PMC-ND

(1.08.09.13)

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

RECIPIENT: University of Nevada, Las Vegas **STATE:** NV

PROJECT TITLE : Development of Gas Bearings for Supercritical CO2 Recompression Brayton Cycle

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002378	DE-EE0009821	GFO-0009821-001	

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 the University of Nevada, Las Vegas (UNLV) to design, fabricate, install, and test non-contact Externally Pressurized Porous (EPP) gas bearings (gas bearings provide a low friction load-bearing interface between two surfaces) for a solar driven supercritical CO2 Brayton system (the thermodynamic cycle that explains how gas turbines extract energy from flowing air and turn into a viable energy source). The project would validate the use of these bearings for smaller scale concentrating solar power systems. The project would take place over a time period of one year and one budget period.

Design, modification, and fabrication of bearing plates, assembly of gas bearings, and installation and testing of gas bearings with turbine/compressor assembly on solar dish systems would all take place at UNLV's machine shops and solar sites. Fabrication of bearings would take place at New Way Air Bearings in Aston, PA. The proposed project activities would include data analysis, computer modeling, and various small-scale research and development tasks performed within controlled laboratory settings and solar energy research facilities.

Proposed activities would be divided into three stages, comprised of design, fabrication and partial assembly testing, and lastly full assembly, installation, and testing. Stage one would include conceptual design work, including the development of a suitable EPP gas bearing, modular bearing plates for the turbine/compressor, and software machine tool paths. Stage two would include the machining of two modular bearing plates, and the fabrication and installation of the EPP gas bearings. The inner turbine/compressor would be assembled and pre-tested. CO2 gas piping would be installed, and compressed air used to power the turbine/compressor. Stage three would include the installation of the turbine/compressor assembly in the solar dish engine package, and several tests of the full system with EPP gas bearings. Testing would include system leak testing, as well as off-sun, on-sun, and spin testing. Different parameters would be measured, including CO2 mass fill and storage. At the completion of the project, the results would be published in a journal and presented at professional organization meetings.

Testing would involve the machining and handling of metals, several pounds of graphite carbon, compressed air,

and two cylinders of industrial grade CO2 gas. UNLV and New Way Air Bearings would both follow all OSHA safety practices, managed in accordance with Federal, state, and university/facility guidelines. This work would pose no risk to the public. The initial testing of turbine/compressor assembly with gas bearings would vent some CO2 emissions through the bearings into the atmosphere.

All project work would be performed at existing, purpose-built facilities that regularly perform work similar in nature to that proposed as part of this project. No modifications to existing facilities, ground disturbing activities, or changes in the use, mission, or operation of existing facilities would be required for the work activities proposed. Likewise, no additional permits or authorizations would 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.
Review completed by Alex Colling on 01/17/21.

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: 1/18/2022

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