

FY22 DOE Scale-up of Integrated Biorefineries and GHG Reduction. DE-FOA-0002638	Summary for Public Release	Control Number: 2638-1508
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Project Title	Renewable Blending Components to Enable 100% Sustainable Aviation Fuel (SAF)	
Applicant	Captis Aire LLC	
Principle Investigators	Kim Tutin (Captis Aire LLC) and Dr. Andrew Sutton	
Co-Investigators	Dr. J. Heyne, Dr. J. Ellsworth, Dr. P. Loezos	
Project Participants	<ul style="list-style-type: none"> • Boeing • Oak Ridge National Lab • Washington State University 	<ul style="list-style-type: none"> • Captis Aire • RPD Technologies

Description: This project will demonstrate the conversion of gaseous carbon wood wastes (terpenes) to renewable Terpenes SAF blending components. We will blend these with fuels from previously ASTM approved SAF production pathways, for example Hydroprocessed Esters and Fatty Acids Synthetic Paraffinic Kerosene (HEFA-SPK), to provide fully formulated, backwards compatible, 100% SAF, also termed ‘drop-in’ SAF. Currently, SAF is typically blended with fossil fuels. This diminishes the sustainability of the resulting fuel. This issue has motivated R&D toward the development of the fully formulated, drop-in Terpenes SAF. This approach enables 100% SAF for the three most technically mature SAF pathways, termed “Leader Pathways”. The SAF blends are expected to meet not only minimum ASTM specification requirements, but also density requirements. Hundreds of millions of gallons of drop-in 100% SAF will be unlocked.

Methods: The state of the art oxidizer (burns) valuable terpenes “wastes” liberated in gaseous form from drying green pine wood. These oxidizers are literally “gas guzzlers”. They can use literally hundreds of thousands of BTUs/year per site and the only thing they create is greenhouse gases (GHG). Instead, the team will demonstrate a 1/250 scale Terpenes Collector pre-pilot that uses specialized bead activated carbon to efficiently collect the terpenes rather than burn them. Scalable catalytic conversion methodologies will be developed to convert the terpenes to Terpenes SAF blending components. These will be blended with other SAF to provide 100% SAF.

Objectives: Objectives are to 1) provide economically viable, fully formulated, “drop-in” 100% SAF, 2) make hundreds of millions of gallons/year of 100% SAF, 3) reduce GHGs in SAF and wood products manufacturing by >70%, 4) reduce energy usage by >10 trillion BTUs/year, and 5) convert >90% of biogenic gaseous carbon terpenes “wastes” to SAF.

Impacts: DOE funding would de-risk technology scale-up. This would support an equitable clean energy future by enabling economic viability and expansion of wood products production, renewable clean energy production, diverse team leadership including personnel typically underrepresented in STEM, and manufacturing jobs located in underserved rural communities. Further, it would help put the U.S. on a path to achieve net-zero emissions, by reducing greenhouse gas emissions from hundreds of wood products manufacturing and providing a potentially carbon negative SAF. Cumulative benefits for 50 sites include reducing GHG emissions by ~1 Million tons per year and reducing energy usage by >10 trillion BTUs as compared to the state of the art “gas guzzler” oxidizers. Further upside potential is strong as the wood products industry grows aggressively in rural communities. While the current target is the wood products industry, the DOE impact on the FBC technology could be truly transformative to the emissions control industry via expansion into the other 104 industries subject to the clean air act.