Santa Fe Community College

Proposed Agenda Item

Governing Board Meeting

Complete this form and submit it to the Office of the President by **noon, thirteen days** before the Wednesday evening meeting of the Governing Board. If this form does not provide enough space, you may use an expanded version *as long as you follow the format specified below.* Please note: Subject line must always match both Agenda and Agenda Items.

Date of Board Meeting: 4.28.21 **Date of This Proposal:** 4.14.2021

Check one: X **Information Item** ☐ Action Item

SUBJECT: DOE BETO Pond PALS Grant Application

RECOMMENDATION: No recommendation required, informational item only

BACKGROUND/RATIONALE: Per Policy 1-31: Governing Board Financial Oversight: The Grants Director, Ann Black is informing the SFCC DGB of the following grant application:

US Department of Energy Bioenergy Technologies Office (BETO) Feedstock Technologies and Algae (DE-FOA-0002423) - Improving Pond Productivity of ALgae Strains through Designed Polycultures (Pond PALS).

Project partners LANL, NMSU and Texas A&M approached SFCC to be the algae culture facility for this project. We are the only institution in the Southwest besides Arizona State University, that can provide algae culture at industrial scale. LANL would like to use our facilities to grow out their strains and NMSU would like to analyze the ones we have growing.

If funded, SFCC will receive a $420,067 subcontract from New Mexico State University over four years, which will fund work to be completed by principle investigators, Dr. Stephen Gomez and Ondine Fraucnglass. It will also fund four SFCC interns to participate in undergraduate algae research.

SFCC will provide the following in-kind resources valued at $188,350: SFCC lab and greenhouse cultivation facilities and analytics, SFCC greenhouse technician, and algae cultures.

Estimated Cost and Budgetary Support (how will this be paid for?): This grant allows SFCC to charge it's full 45.8% indirect cost rate (IDC) on salaries and benefits (estimated IDC is $126,568 over four years)

RESOURCE PERSON(S) [name(s) and title(s)]: [Authorized person(s)/Originator] Dr. Steve Gomez, PI and TATC Dept. Chair and Ann Black Grants Director

SIGNATURES:

Originator — Date: 4.14.2021

Supervisor — Date: 4/15/21

Vice President or Other Cabinet-Level Supervisor — Date: 4/15/21

PRESIDENT'S APPROVAL:

4-21-21

Improving **Pond P**roductivity of **AL**gae **S**trains Through Designed Polycultures (Pond PALS)

2423-1588

PI: Wiebke Boeing, New Mexico State University

Key Participants: Los Alamos National Laboratory (B.L. Marrone, R. Gonzalez); Texas A&M University-Galveston (A. Quigg, M. Kamalanathan); Santa Fe Community College: (S. Gómez, O. Frauenglass)

Technology Summary

We will integrate highly productive "APEX" algae strains into well-established, resilient algae polycultures, which we expect will derive into hardy algae assemblages that remain productive from laboratory testing towards outdoor growth conditions. Besides the traditional metrics (biomass yield and quality), we will design and implement measurements of oxidative status as a tool for predicting pond health and productivity, since this is a parameter that correlates photosynthetic rates with carbon storage and cellular stress. Culture management strategies and polyculture performance will be guided by technoeconomic and life cycle analysis.

Technology Impacts

- The beneficial strains identified
- The oxidative stress tool for pond health prediction
- Contribute to BETO's goal of algae-based biofuel production at a total cost of $2.50/GGE
- Annual algae productivity at or above the target of 22 g m^{-2} day^{-1}
- The ecological methods derived from this project are applicable to the algae industry and other BETO projects
- TEA and LCA analyses and models tailored to polycultures

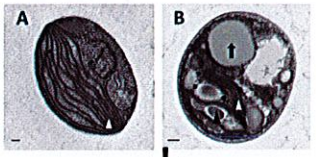
Requested federal funds: $3.2M over 48 months

Cost Share: $800k over 48 months

Project Goals

Improve the seasonal productivity of microalgae crops grown outdoors with traditional CO_2 supply, by: i) Utilizing naturally-established and resilient microalgal polycultures as an "ecological matrix" that supports co-culturing of a previously characterized microalgal production strain, ii) Developing a predictive and shareable tool for pond health and productivity based on the polyculture's oxidative status, iii) Implementing an experimental guidance protocol that integrates population dynamics and biomass quantity and quality with TEA/LCA models and iv) Evaluate the performance of designed polycultures as these scale up from laboratory conditions to field trials.

An APEX strain: *Picochlorum soloecismus*



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A robust natural polyculture maintained outdoors under freezing temperatures at the Santa Fe, NM site.

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- *Higher biomass productivity*
- *Extended seasonality*
- *Protection from predators*
- *Scalability*

Progression of testing scales from laboratory to outdoor conditions. Left: Environmental photobioreactor array at LANL (500 mL); Middle: Greenhouse aquaria (10 gal); Right: Raceway ponds at the Las Cruces, NM site (1000 L).

Design and test ecologically-based strategies for improving year-round pond productivity by introducing proven production (APEX) strains into robust, naturally formed algae polycultures.