

Solazyme Integrated Biorefinery: Diesel Fuels from Heterotrophic Algae

Solazyme, Inc. will build, operate and optimize a pilot-scale “Solazyme Integrated Biorefinery.” SzIBR will demonstrate integrated scale-up of Solazyme’s novel heterotrophic algal oil biomanufacturing process, validate the projected commercial-scale economics of producing multiple advanced biofuels, and enable Solazyme to collect the data necessary to complete design of the first commercial-scale facility.

Solazyme’s technology transforms high-impact, domestic, renewable lignocellulosic feedstocks to oil-based fuels that leverage and remain fully compatible with the petroleum economy, at costs comparable with petroleum. Competing approaches, in contrast, offer imperfect fuel substitutes rather than chemically identical replacements. Solazyme’s approach will enhance national energy security and help the US to reach the goals of the Renewable Fuel Standard (RFS) not only by displacing petroleum imports, but also by maintaining full compatibility with existing petroleum refining, distribution, storage, retailing and vehicle infrastructure.

Project Description

Solazyme’s innovative process harnesses the capacity of some algae to produce as much as 75% of the dry weight of the cells as oil. In Solazyme’s process, algae grow efficiently in the dark in industrial



CAPTION: Left to right: (a) Laboratory scale fermentation of algae (b) Dried algal biomass (c) Purified algal oil (d) Thousands of gallons of algal oil have been produced in non-integrated tolling facilities. Solazyme algal oils have been refined to transportation fuels that meet industry specifications. (e) Solazyme’s biodiesel and renewable diesel have powered a light truck and three cars with unmodified diesel engines for thousands of miles on the open road (with blends ranging from B20 to B100).

fermentation vessels to very high cell densities. They ingest and metabolize carbon substrates provided in the growth media and convert them to triglycerides – nearly identical in composition to common vegetable oils. The quantity of oil produced per day per liter of fermentor volume is extremely high. This high productivity makes the process extremely capital efficient and economically far more attractive than biofuel concepts that rely on photosynthetically grown algae, or that produce ethanol or many other non-ideal fuel substitutes.

Solazyme has also pioneered methods to recover and purify the algal oil inexpensively with high yield. Existing oil refineries can either transesterify the purified algal oil to yield biodiesel, or hydrotreat it to yield renewable diesel or jet fuels. Solazyme has already produced thousands of gallons of algal oil and has refined algal oil into fuels that comply with applicable ASTM

standards without any blending with other fuels or fuel feedstocks.

Solazyme will demonstrate production at SzIBR of algal oil derived entirely from lignocellulosic feedstocks (switchgrass, corn stover, wheat straw and/or municipal green waste), as well as other feedstocks, as part of the project. Solazyme’s biofuels derived from these feedstocks will reduce lifecycle greenhouse gas emissions by over 90%.

Potential Impacts

The proposed project will create or preserve 88 jobs per year directly and 256 jobs per year indirectly.

Other Participants

Abengoa Bioenergy Corp.
BlueFire Ethanol, Inc.
Renewable Energy Group, Inc.
UOP LLC

Prime	Solazyme, Inc.
Location	Riverside, PA
Feedstock (s)	Sucrose (from cane); municipal green waste; switchgrass
Size	13 metric tons of dry feedstock per day (peak capacity)
Primary Products	Biodiesel and Renewable Diesel from Purified Algal Oil
Capacity	300 KGY Purified Algal Oil
Award Date	TBD
GHG Reduction	>90% reduction versus fossil product at commercial scale
Anticipated Job Creation	344
Company Point of Contact	Pete Rocha