

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



RECIPIENT: The Ohio State University

STATE: OH

PROJECT TITLE: Bench-Scale Development of Facilitated Transport Membranes for Bio-Syngas Cleanup

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002946	DE-EE0011112	GFO-0011112-001	

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 The Ohio State University (OSU) to improve energy and cost efficiency associated with removing hydrogen sulfide (H₂S) and carbon dioxide (CO₂) from biomass-derived syngas (i.e., bio-syngas) using transformational facilitated transport membranes (FTMs) and membrane modules. The award would involve fabricating new FTMs, validating the FTM module performance with simulated bio-syngas, and testing the membrane process using a bench-scale membrane skid with actual bio-syngas.

The award would be separated into three (3) budget periods (BPs). BP1 would involve fabrication and characterization of the transformational FTMs as well as validation of the membrane formation methods. The optimized membrane from BP1 would be scaled up to the prototype width of 21 inches in continuous roll-to-roll fabrication during BP2. BP2 would also involve the fabrication of prototype spiral-wound membrane modules and the design of a bench-scale membrane skid. In BP3, the bench-scale membrane skid would be fabricated, and the membrane module would be tested in the single-stage membrane system to show H₂S removal using both simulated and actual bio-syngas.

OSU would utilize a dedicated laboratory facility to perform data analysis and laboratory research including organic and polymer synthesis, membrane synthesis, membrane characterization, spiral-wound membrane module rolling, and module testing. Energy & Environmental Research Center (Grand Forks, ND) would produce bio-syngas via a high pressure fluidized-bed gasifier and use the produced bio-syngas to test the membrane skid. Gas permeation measurements of H₂S, hydrogen, and CO₂ on flat-sheet membrane performances would be gathered by Zenith Purification LLC (Zenith) in Missouri City, TX. Zenith would also perform data analysis activities and report preparation. Trimeric Corporation (Buda, TX) would be responsible for life cycle assessment and technoeconomic analysis studies. All facilities are preexisting purpose-built facilities for the type of work to be conducted for this award. Zenith would perform a minor upgrade to their laboratory engineering control system to handle H₂S. Other than this activity, facility modifications would not be required.

Award activities would involve typical hazards associated with laboratory research, including handling and use of hazardous materials and operation of potentially hazardous equipment. 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.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office (BETO)
NEPA review completed by Corrin MacLuckie, 3/18/2024.

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:  _____ Date: 3/18/2024
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