Flash Analysis

Credit Risk Management

Aviation

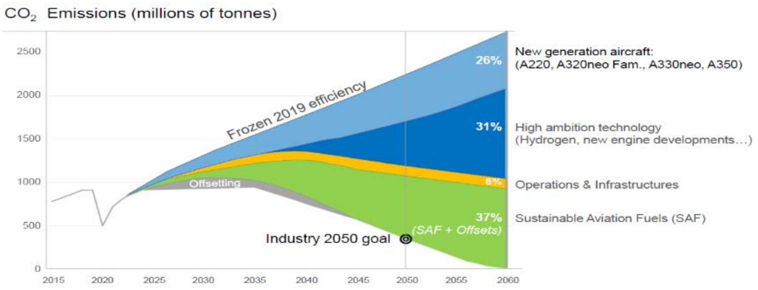
››› Sustainable Aviation Fuels – The (climate) saviour of aviation?

Juni 2021, Daniel Busik, Markus Feth, Lene Stauß

Increasing interconnectedness of international supply chains, cross-border trade in goods and services, globally rising standards of living and a growing demand for mobility have resulted in aviation becoming one of the world's most important modes of transport in recent decades. In 2019 alone, aviation carried over 4.5 billion passengers. The International Air Transport Association (IATA) expects passenger numbers to rise to 8 billion by 2039. At 915 million tonnes, aviation was responsible for 2% of global CO_2 *emissions in 2019. This figure will increase significantly in the future due to rising passenger numbers. Targeted countermeasures are therefore necessary if aviation is to contribute positively to fulfilling the Paris Climate Agreement.*

Aviation climate targets

The aviation industry has agreed to halve its CO_2 emissions by 2050 compared to 2005, and to realize CO_2-neutral growth from 2020. A 4-pillar strategy has been developed to achieve these targets. The four pillars are engineering, operations, infrastructure and aviation emissions offsetting (CORSIA[1]). Technological innovations (e.g. hydrogen aircraft, open rotor) can only contribute to global emissions reductions in the long term because of the lengthy development and utilisation periods of aircraft. Similarly, upgrading operations and infrastructure provide only comparatively low emission savings at a high cost. Therefore, in addition to CORSIA, the use of Sustainable Aviation Fuels (SAF) will be crucial to achieving CO_2-neutral growth by 2035.



Source: Airbus (2021), *Airbus Financier Forum*

What are SAF?

Potential CO_2 savings: 60–80%

SAF are alternatives to fossil-based aviation fuel and meet specific sustainability criteria. They are considered “drop-in fuels” which require no technical adjustments to infrastructure – the current blending limit with conventional jet fuel is up to 50%. However, no standard definition of the sustainability criteria currently exists. The EU stipulates in its Renewable Energy Directive (RED II) that biofuels must reduce emissions by at least 65% compared to the fossil baseline in order to be recognised as SAF. By contrast, criteria from the International Civil Aviation Organisation (ICAO) refer to a 10% reduction in greenhouse gas emissions and specific acreage

---

[1] CORSIA: Carbon Offsetting and Reduction Scheme for International Aviation

requirements. Emission reductions can be quantified using “life cycle assessments”, according to which SAF CO_2 emissions are set relative to conventional jet fuels as reference values. Current estimates indicate that CO_2 emissions can be reduced by 60–80% in the future by using SAF. Furthermore, SAF combustion produces fewer nitrogen/sulphur oxides and fine dust particles.

How are they made...

…Hydroprocessed esters and fatty acids (HEFA)

…Fischer-Tropsch (FT)

…Power-to-Liquid (PtL)

Globally, seven production processes have already been approved under the ASTM D7566 standard. HEFA is the most commercially mature technology to date and uses hydrogenation to convert oils and fats into SAF. The FT process is also already far advanced. In this process, carbon-containing material such as biomass is first broken down into a syngas and then transformed into SAF using FT synthesis. The PtL process is seen as having the most long-term potential. Green hydrogen is used here to produce SAF.

High costs as a barrier

Widespread use of SAF is currently still being hampered by a number of factors. These obstacles include price, lack of cultivation areas, lack of incentive systems and the high level of investment required. SAF costs depend heavily on the raw materials and manufacturing process being used. The most inexpensive process, HEFA, costs around USD 1,200 per tonne (fossil-based aviation fuel cost USD 600 per tonne in 2019). However, HEFA facilities are currently using the majority of their capacities to produce biodiesel. Biodiesel is both simpler to make and has higher margins. Switching to SAF-only production would reduce overall output and would not currently be profitable for producers.

Land required for cultivation

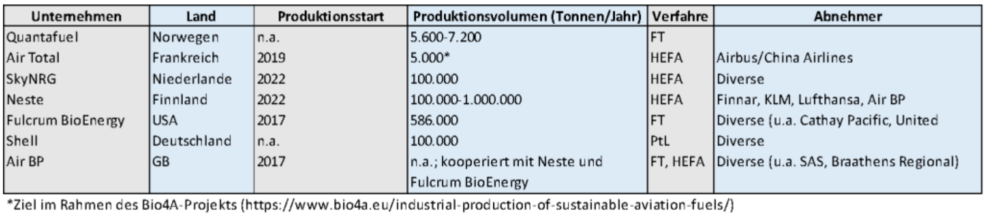
As well as the purely financial constraints on SAF, acquiring raw materials in sufficient quantities is also a challenge. Using food-based raw materials would contradict the second Sustainability Development Goal. Moreover, to meet the aviation industry's global demand for biofuels, land 10 times the size of Germany would be needed (FT, HEFA). The increased use of monocultures would also be detrimental to local biodiversity. Remedies could include the alternative use of waste materials or algae. In the future, using solar power (PtL) could reduce the amount of land required by up to 90%.

EU with the need to catch up

Despite the RED II initiatives and the EU Emission Trading Scheme, there is currently no sufficient incentive scheme in the EU that would sustainably increase SAF competitiveness. By contrast, Norway, as a European pioneer in SAF, stipulated that fuel must contain 0.5% SAF from 2020.

Conclusion

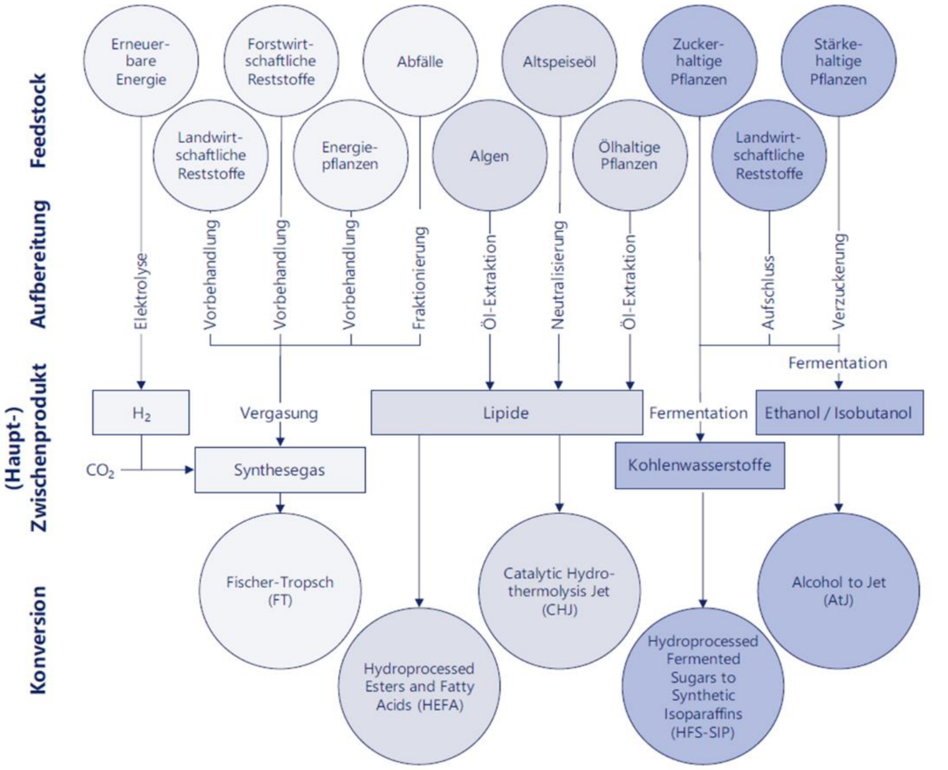
In the short term, SAF use is indispensable to achieving climate targets. This is a view shared by industry representatives such as aireg, ICAO and participants at the World Economic Forum. The ongoing high costs of alternative fuels are expected to be reduced in the medium to long term through increased production capacities and the increased use of PtL. Investments in new facilities already announced raise confidence that SAF's competitiveness can be significantly increased. From 2035, new propulsion concepts (hydrogen, battery) are expected to further reduce aviation's CO_2 emissions.



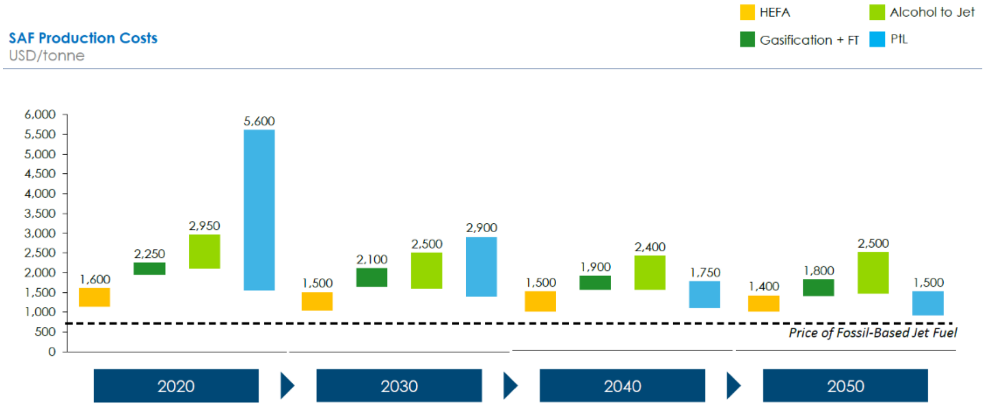
Unternehmen	Land	Produktionsstart	Produktionsvolumen (Tonnen/Jahr)	Verfahre	Abnehmer
Quantafuel	Norwegen	n.a.	5.600-7.200	FT	
Air Total	Frankreich	2019	5.000*	HEFA	Airbus/China Airlines
SkyNRG	Niederlande	2022	100.000	HEFA	Diverse
Neste	Finnland	2022	100.000-1.000.000	HEFA	Finnar, KLM, Lufthansa, Air BP
Fulcrum BioEnergy	USA	2017	586.000	FT	Diverse (u.a. Cathay Pacific, United
Shell	Deutschland	n.a.	100.000	PtL	Diverse
Air BP	GB	2017	n.a.; kooperiert mit Neste und Fulcrum BioEnergy	FT, HEFA	Diverse (u.a. SAS, Braathens Regional)

*Ziel im Rahmen des Bio4A-Projekts (https://www.bio4a.eu/industrial-production-of-sustainable-aviation-fuels/)

Source: Own table based on European Parliament (2020), *Sustainable Aviation Fuels*



Source: aireg (2020), *Nachhaltige Flugkraftstoffe - Status, Optionen, Handlungsnotwendigkeiten*



Source: World Economic Forum (2020), *Clean Skies for Tomorrow: Sustainable Aviation Fuels as a Pathway to Net-Zero Aviation*