PMC-ND

(1.08.09.13)

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

RECIPIENT: University of Maryland - College Park **STATE:** MD

PROJECT TITLE : Systematic Characterization of Variability in MSW Streams to Identify Critical Material Attributes for Fuel Production

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002423	DE-EE0009667	GFO-0009667-001	GO9667

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 and validate models and machine learning (ML) approaches that establish quantifiable relationships between characteristics of municipal solid waste (MSW), time of year, geographic region, and method of MSW conversion to biofuel. Award activities would involve the collection, handling, analysis, and conversion of MSW samples.

This award would involve coordination and planning efforts among numerous collaborators across the United States (US). UMD would collaborate with Virginia Tech (VT) (Loudoun Water Broad Run Water Reclamation Facility, Ashburn, VA), Quasar Energy Group (QEG) (Wooster, OH), Ohio State University (OSU) (Columbus, OH and Wooster, OH), Mississippi State University (MSU) (Starkville, MS), and Idaho National Laboratory (INL) (Idaho Falls, ID). Each collaborator is located in one of five geographic regions defined for the project: Northeast (MD), Eastern (VA), Midwest (OH), South (MS), and West (ID).

The award would start with initial verification activities. These activities would involve establishing a baseline for MSW characterization, verification of the MSW sampling methods to be used, evaluation of potential award risks, and evaluation of potential differences to expect between MSW samples that would be collected.

After the completion of initial verification activities, activities involving the collection, handling, and transport of MSW samples would begin and continue through most of the award's duration. MSW samples would be collected multiple times per year over numerous years from approximately twenty different sites across the five geographic regions. Project collaborators would be responsible for collecting samples from sites within their respective regions. Collaborators would prepare portions of their samples (subsamples) for analysis. Some subsamples would be analyzed on-site while other subsamples would be shipped to other collaborators for analysis. Collection, handling, and transport of MSW samples would be done following American Society for Testing and Materials (ASTM) International standards. Approximately 1800kg of MSW would be collected and processed over the life of the award. All MSW would be generated from normal site operations that are independent of this award. The sites from which MSW would be collected would represent a variety of operations including: educational, food service, waste management, and energy production.

MSW collected and received by collaborators would be analyzed in laboratory settings to determine physical,

chemical, and biological characteristics, as described below.

MSW would be evaluated to determine physical characteristics, including bulk density, moisture content, particle sizes, water distribution, and structure. Such activities would involve examining how matter absorbs and emits light or radiation, how matter flows when liquified, and examination of matter with a microscope. Physical characterization activities would be completed by UMD, INL, QEG, VT, and MSU.

MSW would be evaluated to determine chemical characteristics including volatile solids, pH, alkalinity, and chemical makeup. Such activities would include the use of laboratory equipment designed to analyze chemical properties and makeup. Chemical characterization activities would be completed by UMD, INL, QEG, VT, and MSU.

MSW would be evaluated to determine biological characteristics including evaluation of characteristics such as pathogens, fungi, fecal indicators, antibiotic resistant genes, viruses, and enzymes. Such activities would involve the use of laboratory and bench scale equipment designed to extract and analyze nucleic acid as well as genomes, proteins, and other biological characteristics. These activities would not involve the culturing of any microorganism. Biological characterization activities would be completed by UMD, QEG, OSU, and VT. Some activities may be outsourced to preexisting facilities that conduct such activities as part of their normal business operations.

After determining the characteristics of MSW samples, samples would be converted to biogas by one of two methods: anaerobic digestion (AD) or gasification. AD produces biogas from microorganisms breaking down the MSW in a low-oxygen environment inside a bioreactor. Gasification converts materials to biogas by subjecting the MSW to controlled amounts of oxygen and water at extremely high temperatures in a gasification reactor. AD activities would be completed by UMD, VT, and QEG. Gasification activities would be completed by MSU. Characteristics of the biogas produced would be used in subsequent modeling activities to determine potential biofuel yield. Biogas production by VT would be done with pilot-scale equipment. All other biogas production would be done at bench-scale.

Machine learning (ML) approaches and models would be developed to establish measurable relationships between MSW variables, conversion methods, and biofuel yield. MSW variables considered would include geographic region, season (when it was collected), and physical, chemical, and biological characteristics. These ML approaches and models would be validated by results from characterization and conversion of MSW samples collected near the end of the award. The ML approaches and models would be used to develop a map that could aid users in maximizing biofuel yields from MSW in their geographic region.

All facilities where the award activities would occur 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 handling and use of hazardous materials, including chemical reagents, acids, and MSW, which may include metals, glass, and undefined microorganisms and viruses. All such handling and storage for analysis activities would occur within controlled settings and would follow existing policies and procedures for handling and disposal of these materials. Preestablished biosafety protocols would be followed when handling MSW samples to prevent transmission of potential pathogens. If COVID-19 viruses are detected in any MSW samples, findings would be reported internally and to relevant government agencies. All nanoscale materials recovered from MSW samples would be handled using proper engineering controls until adhered to surface materials or dissolved in solvents. Existing university, corporate, and government 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).

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office (BETO)
NEPA review completed by Dan Cahill, 2/15/2022.

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: Roak Parker Date: 2/17/2022

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