

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



RECIPIENT: Arizona State University

STATE: AZ

PROJECT TITLE : Direct Air Capture Integration with Algae Carbon Biocatalysis

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-EE002423	DE-EE0009674	GFO-0009674-001	GO9674

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.

**B5.15 Small-
scale
renewable
energy
research and
development
and pilot
projects**

Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to Arizona State University (ASU) to implement a Direct Air Capture (DAC) technology with wild-type (WT) and genetically engineered algae strains to increase annual productivity while maintaining quality. This award would develop and test DAC technology to pull carbon dioxide out of the air by addressing barriers that currently limit overall process efficiency.

Award activities would involve the implementation of a DAC system at ASU Tempe (Tempe, AZ) for algae cultivation in a laboratory setting and in small pilot outdoor mini ponds at the Arizona Center for Algae Technology and Innovation at ASU (AzCATI-ASU) (Mesa, AZ). The testbed used at ASU would be provided by Carbon Collect, LLC. (Menlo Park, CA). The productivity of algae and carbon dioxide storage in both laboratory and pond scenarios would be tested with different concentrations of carbon dioxide in seasonal trials using a membrane-based carbon dioxide delivery method. A sensor-based control system for outdoor algae and carbon dioxide monitoring would be developed by Burge Environmental (BE) (Tempe, AZ) and implemented at AzCATI-ASU.

Genetically engineered algae strain experiments would be carried out to improve carbon capture and storage by identifying algal response to changes in carbon availability and storage between indoor and outdoor trials. The National Renewable Energy Laboratory (NREL) (Golden, CO) would participate in protein expression, algae strain development, and carbon dioxide monitoring technology development for small scale open ponds. Strains would be tested on their relationships with microorganisms, pathogenic bacteria, fungicides, and salinity swings in order to determine the most viable strain. Sequencing and gene expression data from successful strains would be used to develop a toolkit to help create other candidate strains. Lastly, data would be analyzed and technoeconomic analyses and life cycle analyses would be carried out by Carbon Collect.

All award activities would occur at existing purpose-built facilities. No facility modifications or ground disturbing activities would occur. All outdoor genetically engineered algae experiments occurring at AzCATI would be regulated under the EPA's Toxic Substances Control Act (TSCA), for which a TSCA Environmental Release Application (TERA) would be filed. All necessary TERA permits would be obtained before proceeding with project activities involving genetically engineered materials. There would be no modifications to or change in use of existing facilities. There would be no ground disturbing activities.

Award activities would involve handling of hazardous materials, including chemicals, compressed gases, and solvents. All hazardous materials would be managed in accordance with federal, state, and local environmental regulations, and would follow all existing institutional health and safety procedures. Award activities would also utilize fungicide for outdoor and laboratory cultivation studies at AzCATI-ASU, where a licensed staff member would handle, apply, and dispose of the fungicide according to Arizona Agricultural Department regulations.

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.

Notes:

Bioenergy Technologies Office (BETO)
Review completed by Alex Colling on 05/17/2022.

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: 6/21/2022

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: _____

Field Office Manager

Date: _____