

Control Number: 2396-1552

Applicant: LanzaTech, Inc.

PI: Dr. Sean Simpson

Title: Low-cost Sustainable Aviation Fuel from Waste CO₂

Partners: LanzaJet Inc., Argonne National Lab

LanzaTech, Inc. (LT) proposes to build and operate a pre-pilot implementation of an innovative highly energy efficient and nearly 100% carbon efficient pathway to produce Sustainable Aviation Fuel (SAF) from biogenic waste carbon dioxide (CO₂) and hydrogen (H₂), using renewable electricity. The pathway uses gas fermentation to produce an ethanol feedstock for conversion to SAF via the LanzaJet™ Alcohol-to-Jet process (ATJ). Low-cost renewable electricity provides abundant opportunities to transform and decarbonize the energy economy through electrification. The aviation sector, however, has only limited options to benefit directly from renewable electricity and remains heavily dependent on energy-dense liquid fuels. The proposed pathway offers an exciting opportunity to leverage renewable electricity in decarbonizing aviation. The technology has the potential to produce ~4.6 billion gallons of low-carbon SAF from the CO₂ emitted by existing U.S. corn ethanol plants alone, with GHG savings of near 100% relative to conventional jet fuel. As additional captured CO₂ becomes available, including CO₂ from direct air capture, the SAF production potential will only grow and GHG savings will increase.

Together with our partners Argonne National Laboratory (ANL) and LanzaJet, Inc., and industry technology providers, we seek to optimize and drive down the cost of producing ethanol ATJ feedstocks from renewable electricity and CO₂. To accomplish this goal, we will integrate H₂ production with CO₂ fermentation in a pre-pilot that leverages LT's next generation, high gas mass transfer IMPACT Reactor. The pre-pilot will incorporate innovations in both technology integration and operations to achieve an ultra-high ethanol productivity as a means to achieve the throughput equivalent of 35 gal/day of hydrocarbon production prescribed by the FOA. As part of the project, we will provide CO₂-derived ethanol to LanzaJet for conversion to SAF in the LanzaJet Freedom Pines Fuels facility. DOE investment in this project will provide the largest demonstration of biogenic CO₂ conversion to date and enable rapid commercialization of this new route to produce SAF from waste CO₂.