PMC-ND

(1.08.09.13)

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

**RECIPIENT:** University of Maryland **STATE:** MD

**PROJECT TITLE :** Nearcritical Fluids Treatment for Liquefaction and Extraction of Bio-Fuels

| Funding Opportunity Announcement Number | Procurement Instrument Number | NEPA Control Number | CID Number |
|---|---|---|---|
| DE-FOA-0002396 | DE-EE0009757 | GFO-0009757-001 | GO9757 |

**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 the University of Maryland (UMD) (College Park, MD) to develop a conversion pathway capable of producing bio-oil from biomass and municipal solid waste (MSW) feedstocks.

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-EE0009757). 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.

Early award activities would include the design of a lab-scale reactor (1 L) that would permit UMD to test and optimize the conversion pathway ("pathway"). Components of the reactor would be acquired and assembled at UMD laboratory facilities. The reactor would be designed to allow users to control reactor conditions. A larger reactor (4 L) would be designed and assembled later in the award to support larger-scale activities.

The pathway to be developed would include three major process components: dewatering (removal of moisture), liquefaction (generating liquids from non-liquids), and fractionation (separating into fractions).

A feedstock dewatering process using supercritical carbon dioxide (sCO2) would be developed and optimized. Effect of feedstock characteristics on the process would be evaluated and contribute to optimization efforts. Optimization of the process would include maximizing recovery of sCO2 for reuse (recycling) and improving purity of water recovered from the process.

A liquefaction process would be developed and optimized for different feedstocks. Effect of feedstock characteristics on the process would be evaluated and contribute to optimization efforts. UMD would explore liquefication pathways that use additives to improve bio-oil yields. Bio-oil and by-products, including biochar, would be characterized. Marketable applications for resulting biochar would be investigated.

A fractionation process using sCO2 would be developed and optimized to extract high quality bio-oil from liquids

produced from the liquefaction process. Extracted bio-oil would be characterized. Some bio-oil would be hydrotreated (purified) in a lab-scale hydrotreating reactor with different crude oils (petroleum).

Later in the award, UMD would complete a longer trial utilizing the pathway to demonstrate consistent and continuous operations. This trial would include a minimum of 500 hours (cumulative) with at least 100 hours of continuous operation. Concurrent activities would include investigating multiple configurations for larger scale reactors.

Approximately 15 tons of feedstock, 6624 L of water, and 212 L of chemical solvents would be used over the life of the award. Approximately 5556 L of bio-oil would be produced over the life of the award. Feedstocks would be obtained from preexisting, independent operations that manage and supply feedstocks.

All facilities at UMD are preexisting purpose-built facilities for the type of work to be conducted for this award. Facility modifications would not be required. Award activities would involve the use of common laboratory technologies, including: spectroscopy, chromatography, microscopy, x-ray, and thermal analysis. Award activities would involve the handling and use of hazardous materials, including metals, industrial solvents, chemical reagents, and crude oils. All such handling and storage would occur within controlled laboratory settings at UMD and would follow existing policies and procedures for handling and disposal of these materials. Existing university 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.

Additional award activities would include those of an intellectual, academic, and analytical nature. Such activities would support the completion of a life cycle analysis (LCA) and technoeconomic analysis (TEA).

**NEPA PROVISION**

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office (BETO)
NEPA review completed by Dan Cahill, 3/3/2022.

**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: Electronically Signed By: Casey Strickland Date: 3/3/2022

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