

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



RECIPIENT: Regents of the University of Michigan

STATE: MI

PROJECT TITLE : Design and Manufacturing of Transparent Refractory Insulation for Next-Generation Receivers

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002378	DE-EE0009805	GFO-0009805-001	

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:

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| 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. |
| B3.15 Small-scale indoor research and development projects using nanoscale materials | Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). |

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to the University of Michigan (U of M) to further develop high temperature atomic layer deposition (ALD)-coated aerogel receiver technology for use in concentrated solar power systems. Project participants would develop a receiver design that would accommodate the mechanical properties of refractory aerogels while maximizing performance. They would also develop a manufacturing strategy for these aerogel materials. The project would be completed over 3 Budget Periods (BPs) with a Go/No-Go decision point between each BP. This NEPA determination is applicable to all three BPs.

Project participants would design, construct, and evaluate aerogel-insulated receivers. They would fabricate curved molds suitable for initial feasibility testing of curved aerogel manufacturing and assess the impact of feedstock variability. Gels would be processed to determine yield and quality then down-selected to the gel exhibiting the preferred performance characteristics. An oven/furnace would be used to measure thermal expansion and stress-strain properties of selected aerogels at room temperature and up to 800 degrees. Gels would be upscaled and modeled on an intermediate-scale receiver (1 meter long) then on a pilot-scale receiver (4 meters long). Cost sensitivity analyses would be performed. Ultimately, a standard-length parabolic trough receiver prototype ready for future testing would be developed along with a scalable and cost-effective process for future pilot manufacturing line.

University of Michigan in Ann Arbor, MI would oversee the project. Activities would be conducted in Lenert Laboratory and Dasgupta Research Laboratory and would include atomic layer deposition, synthesis, aging, testing (chemical, optical, thermal, and mechanical), data analysis, and characterization of materials. AeroShield Materials in Hyde Park, MA would develop a process for making aerogel tiles by modifying their current process to produce curved aerogels. This would include molding, aging, solvent-exchange, and critical point drying of aerogels. Forge Nano in Thornton, CO would assist with atomic layer deposition and building equipment. Along with U of M, they would develop a process and reaction chamber. No changes in the use, mission, or operation of existing facilities would be required as part of this project and no additional permits would be required in order to conduct any of the work activities.

Project activities would involve the use and handling of hazardous materials, including solvents, acids, bases, and precursors. Any risks associated with the handling of these materials would be mitigated through adherence to established health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, monitoring, internal assessments, and engineering controls. ALD is a nanotechnology however, the sub-nanometer-scale ALD coating is expected to be chemically bonded to the surface of the aerogel and is not expected to be an additional nanomaterials hazard by itself. All waste products would be disposed of by licensed waste management service providers. University of Michigan and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office
Review completed by Shaina Aguilar on 2/18/22.

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: _____



Kristin Kerwin

NEPA Compliance Officer

Date: 2/22/2022

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: _____