SOLAR GLARE HAZARD ANALYSIS TOOL (SGHAT)

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US Patent Pending on SD # 12353

TECHNOLOGY SUMMARY

With growing numbers of solar energy systems being proposed and installed throughout the United States, the potential impact of glint and glare from photovoltaic modules, concentrating solar collectors, receivers, and other components is receiving increased attention as a potential hazard or distraction for pilots, air-traffic control personnel, motorists, and residents. Hazards from reflection of solar radiation from solar power plants include the potential for permanent eye injury (e.g., retinal burn from concentrated sunlight) and temporary disability or distractions (e.g., after-image). Visual impairment can be mitigated by thoughtful application of analytical tools. Traditionally, glare hazards are analyzed in terms of the geometry of the proposed solar installation relative to key observation points. However, such geometric methods fail to provide an indication of the intensity of the reflected light or the potential ocular impacts.

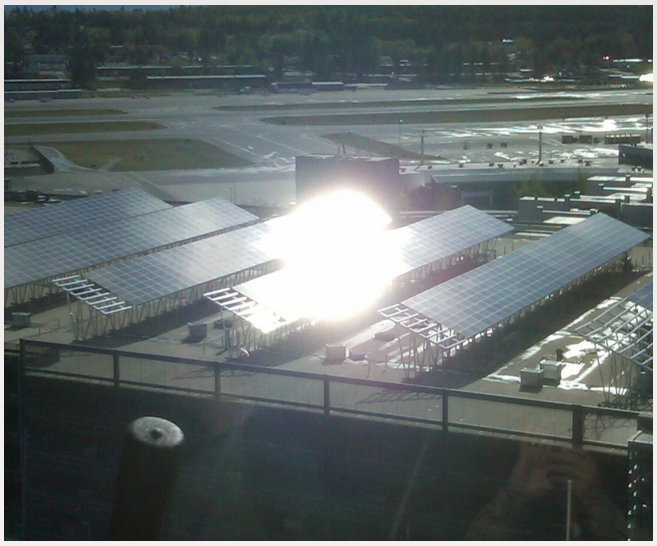

Figure 1. Glare from solar panels viewed from an air traffic control tower.

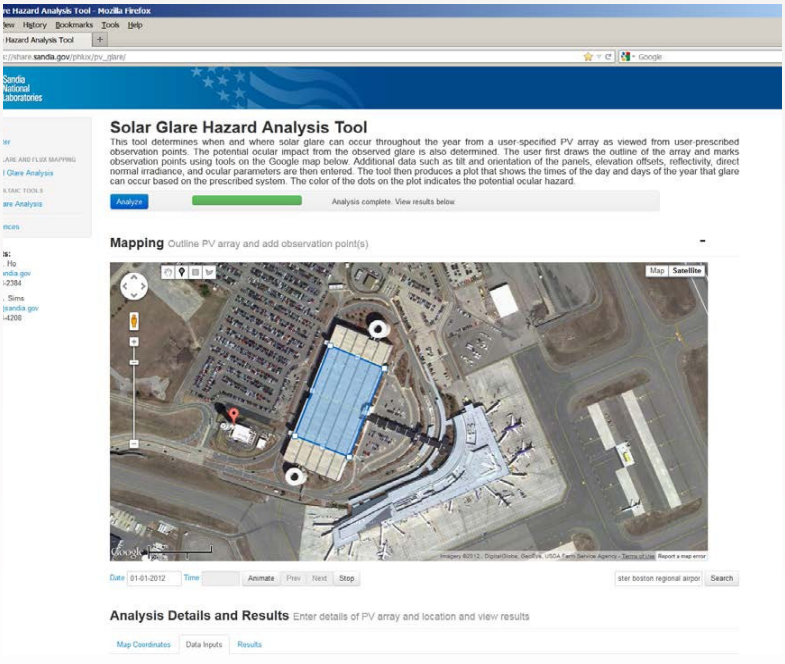

Figure 2. Screen image of glare analysis tool. PV array (blue outline) and observation points (red marker) are entered using drawing and selection tools integrated with Google Maps.

Sandia has developed a web-based tool and methodology to evaluate potential glint/glare hazards associated with solar energy installations. The validated tool provides a quantified assessment of when and where glare will occur, as well as information about potential ocular impacts. The tool can also be used for design optimization to evaluate alternative configurations, orientations, and locations of solar installations that not only mitigate the impacts of glint/glare, but also optimize energy production. The calculations and methods are based on analyses, test data, and models developed over several years at Sandia to evaluate ocular hazards. The results are presented in a simple easy-to-interpret plot that specifies when glare will occur throughout the year, with color indicating the potential ocular hazard.

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POTENTIAL APPLICATIONS

- Glint and glare ocular hazard analyses for proposed/existing solar installations near airports, roads, workplaces, and communities
- Studies to ensure safe siting and expedited permitting
- Design optimization to maximize energy production while mitigating glare from solar installations

TECHNOLOGICAL BENEFITS

- Quantifies when and where glare will occur throughout the year
- Quantifies glare intensity and potential ocular impact
- Determines annual energy production so that PV configurations can be optimized for maximum energy production with minimal glare

TECHNOLOGY READINESS LEVEL

Sandia estimates this technology to have a technology readiness level of approximately 7. Prototypes have been tested and shown to work in operational environments.

CONTACT INFORMATION

For more information or to discuss licensing opportunities please contact ip@sandia.gov.

Or to learn more, please visit our website at
https://ip.sandia.gov.

NNSA National Nuclear Security Administration

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