

**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

Notice of Funding Opportunity Number
DE-FOA-0002946

Procurement Instrument Number
DE-EE0011115

NEPA Control Number
GFO-0011115-002

CID Number
GO11115

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 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 proposed project activities include the scaleup and optimization of fermentation and downstream purification of a biopolymer produced by a Bacillus strain, from bench scale (<1 liter, L) to commercial scale (≥30,000 L). Downstream purification involves unit operations such as dilution, centrifugation, filtration, and pH adjustment.

All award activities would occur within three Budget Periods (BPs). BP1 would validate the fermentation and PGA purification process at the 15 L scale. BP2 and BP3 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 previous NEPA Determination (ND) was completed for all project activities (GFO-0011115-001; CX A9, B3.6; 05/13/24). This NEPA Determination covers the following proposed project timing, process, and location updates/changes:

1. Zymochem identified Lawrence Berkeley National Lab (LBNL) (Emeryville, CA) as the location for scaleup of the fermentation and recovery process to 300 L and for lab scale fermentation optimization. Quantitative Metabolomics and Proteomics measurements would also take place at LBNL.
2. Zymochem identified Laurus Bio (Kadubeesanahalli, Bengaluru Karnataka, India) as the location for project scaleup activities beyond 300 L. Laurus Bio is a purpose-built microbial fermentation facility with the equipment and capabilities in place to perform the work, without facility modifications.
3. Zymochem proposes to add two 30,000 L runs to BP2.
4. Zymochem also proposes the following process-oriented changes:
 - a. Change the feedstock from a lignocellulosic hydrolysate to starch based feedstocks (corn-based dextrose equivalent, DE-95).

b. Change of media from DE-95 to glucose-based media.

c. Eliminate the filtration cell-removal process and focus on centrifugation for the cell removal process

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.

No outdoor work would be performed, and all proposed work would be performed at preexisting purpose-built facilities, with no modifications or change in the use, mission or operation of the facilities. Therefore, no adverse impacts to sensitive resources are expected as a result of project activities at any location. No new permits, additional licenses and/or authorizations are required. All locations from the previous ND would still be participating.

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.

EERE is aware of the November 12, 2024, decision in *Marin Audubon Society v. FAA*, No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the Council on Environmental Quality (CEQ) regulations implementing NEPA are not judicially enforceable or binding on this agency action, EERE has nonetheless elected to follow those regulations at 40 C.F.R. Parts 1500-1508, in addition to DOE's procedures/regulations implementing NEPA at 10 C.F.R. Part 1021, to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

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 James Cherry, 12/13/2024.

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.

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:  Andrew Montano Date: 12/13/2024
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