U.S. Department of Energy
Categorical Exclusion Determination Form

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Proposed Action Title: Precision Combustion, Inc. -- Destruction of VAM Using a Modular Catalytic Element System

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Clovis, California; New Haven, Connecticut; Lexington, Kentucky; Beckley, West Virginia

Proposed Action Description:

AMENDED NEPA DETERMINATION: (See attached original Determination, dated February 8, 2022). This Amended Determination follows the approval of additional funds, new project team members, and new milestones to develop a redesigned modular array to eliminate the release of ventilation air methane (VAM) associated with coal production, in progress under the Reducing Emissions of Methane Every Day of the Year (REMEDY) program. Specifically, the project team will (1) obtain materials, components, and monitoring systems to construct a field system; (2) test the system, incorporate final model iterations, and make needed system adjustments; (3) conduct and monitor field test of system to meet reliability, durability, and emission standards; and (4) identify needed adjustments for future iterations of the system. If successful, this project will result in a process to lower the amount of methane emissions from active coal mines, thereby reducing exhaust methane and greenhouse gas emissions.

Project activities will be conducted at existing facilities at Precision Combustion, Inc. (PCI) (New Haven, CT), SRK Consulting, Inc. (Clovis, CA), University of Kentucky (Lexington, KY), and a field testing location at Arch Resources, Inc. (Beckley, WV) designed for the applicable activities. This project fits within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of the project. The project team has certified that project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and local regulatory requirements. PCI has not obtained all necessary permits and approvals applicable to their proposed actions, and is prohibited from commencing applicable project work until such permits and approvals are obtained. Per the terms of the award, a permits certification and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

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

B3.9 - Projects to reduce emissions and waste generation

B3.11 - Outdoor tests and experiments on materials and equipment components

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: CHARLES CONWAY Digitally signed by CHARLES CONWAY Date: 2024.12.19 09:45:28 -05'00' Date Determined:

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U.S. Department of Energy
Categorical Exclusion Determination Form

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Proposed Action Title: Reducing Emissions of Methane Every Day of the Year (REMEDY) Program (FOA No. DE-FOA-0002504 and FOA No. DE-FOA-0002505 (SBIR/STTR))

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CT; KY; CA; OK; PA; OH; WI; MI; CO; WI; IN; CA; MA; TN; CO; IL; NY; TX; AL; MN; UT; ND

Proposed Action Description:

The REMEDY Program supports the development of highly replicable, system-level solutions for reducing methane emissions from 3 sources in the oil, gas and coal value chain (lean burn engines, flares, and coal mine ventilation air methane) to achieve an overall methane conversion of 99.5%, reduce net GHG emissions > 87% on a life-cycle basis, and have a levelized cost of carbon less than $40/ton CO2e. If successful, REMEDY projects would reduce emissions from sources responsible for at least 10% of US anthropogenic methane. The REMEDY Program is composed of 12 small-scale research and development projects (listed in Attachment A) that will be conducted by universities, non-profit entities, for-profit entities, and federal laboratories. All 12 projects are covered by this Determination and fit within the class of actions identified under the DOE Categorical Exclusion identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements. Recipients for 11 of these 12 projects have not obtained all necessary permits and approvals applicable to proposed actions in accordance with local, state, and federal requirements, or have not identified a field testing site and therefore do not presently know what permits/approvals may be necessary for such field testing. These 11 Prime Recipients, under the terms of their awards, are prohibited from commencing applicable project work before (1) obtaining the necessary permits and approvals (if any, for those pending field testing sites) and (2) providing written assurances to ARPA-E of the same.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

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

B3.9 - Projects to reduce emissions and waste generation

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.

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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: GEOFFREY GOODE Digitally signed by GEOFFREY GOODE Date: 2022.02.08 16:23:40 -05'00' Date Determined:

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Attachment A: Projects in the REMEDY (FOA No. DE-FOA-0002504 and DE-FOA-0002505) Program

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
Precision Combustion, Inc. (2505-1506)	Destruction of VAM Using a Modular Catalytic Element System	A9; B3.6; B3.9
Advanced Cooling Technologies, Inc. (2505-1513)	Swiss-Roll Flare Gas Incinerator	A9; B3.6; B3.9
Marquette University (2504-1529)	Prechamber Enabled Mixing Controlled Combustion of Natural Gas for Ultra-Low Methane Emissions from Lean-Burn Engines	A9; B3.6; B3.9
INNIO Waukesha Gas Engines (2504-1545)	Ultra Low Methane Slip Reciprocating Engine	A9; B3.6; B3.9
Massachusetts Institute of Technology (2504-1517)	Ventilation Air Methane Abatement Via Catalytic Oxidation (VAMCO) With Machine-Learning Enhanced Sensing and Feedback Controls	A9: B3.6; B3.9
Johnson Matthey (2504-1557)	Catalytic Oxidation of Ventilation Air Methane	A9; B3.6; B3.9
Colorado State University (2504-1573)	Crankcase Gas Rerouting/Filtration System to Reduce Crankcase Methane Emissions from Lean-burn NG Engines	A9; B3.6; B3.9
MAHLE Powertrain (2504-1572)	Methane Oxidation Catalysts for Lean-burn Natural Gas Engines	A9; B3.6; B3.9
Texas A&M Engineering Experiment Station (2504-1558)	Reducing Emission of Methane Through Advanced Radical Kinetics and Adaptive Burning in Large Engines	A9; B3.6; B3.9
University of Michigan (2504-1561)	REMEDY using Systems of Advanced Burners for Reduction of Emissions	A9; B3.6; B3.9
Cimarron Energy Inc. (2504-1541)	Flare and Control for Ultra High Destruction and Removal Efficiency	A9; B3.6; B3.9
University of Minnesota (2504-1534)	Plasma-assisted *In-situ* Reforming of Flare Gases to Achieve Near-zero Methane Emissions	A9; B3.6; B3.9