

PMC-ND
(1.08.09.13)

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

**RECIPIENT:** [Kansas State University](#)**STATE:** [KS](#)

PROJECT TITLE: [Integrated Anaerobic Membrane Bioreactor \(AnMBR\)-electro-assisted fermentation platform for totalresource recovery from diverse wastewaters](#)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002336	DE-EE0009504	GFO-0009504-001	GO9504

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 federal funding to Kansas State University (KSU) to develop a novel wastewater recovery process and technology platform. A previously developed biomass fermenter and processing technology platform would be further developed and utilized throughout the project. This platform would be enhanced through the addition of an engineered wetland system, which would allow for further processing of waste water inputs. Operational testing would be performed utilizing the integrated system. The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. This NEPA Determination is applicable to all three BPs.

Proposed project activities would consist of conceptual design work, data analysis, computer modeling, process development, optimization of existing bioreactor and processing platforms, fabrication of a pilot-scale engineered wetland system, and operational testing utilizing the bioreactor and processing platforms.

Process development and operational testing would be performed utilizing bioreactor and processing platforms that were previously developed by KSU. Specifically, the Anaerobic Membrane Bioreactor (AnMBR) and Microbial Electrolysis Cell (MEC) are the two primary technologies that would be used throughout the project and which are currently installed, as integrated systems, at KSU's campus in Manhattan, KS. Both bench-scale (10L capacity) and pilot-scale (1500 L capacity) AnMBR-MEC platforms exist at KSU and would be used throughout the project. Minor equipment modifications would be made to the pilot AnMBR-MEC platform to optimize it for project purposes. These would be limited to modifications to the hardware and establishing new connections to existing infrastructure (e.g., electrical connections), but would not include any other facility modifications.

Process development and operational testing utilizing these platforms would focus on the optimization of wastewater fermentation, separation, and recovery techniques. Swine wastewater would be utilized as the primary wastewater input and would be obtained from an existing swine wastewater lagoon at KSU's campus in Manhattan, KS. For bench-scale testing, samples would be collected directly (approximately 10 – 50 liters over the life of the project)

from the lagoon by qualified researchers. For pilot testing, an existing conveyance system would be used to pump wastewater (approximately 1000 gallons over the life of the project) from the lagoon into the AnMBR-MEC platform.

At the end of the project, an engineered wetland treatment system would also be assembled and integrated into the existing pilot-scale AnMBR-MEC platform. The wetland treatment system would consist of an open container assembled from concrete blocks and plastic liner or from animal water tanks. The container would house plant species native to Kansas (e.g., cattails, sedges, and bulrushes) which would be utilized to further process filtered and treated wastewater from the AnMBR-MEC platform. The container would be connected to the AnMBR-MEC platform's discharge line. Tubing would direct discharged wastewater through the container. Wastewater processed further by the container would be siphoned back to the swine wastewater lagoon from which it was originally obtained. The engineered wetland treatment system would be assembled and placed outdoors, adjacent to the pilot-scale AnMBR-MEC system. The engineered wetland treatment system would consist solely of equipment that is readily movable/transportable and which would easily be removed upon completion of project work. No facility modifications would be required for the placement of the system. Exact dimensions of the wetland treatment system would be developed as part of the project.

KSU would coordinate all project activities and perform process development, operational testing, bioreactor optimization, and engineered wetland assembly at laboratory facilities at its campus in Manhattan, KS. Additional process optimization work, consisting of the development of fermentation and separation techniques, would be performed by the Lawrence Berkeley National Laboratory (LBNL) and the University of Kansas at their laboratory facilities in Berkeley, CA and Lawrence, KS, respectively. Additionally, the Khana Research Group would perform data analysis and computer modeling at its office facilities in Pittsburgh, PA. No physical research activities would be performed by the Khana Research Group. No physical modifications to existing facilities, ground disturbance, or changes to the use, mission, or operations of existing facilities would be required. No additional permits or authorizations would be required.

Project work would involve the use and handling of chemical reagents, waste materials (e.g., livestock primary waste, wastewater), and powered laboratory equipment. All such handling would be performed in laboratory facilities that work with these materials as part of their regular course of business. Potential hazards would be mitigated through adherence to established health and safety policies and procedures. Protocols would include personnel training and the use of personal protective equipment when handling project materials. Wastewater would be discharged in compliance with local waste management guidelines. Biosolids and other solid waste materials would be disposed of by qualified waste management service providers. KSU and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

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:

Advanced Manufacturing Office

This NEPA determination does not require a tailored NEPA provision.

Review completed by Jonathan Hartman, 08/17/2021

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: Kristin Kerwin

NEPA Compliance Officer

Date: 8/18/2021

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: _____

Field Office Manager

Date: _____