

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



RECIPIENT: Fuzhong Zhang, Washington University

STATE: MO

PROJECT TITLE: Understanding and Controlling Cell-to-Cell Variability for Robust Bioconversion

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002636	DE-EE0010301	GFO-0010301-001	GO10301

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 funding to Washington University in St. Louis (WUSL) to improve bioconversion efficiency and batch-to-batch reproducibility in the bioproduction of biofuels and bioproducts by determining the major factors that cause cell-to-cell variability and developing tools to reduce such variability. This award would focus on three industrial-relevant microbial species: biodegradable plastic precursor (Polyhydroxyalkanoate, PHA)-producing *Pseudomonas putida*, biodiesel (lipid)-producing *Rhodococcus opacus*, and fatty acid-producing *Escherichia coli*.

The types of activities associated with the award would include outreach, education, training, data analysis, computer modeling, and laboratory research. 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 techno-economic analysis (TEA). The award would consist of three budget periods (BPs). BP1 activities would focus on verifying baseline cell-to-cell variations for the three bioconversion systems. BP2 goals would work towards understanding the major sources of noise for conversions of biomass, developing computational models as well as genetic tools to reduce and control variability, and assessing the applicability of industrial strategies. The final BP would consist of TEA/LCA and environmental analyses, application of new knowledge and tools to PHA and lipids production, and evaluation of the performance of engineered strains in real industrial settings.

WUSL (St. Louis, MO) would utilize dedicated laboratory facilities on campus to study, model, and engineer microbes as well as prepare biomass breakdown products. The LCA/TEA and market penetration analyses would occur at Texas A&M University in College Station, TX. Prairie View A&M University (Prairie View, TX) would be responsible for computer modeling and training activities. Lastly, Danimer Scientific (Danimer; Bainbridge, GA) would run 10 Liter BioFlo fermentation vessel analyses of broth and determine titers for scale up in yield and variability in dedicated laboratory facilities within their Research & Development (R&D) pilot plant. All facilities are preexisting, purpose-built facilities for the type of work to be conducted for this award. Facility modifications would not be required.

Award activities would involve the use of hazardous materials such as industrial solvents, recombinant DNA, and genetically engineered microbes. Handling, storage, and disposal of such materials would only occur within controlled laboratory settings at WUSL and Danimer and be in accordance with existing federal, state, and local laws and regulations. WUSL labs have an existing permit to handle these types of materials. Additionally, Danimer's R&D facilities are designed for this type of research and are in compliance with all National Institutes of Health and

Environmental Protection Agency regulations. Furthermore, all award participants would be required to follow the Recombinant DNA and Hazardous Research Materials protocols as detailed at each facility. Existing health, safety, and environmental policies and procedures including employee training, proper personal protection equipment, engineering controls, monitoring, and internal assessments would be followed to mitigate hazards to acceptable levels. Mitigated hazards would pose negligible risks to the public and environment.

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. A diversity, equity, and inclusion (DEI) plan would be implemented to encourage the inclusion of individuals from underrepresented groups in fields of science, technology, engineering, and mathematics (STEM).

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office
NEPA review completed by Corrin MacLuckie, 08/01/2023

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.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:  _____ Date: 8/1/2023
NEPA Compliance Officer

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: _____ Date: _____
Field Office Manager