Climate Catalyst

With input from PRI Principles for Responsible Investment

Charting a greener course:

The role of Sustainable Aviation Fuels in the net-zero transition

- Sustainable Aviation Fuels — or SAFs — could significantly reduce the environmental impact of aviation.
- The sustainability and scalability of these fuels depends on how they are produced and the feedstock used.
- The highest-integrity and most scalable SAFs are e-fuels made with responsibly-sourced carbon dioxide and hydrogen produced with renewable electricity.
- Investors can play an important role in scaling these high-integrity e-fuels.

Not all SAFs are created equal

	Crop-based biofuels	Waste-based biofuels	E-fuels
Feedstocks	Crops such as corn, sugarcane or cover crops	Organic wastes, such as used cooking oils, animal fats, forestry residues, and municipal waste	Hydrogen (H_2), carbon dioxide (CO_2) and renewable energy (RE)
Supply and scalability	**Variable but limited** due to environmental criteria	**Very limited** and better used elsewhere like heavy road transport	**Easily scaled** but RE should be additional
Emission reduction potential (compared to conventional fuel)*	**~55%** CO_2 decrease	**27% - 77%** CO_2 decrease	**75% - 98%** CO_2 decrease (assuming low-emission electricity and zero lifecycle emissions)
Potential adverse environmental and social impacts	• Agricultural displacement and food insecurity • Undermine land rights • Soil degradation • Biodiversity loss • Water scarcity	• Resource competition • Produces pollutants	• High water requirements • High need for critical renewable energy • Sustainability of CO_2 streams can vary • Risk of incentivising emission-intensive industries
Cost (compared to conventional fuel)**	**2.4 - 7 times** more expensive	**~1.4 times** more expensive	**3.2 - 5 times** more expensive
Policy coverage	• **Permitted under fewer policies** • Stringent stipulations on feedstocks and lifecycle emission reductions	• **Allowed under most policies** • Some stipulations and caps on feedstocks	• **Encouraged under most policies** • Increasingly supplies required under EU and UK SAF mandate

This table illustrates variable averages based on several technology production pathways and are subject to frequent change.
Emission reduction potential* and cost figures** are based on analysis by Watson et al. 2024 and the IEA, 2023

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Insights for investors

Investors can differentiate between categories of SAF required for the fuel transition.

Institutional investors can consider opportunities to support e-fuels uptake.

Investors can ask portfolio companies to clarify the type of feedstocks they are using.

Investors can contribute to policy developments and emerging regulations on the fuels transition.

Investors can consider just transition, equity and environmental implications of the aviation sector's fuel transition in relation to long-term decarbonisation.

Investors can engage with other decarbonisation levers involved in the long-term decarbonisation pathway to net zero aviation.

For more detail on the different types of SAF see our full report at www.climatecatalyst.org/learning-hub/charting-a-greener-course-report