4.3.2 National Geothermal Student Competition

Presentation Number: 002
Investigator: Visser, Charles (National Renewable Energy Laboratory)
Objectives: To expand university-level geothermal energy education and support expansion of geothermal workforce; to provide universities with challenging, learning-focused geothermal projects and resources to facilitate incorporation of the competition into university curriculum.
Average Overall Score: 1.7/4.0

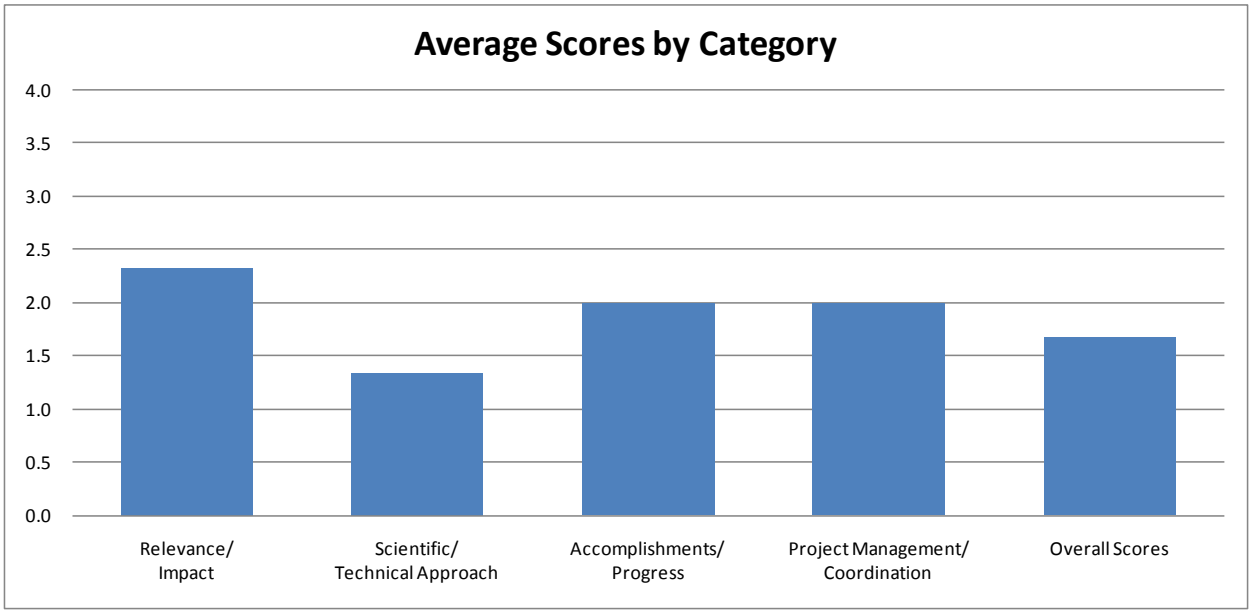

Figure 17: National Geothermal Student Competition

4.3.2.1 Relevance/Impact of the Research

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

Supporting comments:

- The concept of a student competition is good, and the long-term timing is right to raise the profile of geothermal energy in education. This project addresses the barrier of an inadequate education among future professionals in the field.

- This project is relevant to the GTP outreach/education efforts. Student competitions are difficult and this project does have some challenges as detailed in the other sections. Nevertheless, this is an area where the GTP significantly lags other organizations within EERE.

- The goal of increasing interest in geothermal energy among college students is laudable and should be pursued. The next generation of geothermal scientists, engineers, managers and business people needs to be fostered. In this light, the project is quite important. However, the project as presented is not likely to achieve its goals. In addition, the project is not specifically addressed to EGS.

4.3.2.2 Scientific/Technical Approach

Ratings of Three-member Peer Review Panel: Poor (1), Fair (2), Poor (1)

Supporting comments:

- Limiting the first project to the Rio Grande Rift is perhaps a near-fatal flaw in the program. I strongly suggest that, especially since workshops are planned for participating faculty, that they be instructed in how to find local (i.e. near each university) geothermal resource and development data. Why, for example, would an OIT team participate in a study of the Rio Grande Rift, when it would be much more practical for them to study local resources and development? While as professionals we know that case studies are transferrable, persuading today's students of this may become a difficult hurdle.

  The yet-undeveloped link with low-temperature resources will be critical, as many universities are finding this attractive (see all the talks about groundwater heat pumps at the meeting). Making projects local may help faculty broker additional support from their university administrations.

- Could be a "good" rating, but there are some significant challenges. Other DOE student contests have a much more physical aspect, such as the PV powered solar car with the race being the competition, and the Solar Decathlon where students build a structure and the thermal performance and aesthetics define the competition. This is difficult for GT in the sense of having hardware as a defining attribute. What is defined is a paper competition and it may be difficult to excite students with a potentially limited incentive for participation, especially for schools that are not currently involved with geothermal energy. To a certain extent, this competition would have a potential conflict, or potentially benefit to engineering design classes - very dependent upon the situation. The schedule proposed by NREL does not fit well with academic schedules for the soon-to-be-released solicitation.

- The technical approach to the project goals has several problems. First, it almost certainly would be a more effective use of the money to fund graduate and under-graduate students through scholarships for geothermal study or through support for faculty-based projects. Second, there is geothermal expertise at the university level in every state in the west and in many schools throughout the country as well. It is not obvious that there is a need to expand to more schools rather than supporting existing university programs. The number of schools able to teach geothermal energy is not the problem. Rather, helping students see a career in geothermal energy is the problem. Third, the choice of the Rio Grande Rift as a study area is questionable due to the relative lack of information on this area, especially subsurface information, relative to that in any of the more active geothermal regions. It seems unlikely that the sort of projects contemplated would supplement the Rio Grande database in any meaningful way. Fourth, the project schedule is unrealistic in that proposals would be required to be written during this coming summer, when most students are absent from campus, and the project duration upon their return to school is too short.

4.3.2.3 Accomplishments, Expected Outcomes and Progress

Ratings of Three-member Peer Review Panel: Poor (1), Good (3), Fair (2)

Supporting comments:

- Although original contract timing issues impact this, the current expectation that faculty will be able to assemble interdisciplinary teams during the summer seems to me to be unrealistic.

- Good progress per plan, but perhaps the plan should be revisited. There are Reviewer concerns about how students remote from the Rio Grande Rift will relate to and will be able to access and appraise data without some on-site field work. Perhaps the Rio Grande Rift is too geographically restrictive and participants should be able to choose a geological province germane to their area. What software (e.g. GETEM) and background data (e.g. the unpublished analysis by Dr. Laura Butterfield of NREL - the PI has a copy) will be provided to the participants? How will interdisciplinary teams be formed and function? What's the incentive for participation, from both student and professor perspectives? What monetary resources will be provided to participating schools? These questions were not answered during the review.

- The NREL geothermal experience needed to direct this project is quite limited, especially in the area of geothermal geology, geochemistry and geophysics – essentially the subsurface domain. NREL needs to seek outside help to scope a better project.

4.3.2.4 Project Management/Coordination

Ratings of Three-member Peer Review Panel: Fair (2), Good (3), Poor (1)

Supporting comments:

- I am concerned that the project has serious calendar issues with a typical academic year, and that it lacks flexibility to incorporate undergraduate and graduate students at appropriate levels. The program schedule seems to have been developed without regard to university schedules. Universities are different from national labs, etc., and schedules matter a lot. There are many excellent student competitions in engineering, energy and math, but these seem not to have been thoroughly evaluated for what makes them successful. I get the feeling that rather than adapting "the best of the best" that this project is reinventing a whole process. There should be university faculty helping with the development of this; none are listed. Advertising for this can also take additional time. While electronic communications are quick, distributing posters so interested students can be made aware of the opportunity will take a while, especially since many universities are now out for the summer. Expecting feedback from schools prior to the end of October will greatly limit the participation of students, and therefore limit the ability of this project to achieve its goals.

- This student competition is challenging and each phase will be a learning experience. The RFP is ready for issue. It will be necessary for DOE/NREL to have significant on-site and remote interactions with participants. Consideration should be given to having industrial partners or mentors who will also have involvement with the student participants. This would give a real-world flavor to the competition. It is not obvious what funding will be provided to the participating schools and how it will be managed.

- See (2) above for schedule problems. No decision points are evident.

4.3.2.5 Overall

Ratings of Three-member Peer Review Panel: Poor (1), Good (3), Poor (1)

Supporting comments:

- Comments on timing, advertising, coordination with faculty and students are detailed above. The lack of faculty participation in the planning process and the near-total disregard for university schedules may doom this project. It is a good idea, but the execution so far is poor. While the presentation states that "Growth in participation, recognition, complexity and funding is expected in future years" there is no plan included that explicitly states how the first year will be assessed. What constitutes success, and how is it defined?

- This project is badly needed by the GTP, and although it is far from perfect in the current scope, it should be considered a learning experience with improvements made in subsequent solicitations. The existing scope may need some tweaking, but is sound. "Just do it" may be appropriate.

- The entire project seems to be poorly planned, but the goals are important. It would be worthwhile for DOE and NREL to speak to people involved in educating scientists, engineers, business students, etc. to arrive at a project that has more chance of having an impact. This particular project should be extensively revamped.

4.3.2.6 PI Response

To address issues raised, the plan for the National Student Competition has been substantially revised.

To address the concerns regarding the schedule, NREL has coordinated with EERE and university professors to attempt to improve its alignment with the academic year.

The NREL project team has coordinated with Solar Decathlon representatives to help model the competition and discuss lessons learned. We were strongly advised to “widen the net” as much as possible in the first year of the competition to ensure adequate participation. This included opening the project up as much as possible to include schools geographically and academically outside the “usual geothermal suspects.”

With the new emphasis on cross-disciplinary geothermal development, the decision was made to retain the Rio Grande Rift trend as the area of study. In addition to strict technical evaluation, it brings land-use and policy aspects to the project. It is expected that this will be a “build year” for the competition and that subsequent competitions will expand greatly into other geographic locations and types of assessments.