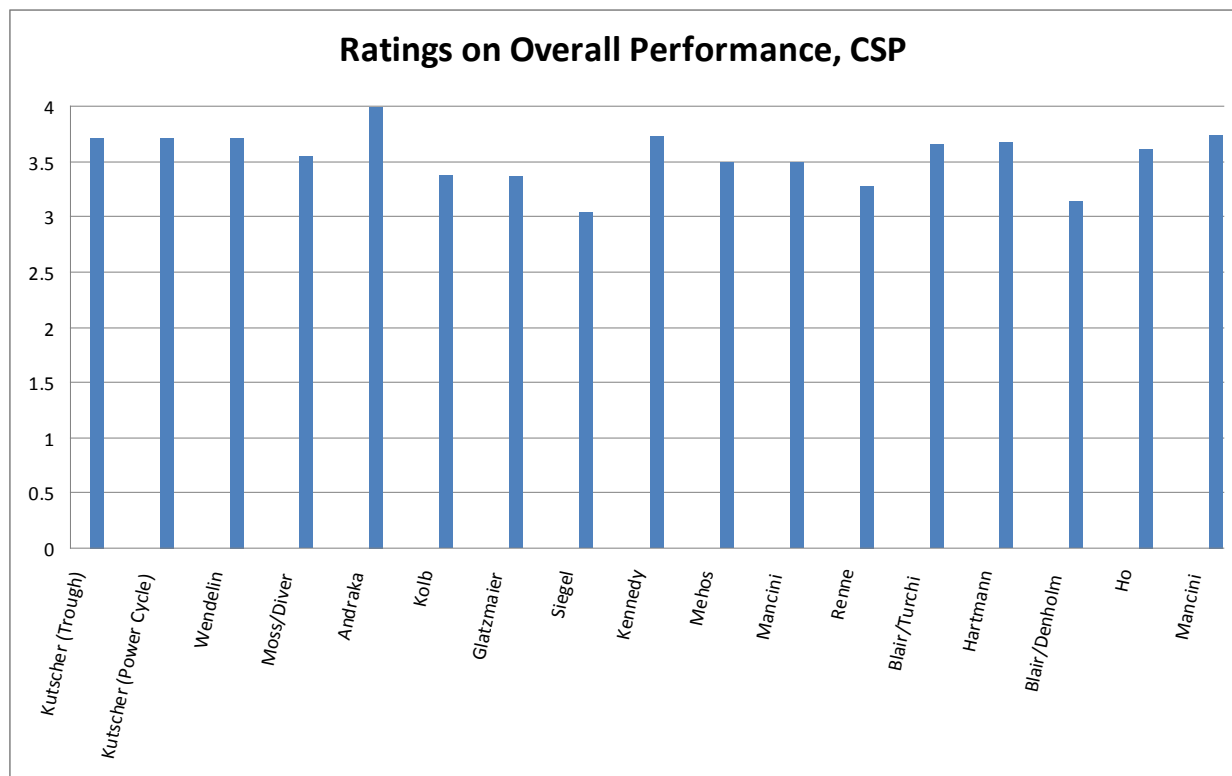


2009 Solar Program Peer Review, Overview of Results for CSP

Figure 1 below shows the rating each project received from the peer reviewers in terms of their “Overall” performance. The ratings are an average of the scores given by the four peer reviewers in this panel. They provide a broad comparison between the projects.

- A rating of 4.0 is an *Outstanding* project, i.e., world-class in nearly all aspects
- A rating between 3.0-4.0 is a *Good* project, i.e., strong and deserving of priority attention
- A rating between 2.0-3.0 is a *Weak* project, with one or more significant deficiencies requiring management attention
- A rating of 2.0 or lower indicates a project with serious deficiencies which warrant careful re-evaluation

All of the projects in the *Concentrating Solar Power* tracks fell into the 3.0 to 4.0 range.



In addition to individual project ratings, the peer reviewers in this track also provided feedback on the projects as a group, and on the program. The reviewers grouped their feedback into two categories: Things Going Well, and Challenges.

Things Going Well

Recent Past. The panelists commended the teams for continued advancement of CSP technology and maintaining the program’s resources during times when fiscal support was not as strong. Reviewers felt the program did a good job maintaining important infrastructure.

The teams, personnel, resources and lab facilities are considered to be very strong at both NREL and SNL. Researchers from both labs have strong and extensive experience, with foundations in practical, hands-on technology development.

Recent funding and staffing for national lab activities have been scarce, and reviewers feel the next couple of years should include focus on rebuilding infrastructure in both facilities and resources. In particular, support should be made available to foster the “next generation” of technology leaders, who will lead the technology into the future.

It is evident that the national labs are working to respond to the recent, sudden changes in the market. For some time, CSP has not been considered a primary solar technology. However, new regulations in Spain, the European Union, and the U.S., have raised interest in CSP, and commercial projects are once again feasible. The labs are working hard to provide adequate support to meet these new demands.

Near-Term Future. Reviewers feel that partnerships with industry are essential during this current period of potentially rapid CSP deployment. These relationships are currently considered to be solid, and the feeling is that they should continue to be encouraged by the program. Working with stakeholders and legislators - federal, state and local – is also considered critical. Helping stakeholders understand CSP technology, particularly at the state and local level, will be important to lowering barriers to acceptance. The labs and DOE need to remain involved in this process, since they bring a level of unique authority that private sector proponents of the technology can’t provide.

The participants in the CSP track indicated that many in the CSP industry are intent on avoiding high-profile failures in CSP plants. The consensus was that the national labs and DOE take responsibility for evaluating carefully any industry approaches that appear to lack rigor in their proposals or practices.

In order to preserve the viability and market appeal of CSP, participants identified critical roles the labs and DOE need to play in the near-term:

- standards for measures of performance both at the system and component level
- standards for acceptance testing
- life cycle materials and component testing
- accelerated lifetime testing

The labs must continue their significant roles in:

- leadership in modeling at the system and component level
- solar data availability and quality for facility assessment
- short time horizon research important for the near term (0-5 years)
- lessons learned so that commercial installations don’t repeat mistakes

Broader Impacts. Reviewers felt that the modeling work of Cliff Ho at Sandia National Laboratories is going to provide several critical benefits. In the short- to mid-term, it will help not only with industry but also with legislative bodies, the financial industry, etc. Reviewers also feel that Cheryl Kennedy’s work at the National Renewable Energy Laboratory will provide DOE with unique perspectives on technology development, while also providing rapid feedback to commercial technology developers. The group recommended additional space, equipment, and personnel resources be provided to in this area.

Reviewers agree that NREL and SNL are contributing significantly to the development of many solar technologies. It was suggested that DOE continue to address not only the current needs of the industry and its stakeholders, but also forecasted needs for three to five years into the future. One highlight mentioned to that end is the CSP program's impact on technology development, particularly in the area of troughs.

Challenges

Reviewers felt that there may need to be better coordination of some toolkits to encourage wider adoption by industry. For example, the alignment tools developed independently at NREL and SNL should be more closely coupled and included as a comprehensive suite of tools that can be used for system installation and alignment as well as operations and maintenance (O&M). Tools should be made readily available to a broader user base, with the development effort focused on reducing costs to build and operate. This is an example of an enabling technology that might be developed by DOE and given away without restriction, since it can create significant leverage for the success of CSP.

Tools like VSHOT, TOPS, and observers were all considered to be very good. However, reviewers felt that for these tools to be truly sustainable and cost effective, they should be more automated and cost efficient. Currently, they require too much labor to meet the overarching needs of industry.

Right now, most companies are using parabolic trough, possibly because it's the only technology with a long enough performance history (10 years) to secure financing. That is a challenge to other CSP technologies. The facilities plan presented by the two labs (Mehos and Mancini) needs to be more coordinated, to avoid unnecessary redundancy and identify areas of critical effort for CSP.

Reviewers felt that some topics being considered (e.g. molten salt working fluid in trough fields) should be deferred to the future. It was agreed that greater effort needs to be invested studying work in other countries before committing to large scale pilot studies of emerging technologies. Steam generation is getting a lot of attention, with several plants being built, so expanded study of this field by the national labs would be helpful. The consensus was that steam generation should get more attention and priority in the near-term than molten salt in trough.

Ultimately, the research under review is intended to help the solar industry reach DOE's target for CSP, e.g., 12 cents by 2015. However, reviewers indicated that, while the research is good work, there doesn't appear to be concrete proof that it is improving cost effectiveness. The difficulty in quantifying the benefits of research in terms of cents per kWh was recognized, but reviewers stressed this goal as a central driver for R&D. None of the presenters have done SAM analysis to estimate the impact of their work on LCOE. Performance metrics and standards of measurement are very important as well.

Based on the presentations, reviewers felt it was difficult to assess what was expected of each PI. It was suggested that individual PIs prepare a table of their objectives, progress for each objective, and the relationship of each program objective to DOE-level objectives.

Little, if any, has been done on the CLFR technology, while applications for 177 MWs of plant licensing are already being processed. Most current projects are appropriately focused on short term projects. However, reviewers propose that this is also a suitable time to begin developing a longer term technology development plan for CLFR.

The success of one high-profile project in California (SES) is considered crucial to the credibility of the CSP industry, and there is some significant concern about whether the plant is capable of achieving its objectives. Reviewers would like to see a successful demonstration happen as quickly as possible, in order to alleviate the current apprehension about whether the project will successfully launch.

While the peer review is an essential part of SETP's evaluative process, the results are not considered the sole indicator of any particular project's success or failure, nor does the review alone determine whether a project will receive continued, additional or reduced funding. The review is a critical opportunity to gain insight from external peers and industry professionals and to open discussion about areas of continued and future focus for the program. It is not a solitary measure of progress, however, and this report is intended to be read with that in mind.