

## UCSD Engineers Give Solar Power a Boost

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The growing popularity of solar photovoltaic (PV) systems across the United States has made it more important to maximize their power input. That's why UC San Diego environmental engineering professor Jan Kleissl is working on technologies and methods that will better predict how much power we can actually harness from the sun.

In a paper recently published in the journal *Renewable Energy*, "Optimum fixed orientations and benefits of tracking for capturing solar radiation in the continental United States," Kleissl and his Ph.D. student Matt Lave explain why it's important to strategize on solar installation, depending upon the location of the building relative to the sun. For example, Kleissl and his students at the UC San Diego Jacobs School of Engineering have improved the solar map for the state of California, which allows homeowners, photovoltaic installers and utilities to better predict how much energy they will get out of their solar systems. The map can be viewed via Google Earth for free.

"Probably the most important result of this work for California is that in all coastal areas (Los Angeles, San Francisco, San Diego) it is advantageous to install the panels facing about 10-degrees west of south," Kleissl said. "This not only optimizes energy production, but it also improves the correlation of solar power production with the load. Panels facing southwest 'see' the sun longer and at a better angle than panels facing south, which means that the energy generated is larger during the peak demand hours (3-to-5p.m.), making the energy more valuable. The generally clear conditions during the annual load peaks (also known as Santa Anas to Southern Californians) mean that the solar panels produce at the optimum power. On the other hand, wholesale energy prices during the peak time may be 10 times those during other days. In a future with more variable electricity rates this margin may tip the balance of economics in favor of solar energy and there will be greater incentives for installing panels facing southwest. Our maps show that there are already benefits of doing so now as the energy generation increases." Kleissl further explains his intensive solar research at UC San Diego in this recent video produced by SPIE, the international society for *optics* and photonics.

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