

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



RECIPIENT: Global Algae Innovations

STATE: HI

PROJECT TITLE : Enhanced algae productivity in CO2 direct air capture cultivation

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002423	DE-EE0009675	GFO-0009675-001	GO9675

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**

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 Global Algae Innovations (GAI) to increase biomass productivity of algae in an outdoor environment through testing algae culturing techniques and improved algae strains in small above ground raceways.

Award activities would begin with Initial verification activities, which would include verification of data, procedures, and metrics from the initial award application to establish baseline metrics necessary to determine relative success of subsequent award activities.

After the completion of initial verification activities, GAI would proceed with fabricating equipment to be used for award activities. GAI would fabricate and install ten above-ground raceways (i.e. shallow artificial ponds) at the GAI Kauai Algae Farm (KAF) site (Lihue, HI). Raceways would be installed on a previously disturbed flattened dirt area of KAF. Each raceway (approximately 129" x 31" x 35") includes an integrated wooden stand that does not require ground disturbance activities for installation. Integrated electrical components would facilitate mixing of each raceway culture during periods of algal growth. All raceways would have components for measurement and control capabilities similar to preexisting raceways at KAF, all of which would be integrated into the preexisting supervisory controls and data acquisition (SCADA) system at KAF. Gas diffusers and control valves would be added to two of the raceways. GAI would fabricate a gas bubbling system that could be used with any of the raceways.

Algae cultivation activities would begin after the completion of equipment fabrication and installation activities. Such activities would begin testing multiple mutated strains mutated through directed evolution of a natural algae ("wild type"). Directed evolution is a process that involves manipulation of environmental variables in efforts to obtain mutated strains suitable for growth in different environments.

Concurrent activities would include raceway tests that evaluate the effect of nine different algaculture practices intended to maximize productivity of algal cultures. Such practices would manipulate environmental conditions of the raceway environment. These tests would start by evaluating each practice separately. Each test would last approximately five to seven weeks. Best practices from these tests would be identified and combined for additional testing. Tests evaluating the effect of combined practices would happen approximately every three months and would last for approximately one month each. Approximately six of these tests would be completed.

Throughout most of the award, GAI would conduct productivity tests every quarter (winter, spring, summer, autumn) at KAF. Each test period would involve growing a single algae strain in three raceways for approximately two weeks. Raceway environmental variables would vary between testing periods. Strains for testing would be selected based on the environmental conditions for the respective test period. Approximately eleven of these tests would be conducted over the course of the award.

Water from the Lihue ditch system (i.e runoff from Mount Waialae) would be used for culture media and pond maintenance at KAF (not to exceed 10,000 gallons per day).

Additional activities would occur in GAI's Kauai Algae Laboratory (KAL) (Lihue, HI). The strains would be cultivated at lab-scale for nucleic acid sequencing and analysis activities. Data sets of resulting genetic data of the strains would be created. Laboratory activities would consume less than 10g per year of chemical reagents (each) for analysis activities and less than 300g per year of nutrients for in-lab cultivation.

All facilities at GAI locations are preexisting purpose-built facilities for the type of work to be conducted for this award. While fabricated raceways would be installed at KAF, facility modifications and ground disturbance activities would not be required. Award activities would involve the handling and use of hazardous materials, including chemical reagents and commercial agricultural fertilizers. Handling and storage of chemical reagents would occur within controlled laboratory settings at KAL and would follow existing policies and procedures for handling and disposal of these materials. Proper handling and storage of fertilizers would occur at KAF. Fertilizers would be consumed during the cultivation process. Outdoor activities at KAF would pose the typical hazards of an outdoor aquaculture farm (e.g. powered machinery with moving parts, hand tools, trip hazards, fertilizers). Safety at KAF would be reviewed on a weekly basis during KAF personnel meetings. Existing corporate health, safety, and environmental policies and procedures would be followed at all facilities, including: personnel training, proper personal protective equipment (PPE), engineering controls, monitoring, and internal assessments.

Award activities would not include the use of genetically modified organisms (GMOs) or genetic engineering technologies. All organisms used for this award would fall under the lowest risk categories concerning individual and public health as described by federal agencies, i.e. Biosafety Level 1 (BSL-1) or Risk Group 1 (RG1). While it is not anticipated that algae strains would need to be exported to Hawaii from the mainland for this project, all necessary permits would be obtained prior to transporting any organisms to Hawaii if export would occur.

Additional award activities would include those of an intellectual, academic, and analytical nature. Such activities would support the completion of a life cycle analysis (LCA) and technoeconomic analysis (TEA).

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office (BETO)
NEPA review completed by Dan Cahill, 2/8/2022.

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:  **Electronically Signed By: Casey Strickland** _____ Date: 3/2/2022
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