

## **Thrust Area 3: Biomass (Algae)**

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

**PI:** Joel Kostka **Co-PIs:** William Cooper, Ivonne Audirac, Amy Chan-Hilton, Ellen Granger

**Students:** Claire Smith (Ph.D.), Kristina Welch (M.S.)

**Description:** IESES' Systems Approach to Bio-Energy Research (SABER) is particularly focused on coupling algal cultivation to wastewater nutrient remediation. SABER has partnered with the City of Tallahassee's T. P. Smith Waste Water Treatment Plant in order to study the growth of local fresh water algae in waste water for use as biofuel. The two main objectives of this project are to: 1) perform both laboratory and field experiments to test for species-specific growth potentials, as well as for the effects of different environmental parameters, including light, carbon dioxide, and nutrient availability on microalgal growth rates and lipid production, and 2) determine the extent to which microbes (i.e. bacteria), which are exceptionally abundant in waste water, act as either competitors (for nutrients, carbon) or symbiotically with algae. To do this we are examining the bacterial community present in the waste water and detecting community shifts that occur during algae cultivation. We are also examining the nutrient uptake dynamics between bacteria and algae by monitoring the usage and production of nitrogen, phosphorous, and carbon-containing compounds. Finally, a number of advanced analytical chemistry techniques are being used to characterize wastewater before and after algae cultivation. With a better understanding of the microbial and biogeochemical processes occurring in waste water during algae cultivation, engineering approaches may be proposed in order to further optimize algal growth in waste water.

**Budget:** \$494,135

**University:** FSU

**External Collaborators:** City of Tallahassee

## **Executive Summary**

Joel Kostka directs the Systems Approach to Bio-Energy Research (SABER) facility until August, 2011, when he leaves for Georgia Tech. Afterward, Jeff Chanton has agreed to become director and lead the program into the future. Bill Cooper of the Chemistry department and Mike Watts of the FAMU-FSU College of Engineering both serve as SABER Co-PIs and they will continue to support the program by directing students. Timeline and Operation of Facility: Maintenance and day-to-day operations of the facility will be carried out by graduate students, Claire Smith and Kristina Welch. Both of these students will pursue the M.S. degree in the Earth, Ocean and Atmospheric Sciences (EOAS) department. The students plan to finish their degrees in 2012. Both student theses will be directed by Professor Chanton. Kostka will co-direct Claire's thesis research as a courtesy faculty member of EOAS, while Mike Wetz will continue to codirect Kristina's thesis project. Kostka will also serve as a member of Kristina's thesis committee. Bill Cooper has participated in SABER as a coPI since its inception. He has agreed to help run the algal cultivation facility and will serve on the thesis committees of both Claire and Kristina. This arrangement should work quite well.

This project has been completed.