Net-Zero Aviation
ReFuelEU Mandates vs. Europe's SAF Competitiveness

Sustainable Aviation Fuels are crucial for decarbonizing the aviation sector.
These "drop-in" fuels offer a scalable and proven solution; however, despite increasing production capacity, global demand is expected to outpace supply, resulting in a gap of around 23 Mt by 2035.

Global capacity is unevenly distributed:

- North America represents the largest share, with around 35% of global capacity.
- Asia leads in project development, with more than 40% of sites already operational or under construction.
- Europe (EU + UK) could increase its share of the global SAF market from about 10% today to more than 20% by 2030. However, in 2024, cancelled capacities exceeded new additions, signalling a worrying erosion of Europe's industrial competitiveness.

After 2030, a "**tipping point**" is expected, when global demand will exceed the availability of HEFA feedstocks.
As a result, an urgent scale-up of advanced production pathways—such as e-SAF—is required to secure long-term supply.
To bring new SAF types to market (new feedstocks, new processes, or new SAF products), OEM approval is required through the **ASTM D4054** evaluation. This process is slow and expensive, and OEMs can assess only about two SAF candidates per year.

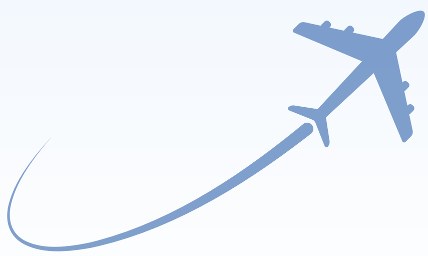
EU SAF Clearing House

The SAF Clearing House is a key initiative in the European ecosystem, established to lower the barriers manufacturers face in bringing new fuel types to market.
Launched in Q3 2023, it acts as a centralized, expert-managed mechanism offering services that streamline the approval process.

It supports manufacturers through:

- Preparation and Technical Evaluation: issuing pre-screening reports to determine whether a fuel requires new OEM approval (ASTM D4054) or fits within an existing ASTM D7566 annex.
- Approval Facilitation: providing reliable data and helping overcome the lengthy and costly testing requirements.
- Joint Task Forces: recommending that manufacturers with similar production pathways undergo evaluation jointly.

The establishment of the EU SAF Clearing House is therefore an essential step in addressing the barriers to SAF scaling, including the need for approvals for emerging feedstocks and production pathways.
Within this framework, the following fuel categories are permitted and can be supported: Advanced biofuels (Annex IX), RFNBO/e-SAF (synthetic fuels from renewable energy), and RCF (fuels derived from non-renewable waste or industrial exhaust gases).



Regulatory Framework

The European regulatory framework is defined by the European Green Deal and the “Fit for 55” package, which aims to reduce GHG emissions by 55% by 2030.

For aviation, the **ReFuelEU Aviation** Regulation mandates a gradual increase in SAF quotas for all flights departing EU airports: from 2% in 2025 to 70% in 2050.

To be eligible, fuels must comply with the stringent RED III sustainability criteria, ensuring at least 70% GHG savings.

The regulation specifies interim targets, requiring 6% SAF by 2030 and increasing to 20% by 2035. ReFuelEU allows the use of advanced biofuels (Annex IX), recycled carbon fuels (RCF), and renewable fuels of non-biological origin (RFNBO/e-SAF). To stimulate advanced pathways, the share of RFNBO (including e-SAF) supplied to the sector is considered equal to 1.5 times their energy content. Since the capacity of e-SAF is lower than that required for 2030, necessary actions are needed, such as the Net-Zero Industry Act, a legislative initiative aimed at supporting the production of clean technologies in Europe.

At the international level, there is an initiative that complements EU regulation.

ICAO has established a global long-term climate goal (**LTAG**), targeting net-zero emissions in international aviation by 2050.

Within this framework the Carbon Offsetting and Reduction Scheme for International Aviation (**CORSIA**) represents the first global market-based measure designed to offset residual CO_2 emissions through the use of carbon market units. Furthermore, the eligible fuels recognized under CORSIA must ensure a net CO_2 reduction of at least 10% compared to fossil kerosene.

The reference value for baseline fossil kerosene is 89 gCO_2e/MJ.

In this context, CORSIA defines SAF as renewable or waste-derived aviation fuels meeting its **sustainability criteria**. Depending on the pathway, these fuels can reduce lifecycle GHG emissions by more than 90%.

CORSIA also recognizes Low-Carbon Aviation Fuels (**LCAF**), which are fossil-based but meet the same sustainability criteria.

To support their deployment, CORSIA has established a regulatory framework and approved Sustainability Certification Schemes (**SCS**) enabling operators to use eligible fuels for international aviation decarbonization.

COCPIT Workshop at EUBCE 2025 (Valencia, Spain)
Source: ETA Florence

Funded by the European Union

This project has received funding from the European Union’s Horizon Europe Research and Innovation Programme under Grant Agreement No. 101122101. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union.