

SUMMARY/ABSTRACT

Under Topic Area 2: Affordable, Clean Cellulosic Sugars for High Yield Conversion, the proposed Sugar is the New Crude™ project will demonstrate the production of clean lignocellulosic sugars from three exceptionally low-cost feedstocks: construction waste, energy cane, and forest residues using AVAPCO's patented AVAP® biorefinery process. These feedstocks have been identified by the Department of Energy, the United States Department of Agriculture and the bioeconomy industry as offering cost-advantaged production of biofuels and bioproducts as well as additional advantages including:

- Reduction of escalating, costly forest fires (forest residues)
- Land-fill CO₂ emissions (construction waste)
- Exceptional carbon sequestration (high productivity energy cane)

With the growing commercial interest in sustainable aviation and marine fuels, a wide variety of low-cost biomass feedstocks will be required to satisfy extremely large aviation fuels markets. In addition, it may be necessary to avoid conventional woody biomass sources (high quality trees) so that the traditional lumber and pulp and paper markets are not pressured.

AVAP's four downstream partners, BASF, Arbiom, Corbion, and Genomatica will evaluate the quality and convertibility of the three low-cost lignocellulosic sugars across a variety of downstream upgrading approaches to gain a diverse understanding of the quality of the substrates. In addition, an established Alcohol-to-Jet Technology partner will evaluate the technical specifications of cellulosic ethanol produced by AVAPCO from the various AVAP sugars to confirm if the ethanol from each source meets their quality requirements for conversion to bio jet fuel. HBCU Clark Atlanta University's students and professors will perform data science analysis of project data.

Goals of the project include:

- Glucose from cellulose performs similar to dextrose DE95 (>90% relative to glucose) as confirmed by external conversion partners.
- Hemicellulose sugars fermented to cellulosic ethanol with 90% of theoretical yield
- Degree of sugar purification to achieve conversion targets defined for each feedstock and biofuel/bioproduct and associated CAPEX and OPEX estimates obtained
- AVAP lignocellulosic sugars (C5 and C6) from construction waste, energy cane, and forest residues can be produced for less than \$0.20/lb at the nth commercial-scale plant, including any necessary purification costs
- Incorporation of underserved communities on project team and STEM mentorship