

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Colorado School of Mines**STATE:** CO

**PROJECT TITLE:** Algal Productivity Enhancements by Rapid Screening and Selection of Improved Biomass and Lipid Producing Phototrophs (APEX)

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0002029	DE-EE0008904	GFO-0008904-001	GO8904

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 Colorado School of Mines (CSM) to apply directed evolution, genetic engineering, and natural selection strategies to algal strains in order to adapt strains to specific outdoor culturing conditions (e.g. high light intensities, O<sub>2</sub> levels, salinity, pH) and improve lipid yield. Algal strains would be analyzed, and down-selected for further research. Strains determined to have targeted traits would then have the strategies discussed above applied to them.

Research activities would be performed concurrently in both laboratory settings and at outdoor cultivation ponds. Specific project activities are as follows:

Task 1: This task would consist of initial data verification with DOE and preliminary project planning.

Task 2: This task would consist of the development of mutagenesis techniques, which would in turn be applied to a select algal strain. The results of this process would be used for the establishment of a mutant library of the strain. The library would be sorted and screened for high-lipid strains.

Task 3: Environmental bioreactors would be used to assess/characterize lipid content of targeted strains.

Task 4: This task would consist of water sample collection, algal isolation, and analysis. Samples would be collected from a variety of water sources (e.g. rivers, lakes, tidal pools, ocean sources) across Hawaii and the mainland United States (mainly sites along the Gulf of Mexico). Samples would be taken using 50 mL plastic sampling tubes containing 30 micron sieves to remove larger ciliates that would have the potential to predate any algae that may be contained in the samples. Equipment used for sampling would be collected upon retrieval of the sample and sampling would take approximately 20 minutes at each site. CSM and its project partners would obtain any necessary permits/authorizations for access to a site, prior to sampling. Because the sampling would occur at such a small scale (e.g. water sampling using 50 mL tubes), and because the equipment used would be introduced to the environment only temporarily, DOE has determined that the sampling would have no effect on listed Endangered Species Act species.

Isolated algal samples would be transported via mail to Global Algae Innovations' (GAI) Kauai Algae Facility in Lihue, HI and assessed for their resilience to the environment and lipid production. Permits would need to be obtained by GAI from the Hawaii Department of Agriculture for the shipment of any algal strains to Hawaii from the U.S. mainland, or vice versa. CSM would coordinate with GAI to ensure that all required permits/authorizations are obtained prior to transferring any specimens for this project.

Task 5: Biomass production would be scaled from laboratory-based environmental bioreactors, to greenhouse/environmental chambers, to outdoor raceways.

Task 6: As part of this task, algal strains with targeted characteristics (e.g. high-biomass, high-lipid production) would be selected for genetic modification experiments (e.g. genome resequencing, DNA sequencing, transcriptome analysis).

Task 7: This task would consist of the development of Techno-Economic and Life Cycle Analyses (TEA/LCA).

All project activities would be coordinated by CSM and performed at existing, purpose-built facilities. Strain isolation, evolution, and analysis would be performed by CSM at laboratory facilities located at its campus in Golden, CO. Indoor algae cultivation and testing would be performed at laboratory facilities operated by the Pacific Northwest National Laboratory (PNNL) in Richland, WA and by GAI at the Kauai Algae Laboratory in Lihue, HI. Outdoor cultivation experiments would be performed at GAI's Kauai Algae Facility in Lihue, HI. No physical modifications to existing facilities, construction of new facilities, ground disturbing activities, or changes to the use, mission, or operation of existing facilities would be required. Likewise, no additional permits or authorizations would be needed for the completion of project activities.

Project work would involve the use and handling of industrial chemicals and electrical equipment. All such handling would occur in controlled research facilities with restricted access. Risks associated with the performance of project materials would be mitigated through adherence to established policies and procedures. Protocols would include personnel training, the use of personal protective equipment, monitoring and oversight, and regular safety/equipment reviews. Laboratory facilities are all equipped with proper safety/storage equipment, including fume hoods, biological safety cabinets, emergency showers, etc. Outdoor cultivation would be performed at facilities equipped for aquaculture research that regularly perform work similar to that included in the scope of the project. All liquid biological wastes, at both the laboratory and outdoor cultivation facilities, would be autoclaved prior to disposal. CSM and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

Water from the Lihue ditch system (run-off water from Mt. Waialeale) would be used for outdoor cultivation experiments. No more than 10,000 gallons per day would be used. Commercial agricultural fertilizers would be used for algal production. All fertilizers would be consumed during production and the remaining, non-hazardous water would be evaporated in a secondary pond.

A strain of *Nannochloropsis gaditana* (CCMP529) would be used for cultivation experiments that has had recombinant DNA technology applied to it. This algal strain is regularly used for biofuel research and genetic manipulation is frequently performed when analyzing this specimen. Strict laboratory containment procedures would be observed at all times when handling the strain. All cells would be autoclaved at the end of each experiment.

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](#)

[This NEPA determination does not require a tailored NEPA provision.](#)

[Review completed by Jonathan Hartman, 02/04/2020](#)

## 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: \_\_\_\_\_



[Casey Strickland](#)

NEPA Compliance Officer

Date: 2/5/2020

## 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: \_\_\_\_\_