

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



**RECIPIENT:** University of Cincinnati

**STATE:** OH

**PROJECT TITLE:** Cost-Effective Integration of PCM Thermal Energy Storage and Wet Compression for High-Temperature Industrial Heat Pumps

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0002997	DE-EE0011194	GFO-0011194-001	GO11194

**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:

<b>A9 Information gathering, analysis, and dissemination</b>	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.)
<b>B1.31 Installation or relocation of machinery and equipment</b>	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.
<b>B3.6 Small-scale research and development, laboratory operations, and pilot projects</b>	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 Cincinnati (UC) to research an innovative Industrial Heat Pump (IHP) that would include multi-stage wet compression and phase change material thermal energy storage. The activities include prototype construction, component integration, laboratory testing, optimization, demonstration and documentation. All activities would take place at a UC research facility in Cincinnati, Ohio.

The project would include the installation a heat pump prototype designed to generate elevated temperatures. This prototype would be installed by qualified mechanical contractors, who would ensure the inclusion of all safety features typically found in commercial heat pumps. Apart from these safety features, there are no identified hazards associated with the proposed project. Utilizing a closed-loop water system for sinks and sources, as well as to serve as a refrigerant, the project operates without generating any waste.

The project would utilize an electric boiler and electric compressors. There would be no combustion or chemical processes associated with this award that would release gases or particulates into the atmosphere.

To remove the excess heat generated by the heat pump in the lab space, an additional 3-ton split system heat pump may be installed, which would include an outdoor component. While the exact footprint for this system is not yet known, it would be approximately 74 x 47 x 33 inches (length x width x height). This outdoor component would be situated in a previously disturbed area with an existing fence that is currently utilized to house equipment for the existing HVAC lab.

The project would also require the installation of an electric boiler with associated safety features, which may necessitate a permit from the City of Cincinnati. All equipment installation must also receive approval from the

University of Cincinnati Planning + Design + Construction office for any work to be undertaken. Any and all permits required for the execution of the project at the above-referenced locations would be the responsibility of the recipient. Based on the nature of the modifications associated with the award, the DOE does not anticipate any impacts to resources of concern due to the proposed award activities under this conditional NEPA determination.

**NEPA PROVISION**

DOE has made a final NEPA determination.

Notes:

Industrial Efficiency & Decarbonization Office  
NEPA review completed by Chris Akios, 05/30/2024

**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:  Matthew Blevins Date: 5/31/2024  
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