

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



RECIPIENT: [zymochem inc](#)

STATE: CA

PROJECT TITLE: [Scaling an integrated process for biopolymer production using lignocellulosic feedstocks](#)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
<a href="#">DE-FOA-0002946</a>	<a href="#">DE-EE0011115</a>	<a href="#">GFO-0011115-001</a>	<a href="#">GO11115</a>

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:

<b>A9 Information gathering, analysis, and dissemination</b>	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.)
<b>B3.6 Small-scale research and development, laboratory operations, and pilot projects</b>	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 ZymoChem, Inc. (ZymoChem) for research and development activities related to scaleup (bench scale to industrial scale) and optimization of purified polyglutamic acid (PGA) production. The award aims to produce greater than 2 metric tons of purified PGA which would allow ZymoChem to generate experimental bio-based diapers in a separate effort from this award.

The award proposes to produce PGA from a biopolymer derived from a Bacillus strain via a fermentation and downstream PGA purification process. All award activities would occur within three Budget Periods (BPs). BP1 would validate the fermentation and PGA purification process at the 15 Liter (L) scale. BP2 and 3 would focus on the scaleup and optimization of the PGA production process in 10-fold steps, i.e., 300 L to 3,000 L to 30,000 L. A life cycle assessment would occur at the end of BP3 to determine the environmental impact and reduction to greenhouse gas emissions of ZymoChem's bio-based diapers, when compared to traditional petroleum-based products.

ZymoChem (San Leandro, CA) would utilize existing facilities to genetically engineer the Bacillus strain and perform lab scale fermentation as well as lab scale PGA and metabolite isolation and measurement activities. Scaling of the PGA production process to 300 L would occur at the Lawrence Berkley National Laboratory (LBNL) in Emeryville, CA. LBNL would also be the site of quantitative metabolomics and proteomics measurements. The National Renewable Energy Laboratory (Golden, CO) would be responsible for the production of lignocellulosic hydrolysate to be used in the media as the primary carbon source. Scaleup beyond 300 L would occur at an undetermined production partner location that is existing and purpose-built. All award facilities are preexisting purpose-built facilities for the type of work to be conducted for this award. Facility modifications or outdoor work would not be required.

Award activities would involve the handling and use of hazardous materials including acids, bases, and industrial solvents. All such handling would occur in-lab by organizations that are dedicated to proper hazardous material handling and disposal practices. Additionally, the award involves the handling and use of genetically modified organisms (GMOs) in the form of Bacillus strains. Bacillus strains are classified as a Biosafety Level 1 organism. All media, vessels, and liquids that contain Bacillus or deoxyribonucleic acid (DNA) would be decontaminated via autoclave or bleach prior to disposal. All team members are required to receive applicable training on the safe handling and disposal of recombinant DNA and GMOs. Existing health, safety, and environmental policies and procedures would be followed to mitigate hazards to acceptable levels. 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.

Include the following condition in the financial assistance agreement:

The production partner selected for scaleup activities beyond 300 L must be a preexisting purpose-built facility in which no facility modifications or outdoor work are necessary. If the production facility cannot meet these restrictions, an additional NEPA review would be required before the associated work can begin.

Notes:

Bioenergy Technologies Office (BETO)

This NEPA determination requires legal review of the tailored NEPA provision.

NEPA review completed by Corrin MacLuckie, 05/13/2024.

## 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:

  
NEPA Compliance Officer

Date: 5/13/2024

## FIELD OFFICE MANAGER DETERMINATION

- Field Office Manager review not required
- Field Office Manager review required