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(1.08.09.13)

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

**RECIPIENT:** The University of Tulsa **STATE:** OK

**PROJECT TITLE:** Carbonized Microvascular Composites for Gas Receivers

| Funding Opportunity Announcement Number | Procurement Instrument Number | NEPA Control Number | CID Number |
|---|---|---|---|
| DE-FOA-0001840 | DE-EE0008736 | GFO-0008736-001 | |

**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 Tulsa (TU) to develop a novel carbonized microvascular composite receiver system for use in concentrated solar power (CSP) applications. The composite material would be developed so as to optimize heat transfer to a supercritical carbon dioxide (sCO2) heat transfer fluid and would have the potential to serve as an alternative to traditional metallic receiver systems. TU would develop sample coupons of the composite material and test them in small-scale receiver modules.

The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. Proposed project activities for BP1 would consist of computer modeling, material testing, fabrication of sample coupons of composite materials, fabrication of a sCO2 test stand, and chemical compatibility testing (e.g. exposure to air, CO2, and liquid metal). BP2 activities would involve coating testing, material performance testing (e.g. thermal conductivity, tensile mechanical properties, leak rate), laboratory-scale receiver module assembly using composite materials, and thermal modeling. BP3 activities would involve various performance test series performed in-lab (e.g. solar simulations, oxidative resistance, fatigue testing, leak rate testing).

All research activities would be performed at existing, purpose-based laboratory facilities at TU's campus in Tulsa, OK and at Boise State University's (BSU) campus in Boise, ID. The majority of the mechanical and high temperature testing would occur at TU. Solar simulator testing would be performed at BSU. Both locations regularly perform work similar in nature to that included as part of this project. No outdoor testing would be performed. Project activities would not require any physical modifications to existing facilities, ground disturbing activities, or changes in the use, mission, or operation of existing facilities. No additional permits or authorizations would be required.

Project activities would involve the use and handling of industrial chemicals (e.g. solvents and resins) and machinery operating at high temperatures. All such handling would be performed indoors, in a controlled laboratory setting. In order to mitigate against any potential risks, TU and BSU would adhere to established health and safety policies and procedures. Protocols would include employee training, the use of proper protective equipment, engineering

controls, monitoring, and internal assessments. Any waste materials generated during the project would be disposed of in accordance with established university policies. TU and BSU would observe all relevant Federal, state, and local health, safety, and environmental regulations.

**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 Jonathan Hartman, 06/20/2019

**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: 6/20/2019

NEPA Compliance Officer

**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: _____ Date: _____

Field Office Manager