



ESW

BIOFUELS

Fall 2020 Newsletter

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Team Updates

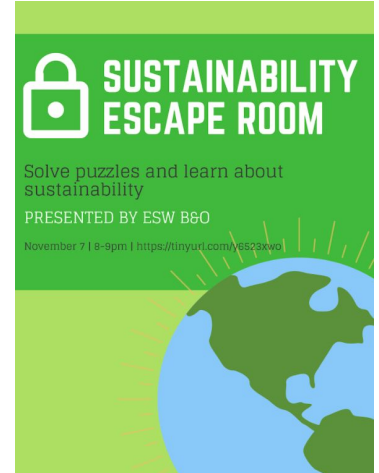
This semester, ESW Biofuels welcomed three new members to the team! Yang Han joined Bioenergy Implementation and is most excited for rare earth element techno-economic analysis. He is a junior studying chemical engineering and grew up in Vancouver, Canada. Niki Reddy is a sophomore from Corning, NY who also joined Bioenergy Implementation. She is studying operations research and information engineering and is also most excited for her sub team's REE TEA work with Barstow's Lab. Sam Karunwi is a junior studying materials science and engineering who joined Research & Development. He is from the Bronx, NY, and is most excited for the Effect of Different Organics on Nutrients Recovery from HTL aqueous phase using struvite production.





Business & Outreach

This semester, Business and Outreach created a sustainability themed, virtual escape room. The escape room was designed as a social event that also taught about current environmental issues and solutions, including topics like climate change, nitrogen pollution, garbage classification, and green engineering. The team is also working in collaboration with the Ithaca Sciencenter to schedule a virtual event for kids in elementary school involving a demo with soap and oil and a discussion about the effects of oil spills. For older students in middle school, Business and Outreach will work with the Sciencenter to create a program using their escape room. Business and Outreach also developed the Biofuels Fall 2020 newsletter and updated their newsletter template to be more accessible and efficient. The team will next work on updating the Biofuels website.



Virtual Escape Room Flyer

Biofuels Fall 2020





Research & Development

In transitioning away from the Hydrothermal Liquefaction Reactor project, R&D decided to continue their partnership with the Tester Group through an online project. In continuation of the theme of wastewater treatment, they chose to work on modeling the production of Struvite from acid-whey waste-streams. Using a software called Visual Minteq, they can enter data on the composition of acid-whey waste-streams from yogurt producers in NY to get an idea of the ideal conditions under which it forms as well as what potential additives are best for facilitating its precipitation. The importance of Struvite comes from the fact that it serves both as a means of extracting Nitrogen and Phosphorous waste that would otherwise end up as a pollutant and repurpose it as a slow release fertilizer in Struvite. Being a slow fertilizer means that it takes longer for Struvite to break down and thus can be used with greater care than other types of fertilizers. Widespread use of Struvite would thus further limit nutrient pollution. This semester, they hope to be able to finish preliminary testing in Minteq based on varying the inputted compositions with the standard deviations given by averaging the data they are collecting. The end goal of the project is to analyze the results from their modelling and write a short paper detailing the results.





Bioenergy Implementation

In the Fall 2020 semester, Biolmp worked on three main projects this semester. They were working on a project with Cirenas, a sustainable living community in Costa Rica to educate people there about sustainable practices and the goal was to help Cirenas troubleshoot the Anaerobic Digester system to get the Anaerobic Digester to produce biomethane properly. Another project was the Teaching Dairy Project, where the team was determining the best solution to increase the lifespan of the gasket of the equipment to prevent it from failing prematurely. Ree Tea was the project that Biolmp started to work on this semester. They were working towards replicating the results of the prior bioleaching Tea publication.



Anaerobic Digester





Biodiesel Engine Project

In the Fall 2020 semester, BEP worked on using the GREET software, which estimates pre-combustion emissions for the biodiesel fuel B100, measuring emissions from processes like resource extraction and transportation. The team also added the final parts to the PEMS unit, and built a mounting bracket in the tractor's cabin, so that it could be attached to the tractor to measure post-combustion emissions. This progress on GREET and PEMS has been important in BEP's ongoing life cycle assessment (LCA) to analyze and measure the total environmental impact of using the Vector System in the tractor. The LCA will be presented in the spring, and it will be used to compare the environmental impacts of running the tractor with the Vector System and with just diesel fuel. BEP is currently in the process of collecting data by combining data from the GREET software and the PEMS unit. Once this data has been collected, it will be analyzed by measuring the global warming potential of various greenhouse gases. BEP has also developed a new 3-week rotation of different testing procedures for running the tractor, which will allow for broader testing of the Vector System. In the final week of the in-person portion of the semester, BEP plans to calibrate the PEMS unit to start collecting sample data.

