JACOBS SCHOOL OF ENGINEERING

(858) 834-8087

MAIL CODE 0411

9500 GILMAN DRIVE

Center of Excellence for Renewable Resources and Integration at UC San Diego

TEAM AND TRACK RECORD

The Center of Excellence for Renewable Resources and Integration at the University of California San Diego (UCSD) is being Co-Directed by Assistant Professor Jan Kleissl, Director of the Solar Resource Assessment and Forecasting Laboratory and Associate Professor Carlos Coimbra, Director of Forecast Engine Laboratory.   The Center of Excellence will develop comprehensive forecast models that predict solar power output, based on how much sunlight can be found at a specific location and how it fluctuates in order to efficiently and reliably integrated the renewable energy into the nation's transmission and distribution systems.

This team with Co-Principal Investigator Byron Washom has an unparalleled track record in winning state, federal and private contracts in renewable forecasting and a strong record of success in bringing research results from lab to market.

- $1.9M DOE grant for the Advanced Modeling of High Penetration of PV on the Distribution Feeder with $.5M of matching funds from the CEC (2009).
- $1M from CEC for studying the integration of solar forecasting, load forecasting, energy efficiency and dispatchable resources (waste-to-energy plasma gasification) in a high solar penetration community (2009).
- $.57M from NSF for developing new sensor technologies that are directly relevant to solar forecasting at multiple time horizons (2009).
- $0.6M California Solar Initiative (CSI) grant to improve solar resources, PV modeling and solar forecasting using sky and satellite imagery (2010).
- Site host of DOE CPUC High Penetration Solar Forum and DOE Microgrid Workshop (2011).
- Panasonic/Sanyo Electric Corp funded the development of a sky imaging system for nearly $.75M that forms the basis for the advanced imaging system proposed in this grant (2011).
- $1.5M California Solar Initiative (CSI) grant on solar forecasting integration with San Diego Gas & Electric (2012).
- A $.55M California Energy Commission (CEC) grant and $.38M National Science Foundation grant to compare different forecasting techniques (numerical weather prediction, satellites, ground data), enhance their accuracy through machine learning, and integrate them for the best possible forecasting product across the climate zones and seasons of CA (2012).
- $2M Pending Self Generation Incentive Program (SGIP) Conditional Reservations and DOE funding for 1.3 MW/2.6 MWH of distributed PV integrated energy storage (2012).

CURRENT DOE FUNDING OPPORTUNITY

DOE issued on April 16, 2012 a $9M solicitation on Improving the Accuracy of Solar Forecasting (DE-FOA-0000649) with an expectation to issue two awards. UCSD is the only university, public or private, in the country that is bidding as a prime contractor. The University already has a significant lead in this area and is building with its strategic partners a National Center of Excellence in Renewable Resource Forecasting and Integration. The Center will become the 'center pole' of a national push to effectively integrate, reduce the costs and maximize the benefits of renewable resources in power grids across the country. With a successful bid, UCSD will create a next generation nationwide solar forecasting system with state-of-the-art forecasting tools for all time horizons and optimized for accuracy and maximum value to generators, storage resources, utilities and RTO/ISOs. CA ISO, SDG&E and PJM RTO have already provided UCSD with a letter of support.

PROJECT OBJECTIVE AND SCOPE

The objective of the project is to improve the accuracy of solar forecasting to lower costs for grid integration of renewable resources. Fully integrating electricity generated from Photovoltaic (PV), Concentrating Solar Power (CSP) and Concentrating PV (CPV) technologies into power system planning and operations is critical in order to accelerate the efficient use of renewable power. The scope of this project is to develop, demonstrate and evaluate the solar forecasting tools needed for high penetration scenarios of solar generation on the electric grid. UCSD will integrate for the first time: 1) advanced sky imager forecasts; 2) machine learning assisted forecasts based on remote sensing; 3) high resolution Numerical Weather Prediction models, and 4) high fidelity solar forecast engines to dramatically improve solar forecasting accuracy across all time horizons from minutes to days ahead. Throughout the scope of the initiative, UCSD and its strategic partners will quantify the economic value associated with forecasting improvements.

UCSD is assembling a very strong set of technical, utility, market and strategic partners to support the bid, including Enernex, Stanford University, E3, SolAspect, SunEdison and others. DOE has set aside $1M of the funding for NOAA to collaborate and integrate their expertise with the two winning bidders, and the UCSD team is evaluating where NOAA's expertise would be most highly leveraged. LADWP, SMUD, PG&E, SCE and ERCOT are also being requested to serve in a technical advisory capacity on certain tasks.

ADVISORY COUNCIL

As part of its bid, UCSD is establishing an Advisory Council of world class experts to provide guidance to the Center of Excellence. Mason Willrich, two- term immediate past chair of CAISO, has agreed to chair the Advisory Council. Other Advisory Council members already confirmed include Captain James Wink, US Naval Facilities, Southwest Region; Dana Younger, Senior Advisor, Renewable Energy & Sustainability, International Finance Corporation, World Bank; Dr. Tony Haymet, Director of Scripps Institution of Oceanography; and Dr. Lawrence Papay, Senior Fellow and Board of Councilors of the National Academy of Engineers.