PMC-ND

(1.08.09.13)

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

RECIPIENT: Quasar Energy Group **STATE:** OH

PROJECT TITLE : High Solids In Situ Product Recovery; The Next Generation of Arrested Anaerobic Digestion Technology

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002396	DE-EE0009765	GFO-00009765-001	GO9765

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 Quasar Energy Group (QEG) to build and operate a pilot-scale system capable of producing volatile fatty acids (VFAs) from solid food waste, which would be converted into aviation biofuel.

QEG would leverage existing technology, known as Arrested Anaerobic Digestion (AAD) with integrated In Situ Product Recovery (ISPR) or AAD-ISPR, developed by the National Renewable Energy Laboratory (NREL) (Golden, CO) to produce VFAs. Previously demonstrated by NREL at laboratory-scale, this technology starts with a bioreactor containing wet organic solids that are broken down by microorganisms in a low-oxygen environment (i.e. anaerobic digestion). The resulting sludge is pumped to a rotating ceramic disk (RCD) filter that separates the solids from liquids, the latter of which is pumped to a membrane contacting unit (MCU) capable of extracting VFAs with a separate solvent (i.e. liquid-liquid extraction). The resulting VFA-solution is subjected to a single-stage separation technique (flash distillation) that separates VFAs from the solution. QEG, in collaboration with NREL, would scale up this technology to pilot scale and test alternative components that could reduce cost.

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-EE0009765). 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. These activities would include operations of NREL's existing AAD-ISPR technology at laboratory scale (6L bioreactor).

After the completion of initial verification activities, QEG would begin fabrication of an 80L pilot-scale bioreactor (approximately 2.3' x 5' x 2.3') within their facility (Independence, OH) for feedstock digestion. The bioreactor would be connected to a separation skid transported to QEG from NREL. The separation skid would be fabricated at NREL before transport and would include the remaining components of the AAD-ISPR system (pump, RCD, MCU, distillation unit), scaled up to accommodate the pilot bioreactor to be fabricated by QEG. All major components of the skid are smaller than 6.6' x 6.6' x 3.3'. The full system would be tested to collect performance data and verify the system can process the contents of the bioreactor within 30 hours.

QEG would test alternative components for the AAD-ISPR system. These components would be fabricated and installed in collaboration with New Logic Research (New Logic) and Zaiput Flow Technologies (Zaiput). New Logic would be involved with a membrane system that would replace the RCD. Zaiput would be involved with a liquid-liquid extraction unit that would replace the MCU. The full system with alternative components would be tested to verify operability for a full 8-hour working day (minimum) and provide performance data which would be compared to the performance data of the system with the RCD and MCU.

After fabrication, installation, and verification of the AAD-ISPR system, QEG would complete demonstration operations of the system with the New Logic and Zaiput components. Demonstration operations would involve the processing of approximately 190 kg food waste feedstock to recover approximately 1.7 kg of VFAs. The demonstration would take approximately 340 hours to complete. If recovered VFAs do not meet purity standards by flash distillation, the VFAs would be subjected to batch fractional distillation (i.e. distilling each fraction of the sample) to meet purity standards. After purity standards are met, approximately 1.7 kg of VFAs would be transported to NREL using chemical containers supplied by NREL.

The VFA sample received by NREL would be converted into aviation biofuel at NREL facilities in collaboration with Alder Fuels, LLC. Conversion would be completed through ketonization (reactions that create ketones, carbon dioxide, and water) and hydrodeoxygenation (reactions that remove oxygen from chemical compounds). Prior to conversion of the VFA sample, conversion activities would be performed on a mock VFA solution to determine optimal conditions for conversion of the VFA sample produced by QEG. Conversion activities would yield approximately 1 L of aviation biofuel.

QEG collects solid food waste (feedstock) from preexisting independent parties as part of their normal business operations and would use such feedstock (approximately 1000kg) for these award activities. Food waste would not be deliberately generated for the purposes of this award. The food waste collections would contain naturally occurring microorganisms involved with anaerobic digestion. The use or handling of cultured microbial specimens would not be required for these award activities.

All facilities at QEG and NREL are preexisting purpose-built facilities for the type of work to be conducted for this award. While award activities would include the installation of equipment at the QEG site, facility modifications would not be required. Award activities would involve the handling and use of hazardous materials, including hazardous chemicals, solid food waste, digestate, and biofuel. All such handling and storage would occur within controlled settings at QEG and NREL and would follow existing policies and procedures for handling and disposal of these materials. Activities would include the handling and use of tools and machinery to fabricate and install system components and separation skid. All fabrication, installation, and system operation activities would occur within controlled indoor settings at QEG and NREL. Existing 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)
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Dan Cahill, 1/25/2022.

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: 1/25/2022

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