

University of Central Florida *Enhanced and Expanded PV Systems Testing Capabilities at FSEC*

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Description: An important FSEC function is consumer protection from poorly designed and manufactured PV modules and systems. FSEC’s test capabilities were established over 10 years ago and were adequate at the time to test PV modules for certification. However, PV costs have fallen and competing electric utility rates have risen. In the last two years, these curves have crossed under some economic scenarios and incentive programs, and the demand for PV module testing and system certification has jumped. Thus, this task will provide for enhanced and expanded PV testing and certification capabilities. The task will also be done in close coordination with FSEC’s work with the U.S. Department of Energy’s PV program.

Budget: \$132,398.00

Universities: UCF/FSEC

External Collaborators: Sandia National Labs and US Department of Energy

Executive Summary

The objective of this project was to provide for enhanced and expanded PV testing and certification capabilities at the Florida Solar Energy Center (FSEC). Using funding from the Consortium, this project was used to purchase or to leverage the purchase of photovoltaic test equipment with the resulting goal of being able to greatly expand the research and commercial PV testing capabilities at FSEC.

The demand for PV products is currently driven by three major forces: the recent “boom” in green energy awareness, the globalization of the solar industry with many previously uncertified overseas manufacturers, and the rapid change in PV cell and module technologies. These conditions have dictated the need for providing enhancement and expansion of FSEC’s PV testing and certification capabilities. In addition to specific equipment improvements, FSEC has enhanced the general testing infrastructure to include improved instrumentation, documentation, and development of test procedures.

The outdoor test area for PV modules, inverters, and systems testing was expanded to accommodate more module and small systems testing. Additional module I-V multi-tracers have been installed and have expanded the number of modules that can be tested concurrently. This allows short-term testing of commercial production modules to be conducted concurrently with the long-term testing of different modules for research without conflict or interruption. Performance testing times have been reduced and PV modules using newer technologies can be evaluated accurately. The outdoor test facility at FSEC is now used for very important for long-term reliability and durability studies and it has been greatly improved and expanded during this project.

Space has also been allocated for expanding the fixed module exposure area to increase the available rack space for outdoor testing. This expansion has already been successful in attracting additional contract research for side-by-side module testing of small PV systems. Areas were also designated for installation of a dual axis tracker and high voltage bias testing racks to further enhance the existing test capabilities.

For indoor testing, a state of the art long-pulse simulator was purchased and has contributed to decreased the turn-around time for commercial testing and allows more accurate testing of newer thin-film and multi-junction PV technologies. The new solar simulator was installed in the newly enclosed and

remodeled PV test facility. This is the same equipment used at Sandia National Labs and the National Renewable Energy Lab.

The PV industry has shown great interest developing low cost alternatives to crystalline PV modules and thin-film PV has promised to be a strong player. Moisture intrusion is a common failure mode in the newer thin-film PV module technologies. PV manufacturers are particularly interested in testing new products at FSEC under the rigorous test conditions created by Florida’s hot and humid weather, thus, FSEC is able to conduct long-term experiments to validate module performance for these new technologies.

Due to the increased testing capabilities, PV research has attracted significant outside funding for applied research and testing. Work with Sandia National Labs has continued in the area of test and reliability of PV equipment. The research involves PV modules and all system components including inverters and balance of system parts. High quality module performance data is critical to Sandia’s PV performance modeling.

In fact, the consortium project has been instrumental in the US Department of Energy funding the nation’s only university-based Photovoltaic (PV) Regional Test Center (RTC) to be located at the Orlando Campus of the University of Central Florida. The UCF RTC will provide validation testing for large-scale photovoltaic systems and will help banks, insurance companies, and other stakeholders establish the confidence that new PV technologies perform reliably in the field. The UCF site was selected as the Hot-Humid Climate regional test center and will accommodate up to four megawatts of power production.

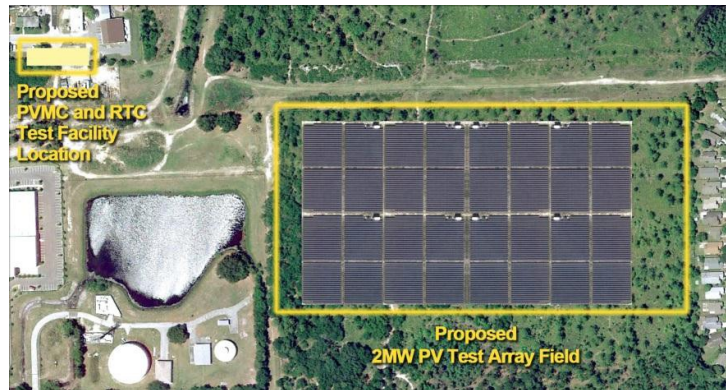


UCF CAMPUS AND RTC SITE

The Department of Energy (DOE) will award approximately \$2.3 million to UCF’s Florida Solar Energy Center for construction of the RTC and the purchase of test equipment. A multi-year contract will fund the center, with first-year funding of approximately \$500,000. Industry, in cooperation

with DOE and UCF, will supply and install the PV systems. The UCF RTC will begin at two megawatts and, as demand grows, may expand by another two megawatts.

Energy will be produced by the facility during the day at peak demand periods. The estimated value of energy, based on current utility rates, is almost \$300,000 annually for the initial two megawatts.



PV ARRAY FIELD CONCEPT AND GENERAL LOCATION

The RTC--together with an existing DOE program for PV testing and reliability (\$500,000 per year) and a DOE SEMATECH subcontract (\$1million per year for five years) for crystalline silicon photovoltaic manufacturing research--positions UCF and Florida as the nation's leader in PV applications and manufacturing research. Researchers will conduct reliability and performance studies on PV systems, and they will provide manufacturing research and education. The RTC and the Photovoltaic Manufacturing Consortium will serve Florida as a magnet for related industries. Initially, they will attract visits by PV experts who will spur interest in relocating and starting PV-related manufacturing and service businesses in Florida.

This Project is completed. [Final Report found here.](#)