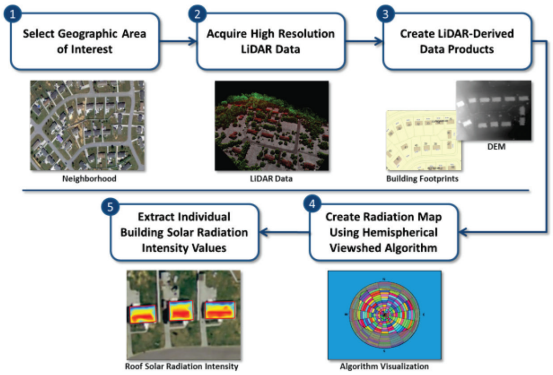
Visual-SOLAR: Visualizing Solar Radiation Potential on Building Rooftops

Many communities across the world are encouraging the use of rooftop-mounted solar energy technologies, from photovoltaic (PV) to solar water heaters to PV distributed generation system. In the United States, for instance, the Department of Energy (DOE) is promoting large scale deployment of rooftop-mounted PV for residential and commercial electricity generation applications as a strategy for achieving a sustainable energy policy. Both the solar resources and rooftop space needed to achieve this objective are readily available. Uncertainly about the potential of this resource, however, has been a hindrance to the deployment of rooftop-mounted solar energy technologies. Rooftop solar radiation maps offer a powerful way to reduce this uncertainty by both visualizing and quantify solar radiation. The creation of solar radiation maps allows one to intuitively "see" how solar radiation behaves spatially at different locations and for differing time periods.

The state-of-the-art in solar radiation maps assumes flat roof, does not account for possible shading from adjacent structures or vegetation, and are not applicable to utility-scale or community-scale application. To bridge these gaps, we have developed a spatial model for estimating solar radiation on individual building rooftops in a community using LiDAR-based digital elevation models at approximately 1 meter horizontal resolution and 0.3 meter vertical resolution. The resulting solar map, Visual-SOLAR – Visualizing Solar Radiation Potential on Building Rooftops, addressed all the limitations of the state-of-the-art. The *unique* application of Visual-SOLAR is that it helps utilities to evaluate how PV distributed generation could help address peak shaving and postpone infrastructure upgrade within their service areas by taking advantage of solar radiation potential on their customers' building rooftop. The time required to perform the analysis could be reduced from months to minutes thereby greatly reducing the up-front planning cost of solar deployment at the utility level. For the residential and commercial customers, Visual-SOLAR helps individual building owner or a group of owners (in a co-op setting) to evaluate solar energy potential available to off-set some of their current electricity consumption.



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September 2014

ORNL is managed by UT-Battelle for the US Department of Energy

Publication

Jeffrey B. Kodysh, Olufemi A. Omitaomu, Budhendra L. Bhaduri, and Bradley S. Neish (2013). Methodology for Estimating Solar Potential on Multiple Building Rooftops for Photovoltaic Systems, *Sustainable Cities and Society*, **8**, 31-41.

ORNL 2014-G01070/chj