PMC-ND
(1.08.09.13)

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

RECIPIENT: NREL **STATE:** CO

PROJECT TITLE: NREL-19-027 Novel, Biological, Sustainable and Low Energy CO2 Separation (NCSU & UK)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
	DE-AC36-08GO28308	NREL-19-027	GO28308

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:

DOE/EA-1968 (NREL STM)	SITEWIDE ENVIRONMENTAL ASSESSMENT, U.S. DOE NATIONAL RENEWABLE ENERGY LABORATORY, SOUTH TABLE MOUNTAIN CAMPUS, GOLDEN, COLORADO
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's (DOE) Bioenergy Technologies Office (BETO) proposes to provide federal funding to DOE's National Renewable Energy Laboratory (NREL) and collaborators at North Carolina State University (NCSU), the University of Kentucky (UK) Center for Applied Energy Research (CAER), and Novozymes to develop a novel biological and low energy method to remove CO2 from mixed gas streams. The proposed project would use natural and engineered carbonic anhydrase (CA) enzymes to demonstrate this method at bench-scale.

Activities at NREL would occur in the Integrated Biorefinery Research Facility (IBRF) located at NREL's South Table Mountain campus in Golden, Colorado. Researchers at NREL would grow microbial cells using bacteria, such as Escherichia coli, to express CA enzymes with native or targeted mutations. Researchers would characterize enzyme activity under different conditions and analyze enzyme performance. Researchers would use this data to design new proteins with desired functions for improved activities and performance, and investigate alternative solvents with reduced regeneration energy.

Activities at NCSU would occur at the College of Textiles' Department of Textile Engineering, Chemistry and Science located in Raleigh, North Carolina. Researchers at NCSU would develop biodegradable enzyme-entrapping polymeric structures (BEEPS) to immobilize CA enzymes to improve CA longevity under process conditions, and optimize BEEPS fabrication methods to enhance CA performance in selected solvents.

Activities at UK would occur at its Center for Applied Energy located in Lexington, Kentucky. Researchers at UK would investigate solvents with reduced regeneration energy using the BEEPS developed at NCSU and using CAs provided by Novozymes and NREL. Researchers would conduct bench-scale testing using different solvents and BEEPS to determine optimal CO2 capture parameters.

Novozymes, located in Davis, California, would provide natural and engineered CA enzymes for this work.

At the conclusion of the experiments at all sites, any remaining cell cultures would be autoclaved, and the resulting non-hazardous material would be disposed of in accordance with established policies and procedures. The spent solvent wastes that would be generated are classified as non-hazardous waste and would be disposed of in accordance with established policies and procedures.

All research activities would occur in existing laboratories that perform such work, and no new equipment or infrastructure would be needed to support the experiments. No change in the use, mission, or operation of existing facilities would result from the proposed project. If required, the responsible researcher(s) at each site will obtain any United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) permits needed to conduct the work. Any work associated with this proposed project shall not proceed until all required permits have been received.

The proposed project would involve the use and handling of chemicals, enzymes, and bacteria typically used in biological laboratory work. The enzymes and bacteria that would be used are considered to be safe and pose little to no threat of infection. There would be no anticipated direct or indirect environmental or health and safety impacts due to the work. Existing corporate health and safety policies and procedures would be followed, including safe handling of organisms, proper waste disposal, and the use of employee personal protective equipment.

NEPA PROVISION

DOE has made a final NEPA determination.

Include the following condition in the financial assisstance agreement:

Any work associated with this proposed project shall not proceed until all required permits from the United States Department of Agriculture Animal and Plant Health Inspection Service have been received.

Notes:

NREL
Nicole Serio 4/26/2019

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: Electronically Signed By: Kristin Kerwin Date: 4/29/2019

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