PMC-ND
(1.08.09.13)

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

RECIPIENT: Vertimass LLC **STATE:** CA

PROJECT TITLE: Production of renewable cycloalkanes from ethanol for blending with jet fuel to enhance energy density and material compatibility and reduce particulate emissions

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002029	DE-EE0008922	GFO-0008922-001	GO8922

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 Vertimass to convert jet fuel aromatics into cycloalkanes using cellulosic ethanol and fusel oil feedstocks (Note: fusel oils are hydrocarbons with a high molecular weight). The project would seek to optimize a process previously developed by Vertimass for hydrocarbon conversion from ethanol. The project would focus on optimization of the conversion catalyst and energy density, as well as a reduction in particulate emissions associated with combustion.

Proposed project activities would consist primarily of demonstration reactor runs, in which optimized catalysts would be tested for their ability to convert ethanol into targeted hydrocarbons (e.g. jet fuel). A laboratory-scale catalytic reaction system (4 reactors that are approximately 5’ in height with a 1” diameter) would be used. The system would utilize approximately 5 gallons of ethanol feedstock per day and would produce approximately 3 gallons/day of hydrocarbons (e.g. gasoline and/or jet fuel). Approximately 600 gallons of biofuel would be produced over the course of the project.

All task work would be coordinated by Vertimass and performed at existing, purpose-built laboratory facilities. Demonstration testing would be performed at a dedicated research center operated by project partner TechnipFMS in Wymouth, MA. A previously developed catalytic reaction system would be scaled-up to incorporate the reactors described above and associated components. This system would be slightly larger than the existing system, but far smaller than a commercial-scale system. Laboratory scale optimization of catalyst materials and reactors conditions would be performed by project partner University of California, Riverside (UCR) at its facilities in Riverside, CA. Jet fuel qualification testing would be performed by the University of Dayton Research Institute (UDRI) at its campus in Dayton, OH.

Specific tasks to be performed would include:

Task 0: This task would consist of an initial validation run of the conversion process utilizing the catalytic conversion

system and an initial catalyst that has not been optimized. Vertimass would collect data for future runs.

Task 1: Vertimass and UCR would alter catalyst formulations in order to reduce aromatics and increase carbon number (catalyst optimization).

Task 2: Vertimass and UCR would work to identify optimal reactor process conditions to reduce aromatics and increase molecular weights (e.g. modifying pressure, temperature, feedstock injection points, catalyst, and flow rates).

Task 3: Vertimass and TechnipFMC would upgrade the existing catalytic reaction system at TechnipFMC and perform demonstration runs with an un-optimized catalyst.

Task 4: Vertimass and TechnipFMS would employ the optimized catalyst and process developed in Tasks 1 and 2 in demonstration reactor runs.

Task 5: This task would consist of submitting the jet fuel produced by the project for testing to verify that the fuel meets ASTM International standards for jet fuel blending. Initial compositional analysis would be performed by UDRI. Upon completion of initial tests, samples would be submitted for third-party regulatory testing.

Task 6: Vertimass and UCR would characterize fusel oil feedstocks and run them in laboratory reactors in order to assess their performance capabilities as compared to ethanol feedstocks.

Task 7: Vertimass would complete Techno-economic and Life Cycle Models.

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. Likewise, no additional permits or authorizations would be needed for the completion of project activities.

The project would involve the use and handling of flammable chemicals and solvents, as well as the use of equipment running at high temperatures. All such handling would occur in controlled, laboratory environments. In order to mitigate against risks associated with the performance of project activities, Vertimass and its project partners would adhere to established corporate health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, engineering controls, monitoring, and internal assessments. Chemical reactions would be performed in areas with proper ventilation. Any hazardous wastes produced would be disposed of by qualified waste handling companies, in compliance with established corporate policies. Vertimass 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:

Bioenergy Technologies Office
This NEPA determination does not require a tailored NEPA provision.
Review completed by Jonathan Hartman, 02/24/2020

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: Casey Strickland Date: 2/24/2020

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] 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