Non-glaring photovoltaic installations

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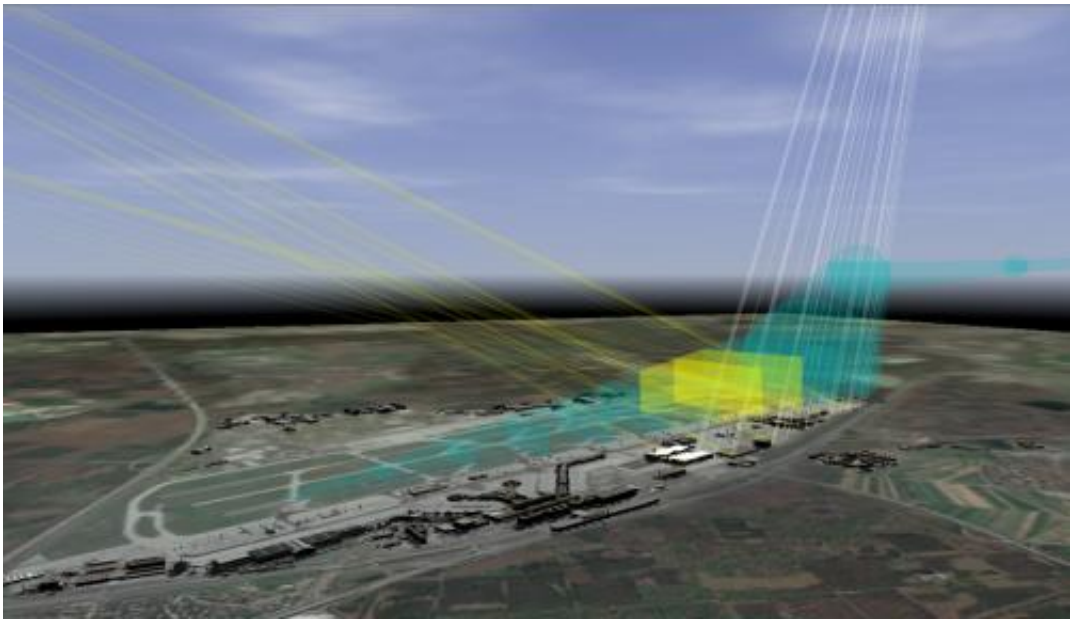

A new type of software calculates where and when planned photovoltaic installations can cause glare – such as the region around Frankfurt airport. Credit: Fraunhofer FIT

Before a photovoltaic installation may be constructed, engineers calculate, for some selected days in the year, when and where the interfering light reflections occur, especially if airports, highways or larger residential areas are close by. In the future, this will be easier and more comprehensive: with software that creates a three-dimensional depiction of the glare at the touch of a button.

The pilot is about to land the plane, when he is suddenly blinded by

glaring brightness created by a large-scale photovoltaic installation reflecting the sun. These blinding events create major safety hazards in the vicinity of airports. They also increase the potential for accidents when near highways. For this reason, before a photovoltaic installation may be constructed, engineers calculate, for some selected days in the year, when and where the interfering light reflections occur, especially if airports, highways or larger residential areas are close by.

In the future, this will be easier and more comprehensive: with software that creates a three-dimensional depiction of the glare at the touch of a button. It is developed by researchers at the Fraunhofer Institute for Applied Information Technology FIT in Sankt Augustin, Germany together with their colleagues from the State Office for the Environment, Protection of Nature and Geology in Mecklenburg-Western Pomerania and various solar planners. "The software creates a 3D view from all sides for any time of the day or time of the year," says Alexander Wollert, a scientist at the FIT. "We recreate the entire scene in a three-dimensional room, with a map, elevation profile, sun, three-dimensional buildings and photovoltaic installations." The researchers also simulate the course of the sun and the blinding for each time unit and in any direction. They take into account the elevation of various ground surfaces as well as obstacles, such as trees or noise barrier walls.

The planners can randomly move the installation around the monitor screen and immediately determine when and where it will cause problems. They determine at what position of the sun, at what time of the day and during which season the solar modules cause glares, and in which directions the reflections point. For example, do they affect residents, how often and how intense? And what can be done to prevent glares? For example, the planners of the installation can change the orientation and tilt angle of the elements. If that is not enough to mitigate the effects, the software can "simulate" modules with a somewhat more matte surface. They reflect the sun far less than traditional models;

however, they are also more expensive.

The researchers have set up and tested the software for the region around the Frankfurt airport. Building on that, they are now developing a version that is intended to help the operators of photovoltaic installations throughout Germany. "The software downloads its map material dynamically from the Federal Agency for Cartography and Geodesy," explains Wollert. "It automatically downloads the required map material from there, as well as analogous contour maps. The software combines this information into a three-dimensional view of the respective surroundings, which form the basis for all further calculations." Wollert expects the software to be operational in the coming year.

The application is also of interest for private installations, because sometimes lawsuits are filed when neighbors feel bothered by the glare. In the future, the software could help avoid this problem. Used as service for engineers or planning agencies the peace among neighbors could be preserved.

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