

FLORIDA STATE UNIVERSITY

Establishment of the Center for Marine Bioenergy Research: Systems Approach to BioEnergy Research (SABER)

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Description: This proposed SABER research center will blend fundamental and applied research to:

1. Develop sustainable, biologically-based fuel alternatives and renewable energy strategies.
2. Capture, recycle or clean up environmental pollution (greenhouse gases, excess nutrients) associated with energy production and use. Equally important to our research goals will be partnering with public and private institutions to immediately implement our research for the benefit of society. Biosolutions will be rapidly incorporated into the solid waste treatment and power plant industries. We will partner with the other IESSES groups to promote awareness that the near-term realization of clean, cost-effective energy alternatives will occur only through a multidisciplinary systems-based approach from research to planning and implementation. We will assure sustainability by assessing the environmental impacts and promoting the mitigation of those impacts of alternative energy technologies on the geosphere.

The centerpiece of the proposed project will be the development of sustainable practices for the production of transportation fuels from algal biomass feed-stocks. Algal cultivation practices will also be incorporated into industrial processes such as CO₂ capture and sequestration from coal-fired power plants and wastewater treatment.

Budget: \$494,135

Progress Summary

The centerpiece of the SABER project is the development of state-of-the-art technology to tap marine or aquatic algae as a biomass source for fuel production (Figure 1). A state-of-the-art, off-the-grid algal cultivation facility will allow us to produce algae with a minimal ecological footprint. Once cultivated, the algae yield lipids, carbohydrates, and protein, which can be processed into biofuels or used as biomass in animal feed. Wastewater from the process can then be reintroduced into the system during cultivation, making this a highly efficient, ecologically friendly alternative for producing fuel from the sun. A multidisciplinary team of faculty and students at FSU is covering biofuels R&D across the entire value chain, including algal strain selection and growth optimization, biomass analysis and conversion, and the use of green power in sustainable, carbon neutral algal cultivation. SABER is particularly focused on coupling algal cultivation to wastewater remediation.

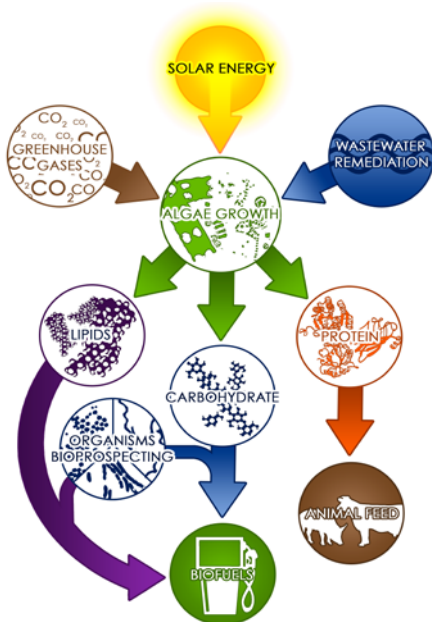
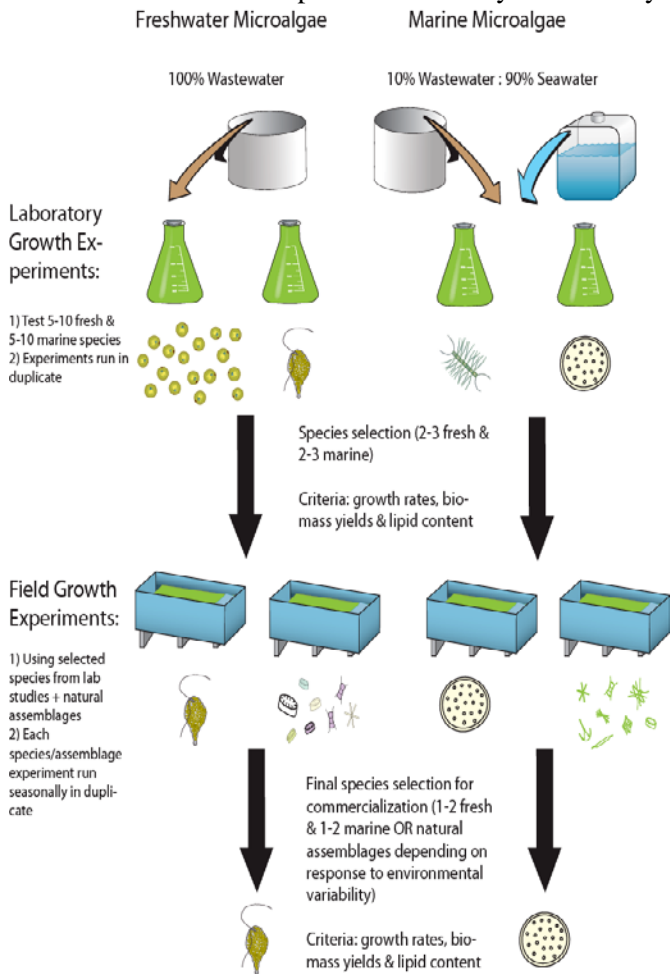


Figure 1.

In the first month, PI Kostka and co-PI Wetz visited the following Florida companies engaged in algal biofuels research throughout the state: the Midwest Research Institute (MRI) of Palm Bay, Petroalgae in Melbourne, Aurora Biofuels of Vero Beach, and Algenol of Bonita Springs. We toured facilities and discussed potential research collaborations.

Based on these discussions, we pursued further contacts with Petroalga and MRI. Contact with MRI resulted in the submission of two research proposals. The partnership with Petroalga requires that we build an marine algal cultivation facility close to the ocean. Thus, we are currently in discussions with the Director of the FSU Coastal and Marine Laboratory, Dr. Felicia Coleman, to move forward on this partnership with Petroalga.

SABER has entered into a partnership with the city of Tallahassee to optimize the growth of algal biomass for fuel from the city's nutrient-rich wastestream. See Figure 2 for details on the research plan. The city has offered the use of land at the plant to build a pilot scale algal cultivation facility. SABER will build the pilot scale facility and the city will offer some analytical services as a match.



The city also has an operating biorefinery for transforming vegetable grease into biodiesel through a transesterification process. We are exploring the possibility of using this refinery to produce biodiesel from algal biomass. Secondly, we discussed the establishment of a recycling program on campus for oils from food waste to be used as a feedstock for the production of biofuels.

A total of 9 proposals and white papers have been submitted to federal agencies for funding. A number of biofuels meetings were attended by the PIs. A principal investigator meeting for the SABER program was convened by the PI in September. The goal of the meeting was to report on research progress and discuss further collaborations within IESES at FSU. This meeting was a resounding success, and the presentations are available upon request. Numerous other meetings were attended by the PI with state and local officials that are not listed.

Figure 2.