

California Energy Commission Accelerates Renewable Energy Research at UC San Diego Through \$1.4 Million Grant

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The California Energy Commission's (CEC) Public Interest Energy Research (PIER) today announced \$1.4 million in funding for UC San Diego that will accelerate the development and deployment of renewable energy technologies for Californians. UC San Diego's portion will boost solar forecasting research, support the campus' deployment of solar powered electric vehicle charging stations, solar integrated energy storage systems and improved information technology architecture with grid operators.

"Our investment in research on renewable energy projects will help accelerate its development and application in California," said Energy Commission Chair Dr. Robert B. Weisenmiller. "The partnership with UC San Diego expands on the campus' expertise in clean energy."

UC San Diego environmental engineering professor Jan Kleissl will use \$469,447 of the CEC funding to advance his critically acclaimed solar forecasting research. Kleissl, who has been focusing on solar energy for nearly a decade, currently uses advanced weather stations and sky imaging tools to create intra-hour solar production forecasts. Under the new grant, Kleissl and his team will work with local and national weather forecasting companies to combine these technologies to come up with the optimal solar forecasting method. Kleissl, who will also develop software, plans to have a prototype developed by next year. The research will uniquely use ensemble forecasting techniques to improve the accuracy of cloud cover every 15 minutes in order to predict the production of electricity from solar systems.

"This is particularly relevant for California's unique and notorious coastal and Central Valley fog patterns. With greater accuracy in forecasting solar electricity generation, the expense and emissions of standby generators can be drastically reduced," Kleissl said.

Ensemble techniques are used in weather forecasting to anticipate variations from the inputs that in turn permits the model to automatically and accurately recalculate a forecast on a near continuous basis. This research will be the first application of ensemble technologies to solar power production. If successful, the advancement will be transferred to private forecasting services to help California efficiently achieve by 2020 its 33 percent Renewable Energy Portfolio Standard.

"California has been a leader in funding solar forecasting research due to the visionary steps taken by the CEC," Kleissl said. "This is justified as the majority of solar power installations will be in California. While currently much less than 1 percent of the state energy comes from solar power plants, we need to develop the tools now that can help us in two-to-five years when we will have a lot more solar power on the grid."

Kleissl's research is part of a booming solar sector in San Diego, which is a state leader in solar energy. According to the California Solar Initiative, San Diego has the greatest solar photovoltaic (PV) adoption rates in the state and currently holds the designation as the number one solar city, due to the number of solar PV rooftop installations.

The balance of the new CEC funding will primarily focus on solar energy storage, renewable energy charging of electric vehicles and IT architecture with grid operators. San Diego has also been designated an iHub for innovation in solar energy storage technology to provide a platform for research clusters, startup companies, government entities, business groups and venture capitalists by leveraging assets such as research parks, technology incubators, universities, and federal laboratories to foster innovation and job creation statewide.

"The grant will further accelerate UC San Diego as a critical test bed for emerging energy storage systems from the private sector to be integrated with existing solar and other renewable technologies on campus," said solar pioneer Byron Washom, the co-lead for the CEC grant and director of the university's strategic energy initiatives. "California is presently deliberating the targets for energy storage after the passage of AB2514 to improve the efficiency of the state grid and lower the cost of delivered energy, and the ability to demonstrate the various storage technologies will significantly contribute to this process. Bringing in innovators from the private sector to demonstrate their systems on campus is a key to the success of boosting renewable energy use on campus and across the California."

Washom added that the funding will contribute to the on-going "Tailpipe Endgame" project that seeks to utilize a scheduled 4 megawatts of renewable energy on the UC San Diego microgrid for the direct charging of a fleet of electric vehicles in order to achieve zero tailpipe emissions. This is one of several projects being jointly undertaken by Smart City San Diego, a new public-private collaboration that aims to improve the region's energy independence, empower consumers to adopt electric vehicles, reduce greenhouse gas emissions and drive economic growth. The partnership includes the City of San Diego, San Diego Gas & Electric (SDG&E), GE, CleanTECH San Diego and UC San Diego.

"This quantum advancement will establish the technical feasibility of using renewable energy to electrify the transportation sectors while inciting the global competitive forces to leapfrog to the one solution that provides the greatest sustainable, secure supply of energy and reduces the largest global source of greenhouse gas emissions and local air pollutants," Washom said.

Lee Krevat, director of smart grid for SDG&E and member of the Smart City San Diego Advisory Committee, said the CEC grant will provide valuable research to the numerous clean tech projects throughout the San Diego region that are working to assist with the development of a more efficient grid.

"We must be forward-thinking about how we will support the needs of residents and businesses who are adopting technologies like plug-in electric vehicles and rooftop solar at a rapid rate," Krevat said.

The new CEC grant will also allow UC San Diego to accelerate its deployment of software on its already robust microgrid, which self generates 82 percent of its annual needs, to demonstrate a case for increased use of digital information and controls technology to improve reliability, security and efficiency of the electric grid. This will provide an opportunity to identify IT architecture required for reliable operation of the micro grid with the bulk power grid. One supporter of the project is the **California Independent System Operator (CAISO)**, a non-profit public benefit corporation charged with operating the majority of California's high-voltage wholesale power grid. The CAISO is interested in the development and demonstration of renewable based microgrids and how they can be integrated with overall operation of the power grid.

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