

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



RECIPIENT: [Pennsylvania State University](#)

STATE: PA

PROJECT TITLE : [Novel microbial electrolysis cell design for efficient hydrogen generation from wastewaters](#)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002446	DE-EE0009623	GFO-0009623-002	G09623

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.

B3.15 Small-scale indoor research and development projects using nanoscale materials

Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to the Pennsylvania State University (PSU) to fabricate a microbial electrolysis cell (MEC) which would produce hydrogen using biomass fermentation effluent as a feedstock. The award aims to achieve a cost-effective pathway for high volumetric H₂ production.

DOE previously completed one NEPA Determination (ND) for this award (GFO-0009623-001; 08/11/2021). Since the original ND, one co-Principal Investigator left PSU for Johns Hopkins University (JHU). As a result, the location of Budget Period (BP) 2 and BP3 tasks, including MEC design, fabrication, and operation, are proposed to be moved from PSU to JHU. All BP2 and BP3 tasks remain the same per the original ND, only a location change is proposed. BP1 tasks were completed at PSU under the original ND and are not being evaluated as part of this ND.

Project management and data analysis activities would occur on campus at PSU (University Park, PA). The design, fabrication, and testing of a 100cm² MEC would occur within laboratory facilities on JHU's campus (Baltimore, MD). The National Renewable Energy Laboratory (NREL) would be responsible for operating a fermentation unit at its laboratory facility in Golden, CO. NREL would use the fermentation unit to synthesize biomass effluent from pre-processed biomass (e.g., corn stover) at laboratory scales (approximately 500 L of effluent over the course of the award). Island Water Technologies would provide additional effluent samples and perform conceptual design work, data analysis, and computer modeling at its research facilities in Charlottetown, Canada. All facilities are preexisting purpose-built facilities for the type of work to be conducted for this award. Facility modifications and additional permits or authorizations would not be required.

Award activities would involve the handling of industrial chemicals, genetically engineered bacteria cultures, and nanoscale materials. Handling, storage, and disposal of such materials would occur within controlled laboratory settings. Handling and disposal of genetically modified organisms (GMOs) at all facilities would be done in accordance with existing federal, state, and local laws and regulations. All GMOs used for this award would fall under the lowest

risk categories concerning individual and public health as described by federal agencies, i.e., Biosafety Level 1 (BSL-1). Also, such cultures would be handled in facilities meeting BSL-1 requirements. Biological waste would be treated prior to disposal (e.g., bleached and sterilized by an autoclave). All nanoscale materials would be handled using proper engineering controls (i.e., under a fume hood in a research laboratory environment). Existing health, safety, and environmental policies and procedures would be followed at all facilities to mitigate hazards to acceptable levels and would consist of employee training, proper personal protective equipment, engineering controls, and routine monitoring. Mitigated hazards would pose negligible risks to the public and environment. All activities would comply with existing federal, state, and local laws and regulations.

DOE has considered the scale, duration, and nature of proposed activities to determine potential impacts on resources, including those of an ecological, historical, cultural, and socioeconomic nature. DOE does not anticipate impacts on these resources which would be considered significant or require DOE to consult with other agencies or stakeholders.

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:

Hydrogen and Fuel Cell Technologies Office
NEPA review completed by Corrin MacLuckie, 06/01/2023.

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.

DOE has determined that work to be carried out outside of the United States, its territories and possessions is exempt from further review pursuant to Section 5.1.1 of the DOE Final Guidelines for Implementation of Executive Order 12114; "Environmental Effects Abroad of Major Federal Actions."

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: 6/1/2023

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: _____