SAF Tracker

Sustainable aviation fuel newsletter

November 2022

Highlights

- ICAO member states added to their long-term goal to be net-zero carbon by 2050 in addition to their existing goal of carbon offsetting their operations boosting support for SAF further.
- Qatar Airways became the first airlines in the Middle East and Africa to commit to net-zero by 2050 and Southwest Airlines added an interim target to cut CO_2 emissions by 20% compared to 2019 by 2030.
- Out of five SAF plants that were announced recently, three plants are based in the U.S. while one is a pilot plant based in Japan.
- Alcohol-to-jet is the leading technology with four out of the five announced plants being based on the technologies developed by LanzaJet (to own and operate), Gevo (to be owned by Brasil BioFuels), Air Company (to own and operate), and Axens (to be owned by Idemitsu).
- Technology developers are aiming for a SAF that is a 100% drop-in solution as opposed to a blended solution, for instance, the lignin-based SAF developed by NREL in collaboration with MIT and Washington State University.
- SAF is also being tested for use in applications such as helicopters and Belgian company, NHV, recently made their first test flight using SAF sourced from TotalEnergies.
- To support their decarbonization goals, airlines including Qatar Airways, Korean Air, Cathay Pacific, and the Air France-KLM group signed multi-year SAF purchase agreements with producers such as Gevo, Shell, Aemetis, and DG Fuels-Neste, respectively.
- Regulatory and policy pressures continue to intensify globally as more countries are setting clear goals for decarbonization.

This newsletter complements ADI Analytics' multi-client study on the future of jet fuel and sustainable aviation fuel. The newsletter will track airline commitments and efforts, plant announcements and technology developments, supply deals and partnerships, and regulatory and policy landscape developments. Contact us to subscribe today for an introductory price!

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- While the U.S. has announced a grand challenge and allotted budget to promote SAF as a part of the Inflation Reduction Act (IRA), India and Japan in Asia Pacific also announced goals to decarbonize aviation.

Demand and customer landscape

Airlines are committing to lower carbon intensity of their operations and setting up interim goals in addition to long-term goals

- **International Civil Aviation Organization (ICAO) state members adopt a long-term goal of net-zero carbon emissions by 2050** at their 41st Assembly in October 2022 in addition to carbon offset goals announced in 2020.
- **Southwest Airlines commits to an interim target for 2030 to help reach net-zero carbon emissions status by 2050** and cut carbon intensity of their operations by 20% compared to 2019 levels by 2030.
- **Air France aims to reduce its CO_2 emissions per passenger or kilometer (km) by 30% in 2030 compared to 2019** which will be a reduction of 12% in absolute terms in addition to their offsetting goals.
- **Qatar Airways commits to net-zero carbon emissions by 2050** becoming the first airline in the Middle East and Africa to do so.

Airline	Commitment
	State members adopt a long-term goal of net-zero carbon emissions by 2050
Southwest	Commits to net zero by 2050 with an interim target of cutting carbon intensity by 20% compared to 2019 levels by 2030
AIRFRANCE	Aims to reduce its CO_2 emissions per passenger/km by 30% by 2030 compared to 2019 excluding offsetting efforts
QATAR AIRWAYS	Commits to net-zero carbon emissions emission by 2050

Exhibit 1. Decarbonization commitments by airlines

Supply and plants landscape

- **LanzaJet to receive $50 million grant for alcohol-to-jet SAF plant** from Breakthrough Energy Catalyst, a funding program for

early commercial-scale clean technologies. The plant called Freedom Pines Fuels SAF plant in Soperton, Georgia is LanzaJet's first commercial scale SAF plant.

- **Topsoe to support SAF production facility in Manaus, Brazil for Brasil BioFuels, the first in the country.** The facility will use Topsoe's Hydroflex™ technology for 500,000 tons per year (tpy) or 165 million gallons per year (gpy) production of SAF and is expected to start-up in 2025.

Alcohol-to-jet investments are rising with two plants announced using LanzaJet and Gevo's technology …

- **South Dakota Biotech to build SAF facility in Lake Preston using Gevo's alcohol-to-jet technology.** It is expected to come online in 2025 and will produce 55 million gallons of aviation fuel annually.

- **Air Company starts CO_2-based SAF production** after developing the process to distill vodka using captured CO_2. The company's total funding reached $40 million after $30 million investment round that included investments from Carbon Direct Capital Management and JetBlue's and Toyota's venture capital arms.

… And two pilot plants using Air Company and Axen's technologies each

- **Idemitsu plans to build a pilot SAF production plant in Japan** using Axens alcohol-to-jet technology. The capacity of the pilot project will be 100,000 liter per year or about 2,000 gpy and is expected to start production in 2026 with a second plant expected to bring the production to 12 million gpy by 2030.

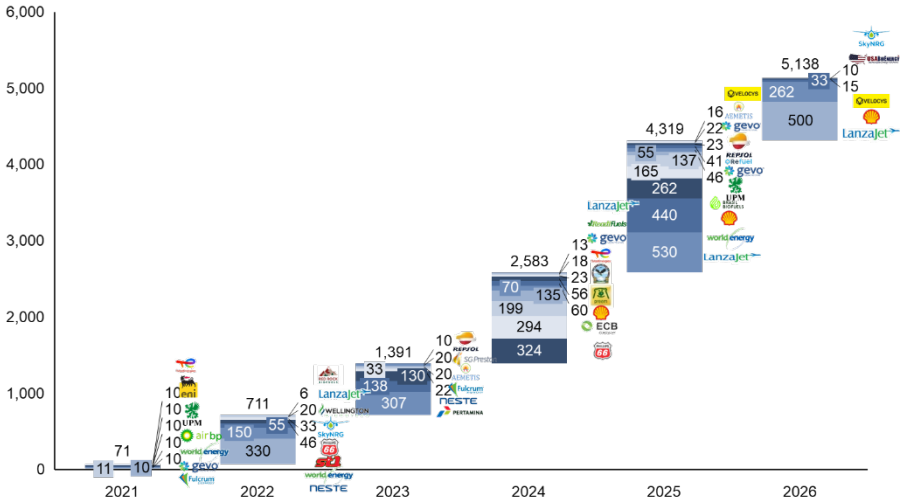

Exhibit 2. Expected SAF supply by 2026 in million gpy

Technology developments and testing

Technology developers are pushing for a 100% drop-in SAF solution

- **New process by National Renewable Energy Laboratory (NREL) could allow 100% SAF use in airlines** due to the success in using 'Lignin'. Lignin, that is typically burned for heat and power or used only in low-value applications, was tested as feedstock for SAF by NREL along with partners Massachusetts Institute of Technology (MIT) and Washington State University as a new 100% drop-in fuel.

- **Honeywell launches ethanol-to-jet fuel technology to meet rising demand for SAF.** The new technology, developed by Honeywell India Technology Center, is projected to reduce greenhouse gas (GHG) emissions by 80% on a total lifecycle basis, compared to petroleum-based jet fuel. Honeywell aims to contribute and enable India to meet its 2030 SAF mandates and 2070 emission reduction targets.

- **Belgium helicopter operating company, Noordzee Helikopters Vlaanderen (NHV) completes first SAF helicopter fight** in collaboration with TotalEnergies. According to NHV, using SAF will reduce flight CO_2 emissions by 27%.

Partnership and tie-ups

Several airlines are locking in SAF supply to ensure meeting carbon intensity reduction goals

- **Qatar Airways to buy 25 million gallons of SAF from Gevo** over the course of five years as part of its commitment to net zero emission by 2050 with deliveries starting 2028 from various airports in California.

- **Korean Air to purchase SAF from Shell beginning 2026 over five years** through 2032 as a part of its efforts to cut emissions and switch to environment-friendly fuel. The deal comes in accordance with the national commitment to reduce carbon emissions by 40% of 2019 levels by 2030.

- **Cathay Pacific to purchase 38 million gallons of SAF from Aemetis** which will be delivered over seven years beginning 2025 from San Francisco International Airport. The blended SAF will contain 40% SAF and 60% petroleum Jet A-1 fuel to meet international blending standards.

- **Air France-KLM signs multi-year SAF purchase agreements with Neste and DG fuels** for a total volume of 1.6 million tons beginning 2023. Neste will supply 1.0 million tons from 2023 to 2030 and while DG fuels will supply 600,000 tons from 2027 to 2036.

Airline	Producer	Discussion
QATAR AIRWAYS	gevo	Qatar Airways signed an agreement to purchase 25 million gallons of SAF from Gevo over the course of five years
KOREAN AIR	Shell	Korean Air signed a five-year deal with Shell to purchase SAF from 2026
CATHAY PACIFIC	AEMETIS	Cathay Pacific signed an offtake agreement with Aemetis for the of supply blended SAF starting 2025
AIRFRANCE KLM GROUP	DG FUELS NESTE	Announced a multi-year SAF purchase contract for a total of 1.6 million tons that will start from 2023

Exhibit 3. Recent SAF purchase agreements

Countries are setting clearer goals and setting up guidelines to meet decarbonization goals

Regulatory and policy landscape

- **The U.S. released SAF grand challenge roadmap** outlining the government-wide strategy for scaling SAF production across the country. It is a result of MoU among the U.S. Department of Energy, the U.S. Department of Agriculture, the Environmental Protection Agency, the U.S. Department of Transportation, and its Federal Aviation Administration. The plan involves acceleration of SAF related research, development, demonstration, and deployment to reach 35 billion gallons per year production capacity by 2050.

- **Japan's drafted policy on aviation decarbonization features SAF** which would require domestic airlines to be carbon neutral by 2050. The policy draft has set three primary targets for airlines including airlines to stabilize CO_2 emissions from international flights, CO_2 emissions reduction from domestic flights by 16% by 2030 compared to 2013 baseline, and making both international and domestic flights carbon neutral by 2050.

- **Indian Ministry of Civil Aviation and the Ministry of Petroleum and Natural Gas to issue a roadmap for SAF soon** aiming to make Indian airlines a part of Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) from 2027 onwards.