

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



**RECIPIENT:** Oregon State University

**STATE:** OR

**PROJECT TITLE :** Development of Forced-Air Combustion Systems with Automated Controls to Reduce Emissions from Cordwood Room Heaters in Everyday Use

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002396	DE-EE0009769	GFO-0009769-001	GO9769

**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>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 Oregon State University (OSU) to develop, fabricate, and test two types of prototype retrofits for residential wood heaters ("fireboxes") which would reduce particulate matter emissions and produce higher amounts of heat. OSU would develop scaling and design parameters so the technology could be adapted for other applications that rely on the burning of wood.

DOE has not previously completed any NEPA Determinations (NDs) for this specific award, but DOE previously completed a NEPA Determination (ND) (FOA-0002396-001; A9, B3.6; 5/20/2021) for Funding Opportunity Announcement (FOA) DE-FOA-0002396. The ND for the FOA applies to initial verification activities for awards issued under the FOA, including this award (DE-EE0009769). Initial verification activities for this award would include verification of data and assumptions from the initial award application to establish baseline metrics necessary to determine relative success of subsequent award activities.

Community engagement would occur throughout the award. OSU would collaborate with community officials, coordinators, committees, and approximately 30 households of the Nez Perce Tribe (Idaho) and 40 non-tribal rural households near the Aprovecho Research Center (ARC) (Cottage Grove, OR). Along with a needs assessment, common heating stove models would be identified. Two models would be selected to be the focus for prototype design and installation activities. At least fifteen heating stove users would participate in early in-home monitoring activities for data collection on user behavior (how the stove is used) and fuel (wood) consumption.

Concurrent activities would include laboratory experiments and analyses to determine how potential prototype characteristics affect combustion (burning) behavior in a firebox. A subscale firebox would be fabricated to accommodate the integration of instrumentation for observation and data collection. The firebox would be tested for data collection activities. Resulting experimental data and findings from literature reviews would be used to develop and validate models to aid prototype design and testing activities. Models would also aid in the development of a control system for the prototypes. Additionally, laboratory activities would include the operation and data collection of the two firebox models of interest identified during aforementioned community engagement activities.

Guided by earlier experimental results, an adjustable prototype for a full-size firebox would be fabricated to test different configurations that affect airflow in the firebox. Each configuration would be tested with an active firebox for data collection and performance evaluation. These activities would be repeated later in the award, but with a different

firebox model to ensure that earlier findings would be applicable to multiple firebox models. Experimental data would be used to refine models developed earlier in the award. Prototype fabrication would be an iterative process that would later focus on durability and commercial manufacturing considerations.

Final prototypes would be installed and tested in private residences within the participating communities. Approximately five to fifteen residences would participate in this effort. Testing would involve regular operation of the firebox with the installed prototype. Researchers would routinely visit these residences for maintenance. In the event testing could not be completed at private residences, the testing would occur in a laboratory in a manner that would mimic real-world use.

A team of engineering and computer science students would create a smartphone application that would enable a user to monitor firebox performance and change the operating modes.

Data analysis and modeling activities would occur at OSU's Combustion, Ignition, Radiation, and Energy (CIRE) Laboratory (Corvallis, OR), the Hagen Laboratory (Bend, OR), and ARC. Design and fabrication of the subscale firebox would occur at the CIRE and Hagen. Activities involving design and modification to full-size prototypes would occur at ARC and Blaze King Industries (Walla Walla, WA).

Approximately 2-4 cords (256-512 cubic feet) of firewood would be burned over the award's duration. Award locations that would involve wood-burning activities are not within nonattainment sites.

All facilities at OSU, Hagen Lab, ARC, and Blaze King Industries are preexisting purpose-built facilities for the type of work to be conducted for this award. Facility modifications would not be required. While prototype retrofits would be installed in private residences for testing, no structural modifications would be required. Award activities would involve the handling and use of hazardous materials, including tools and machinery for fabrication activities. All such handling would occur within controlled settings at all facilities. Award activities would involve the operation of fireboxes which pose burn and smoke inhalation hazards. Prototypes would be tested for safety and receive Environmental Protection Agency (EPA) safety certifications before testing in private residences. All necessary permissions and permits would be obtained before testing prototypes in private residences. Existing university and corporate health, safety, and environmental policies and procedures would be followed at all facilities, including: personnel training, proper personal protective equipment (PPE), engineering controls, monitoring, and internal assessments.

Community engagement activities would include recruitment efforts from underserved communities to participate in award activities. In addition to collaborating with ARC, OSU would reach out and recruit from Tribal Colleges and Universities (TCUs), Historically Black Colleges and Universities (HBCUs), the Society of Women Engineers, and the Society of Hispanic Professional Engineers. Additional engagement activities would include the creation of an award Industry Advisory group which, along with professionals in academia, would provide input and feedback throughout the award.

## **NEPA PROVISION**

DOE has made a final NEPA determination.

Notes:

Bioenergy Technology Offices (BETO)  
NEPA review completed by Dan Cahill, 2/16/2022.

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



Casey Strickland

NEPA Compliance Officer

Date: 3/21/2022

**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: \_\_\_\_\_