

Free Tool Mitigates Potential Barrier to Renewable Energy

The growing number of photovoltaic (PV) solar energy installations marks steady progress toward the U.S. goal of increasing the use of clean, renewable energy—and reducing dependence on fossil fuels. However, PV installations can also produce intense glare—creating potential safety issues for pilots, air traffic Controllers, and motorists.

Aware of the risks, the Federal Aviation Administration (FAA) in 2013 announced a new policy that calls for quantified analysis of potential ocular hazards from glint and glare for PV installations planned at airports—and other organizations are calling for similar analyses.

Commercial ray-tracing tools can be used to model glare occurrences, but are expensive and complicated to set-up, placing a significant burden on companies seeking to comply with the FAA requirement.

New Tool Helps Private Industry Ensure Safe PV Arrays

Aware that the glare analysis requirement could be a barrier to increased penetration of renewable energy generation, the Office of Energy Efficiency and Renewable Energy (EERE) within the Department of Energy sought a solution that would be free, easy to use, and widely available.

To this end, EERE's Solar Technologies Soft Costs program supported the work of Sandia National Laboratories on the Solar Glare Hazard Analysis Tool (SGHAT) project.

Building on its past analyses, test data, and models, Sandia developed a web-based interactive tool that allows easy evaluation and quantification of potential glare impacts from solar energy installations.

SGHAT results, presented in a simple, easy-to-interpret plot suitable for non-technical users, have been confirmed with observations at Manchester/Boston Regional Airport, Albuquerque International Sunport, and residential PV arrays.

Market Impacts

To date, nearly 1,000 users in 37 countries have downloaded SGHAT, and the tool has already been used to ensure safe siting of solar installations at dozens of airports across the United States and around the world— thus improving public safety while advancing U.S. solar energy goals.

In so doing, this free tool, available on computers and mobile devices, has helped multiple companies quickly and easily comply with a regulation that might otherwise have become a costly, time-consuming enterprise. In recognition of its potential, SGHAT was honored with the prestigious R&D 100 award in 2013.

As an added plus, SGHAT has demonstrated its value as a PV design optimization tool. Specifically, it can evaluate alternative PV installation designs, layouts, and locations to identify configurations that maximize energy production while mitigating the impacts of glare.



Glare seen from the air traffic control tower at Manchester/Boston Regional Airport. (Photo used with permission of the Manchester/Boston Regional Airport.)



Road sign on Massachusetts State Route 2. (Photo credit: Stephen Barrett; Harris, Miller, Miller, & Hanson Inc.)

As SGHAT becomes a valuable resource for maximizing the potential of PV installations, its benefits will extend well beyond the design goals.

“A superb software tool...comparable to the best that could be offered in the private sector.”

“The SGHAT was easy to find, easy to obtain, easy to learn, and easy to use. The user interface is excellent and well-laid out. The results are presented clearly and accurately. I appreciated that detailed information was presented, along with compelling and easy-to-understand graphical results.

“The report that is generated is very useful and well-presented. It can be used directly in my report. The user guide was very well written and easy to understand. The case study given in the manual was very interesting and informative as well as being instructive in the use of the tool, and in understanding the subject of solar glare.

“In short, this is a superb software tool for a vital and much-needed area of study for the solar industry and for the aviation industry. I think it is comparable to the best that could be offered in the private sector (even though there is nothing in the private sector for this). And it's free! This is the kind of thing that makes me happy to pay my taxes.”

- Lyle K. Rawlings, P.E., President & CEO, Advanced Solar Products Sandia

Market Impacts of SGHAT project:

- Nearly 1,000 downloads in 37 countries
- Usable on computers or mobile devices with Internet access
- Greatly eases private industry compliance with FAA 78 FR 63276
- Endorsed by Solar Energy Industries Association



Screen image of SGHAT analysis of Manchester/Boston Regional Airport. PV array (blue outline) and observation points (red marker) are entered using tools integrated with Google Maps



Glare from a large photovoltaic array, observed from C-12 cockpit at Kramer Junction, California (from Air Force Flight Test Center 412 TW at Edwards AFB, approval #13166).

- Key contributors to SGHAT project:
- Federal Aviation Administration
- California Energy Commission
- U.S. Air Force
- Solar Energy Industries Association

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Product

A web-based software tool, free to the public, that helps PV operators/companies meet FAA policy 78 FR 63276 and identify PV array configurations that minimize glare hazards while maximizing energy production.



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