Solar Advisor Model

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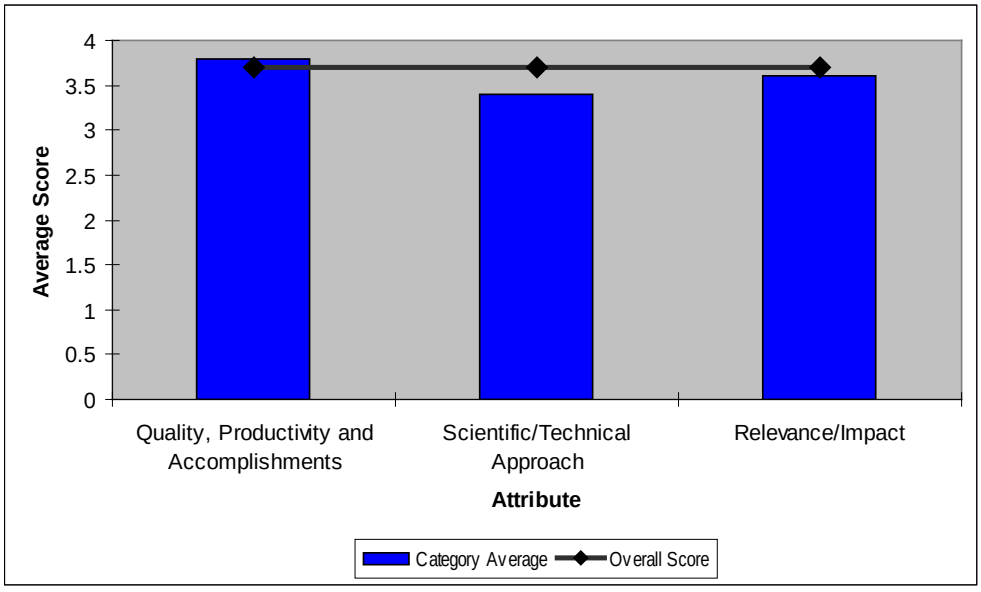

Overview of NREL's work on and vision for the Solar Advisor Model (SAM). SAM is designed to combine PV, CSP and thermal solar technologies into a single analytical model and facilitate comparisons of performance, cost, and financing.

Quality, Productivity and Accomplishments (Average Rating 3.8)

Rating	Comments
4.0	Good project team and excellent results, and productivity.
4.0	[none]
3.0	An appropriate number of people, with well recognized technical credentials have been engaged in this project. The members of the team and collaborators clearly demonstrate their ability to contribute to the project. The facilities deployed on the project appear to be adequate, but limited, for the task at hand. The work under way is producing an appropriate level of accomplishment relative to the costs incurred. The project team appears to be on schedule, but the project is clearly still in progress and not yet complete.

Solar Advisor Model
Funded by CSP and PV
$250k by CSP, significantly more from PV
Started to steer SAM in more of an industry user direction
A lot of tools can give you a good idea of the annual output of a solar plant
Sensitivity Analysis
Dry cooling vs wet cooling
Google groups for user group
University of Wisconsin student for power tower and Stirling engine models
Built on trnsys platform from Univ of Wisconsin (Sel.me.wisc.edu/trnsys)
Good use of industry needs survey to inform future work in out-years
Gatecycle design tool possible interface with SAM
Do not recommend commercialization or things like that for these core tools – make them available for open use – if this is an enabling technology, keep the barrier to entry low.

4.0	SAM – deals with PV and CSPVision. On the same footing – where R&D dollar will be spent Changed from planning for DOE to an industry-centric tool Detailed performance models to impact results Includes sensitivity analysis SAM is a valuable tool providing capabilities to calculate• energy output• energy cost• cash flows• prediction of levelized cost of electricity Solar Advisor Model improved by adding new capabilities. This helpful tool provides capabilities for calculation of energy output, energy costs and cash flows as well as parametric analysis.

Scientific/Technical Approach (Average Rating 3.4)

Rating	Comments
3.0	The approach used is appropriate for the goals defined.
3.8	[none]
3.0	The project team applied an appropriate technical approach in pursuit of project objectives. The design and execution of the approach are good.
3.8	Trough technology and now dish Stirling New addition will be power tower Core is hourly simulation Includes built-in data sets 10km data grid available – excellent for siting analysis Uses TRANSYS platform simulation engine Can handle incentive information The planned activity to provide greater interaction with risk assessment and other tools, by restructuring the source code, will result in a much more useful product.

Relevance/Impact (Average Rating 3.6)

Rating	Comments
4.0	A reference tool to assess the economic performance of different CSP plants and to compare them is highly needed. NREL's efforts to transform SAM into such a tool are to be commended.
3.5	[none]
3.0	One of their goals was to encourage internal usage of SAM more, but yet we did not see much of it in any of the other projects as a tool being used. Good tool. Recommend using this tool for comparison of project impacts on LCOE where appropriate. Particularly important for this toolkit to remain freely available to all. Modular design is good, so that the tool can support a wide range of users. Caution: Make sure that modules can be easily accessed and lower the learning curve for new users. Recognize that this tool is a system level modeling tool – not a design tool. Software architecture showing multiple layers of analysis (as per Ho) is excellent approach.
4.0	Addition of dry cooling capabilities for CSP systems and development of Dish/Stirling performance model as part of SAM indicates appropriate technical approach for achieving right goals and research direction. Major additions include code development for generic technology option (to compare solar electric with fossil fuel generation.

Overall (Average Rating 3.7)

Rating	Comments
4.0	The project team, its productivity, and the results obtained are excellent. The technical approach used and the efforts made by NREL to improve SAM and to transform it into the computer tool of reference to assess the energy and economic performance of CSP plants are excellent.
3.8	SAM becoming more of an industry tool rather than a DOE planning tool, which is very good. New features are being added, which includes: Dish-stirling version, dry cooling vs wet cooling, Power Tower module. Has even a generic model that can analyze coal plant PV budget is significantly more than the $250K CSP budget. Simulation engine is TRANSYS. Not a design tool, more of a planning tool (feasibility, site selection, comparing technologies, sensitivity analysis, scenario analysis, etc.). Access is free, no user fee. A concern: is it becoming too big to use? The modular design that was mentioned in the presentation is good. If a person wants to use it just for a specific purpose, the ability of turning off other things would be a great idea. People would not use it if other things get in the way when they try to use it for a specific (small) purpose. On the contrary, having everything (a lot of features and capabilities) in one tool has significant advantage provided using it is not too tedious. Having all the fields filled with default values is a great idea. It would have been nice if all the PIs included a SAM analysis in their presentations. SAM team could encourage the other PIs to use SAM to do cost-benefit analysis for their Peer Review presentations.
3.0	Recommend that a clear open architecture, open source software interface design be established.
3.9	Includes performance model for parabolic troughDish StirlingPower towerWill be converted to UNIXIndustry abd utility usersThis tool can provide initial information for design modelSAM is an appropriate tool to provide guidelines and estimate for the system costs and performance. Well deserved credit is due to the highly qualified staff for for regularly updating, improving and adding new features.The project team is urged to keep up with the model improvements and make sure that the user interface is appropriate and can meet needs of diverse users. SAM: SAM is an excellent tool. One of the major program goals was to encourage internal usage of SAM, but there was not much evidence of its use by other projects.It is particularly important for this toolkit to remain freely available to all.Modular design is good, so that the tool can support a wide range of users. Caution: Make sure that modules can be easily accessed and lower the learning curve for new users.