4.3.1 Geothermal Electricity Technology Evaluation Model (GETEM) Development

Presentation Number: 001
Investigator: Mines, Greg (Idaho National Laboratory)
Objectives: To provide a tool for estimating the performance and contributions of all phases of a geothermal project to power generation costs; to provide a means of assessing the impact of technology advances; and to provide sufficient detail in characterizing cost contributors that results of DOE R&D can be readily integrated.
Average Overall Score: 2.7/4.0

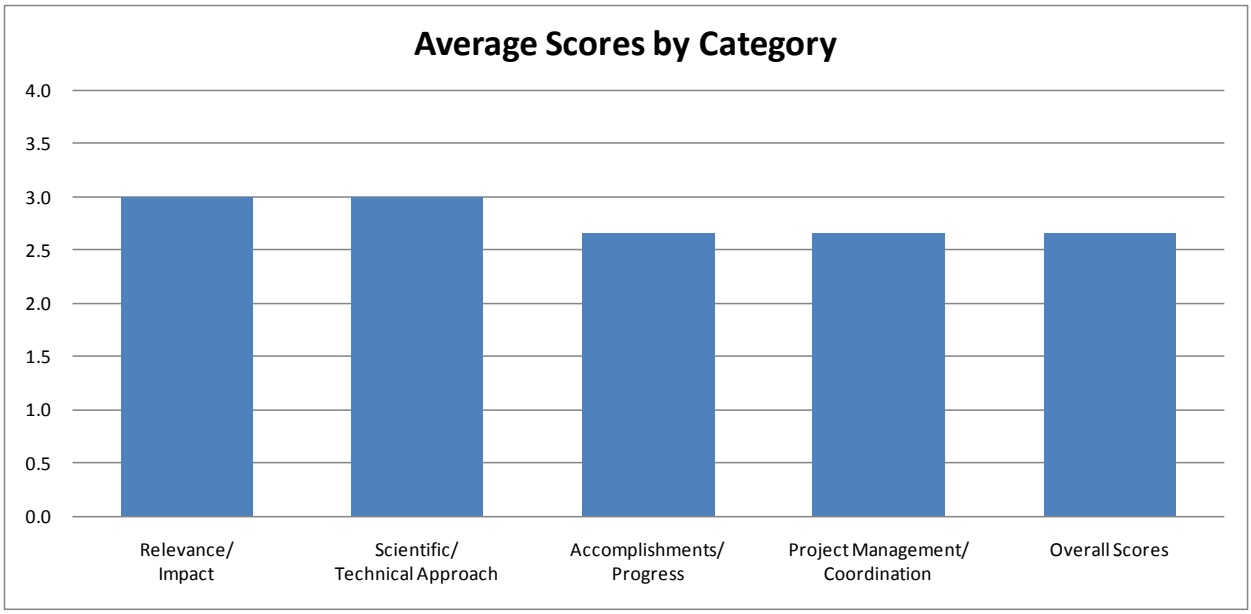

Figure 16: Geothermal Electricity Technology Evaluation Model (GETEM) Development

4.3.1.1 Relevance/Impact of the Research

Ratings of Three-member Peer Review Panel: Fair (2), Good (3), Outstanding (4)

Supporting comments:

- As stated in the presentation, the importance of GETEM ". . . to DOE is its ability to analyze the contributors that are the drivers for generation costs and assess technology benefits." If GETEM can truly provide DOE with an analysis of how sensitive final project costs are to each factor involved in developing a geothermal resource, this will be an important piece of work. Based on the presentation and text, the Excel program seems to be very complex, yet very far from achieving its goal.

- GETEM is relevant to barriers W,X, and Y. At present, GETEM is the most used and the most useful model within the GTP portfolio.

- This is an important project that will allow users to assess viability of potential EGS development and allow DOE to better assess the need for funding EGS projects versus other uses of limited funds. The project is making good progress on improving a model that has been under development for some time.

4.3.1.2 Scientific/Technical Approach

Ratings of Three-member Peer Review Panel: Fair (2), Good (3), Outstanding (4)

Supporting comments:

- I am concerned about two factors. These are the reliance on Excel as the platform for the models, and the need already for 400 input parameters before the model can be run, which would seem to be relatively high for use by the general public. However, 400 parameters are probably OK for internal DOE use.

  The version of Excel being used was not explained. Since original model development was completed in 2006, is it Excel 2003? Will the model be updated when Excel 2010 comes out, presumably with new features? What level of Excel expertise is expected for end users? While mention is made of coordination with industry and the public, and industry will be contacted for "feedback on reasonableness of estimates," there is no mention of support for end users. Will this just be an Excel spreadsheet package that is distributed without comment, or will there be a users' guide that explains all the inputs, the ranges of values each input may have, the context of the range, and critically the sources of data for each entry? For example, will there be an explanation of what choices exist for modeling power production if your temperature is 125 ^{o}C, and the benefits and problems with each choice?

  The project has no partners. The presentation notes, however, that there are reviews taking place. Who is doing these is not specified.

  In the brief time of the presentation I was unable to confirm how PPI data will be continually updated, especially by end users. If the program is distributed as an Excel file, will constant updates be provided to end users?

- GETEM is based on a well-defined technical plan and has a reasonable breadth of applicability. DOE and INEL need to define what GETEM will eventually be and what the relationship is with the systems model being developed by SNL. The eventual level of applicability and detail that will be modeled should be defined. The work at SNL appears to possibly be duplicative if proper scopes are not defined. However, the PIs of both projects acknowledge their collaboration.

- The overall approach to modeling embraced by GETEM has been considered solid for several years. The current approach of identifying needed improvements to better incorporate EGS projects seems to be solid as well.

4.3.1.3 Accomplishments, Expected Outcomes and Progress

Ratings of Three-member Peer Review Panel: Fair (2), Good (3), Good (3)

Supporting comments:

- Project seems to be stalled on waiting for low-temperature data. On the one hand, the project claims a 3/10 milestone for "evaluation of low-temperature resources" while the next paragraph notes that that the ". . . cost estimating software package . . . is not yet available . . ." This section is now scheduled for review by the end of September. The text also states that the software will be available in late spring, but I do not recall any progress on this front being noted during the meeting. Progress in some parts, such as resource temperature and pumping, are reported to be good.

- GETEM has had significant use within the GTP. There does not appear to have been adequate review and critique by industry. It is not obvious that industry is using GETEM, but if industry has their own models, it would be valuable to DOE to know how GETEM compares with the industry models. That would be an independent evaluation and perhaps a validation. GETEM has the advantage of being based on a widely accessible platform (EXCEL).

- Project progress is adequate. The PI, perhaps assisted by other talent at INL, is quite competent to do this work due to his years of geothermal experience.

4.3.1.4 Project Management/Coordination

Ratings of Three-member Peer Review Panel: Fair (2), Good (3), Good (3)

Supporting comments:

- This program, like other computer modeling being funded, seems to be developed in relative isolation. Some coordination with other modeling efforts at other labs is noted but my general sense is that these could be improved. I would like to see very close coordination among model developers. Is there any chance that all the models funded by DOE could be based on one front end, so users will not have to learn separate models and programs to answer questions, but instead could learn one program and have multiple options in how they run it?

- Strong management of the task by INL. DOE appears to be adding more "bells and whistles" - these should be defined as part of a long-term scope. DOE needs to maintain close coordination of additional GETEM development with other activities within the GTP (SNL and ANL modeling) to ensure efficient performance of efforts and to avoid duplication of efforts.

- Although no specific decision points were identified by the presenter, it is quite obvious that there are such decision points prior to beginning work on a given module of the GETEM model. The spend plan is being followed.

4.3.1.5 Overall

Ratings of Three-member Peer Review Panel: Fair (2), Good (3), Good (3)

Supporting comments:

- I would like to rate this higher, but at least to me it needs to demonstrate further progress. I think that what has been accomplished so far is useful, but I am concerned that there is not adequate coordination with other DOE efforts. Some thought should be given to porting this work to a web-based format, where updates and user support can be continually provided.

- Good model with strong performance by INL. Needs to be better validated, especially by industry. GETEM is quite useful for evaluating the relative potential of technology advances and research investment opportunities by the GTP. This meets the original goal of GETEM.

- This is a solid project with considerable value to the DOE Geothermal Program and of potential great value to the entire geothermal community. The PI should pay more attention to technology transfer to assist others besides DOE in using the GETEM model. A workshop on use of the model would be a good start on this technology transfer.

4.3.1.6 PI Response

No response.