

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Echogen Power Systems**STATE:** OH**PROJECT****TITLE:**Advanced compressors for CO<sub>2</sub>-based power cycles and energy storage systems

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0002064	DE-EE0008997	GFO-0008997-001	

**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 Echogen Power Systems (Echogen) to develop and test a novel gas compressor design for electro-thermal energy storage system operation in concentrated solar power applications. Echogen would seek to improve the performance operation of the compressor as compared to current technologies, by optimizing component efficiency. The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

BP1 would focus on development of conceptual designs for a full-scale axial compressor, a subscale compressor (approximately 1 m diameter x 1.5 m length), and a test loop. In BP2, fabrication of a subscale compressor would be initiated and an existing test loop at University of Notre Dame (UND) would be modified/commissioned for compressor testing. Baseline testing of the loop would also be performed as part of this BP. Finally, fabrication of the subscale compressor would be completed during BP3. Performance testing of the compressor would also be undertaken utilizing the test loop.

All project work would be coordinated by Echogen and performed at existing, purpose-built facilities. Design work would be performed by Echogen at its office/laboratory facilities in Akron, OH and by its project partners University of Cincinnati (UC) at its campus in Cincinnati, OH and Barber-Nichols Inc. (BNI) at its office facilities in Arvada, CO. Parts fabrication and assembly would be performed by BNI at its manufacturing facilities in Arvada, CO and by University of Notre Dame (UND) at its campus in South Bend, IN. Performance testing would also be performed at UND. As mentioned above, an existing test loop would be modified for testing. Various components would be integrated into the open-loop (i.e. exposed to air) system in order to convert it into a closed-loop system filled with CO<sub>2</sub>. The closed-test loop would be connected to an existing water supply and would have a CO<sub>2</sub> supply system integrated into the loop.

No physical modifications to existing facilities, construction of new facilities, ground disturbing activities, or changes to the use, mission, or operation of existing facilities would be required for any of the above activities. No additional

permits, licenses, or authorizations would be required.

All project activities would be performed indoors, in controlled laboratory/manufacturing environments. When conducting performance testing (e.g. compressor aerodynamic and mechanical testing) and/or parts assembly, UND would observe all established university health and safety practices. Pressures, temperatures and flow rates would be kept within standard operating limits. Carbon dioxide (CO<sub>2</sub>) would be used as a working fluid. CO<sub>2</sub> detectors and alarms would be installed and utilized when performing tests with CO<sub>2</sub>. When performing machining/fabrication activities, BNI would adhere to established corporate health and safety policies. BNI is a specialized-parts manufacturer that regularly performs work activities similar to those included in the scope of this project. Project work performed by Echogen and UC would be limited to office-based design/analysis activities. Health and safety risks would be limited at these locations. Nonetheless, each entity would adhere to their respective corporate/university health and safety policies. Echogen 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

This NEPA determination does not require a tailored NEPA Provision.

NEPA review completed by Jonathan Hartman, 02/10/2020

## 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.

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

NEPA Compliance Officer

Date: 2/12/2020

## 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: \_\_\_\_\_