

Here's what it will take to get aviation biofuels off the ground

By [Ucilia Wang](#) November 5, 2018



United is sourcing 1 million gallons of jet fuel, a 30 percent biofuel blend, from AltAir Fuels in the Los Angeles area.

Air travel is one of the fastest growing sources of carbon emissions, accounting for 2 percent of the total global footprint. To put it another way, as the [European Commission helpfully has described](#), "If global aviation was a country, it would rank in the top 10 emitters." What's more, by 2020, estimates suggest that this type of fossil-fuel burning pollution will soar 70 percent higher than the 2005 levels.

How well are the airline industry, which supports [\\$2.7 trillion](#) in economic

activities worldwide, and its regulators doing in cutting emissions? Not very. But pressure to do more is mounting as a 2020 deadline approaches for ensuring that global aviation will stay carbon neutral thereafter, a goal that will need biofuel to play a role.

"Batteries to fly a large plane are still way off in the future. Boeing is still looking at liquid-fuel planes for quite a few years," said Maria Race, director of sustainability and air emissions and strategy program at United Airlines, said at the recent VERGE 18 conference in Oakland, California. "There's a compelling case for bio jet fuel. We need to scale up."

The development of biofuels for jet airplanes has been tortuously slow for technical, financial and regulatory reasons, including the long process for certifying any new type of fuel. An array of investments and partnerships between airlines and biofuel makers have been announced in the past decade, but so far there isn't a single plant capable of making aviation biofuel at a commercial scale of tens of millions of gallons per year.

"There's a lot of technology risk and therefore a lot of investor risk in making biofuels," said Jennifer Holmgren, CEO of Chicago-based LanzaTech, which recently supplied the biofuel for a 6 percent blend to power a test flight by Virgin Atlantic between Orlando, Florida, and London. "You need some failures — that's what you would expect in a new sector. We will have some successes."

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no penalties for increasing their carbon footprints. The European [Commission scaled back the rules](#) for making airlines pay for exceeding limits for emissions because it was counting on an organization within the United Nations, the International Civil Aviation Organization (ICAO), to set targets and plans to cut emissions given the global nature of the industry.

ICAO is still negotiating with nations and the aviation industry over rules for setting emission-reduction goals for international flights, and measuring and validating efforts to reach them. There is a near-term goal of staying carbon-neutral by using a combination of carbon credits and biofuel after 2020.

Under the current framework, however, domestic flights would be governed by each country's own plan for complying with the Paris accord. Since the United States, the largest aviation market in the world, is getting out of that global agreement on climate change, that leaves its intentions up in the air.

Critics say governments are reluctant to require the aviation industry to seriously cut emissions, a strategy that could increase operational costs, because air travel for passengers or freight is so critical for their economies. Washington state voters will head to the polls next week to [decide on carbon tax](#), which will exempt Boeing.

"There isn't a political will to do it," said Jori Sihvonen, clean fuel officer with Belgium-based Transport & Environment, a coalition of European environmental and transportation policy groups. "The political reality is countries are unwilling because they are afraid of losing their competitiveness."

United is ahead of other airlines in [making good on its promise](#) to use biofuel to reduce emissions. Even then, the company is buying just 1 million gallons of biofuel per year when it needs 4 billion gallons of fuel for its entire

fleet. The biofuel comes from AltAir Fuels near the Los Angeles International Airport; from that airport, the airline flies jets with a 30 percent biofuel blend. In 2015, United invested \$30 million in Fulcrum BioEnergy, which broke ground near Reno, Nevada, in May on a plant with the capacity to produce 10 million gallons of jet fuel from household trash annually.



The other airlines that have put money and purchase agreements in place are part of a small club. There's Hong Kong-based Cathay Pacific, which also took a stake in Fulcrum. Southwest Airlines and FedEx have signed contracts to buy biofuel from Red Rock Biofuels, which broke ground on a plant in Oregon in July that could produce 15 million gallons of fuel annually from wood wastes. British Airways is working with Velocys to build a plant to produce fuel from trash in the United Kingdom. The project just completed an initial development stage and recently secured \$6.37 million for an engineering and site-selection study. JetBlue and Qantas Airways [signed agreements](#) to buy fuel from SG Preston.

Many biofuel makers that had an interest in the aviation business primarily were gunning for the ground transportation business, and many [went out of](#)

[business](#) when they ran into technical problems in mass production or couldn't raise enough money to build production plants. Some pivoted to make oils for food and cosmetic industries or otherwise found money to keep research and pilot projects going until they could convince airlines to sign long-term purchase agreements, which they could then use to line up money to build production plants.

"A lot of people feel that the one market that has at least a glimmer of light is the alternative fuel jet market," said Michael Wolcott, director of [Ascent](#), a federally funded coalition of universities and industry in aviation research, at Washington State University. "The industry is growing more rapidly than the fuel savings. The only way to meet climate goals is to decarbonize the fuel."

Airlines prefer biofuels made from some sort of waste instead of food supplies or other feedstocks that could [encourage forest clearing](#) to farm crops, Sihvonen said. Waiting for technology that could convert wastes to jet fuel took time. So was the process of going through the [process to certify new types of jet fuel](#), and that could take years.

LanzaTech's biofuel for the Virgin test flight took two years to secure the certification, after reviews by mostly aircraft and engine makers pored over technical data of the fuel, Holmgren said. The company made the jet fuel from ethanol, which it made using captured waste gases from a steel mill in China.

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Holmgren said LanzaTech has "letters of support" from airlines but declined

to name them except Virgin, which is lobbying the U.K. government to provide more financial aid and other incentives to help LanzaTech build a plant there. The government already gave the company more than \$520,000 for a feasibility study.

The company also wants to build a plant with a 10 million-gallon capacity in Georgia, on a site it bought a few years ago at an auction for assets of Range Fuels, a biofuel company that ran out of money and [went out of business](#) in 2011. LanzaTech, which turns ethanol into jet fuel, is applying for a loan guarantee from the U.S. Department of Energy to help cover the estimated \$50 million for building the plant, Holmgren said.

The buildout of alternative jet fuel plants is slow, conceded Wolcott, and that's worrying in an industry that expects the number of jet passengers to double to [8.2 billion by 2037](#). But he also contends that people also can be impatient when history has shown that replacing one major energy source with another on a global scale would take 50 years or more.

"We don't have that kind of patience because a lot of us are used to the tech boom of the last decade and the adoption of iPhone," Wolcott said. "It's important to get the first, second and third plant built because that's how we gain efficiencies. We need to have patience with biofuel."