

Software 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 energy sources. However, PV installations can also produce intense glare, creating potential hazards for pilots, air traffic controllers and motorists.

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

Commercial ray-tracing tools can be used to model glare occurrences, but are expensive and complicated to setup, placing a significant burden on companies seeking to comply with local, state, federal or international anti-glare requirements.

New Tool Helps Ensure Safe PV Arrays

Aware that the glare analysis requirement could be a barrier to increased penetration of renewable energy generation, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) sought a solution that was 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 and test data and models, Sandia developed a web-based, interactive tool that allows users to easily evaluate and quantify potential glare impacts from solar energy installations.

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

Market Impacts

The tool has been used to ensure safe siting of solar installations at dozens of airports across the United States and in more than 120 countries around the world, thus improving public safety while advancing U.S. energy goals.

In so doing, this online tool 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, SGHAT can evaluate alternative PV installation designs, layouts and locations to identify configurations that maximize energy production and mitigate 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 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).”

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

Features and Benefits:

- Available on computers or mobile devices with internet access.
- Greatly eases compliance with local, state, federal or international anti-glare requirements
- Endorsed by the 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 (photo from Air Force Flight Test Center 412 TW at Edwards AFB, approval #13166).

Key Contributors

- Federal Aviation Administration
- California Energy Commission
- U.S. Air Force
- Solar Energy Industries Association

Product

SGHAT is a web-based software tool that helps PV operators and companies comply with local, state, federal or international anti-glare requirements while maximizing energy production.

Licensed use of SGHAT is now available to the public at ForgeSolar glare analysis tools: www.forgesolar.com

Contact:

Abraham Ellis, aellis@sandia.gov | sandia.gov/glare-tools



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND2014-3983P.

