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(1.08.09.13)

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

RECIPIENT: University of Toledo **STATE:** OH

PROJECT TITLE: Toward Low-Cost, Efficient and Stable Perovskite Thin-Film Modules

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002064	DE-EE0008970	GFO-0008970-002	GO8970

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 Toledo to address the critical hurdles for perovskite solar cell (PSC) commercialization. The project would be comprised of three Budget Periods (BP). BP1 research would evaluate the intrinsic stability of PSCs and develop tailored accelerated lifetime test (ALT) protocols to reliably predict the lifetime of PSC modules. In BP2, ALT protocols would be refined and applied to small prototypes ("minimodules") fabricated in-lab using scalable techniques. Final project tasks in BP3 would involve the development of PSC packaging methods and outdoor testing of minimodules to verify the predicted lifetime.

The University of Toledo received a final NEPA Determination (GFO-0008970-001; CXs A9, B3.6) in February of 2020 for the activities described below. Since that time, the recipient has proposed to add additional outdoor testing sites on the University of Toledo campus. Short-term and temporary outdoor field tests on cells and minimodule prototypes would be conducted in front of the Research and Technology Complex 1 (R1) as well as the rooftop of Stranahan Hall. There are no ground disturbing activities associated with the proposed testing, which would occur entirely at dedicated university facilities. No change in the use, mission or operation of existing facilities would arise out of this effort. New permits or modifications would not be necessary. DOE has determined that project activities would still fall within the category of actions covered by the CXs that were previously applied to this award.

Project activities would include the synthesis, fabrication, and characterization of efficient and stable PSC cells and minimodules. Bench-scale laboratory activities would be conducted at the University of Toledo Research and Technology Complex (Toledo, OH), subrecipient First Solar (Santa Clara, CA), and the National Renewable Energy Laboratory (NREL; Golden, CO). Outdoor field tests would occur at NREL's dedicated testbed facilities. No change in the use, mission, or operation of existing facilities would arise out of this effort.

The project is expected to fabricate at least 1000 PSCs and 200 minimodules. At least 150 PSCs and 75 minimodules would undergo indoor and/or outdoor testing. All PSCs and minimodules used for testing would be

disposed of at the conclusion of the proposed project; other materials would be retained for future research. Chemical quantities would not exceed approximately (~) 3kg of each elemental PSC component and ~30L of solvents. The project would procure ~15 3-inch targets for PSC deposition. Since project activities would take place exclusively at purpose-built facilities, no new equipment or physical modifications would be required.

Fabrication activities would involve the use and handling of various hazardous materials, including semiconductors, acids, and solvents. All such handling will occur in properly equipped, fully permitted research laboratories. Project personnel would adhere to existing health and safety policies and procedures, including employee training, personal protective equipment, engineering controls, monitoring, and internal assessments. Hazardous materials would be managed in accordance with applicable Federal, state, and local environmental regulations.

Lead-containing PSCs and minimodules would require disposal as hazardous waste. This type of material is a standard component of waste streams currently originating from the facilities proposed for project work. Hazardous wastes generated by research processes are profiled, properly contained, and then transported offsite to a licensed treatment and disposal facility. Minor quantities of non-hazardous laboratory and office consumables (e.g. glass, gloves, mixed recyclables, etc.) would also be disposed of via established systems and/or contracted services.

Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Whitney Doss Donoghue, 9/29/2021

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 Date: 9/30/2021

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] 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: _____ Date: _____

Field Office Manager