

PMC-ND
(1.08.09.13)

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

**RECIPIENT:** Brayton Energy**STATE:** NH**PROJECT TITLE:** "Gen3 Gas Phase System Development and Demonstration"

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001697	DE-EE0008368	GFO-0008368-002	GO8368

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.)
- B1.31 Installation or relocation of machinery and equipment** Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.
- 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 Brayton Energy, LLC to design a commercial-scale gas-phase Concentrating Solar Power (CSP) solution that would be developed and demonstrated via a subscale test facility. The megawatt-scale demonstration system would absorb concentrated solar energy from a heliostat field and deliver it into thermal energy storage integrated with a high-efficiency supercritical carbon dioxide (CO₂) power cycle.

The proposed project is organized into three Phases and five Budget Periods (BP). Phase 1/BP1, involving the development of a preliminary system design, was reviewed by GFO-0008368-001 in August 2018. Since that time, Phase 1 has concluded and the project has received approval from the Solar Energy Technologies Office to move forward into Phase 2/BP2, which would involve prototype component fabrication, validation testing, and more detailed facility design. Until such time as Phase 2 design work advances, there is not sufficient information available to review proposed construction and demonstration tasks in Phase 3/BPs 3-5. Therefore this NEPA Determination is only to review Phase 2 activities. Following Phase 2 there will be a competitive down-select; further NEPA review will be required if the project is selected for Phase 3 funding.

Proposed activities associated with Phase 2/BP2 are as follows. Sub-scale prototypes of a solar receiver, thermal energy storage system, and heat exchangers would be fabricated within existing research and development (R&D)

laboratories and manufacturing workshops, located primarily at Brayton Energy (Hampton, NH). Small-scale testing of heat exchanger and receiver components would also be performed by Brayton Energy. Other component development and testing activities would take place at the established R&D facilities of various subrecipients: thermal energy storage system development at the National Renewable Energy Laboratory (Golden, CO); particle heat exchanger development at Solex Thermal Science (Calgary, AB Canada), and; particle heat transfer characterization testing at the University of Wisconsin Thermal Hydraulics Laboratory (Madison, WI). No construction, site development, and/or physical modifications to existing facilities would be required in order to complete Phase 2 tasks at these locations.

Additionally during Phase 2, on-sun testing of a sub-scale solar receiver prototype would be conducted at an existing power tower test facility operated by subrecipient Heliogen (Lancaster, CA). At this location, activities associated with the proposed field testing of prototype assemblies would include the installation of an approximately 20' x 20' concrete pad for supporting CO2 circulation equipment (compressor, recuperator, heater, valve skid, air cooler, and storage tanks) as well as the relocation of a portion of the site's fencing. Both the concrete pad and fencing would be installed on previously disturbed ground, adjacent to the existing tower pad and currently used as a forklift parking area for staging work on the receiver. Fencing would need to be relocated to provide operator protection for personnel working on the new pad. No ground clearing would be required as the entirety of this site has already been developed for such work. The addition of the concrete pad would require the approval and issuance of a permit from the City of Lancaster, which would be obtained by Heliogen before initiating this task.

The project would involve the use and handling of various hazardous materials including metals, industrial solvents, and silica sand. All such handling would occur in properly equipped laboratories or controlled outdoor testing spaces. Project participants are trained in applicable health and safety policies and procedures, and would wear personal protective equipment including latex gloves, face masks, eye protection and ear protection where applicable. No public access is allowed in these laboratories or workspaces; no members of the public would be at risk for contact with materials used by the proposed project. Hazardous materials would be managed in accordance with all applicable Federal, state, and local environmental regulations.

The project would also involve the set-up, movement, and operation of heavy equipment, including a high temperature, high pressure carbon dioxide-to-sand heat exchanger test rig. The test rig would be designed and built to applicable ASME codes and would include required pressure relief safety devices to prevent catastrophic failure. Work would be conducted by certified individuals employing appropriate engineering controls and monitoring throughout testing activities. Existing corporate health and safety policies and procedures would be followed at all times during the course of project work.

Phase 2 work would not require the use or disposal of substantial amounts of water or chemicals; types and quantities would not exceed those employed in standard operations at these facilities. An estimated five thousand pounds of metal would be used for prototyping at Brayton and NREL, respectively. Steel and any other scrap metal generated by the proposed project would be repurposed or recycled. Facility upgrades at Heliogen would remain in service, while equipment and materials would be transported to Brayton Energy for storage, recycling, or re-use upon project decommissioning. No change in the use, mission, or operation of existing facilities would arise out of these efforts.

All Phase 2 activities would occur exclusively at facilities that were purpose-built for the type of activities being proposed; therefore, no adverse impacts to sensitive resources are expected as a result of the proposed activities at any of the aforementioned locations. No change in the use, mission or operation of existing facilities would arise out of this effort. 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.

NEPA PROVISION

DOE has made a conditional NEPA determination.

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

All Tasks and Subtasks of Phase 1/Budget Period 1 and Phase 2/Budget Period 2.

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

All Tasks and Subtasks of Phase 3/Budget Periods 3-5.

Notes:

Solar Energy Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Whitney Doss Donoghue, 5/5/2020

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."

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:  _____ Date: 5/6/2020
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