



U.S. Department of Energy

Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Aerodyne Research, Inc. (Aerodyne) - Single-Cylinder Two-Stroke Free-Piston Internal Combustion Generator

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Billerica, MA; Stony Brook, NY; North Haven, CT; and Ellisville, MO

Proposed Action Description:

Funding will support research and development activities to develop a small, single-cylinder, two-stroke, free-piston Internal Combustion Engine (ICE) for use as a residential Combined Heat and Power (CHP) system. To reduce friction and improve efficiency, the proposed free-piston engine will not employ a traditional slider-crank mechanism. In addition, the proposed CHP system will incorporate a low temperature, glow plug-assisted homogeneous charge compression ignition combustion to reduce heat loss and a double-helix spring for energy storage. If successful, widespread deployment of highly efficient, compact, economical, and long-life residential CHP systems in the United States could lead to significant energy savings and a reduction in CO₂ emissions associated with power plant electricity generation and household heating.

All research and development activities will be conducted in Aerodyne's laboratory facility located in Billerica, MA; Stony Brook University's laboratory facilities located in Stony Brook, NY; and Precision Combustion Inc.'s laboratory facilities located in North Haven, CT. C-K Engineering's role in the proposed project will be limited to theoretical and computer simulation work on the engine and lubrication design which will be performed in its Ellisville, MO office facility. All work will be performed in accordance with applicable Federal, State, and local safety and environmental requirements.

Categorical Exclusion(s) Applied:

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer:

Date Determined: 10/15/2015