

Document: Summary/Abstract for Public Release

Applicant Name: Viridos

Project Title: Pre-pilot Integrated Sustainable Aviation Fuels Algae Biorefinery

Principal Investigator: Dr. Rob Brown, Viridos

Key Partners: National Renewable Energy Laboratory (NREL)

An important limitation of the scalability of algae-to-fuel processes is the current lack of demonstrated large-scale oil extraction of algal biomass and upgrading of algal oils, which would allow for testing compatibility and resulting fuel properties of the resulting Hydroprocessed Esters and Fatty Acids and Synthetic Paraffinic Kerosene (HEFA-SPK). Demonstrating successful yield and oil quality is imperative to reaching the target volumes of SAF at a national level and in compliance with local (California) and federal standards.

This project will deliver a demonstrated scalable, deployment-ready oil-extraction system focused on creating a low carbon-intensity pathway to algae-based sustainable aviation fuels (SAF). The envisioned system will be developed to support production of at least 0.5 dry ton per day algal biomass at Viridos' California Advanced Algal Facility (CAAF), in Calipatria, CA, and processing and extracting oil using NREL's pilot plants to meet the equivalent target of at least 35 gallons of upgrading-ready oils.

Viridos, formerly Synthetic Genomics, is a leader in the field of synthetic biology and innovative algae farming and ideally positioned to lead this work. Over the last four years Viridos has progressed its leading genetically engineered strains and demonstrated their robust performance at outdoor scale in open raceway ponds. At the California Advanced Algal Facility (CAAF) site, on 7 workable acres of algae production systems, under authorization and supervision of the U.S. EPA, genetically engineered algae strains are cultivated to reach unprecedented productivity and lipid quality targets, such as the 2022 best-case demonstrated 9 g oil per m² per day (equivalent to 5-7 tons of oil per acre per year) productivity for a warm-season production run.

The National Renewable Energy Laboratory (NREL) is home to two pilot-scale facilities. For this work, we will use the capabilities of the biochemical pilot plant at the Integrated Biorefinery Research Facility (IBRF). This facility has executed many projects over the last 25 years for BETO and industrial clients.

The proposed work will demonstrate a de-risked technology suite that meets technical, economical and carbon efficiency targets scale up of a pretreatment and extraction process specifically tailored to the unique high-quality algae produced at scale.