ESW BIOFUELS

Fall 2022 Newsletter

Contents

Team Updates

Welcome New Business and Outreach Members!

Maura Beatty
E&S 2026

Sofia Etlin
GPHS 2026

Kathryn Fligstein
E&S 2024

Team Updates

Welcome New Research and Development Members!

Miranda “PJ” Brunette
MSE 2026

Moho Goswami
CBE 2026

Team Updates

Welcome New Bioenergy Implementation Members!

Clare Belman
CBE 2026

Stephen Smith
CBE 2026

Anthony Parlatore
CBE 2026

Trent Donaldson
CEE 2025

Ethan Lin
CS 2026

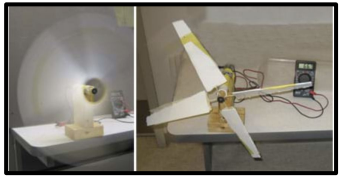
Angel Liang
CBE 2026

Biofuels Fall 2022

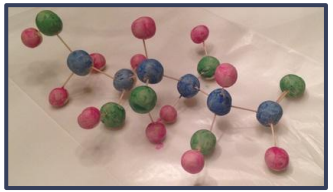
Business & Outreach

B&O wrapped up the Complex Lesson Plans and began drafting the Elementary Lesson Plans. They have used the complex lesson plan as a template, working section by section to put the curricula in simpler terms. Additionally, they have been working on compiling activities to go with both lesson plans. The elementary lesson plan activities have been finalized and include the purpose of the activities, materials & costs, and procedures. Members have also begun drafting activities to pair with the complex lesson plans, allowing students to process the curricula through hands-on activities. The next steps are to finalize the complex lesson plan activities, reorganize the elementary lesson plans' table of contents, and formulate directional documents for instructors to follow when teaching the lesson plans. Since CCE Suffolk disbanded from the lesson plans, B&O will look for partners next semester, including 4-H of Tompkins County.

A few of the complex lesson plan activities!



"Solar Energy" from "Oceans and Energy"



"Chemical Model" from "Biofuels"

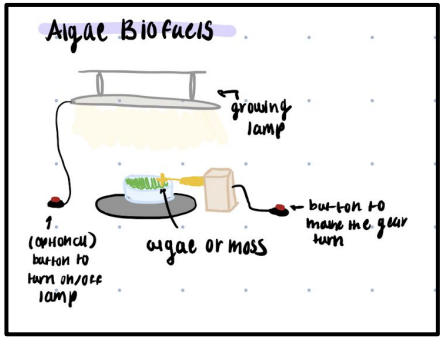
"Ocean Acidification" from "Climate Change and Ocean Health"

Business & Outreach

Midway through the Fall 2021 semester, CCE Suffolk proposed a project involving the creation of a podcast that would detail environmental issues on Long Island and subsequent problems that the Shinnecock Nation is facing. This semester, B&O's work with the podcast was mainly centered around modifying questions for the Shinnecock nation and planning our setup for an eventual recording date. We have been in contact with Rewa Phansalkar from the New York State Water Resource Institute (NYSWRI) and Shavonne, a member of the Shinnecock Nation who are both aiding with the logistics of the podcast recording. At the beginning of the semester, B&O reduced the number of questions we were hoping to ask the Shinnecock from a broad set created last semester and expanded upon the remaining questions to provide for a more thorough, involved discussion. Additionally, B&O reached out to the Milstein Program through Cornell in hopes of recording and editing the podcast with their equipment. After gaining approval, we tested the audio in the Milstein Program studio which went very well. Going forward, B&O hopes to record the podcast in the near future, edit the contents, and release it on a platform where many will be able to listen and better understand topics such as environmental racism, ocean acidification, government actions and their effectiveness, and traditional ecological knowledge.

Business & Outreach

This semester, B&O's work for the Powerhouse was centered on finding potential partnerships and grants. Through reassessing our next steps of the powerhouse, B&O found it vital to get a partner to help us in terms of the project's construction and finances. Given these needs, B&O looked into other project teams and subsequently proposed a partnership with Cornell's Engineers Without Borders (EWB). In addition to finding potential partners, B&O focused on searching for grants that could begin to fund the exhibits in our Powerhouse. Last semester, B&O created a rough budget for some of the exhibits, which were used while researching grants to see which grants could help fund at least one of the exhibits. Fortunately, B&O applied and was accepted to the ESW Build Day Grant! The Build Day grant offers up to $1,500 to help fund a team's project. The grant allows groups to work closely with the ESW Global team to organize materials and a time for construction of their projects in one day, the "Build Day." The grant will fund two of the nine Powerhouse Exhibits: "Algae Biofuels" and "Model of Nations' Carbon Emissions." B&O can also expect future financial support from ESW Global for the other exhibits!



The ESW Build Day PowerHouse Exhibits!

Biofuels Fall 2022

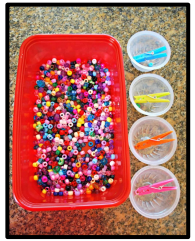
Business & Outreach

For outreach, B&O communicated with the Ithaca Sciencenter to host a Free Community Science Demo Day. The planned date will be February 4, 2023 and will consist of three activities shown on the right, one from each elementary lesson plan. B&O members developed materials and costs budgets, as well as talking points to follow along with each activity.

Moreover, B&O wanted to present the same activities to Caroline Elementary students during a "SteAm Night." Unfortunately, they no longer hold such nights, so B&O contacted other elementary schools such as Cayuga Elementary. Aleaha Gulini, a 4th grade teacher, responded that she would love for B&O to be guest speakers with the activities in one of her class periods! B&O will remain in touch with her to plan an official date next semester.

The Sciencenter Outreach Activities!

"Windmill Crafting" from "Oceans and Energy"



"Beady Biorefinery Process" from "Biofuels"

"Ocean Acidification in a Cup" from "Climate Change and Ocean Health"

Research & Development

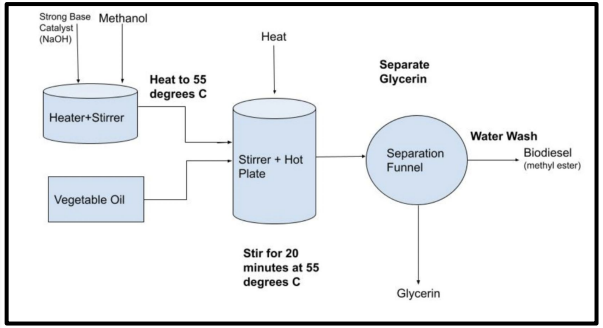
This semester, R&D has continued working on their Ammonium Phosphate Biochar project, which aims to prevent nitrogen and phosphorus runoff into bodies of water while providing sustained fertilizers for crops. By combining ammonium with phosphoric acid, a reaction takes place and results in either monoammonium phosphate (MAD) or diammonium phosphate (DAP) within the pores of the biochar. They have focused on researching the most suitable materials for this procedure, and have already purchased the reagents, biochar, and lab equipment.

In the following semester, they will begin to implement these methods in a new laboratory space to test their feasibility and efficacy.

Raw Biochar before Ammonium Phosphate Addition

Bioenergy Implementation

BioImp continued its work on alternative fuel solutions for Cornell's tractors, which have a high demand for diesel fuel. For sustainability purposes, BioImp hopes to convert Cornell's waste oils into usable biodiesel for the tractors. This biodiesel is made using a transesterification process, a reaction between Triglyceride and Methanol from waste oils that produces biodiesel and Glycerol Acid. This semester, the team developed and proposed the Batch Beaker Process to facilitate the transesterification. The goal in developing this process was to determine the best conditions for the biofuel product in terms of yield and economic feasibility. Three variables were altered over the semester to maximize the following factors: oil to methanol ratio, temperature of reaction, and percent catalyst. Moving forward with the project in the upcoming semester, BioImp hopes to secure lab space to experiment with the Batch Beaker Process and eventually switch from pure vegetable oil to campus waste oil as the source for the biodiesel. The team also hopes to design a continuous reaction that will yield larger amounts of biodiesel, as well as perform an economic analysis to determine the long-term economic feasibility of the project's end goal.



Batch Beaker PFD for the Transesterification Reaction