TURF ALGAE

Maximizing the product value from converting whole algae to fuels and chemicals enhances the economics of renewable fuels.

OVERVIEW

Sandia National Laboratories, in partnership with the Smithsonian Institution and HydroMentia, are pursuing the affordable, scalable, and sustainable production of biofuels from benthic algal polyculture turf biomass. The highly productive, easily harvested, and dewatered algae is a promising new alternative for achieving higher and more reliable biofuel productivity at reduced costs. In comparison to monoculture planktonic algae grown in open pond raceways, the infrastructure and operations of polyculture turf algae resemble conventional open field agriculture, allowing for the use of mechanical farm equipment that reduces the energy output required for harvesting and dewatering.

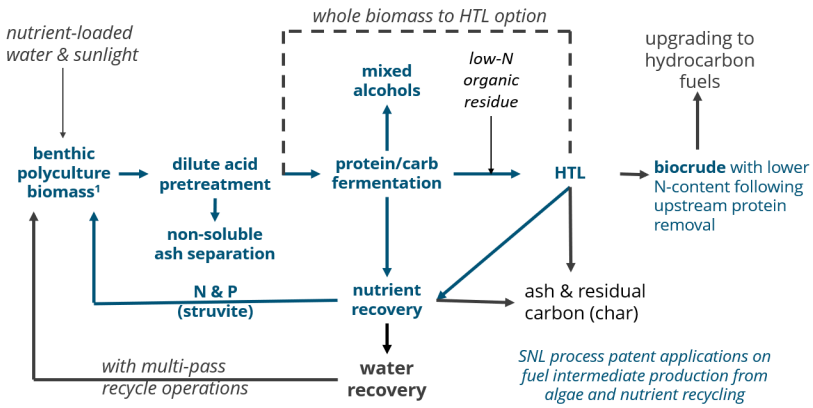
Currently, benthic algal polycuture turf biomass is produced and harvested from an Algal Turf Scrubber (ATS™) system, a technology invented by Dr. Walter Adey of the Smithsonian Institution to effectively extract nutrients and contaminants from surface water. The biomass is then utilized to produce fuel intermediaries in Sandia's Integrated Biocatalysis Process. HydroMentia commercialized the ATS™ technology for use in water treatment applications with numerous multi-acre-scale systems in the US. Utilizing this technical approach creates a dual-use model for cleaning water systems and creating biofuels.

CHALLENGES

Sandia researchers focus on on these challenges:

- Maximizing value from entire biomass (proteins, carbohydrates, and lipids)
- Reducing the ash content of the produced, harvested biomass
- Increasing the overall biomass productivity for higher yields

Key Processing/Recycling Pathways



[1]Benthic algal polyculture turf will also include entrained planktonic species

NUTRIENT RECYCLING

The nutrient recycling process developed at Sandia enables:

- Recycling of nitrogen and phosphate which keeps phosphate out of the environment.
- Lower nitrogen biocrude for upgrading to biofuels.

PROTEIN FERMENTATION

Fermenting proteins and carbohydrates from algae enables the creation of high-value chemicals including:

- Industrial solvents
- Polymers
- Fragrances and flavoring agents
- Biocides and insect repellants
- Pharmaceutical lead compounds
- Fertilizers

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