

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** University of Minnesota**STATE:** MN

**PROJECT TITLE:** Novel Modular Treatment System for Distributed Energy Recovery and Water Reclamation from Industrial Wastewaters

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0002336	DE-EE0009501	GFO-0009501-001	GO9501

**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 University of Minnesota (UMN) to develop a novel process for microbial community development for wastewater treatment applications. UMN would fabricate and test a novel two-stage anaerobic treatment system. Prototype bioreactor devices would be developed and tested in laboratory and commercial settings. Microbial seed communities would be cultured and tested utilizing these devices and wastewater produced from food and beverage production. The project would be completed over two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

Proposed project activities would consist of data analysis, computer modeling, microbial culture enrichment/development, material characterization, genetic sequencing, bench-scale reactor development and testing, and larger-scale prototype reactor development and testing. Existing microbial community cultures would be used by UMN for anaerobic testing and process development. These cultures would be adapted for efficient wastewater treatment through targeted introduction of biomass solids and synthetic compounds. No genetic modification of microbes would be performed. The microbial cultures would be encapsulated with algae extracts to form alginate beads, which would be utilized in the test bioreactors for wastewater treatment.

Bench-scale testing would consist of the introduction of alginate beads to an anaerobic bioreactor system (~ 1 L reactors) containing synthetic wastewater and/or real wastewater samples obtained from local dairies and breweries. Variables of interest (e.g., temperature, pH, input materials) would be modified to observe and test treatment efficiencies. Samples of the microbial communities would be taken periodically and sequenced.

Larger-scale prototype reactor testing (15 gallon per day (gpd) capacity) would be performed utilizing an existing bioreactor system installed at Fulton Brewing in Minneapolis, MN. Alginate beads and microbial communities would be incorporated into the reactor and tested for their wastewater treatment efficiencies. Testing would be performed over a period of approximately 30 days. The system currently has a smaller total treatment capacity. So, the system would be modified in order to increase its capacity to 15 gpd and to incorporate additional components (e.g., measurement devices, pumps) necessary for project purposes. Modifications would be limited to equipment and would not impact facility infrastructure.

UMN would coordinate all project activities and perform data analysis, computer modeling, bench-scale testing, material characterization, and genetic sequencing at laboratory facilities at its campus in Minneapolis, MN. UMN's

project partner, the University of Illinois at Urbana-Champaign (UIUC), would perform computer modeling and data analysis at office facilities at its campus in Urbana, IL. Larger-scale prototype reactor testing would be performed by UMN at Fulton Brewing's facility in Minneapolis, MN. Project partner Evoqua Water Technologies (Lowell, MA) would perform data analysis and serve in an advisory role on process development and bioreactor operations. No physical modifications to existing facilities, ground disturbance, or changes to the use, mission, or operation of existing facilities would be required. No additional permits or authorizations would be required.

Project work would involve the use and handling of potentially hazardous chemicals and metals, as well as compressed gases and powered laboratory equipment. All such handling would be performed at purpose built laboratory facilities that work with these materials as part of their regular course of business. Potential risks would be mitigated through adherence to established institutional policies and procedures. Protocols would include personnel training, the use of personal protective equipment, engineering controls, monitoring, and internal assessments. Biogas produced by the project would be vented through fume hoods. Effluent generated from the bioreactors would be sterilized prior to disposal. UMN and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

## 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, 08/04/2021

## 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:



Casey Strickland

NEPA Compliance Officer

Date:

8/5/2021

## 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: \_\_\_\_\_