

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



RECIPIENT: University of Dayton

STATE: OH

PROJECT TITLE : Development and experimental optimization of high-temperature modeling tools and methods for concentrated solar power particle-systems

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002378	DE-EE0009824	GFO-0009824-001	

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 funding to University of Dayton to develop modeling software (toolbox) to expand current modeling capabilities (known as discrete element method, or DEM+) to inform decision making of the design of particle-based concentrated solar power (CSP) systems. This would be accomplished by designing and fabricating high-temperature particulate solar power systems, and testing the systems via immersion heaters and concentrated radiative resources. The data from the testing would then be used to inform the expansion of DEM+ CSP modeling software capabilities.

This award is divided into eight tasks under a single budget period. The first task would survey leading experts in industry and academia to identify particle modeling challenges within the CSP community, to integrate into the new toolset. The second task would design experiments to collect data to address the responses received from the survey in task one. The third task would design, fabricate, and operate four experimental rigs to gather measurements to incorporate into the new CSP DEM+ modeling toolbox. The fourth task would compare existing DEM+ modeling software and developed new CSP DEM+ toolbox in the CSP environments for slump testing. The fifth task would compare existing DEM+ modeling software and developed new CSP DEM+ toolbox in the CSP environments for spatially varying profiles. The sixth task would measure and compare the impact of error propagation on modeling accuracy. The seventh task would demonstrate the newly developed CSP DEM+ modeling toolbox, a tutorial and white paper would be developed to facilitate community member use of the new toolbox. Task eight would involve the development of a diversity, equity and inclusion plan to be implemented throughout tasks one through seven.

All fabrication activities, testing and operation of experimental rigs would occur in the Dayton Thermal Applications Laboratory (Kettering, OH). Some computer modeling will occur in Linz, Austria, by DCS Computing. Approximately 30 to 50 gallons of chemically inert particulate media, greater than 10 microns in diameter, will be used during lab testing. Possible indoor emissions of particulates through attrition are possible. Existing university health, safety, and environmental policies and procedures would be followed at the lab, including: personnel training, proper personal

protective equipment (PPE), engineering controls, monitoring, and internal assessments. Building water, without additives, would be used as a coolant for thermal management of the test rigs during experiments. No hazardous byproducts are anticipated. All facilities at the Dayton Thermal Applications Laboratory are preexisting purpose-built facilities for the type of work to be conducted for this award. Facility modifications would not be required.

## NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office (SETO)

This NEPA determination does not require a tailored NEPA Provision.

NEPA review completed by Amy Lukens, 2/15/2022

## 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.

DOE has determined that work to be carried out outside of the United States, its territories and possessions is exempt from further review pursuant to Section 5.1.1 of the DOE Final Guidelines for Implementation of Executive Order 12114; "Environmental Effects Abroad of Major Federal Actions."

The proposed action is categorically excluded from further NEPA review.

## SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: \_\_\_\_\_

  
NEPA Compliance Officer

Date: 2/16/2022

## 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: \_\_\_\_\_