). The GTP R&D Integration function is staffed by a GTP senior engineer. The main function of R&D integration is to ensure that R&D is executed and evaluated and that the results inform the EGS System Demonstrations.

The Strategic Planning, Analysis and Evaluation function (6) assimilates key R&D and System Demonstration information to conduct cross-cutting program planning, analysis and evaluation. The National Geothermal Datacenter for Technology Transfer (8) serves as the repository for RD&D results and provides key input to Program performance metrics.

Two critical Program coordination functions include the International Partnership for Geothermal Technologies (1) and the Geothermal Interagency Working Group (2).

Program Administration (7), Budget Preparation and Budget Execution (4) are also functional areas of critical importance.

8.2.1 Program Planning

The Program Analysis activities are led by the DOE Planning and Analysis Lead, and are supported by the National Renewable Energy Laboratory (NREL) planning and analysis team. This team will provide analytical resources, models and tools, and independent analysis capabilities as required. The DOE National Laboratory Annual Operating Plans provide Systems Analysis activities and specific roles and responsibilities.

8.2.2 Program Budget

The Fiscal Year 2009 request of \$30 million is an increase from the \$10.2 million received in the Fiscal Year 2008 appropriation. The DOE EERE “Budget in Brief” discusses GTP Fiscal Year 2009 activities, specifically EGS technology development at cost-shared field sites. The cost-shared field sites are part of the Systems Demonstrations activities and encompass possible drilling/recompletion of wells, reservoir fracturing, establishment of a fluid circulation loop, and long-term reservoir testing.

In FY 2009, several field sites will be evaluated for selection of a site dedicated to experimentation of innovative EGS technology. Various research institutions will conduct supporting research in priority areas identified by an EGS technology evaluation. These areas include monitoring and logging tools, high-temperature submersible pumps, reservoir predictive models, and zone isolation tools.

8.2.3 Program Execution

After OMB concurrence, on June 18, 2008 the Program was cleared to release its first research call for proposals to demonstrate EGS and fund EGS component research. The Program received six system demonstrations proposals and 20 component technologies R&D proposals. The technical merit review and programmatic review for the proposals concluded the week of September 15, 2008. Awards were issued for four System Demonstrations and 17 component R&D proposals at the end of FY 2008. At least two of the Systems Demonstrations are expected to yield results within a year to ensue since they occur near existing hydrothermal fields where geothermal leases have already been obtained. Although critical EGS data will be gathered, proposed technology targets are challenging given prior considerations.

Results achieved within the next three to five years from these first EGS demonstrations (three to five years), should demonstrate actual flow rates from one of the stimulated geothermal reservoirs. The 2010 Joule target addresses one of the most important phases of EGS development: the reservoir characterization, which will predict the ultimate flow rate and determine the system output and economic viability of power production.

Each GTP staff member has responsibility for executing grants, cooperative agreements, congressionally directed projects and national laboratory tasks.

The DOE’s national laboratories are funded directly by DOE where called for in competitively awarded industry applications.

Program Management and Operations

8.2.4 Program Evaluation

Program evaluation provides the means to measure relevant outputs and outcomes that aid the Program in reevaluating its decisions, goals, and approaches and tracks the actual progress being made; it includes performance monitoring and project evaluation. By design, the assessment processes provide the Program with input on progress and efficacy from, stakeholders, independent experts, and other government reviewers. DOE's national laboratory experts provide support to DOE program managers by assisting in the evaluation of RD&D, providing technical expertise to the DOE program managers, and providing DOE with objective, unbiased advice regarding the utility and applicability of industry-based solutions to the needs of GTP.

The various assessments that support the program evaluation process are outlined in Table 8.1

Table 8.1 Program and Project-Level Assessments that Support Decision-Making			
Assessment Type		Assessment Synopsis	Documentation
Performance Monitoring	External Monitoring	DOE's Joule performance measurement tracking system	Joule System Reports
		Office of Management and Budget's (OMB) Program Assessment Rating Tool (PART) ²⁹	PART Report
	Internal Monitoring	EERE's Corporate Planning System (CPS)	CPS Database/Website
		Project Monitoring with PMC Quarterly Reports	PMC Project Management Database
		Project Monitoring with Integrated Baseline Update	CORE ³⁰ Integrated Baseline Reports
Program Evaluation	Peer Reviews	Conducted by independent experts outside of the program portfolio to assess quality, productivity, and accomplishments; relevance of program success to EERE strategic and programmatic goals; and management. ³¹	Public summary documents including Program response
	General Program Evaluation Studies	Conducted by outside experts to examine process, quantify outcomes or impacts, identify market needs and baselines, or quantify cost-benefit measures as appropriate. ³²	Public reports and documentation

29 PART guidance is provided by OMB. Instructions available at <http://www.whitehouse.gov/omb/>

30 CORE is a systems engineering software package

31 EERE Peer Review Guide, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, August 2004
<http://www1.eere.energy.gov/ba/>

32 EERE Guide for Managing General Program Evaluation Studies: "Getting the Information You Need," DOE/EERE, February 2006.

8.2.4.1 Retrospective Economic Assessment for the Geothermal Technologies Program

In cooperation with EERE's evaluation team, in 2009 the GTP is undertaking an independent evaluation process and a modified National Research Council (NRC) analysis approach to determine the realized energy, economic and other benefits for the Program. The study will not replicate the NRC process of using a committee of experts. Thus, it will avoid the lengthy delays, burdensome data collection requirements, and high cost that characterized the 2001 NRC study.³³

A nationally recognized expert in R&D evaluation will be selected to serve principal investigator (PI). Additionally, three evaluation and technology subject matter experts will be recruited as peer reviewers. The primary documents for review will be the Study Evaluation Plan and Draft Report. Both the PI and the peer reviewers will be objective, unbiased, and independent experts from outside the program being reviewed.

Objectives

- To estimate realized benefits and costs of the public investment in Geothermal Technologies Program R&D, enabling the program to document realized economic and other benefits.
- To implement the “retrospective benefits estimation” recommendations in the May 2002 EERE Strategic Technical Review.³⁴

The key evaluation questions to satisfy these objectives are:

- Are Geothermal Technologies Program expenditures producing actual benefits (energy-savings and renewable market growth), and environmental benefits?
- Are Geothermal Technologies Program expenditures enhancing energy security by providing alternative energy sources and protecting existing sources?
- Do public benefits exceed R&D expenditures, and would today's commercialized technologies have happened without DOE involvement?

Potential technologies for evaluation include:

- Polycrystalline diamond compact drill bit (PDC Drill Bits)
- Calcium phosphate cement
- Geothermal Well Cement
- Advanced Direct Contact Condenser, 1999

³³ Energy Research at DOE: Was It Worth It, NRC, 2001, National Academic Press.

³⁴ The EERE Strategic Technical Review prepared by Sam Baldwin in March 2002 called for a consistent retrospective analysis approach in EERE. It recommended using a modified NRC approach for determining the realized economic benefits of EERE R&D programs, and it identified several improvements that could be made to the NRC approach. This study will implement the recommendations.

Program Management and Operations

- Silica Recovery from Geothermal Brine, 2001
- Smart, High-Performance Polyethylene sulfide Coating System, NREL, Brookhaven, 2002
- Acoustic Telemetry Device, 2003
- The Low Emissions Atmospheric Metering System, 2003
- High Temperature Solid-State Battery, SNL, 2006
- Binary Cycle Technology

8.2.4.2 External Performance Monitoring

OMB requires the use of two systems to monitor program performance, the Joule system and Program Assessment Rating Tool. Each program is responsible for establishing and monitoring quarterly milestones and ultimately the annual performance based program and management results as Joule targets. Joule milestones are reported to the OMB quarterly to evaluate progress toward targets as outlined in Congressional Budget Request. The second system, the Program Assessment Rating Tool (PART), also managed by OMB, was developed to assess and improve program performance so that the Federal government can achieve better results. The PART identifies all factors that affect and reflect program performance including program purpose and design; evaluations and strategic planning; program management; and program results. Since the PART includes a consistent series of analytical questions, it allows programs to show improvements over time, and allows comparisons between similar programs. For R&D programs, the PART also incorporates the R&D investment criteria developed under the President's Management Agenda.

The R&D criteria include relevance, quality, performance, and additional specific criteria for programs developing technologies that address industry needs.

GTP Joule targets for 2009 and 2010 are:

- **2009** – Determine actual pre-stimulation reservoir flow rate for a least one EGS field site.
- **2010** – Select a stimulation design plan predicting an increased reservoir flow rate of 10 percent or at least 10 kg/sec.

8.2.4.3 Internal Performance Monitoring

The Program utilizes the Corporate Planning System (CPS) to help formulate, justify, manage and execute Congressional Budget Requests. CPS also serves as a management tool to enable prospective spend planning, project data collection, and portfolio performance assessment. The system stores project-level management data, such as scope, schedule and cost and tracks progress against technical milestones. The performance of the projects (“agreements” in CPS) is monitored and managed by the PMC. Standardized processes used include:

- PMPs are developed to provide details of work planned over the entire project duration and to establish measures for evaluating performance. The plans include multi-year descriptions, milestones, schedules, and cost projections. The PMPs are updated annually.

Program Management and Operations

- Quarterly project progress reports, submitted by funded organizations, outline problem areas, financial and technical status, and identify and highlight achievements. Site reviews are conducted by the PMC annually (at a minimum) for technology validation, and assessment of obstacles and work progress. The PMC assesses project progress against the planned scope and schedule. The PMC assesses financial performance against the cost projection on a quarterly basis. All conclusions are documented in the quarterly management report.

The Program has implemented a systems engineering approach and will establish integrated technical plans across the Program elements to achieve the Program goals. The Program will also develop an integrated baseline which links the technical project activities to the resource-based milestones, illuminates gaps/issues in the current project portfolio approach, and provides the foundation for data-driven decision-making by the Program management. The Program will also use additional systems engineering approaches including interface management, independent performance verification, and robust information management tools to monitor overall progress toward achieving technical goals. The integrated baseline will be updated annually at minimum using project data and information. The updates will identify risks to delivering technical goals, critical technical gaps, cost overruns and schedule slippages.

8.2.4.4 Peer Reviews

In 2009, the GTP will conduct a peer review of EGS RD&D projects awarded in 2008. The emphasis of the peer review will be on the plan and the portfolio as a whole to evaluate organization, structural balance, and performance. Individual projects will also be evaluated by the same criteria.

The OMB issues government-wide policy and procedural guidelines to ensure and maximize the quality of information disseminated by Federal agencies. Per the OMB Peer Review Bulletin³⁵, DOE must peer-review certain scientific information before public dissemination. More rigorous reviews are required of information that is likely to have the greater impact on public policy or private sector decisions.

Regarding the definition of scientific information:

- “Scientific Assessment” means an evaluation of a body of scientific or technical knowledge; and
- “Highly Influential Scientific Assessments” are information products that the agency or OMB determines to have a potential impact of more than \$500 million in any year, or are novel, controversial, or precedent-setting or have significant interagency interest.

Technical experts from industry and academia are selected as reviewers based on experience in various aspects of geothermal technologies under review. Reviewers score and provide qualitative comments based on the presentations given at the peer review and the background information provided. Reviewers are also tasked with identifying specific strengths, weaknesses, technology transfer opportunities, and recommendations for modifying the project scope.

The Program will analyze all the information gathered at the review and develop appropriate responses to the findings for each project. All of the information, including the Program response,

³⁵ <http://www.whitehouse.gov/omb/memoranda/FiscalYear2005/m05-03.pdf>

Program Management and Operations

will be documented and published in a review report that will be made available to the public through the Program website.

8.2.4.5 Technical Project Reviews

GTP plans to hold Stage Gate reviews at the project level. The Stage Gate process, as depicted in Figure 8.2, is an approach for making disciplined RD&D decisions leading to focused processes and/or product development efforts. Specifically, the Program will use Stage Gate reviews to: guide decisions on which projects to include in the Program's portfolio; align R&D project objectives with Program objectives and industry needs; provide guidance on project definition including scope, quality, outputs and integration; and review projects to evaluate progress and alignment with the Program portfolio.

In a Stage Gate review, each section of review, the "stage" is preceded by a decision point or "gate" that must be passed through before work on the next stage may begin. Gate reviews are conducted by a combination of internal management and outside experts or the gatekeepers. The purpose of each gate is twofold: firstly, the project managers must demonstrate met objectives identified in the previous project phase; secondly, project managers must prove criteria satisfied in the current phase. Seven types of criteria are used to judge a project at each stage:

- Strategic Fit;
- Market/Customer;
- Technical Feasibility and Risks;
- Competitive Advantage;
- Legal/Regulatory Compliance;
- Critical Success Factors and Show Stoppers; and
- Plan to Proceed.

Specific criteria are different for each gate and become more rigorous as the project moves along the development pathway.

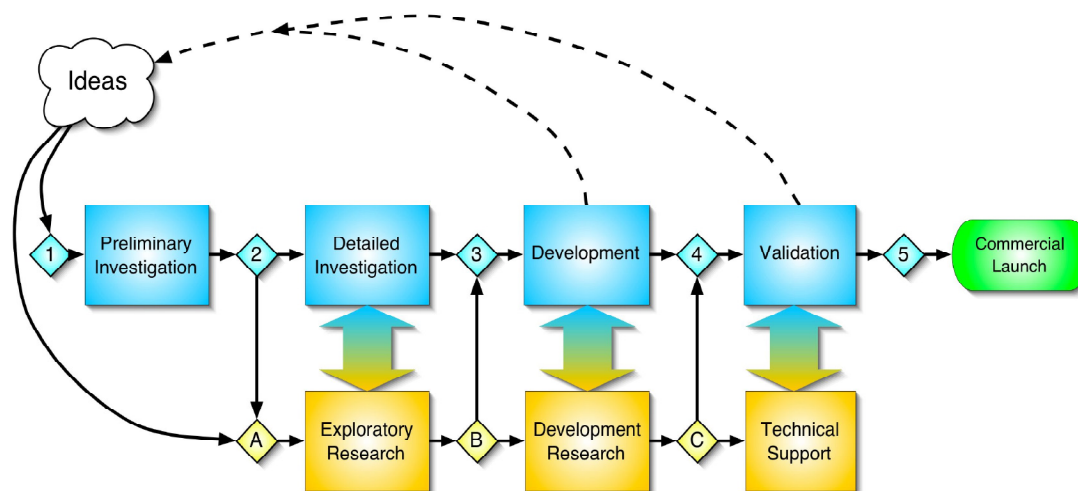


Figure 8.2. Geothermal Technologies Program Stage Gate Process

The possible outcomes of this portion of the review are: pass, recycle, hold, or stop. Passing implies that the goals for the previous stage were met including projected economics and customer satisfaction. Recycling indicates a need to extend work in the current stage as all goals had not been accomplished satisfactorily. A decision to hold suspends a project due to diminished or absent need. For projects placed on hold, the possibility that the project could resume exists if market demands change or future relevance is exhibited. A stop outcome reflects technology development failure, a permanent market shift, or economic disadvantage. In this case, the best ideas from the project are salvaged, but the project is permanently halted.

Only projects that receive a passing outcome move on to the second part of the stage-gate review process. The project leader must propose a project definition and preliminary plan for the next stage, including objectives, major milestones, high-level work breakdown structure, schedule, and resource requirements. The plan must be presented in sufficient detail for the reviewers to comment on the accomplishments necessary for the next stage and goals for completion of the next gate. Once the plan is accepted, the project can move to the next stage. Since the stakes get higher with each passing stage, the decision process becomes more complex and demanding.

The stage gate process is a key portfolio management tool that integrates a number of key decision areas, all of which are challenging: project selection and prioritization, resource allocation across projects, and implementation of business strategy. The gates and gate reviews allow the Program to filter poorly-performing or off-target projects and reallocate resources to the best projects and/or open the way for new projects to begin.

8.3 Technology Management

In FY 2008, the GTP incorporated System R&D Integration principles into technology management. Systems demonstrations and component R&D schedules were adopted in alignment with Program objectives, milestones and key decision points. These schedules, Figures 6.4, 6.5, and 6.6 are located in Section 6.

Program Management and Operations

The GTP administers Program procurements and RD&D project monitoring in close cooperation with DOE's Golden Field Office (GFO). A Project Management Center maintained by the GFO houses GTP contract data and deliverables. The estimated FY 2008 budget for GFO personnel and projects is \$293 million which includes services to other renewable and efficiency offices in DOE's Office of Energy Efficiency and Renewable Energy. GFO Federal staff numbers roughly 150 and includes specialists in engineering, scientific research, project management, procurement, finance, information systems, environmental protection, safety, law and human resource management. A support service contract staff of more than 60 provides GFO with additional capabilities in many of these areas.

8.4 Program Requirements

From time to time, the GTP will sponsor activities and processes that support program evaluation studies described in the EERE Guide for Managing General Program Evaluation Studies. The Program will conduct general program evaluations based on this guide, including the following:

- Needs/Market Assessment Evaluations;
- Outcome Evaluations;
- Impact Evaluations; and
- Cost-Benefit Evaluations.

This page was intentionally left blank.