PMC-ND

(1.08.09.13)

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

RECIPIENT: North Carolina State University **STATE:** NC

PROJECT TITLE : AI-Enabled Hyperspectral Imaging Augmented with Multi-Sensory Information for Rapid/Real-time Analysis of Non-Recyclable Heterogenous MSW for Conversion to Energy

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002423	DE-EE0009669	GFO-0009669-001	GO9669

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.
B5.15 Small-scale renewable energy research and development and pilot projects	Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to North Carolina State University (NCSU) to develop and demonstrate an automated system capable of providing users with detailed characteristics of non-recycled municipal solid waste (MSW) (i.e. trash, garbage) in real-time by implementing artificial intelligence (AI) and sensory technologies. Successful development and use of such technology would improve efficiency of MSW sorting operations, which would result in higher capture rates of MSW capable of being used as feedstock for energy production.

Early award activities would include procurement, installation, and performance verification of equipment at the NCSU facility. Such equipment would include a conveyor system, cameras, sensors, and accessories to support visible camera imaging (VCI), hyperspectral imaging (HSI), and multimodal sensory inputs (MSI). This would happen concurrently with early MSW sample characterization and data collection activities that would assist with the development of the training sets for machine learning (ML) models. MSW characterization activities would examine physical, chemical, structural, and compositional characteristics, some of which would be obtained by using wet chemistry techniques in laboratory settings at the NCSU facility and the National Renewable Energy Laboratory (NREL) (Golden, CO).

Later activities would use datasets obtained and refined in previous activities to train ML models. Training of ML models would involve the use of VCI, HIS, and MSI technologies to collect data on MSW samples that would pass through on the conveyor system. Training would progress until models would be ready for optimization and testing that would reflect real-world conditions for MSW sorting operations.

MSW samples that would be used throughout the award would be obtained from the municipal waste facility operated

by the town of Cary (NC). Approximately 200 – 300 pound MSW samples would be procured by NCSU every three to six months during the award's performance period (i.e. approximately 39 months). Approximately four times during the award, approximately 10 – 15 pounds of presorted MSW would be shipped from NCSU to NREL for analysis.

The NCSU and NREL research and development facilities are preexisting purpose-built facilities for the type of work to be conducted for this project. Although NCSU would install equipment at their facility, facility modifications would not be required to install or operate the equipment. Facility modifications would not be required for NREL. Project activities would involve the handling and storing of hazardous materials, including reagents for analytical chemistry techniques and MSW, which may include metals, glass, and chemical contaminants. All such handling and storage would occur within the facilities and would follow existing policies and procedures for handling and disposal of these materials. Handling of hazardous materials at both facilities would be done in accordance with existing federal, state, and local laws and regulations. Existing university and government health, safety, and environmental policies and procedures would be followed at both facilities, including: employee training, proper personal protective equipment (PPE), engineering controls, monitoring, and internal assessments.

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)
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Dan Cahill, 11/2/2021.

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: 11/3/2021

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