

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



RECIPIENT: Dimensional Energy

STATE: NY

PROJECT TITLE : Silicon Carbide Solar Receiver/Reactor with 3D-Printed Porosity for 1000°C CO₂-Conversion Thermocatalysis and 24/7 Operation

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002378	DE-EE0009806	GFO-0009806-001	

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 Dimensional Energy (DE) to design, model, develop, and test a solar receiver capable of converting solar energy into ultra-high temperature heat, and to transfer that heat to chemical reactors and thermal storage using forced air as thermal fluid. A 150 kW-thermal rated open-air solar receiver made from silicon carbide (SiC) for a heliostat tower would be modeled, designed, and manufactured using binder-jet 3D printing processes.

The proposed project consists of three Budget Periods (BP). At this time, only BP1 activities have been fully defined. BP2 and BP3 activities have been broadly identified but will undergo further definition after successful completion of BP1. Therefore, this NEPA Determination reviews all activities associated with BP1 while BP2 and BP3 are conditioned upon further NEPA review.

Activities associated with BP1 would include development of solar receiver models, design optimization, prototype fabrication and testing of receiver components, prototype reactor performance testing, and heliostat site planning for potential larger-scale testing in subsequent BPs. Catalyst synthesis, testing and screening would occur at DE's laboratory facility located on the Cornell University campus (Ithaca, NY). Small-reactor testing would occur at DE's testing facility located in the University of Arizona Tech Park (Tucson, AZ). Additional receiver/reactor testing in addition to data analysis and planning would be performed at subrecipient Heliogen's heliostat field testing site (Lancaster, CA).

Various other research and development (R&D) activities including 3D printing of reactors would be performed at Oak Ridge National Laboratory (ORNL; Oak Ridge, TN). 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.

BP1 activities would take place exclusively at R&D facilities that are purpose-built for the type of activities being proposed; therefore, no adverse impacts to sensitive resources are expected as a result of project activities at the aforementioned locations. No change in the use, mission or operation of existing facilities would arise out of BP1 efforts. The recipient and project partners have all applicable permits in place, and would not need additional permits for the proposed activities.

The project would involve the use and handling of equipment at high temperatures and gases that are flammable and asphyxiant. All such handling would occur in-lab and/or contained inside system equipment. The facilities have dedicated hazardous material management practices in place, and project personnel would follow existing health and safety policies and procedures at all times.

NEPA PROVISION

DOE has made a conditional NEPA determination.

The NEPA Determination applies to the following Topic Areas, Budget Periods, and/or tasks:

[Budget Period 1](#)

The NEPA Determination does not apply to the following Topic Area, Budget Periods, and/or tasks:

[Budget Period 2 and Budget Period 3](#)

Notes:

[Solar Energy Technologies Office \(SETO\)](#)
[Review completed by Whitney Donoghue on 05/18/2022](#)

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.

A portion of the proposed action is categorically excluded from further NEPA review. The NEPA Provision identifies Topic Areas, Budget Periods, tasks, and/or subtasks that are subject to additional NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____


NEPA Compliance Officer

Date: 5/18/2022

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: _____