

PMC-ND

(1.08.09.13)

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

**RECIPIENT:** The University of Central Florida Board of Trustees**STATE:** FL

PROJECT TITLE: Developing PID susceptibility models for Bifacial PV module technologies

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|--|--------------------------------------|----------------------------|-------------------|
| Funding Opportunity Announcement Number | Procurement Instrument Number | NEPA Control Number | CID Number |
| DE-FOA-0002243 | DE-EE0009345 | GFO-0009345-001 | |

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering, analysis, and dissemination Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)

B3.6 Small-scale research and development, laboratory operations, and pilot projects Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to The University of Central Florida Board of Trustees (UCF) to test bifacial photovoltaic (PV) modules to understand effects related to potential induced degradation (PID). Factors leading to degradation would be quantified and models for predicting PID would be developed to improve the design and installation configuration of bifacial modules for increased reliability. The project would be completed over 2 Budget Periods (BPs), with a Go/No-Go Decision Point between the two BPs.

In order to develop predictive models, studies would be undertaken to determine the effects of PID due to polarization at the rear surface (PID-p) on different commercially available bifacial PV modules in real-world mounting configurations. Data would be collected and characterized on modules from a utility scale plant and by using indoor and outdoor accelerated testing in lab settings.

Underperforming modules would be identified at participating solar plants in California, Utah, and Texas. Field inspections (i.e. visual inspections, infrared imaging, and current-voltage measurements) would determine if performance degradation is due to PID and if so, these modules would be shipped to Arizona State University and UCF for further characterization.

Additional tests would be run on purchased bifacial modules under high voltage and variable light conditions using both outdoor test beds and indoor accelerated testing protocols. Indoor high-voltage accelerated stress testing would determine which modules to test outdoors and what type of single-cell modules should be constructed. It would also inform modeling research. Outdoor testing would be performed under three different mounting configurations and two different voltage biases. The three different configurations would be ground mounted high above ground, ground mounted low above ground, and roof mounted. PID-p performance effects would be characterized and models developed as a function of cell type, packaging resistivity, environmental conditions (incident light on both sides of the module, module wetness, surface relative humidity, and temperature), and leak current to better understand the underlying factors and predict occurrence of PID-p in PV systems.

Proposed project activities would include literature review, field inspections, material characterization, expansion of existing PV racking, performance testing, computer modeling, and data analysis. University of Central Florida would oversee the project. They would perform outdoor accelerated testing and monitoring, module performance characterization, data analysis, and PID modeling. At the UCF Florida Solar Energy Center, existing racking would be expanded to accommodate ten additional commercial modules on an existing PV test field, resulting in a maximum capacity of 48 commercial modules and 16 minimodules for the testbed. They would also install commercially available high voltage PV testing and in-situ monitoring equipment provided by Prodis, LLC on an existing outdoor high voltage test bed. Arizona State University would perform indoor accelerated testing and monitoring, module performance characterization, material characterization, data analysis, and PID modeling. Appalachian State University would perform data analysis and PID modeling. Prodis, LLC would design and build the test system for outdoor PID testbed. SOLV, a Swinerton Company, would inspect and analyze bifacial production field data on various solar plants they have built and maintain. Targeted solar plants for initial analysis are located in California, Utah, and Texas. Locations of field inspections would be determined once underperforming solar plants are identified. They would ship modules to ASU and UCF for characterization. National Renewable Energy Laboratory would provide technical guidance, experiment design, mid-course corrections, material characterization, data analysis, and PID modeling. All activities would occur at dedicated laboratory facilities. There would be no changes in the use, mission, or operation of existing facilities as part of this project and no additional permits required in order to conduct any of the work activities.

Project activities would include electrical shock hazards. Any associated risks would be mitigated through adherence to established health and safety policies and procedures. Protocols would include personnel training, the use of personal protective equipment, and engineering controls. All waste products would be disposed of by licensed waste management service providers. The University of Central Florida and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office

This NEPA determination does not require a tailored NEPA provision.

Review completed by Shaina Aguilar on 2/19/21.

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR

1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____

 **Electronically
Signed By: Kristin Kerwin**
NEPA Compliance Officer

Date: 2/24/2021

FIELD OFFICE MANAGER DETERMINATION

- Field Office Manager review not required
- Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____

Field Office Manager

Date: _____