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(1.08.09.13)

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

RECIPIENT: University of Illinois at Urbana-Champaign **STATE:** IL

PROJECT TITLE: Maximizing Bio-Renewable Energy from Wet Wastes (M-BREWW)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE FOA-0001926	DE-EE0008512	GFO-0008512-001	GO8512

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 Illinois at Urbana-Champaign (UIUC) to design, fabricate, and test a pilot-scale novel wastewater treatment system that would incorporate a novel anaerobic membrane bioreactor (AnMBR), an ion-exchange system and an ammonia electrolysis system, and would be used to convert wastewater bio-solids into two harvestable fuel types: methane and hydrogen gas. Engine testing would also be performed to investigate the potential for combined combustion of biogas and hydrogen gas for electricity production. The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

BP1 (Tasks 1-2) would be limited to initial verification activities. Baseline data would be collected and verified, project targets would be established, and a project management plant would be formulated.

BP2 (Tasks 3 – 10) would focus on construction, start-up and optimization of a cloth-filter AnMBR, optimization of an ion-exchange process using clinoptilolite, and validation of ammonia electrolysis product separation. Specific activities would include the following:
• Task 3: A cloth-filter AnMBR system would be developed and installed for pilot-scale testing at an existing wastewater plant.

• Task 4: The installed AnMBR system would be optimized for performance, with operational adjustments targeting improved energy efficiency.

• Task 5: Methods would be developed to improve ammonia capture using clinoptilolite

• Task 6: Optimization of the process for purified hydrogen fuel production.

• Task 7: Upscaling a 300 cm2 electrode ammonia electrolysis cell to 3,000 cm2 plates for implementation into a

pilot-scale 110 W ammonia electrolysis stack.

• Task 8: Defining scope of work and requirements to install the ammonia capture and electrolysis systems at the local wastewater plant field piloting site.

• Task 9: Characterization of engine generator performance with H2-enhanced biogas (engine testing).

• Task 10: Techno-Economic and Life Cycle Analysis (TEA/LCA) modeling.

BP3 (Tasks 11 – 13) would focus on integrating and optimizing the three components of the proposed system, developed in previous tasks, for a pilot-scale test demonstration of the integrated system.
• Task 11: Performance demonstration of the integrated wastewater treatment process.

• Task 12: Engine testing and performance optimization using a 25-kW biogas-tolerant engine-generator (BTEG). Biogas generated in Task 11 and synthetic blends of biogas would be used for testing.

• Task 13: Final TEA and LCA modeling.

All proposed project activities would be performed by UIUC and its project partners at existing, purpose-built facilities. Laboratory work and analysis would be performed in controlled, laboratory environments by UIUC at its campus in Champaign, IL and by Ohio University at its campus in Athens, OH. Colorado State University would perform computer modeling work at its campus in Fort Collins, CO. No laboratory work would be performed at this site. Engine testing experiments and data analysis would be performed by Mainstream Engineering at its equipment testing facility in Rockledge, FL. Pilot-scale testing of the wastewater treatment system would be performed at the Urbana-Champaign Sanitary District in Urbana, IL.

For pilot testing, the previously developed components would be assembled into the pilot wastewater treatment system and integrated into Urbana-Champaign Sanitary District's existing wastewater treatment operations. The system would be installed in an indoor facility currently housing wastewater influent screens and would occupy an area of approximately 10-ft by 20-ft with 9-ft overhead clearance. Installation of the system would require fitting some additional piping for wastewater influent and effluent, and potentially the installation of new electrical supply lines for the equipment. No earth moving or ground breaking would be required. No change in the use, mission or operation of existing facilities would arise out of this effort.

Once installed, wastewater liquids or bio-solid slurries would be supplied as influent to the proposed pilot unit at a flow rate of approximately 20,000 L/day. Biogas production would amount to approximately 15,000 L/day. This would represent less than 1% of Urbana-Champaign Sanitary District's daily flow rate.

Engine testing would be performed using biogas produced during pilot-testing. Biogas would be compressed into propane cylinders and transported adhering to established health and safety laws.

Laboratory activities would involve the use and handling of industrial chemicals and gases and pilot-testing activities would include the use and handling of untreated wastewater and industrial machinery. All such handling would be performed in dedicated spaces within controlled access facilities. Any risks associated with material handling would be mitigated through adherence to established health and safety policies and procedures. Protocols would include safety training, the use of personal protective equipment, engineering controls, monitoring equipment, and internal audits. UIUC and its project partners would adhere to all applicable Federal, state, and local health, safety, and environmental regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office
This NEPA determination does not require a tailored NEPA provision.
Review completed by Jonathan Hartman, 03/19/2019

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: Casey Strickland Date: 3/20/2019

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