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Insight Paper | March 2025

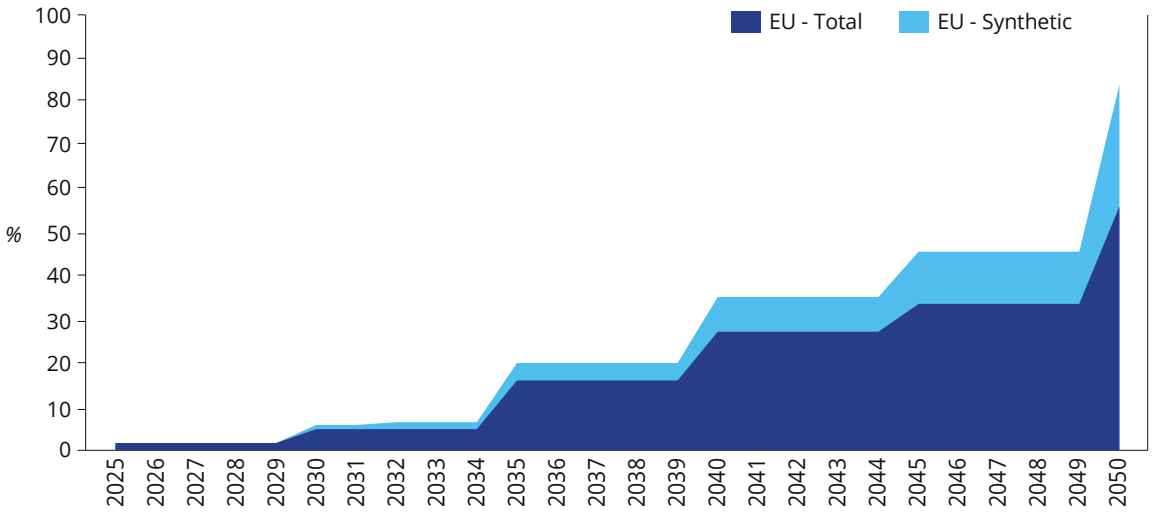
2025: The year of SAF mandates

An Argus overview on SAF regulations, market fundamentals and prices

illuminating the markets®

Global SAF legislative landscape

EU SAF mandate



Obligated parties under ReFuelEU Aviation

Aviation Fuel Suppliers

Must supply minimum shares of SAF according to mandatory quota.

Aircraft operators

Aircraft operators are obligated to refuel at least 90% of their yearly required aviation fuel from Union airports. This obligation was set up to prevent tankering, the act of loading more fuel than needed outside of Europe

Union Airports

Union airports managing bodies have an obligation to facilitate the access to SAF, when passenger traffic is above 800,000 or freight traffic exceeds 100,000 tons/yr*.

*Except for airports in outermost regions

Penalties for non-compliance under ReFuel EU

Member states shall set and enforce fines on fuel suppliers, Union airport managing bodies and aircraft operators in case of non-compliance with the mandates. The penalties must fall within the prescribed minimum threshold for the different obligated parties defined by ReFuelEU.

Global SAF legislative landscape
continued

EU Emissions Trading System (ETS)

Between 1 January 2024, and 31 December 2030, a reserve of 20 million carbon allowances from the EU Emissions Trading System (ETS) will be dedicated to incentivise the use of SAF.

These allowances will cover the price differential – in total or partially – between SAF and conventional jet fuel.

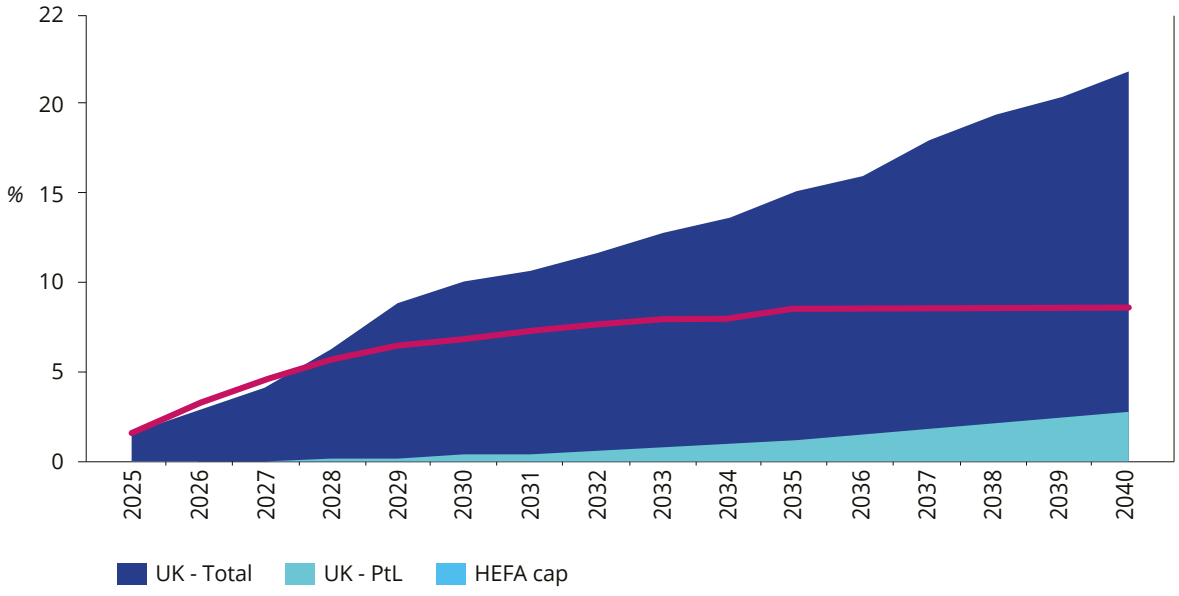
The distribution of SAF allowances will vary depending on the type of SAF used and the geographic location of use.

- Small islands, small airports and outermost regions will be able to cover 100% of the price differential

For all other airports, the coverage of the price differential will depend on the type of fuel used:

- 95% for renewable fuels of non-biological origin (RFNBOs)
- 70% for advanced biofuels
- 50% for other eligible fuels

UK SAF mandate



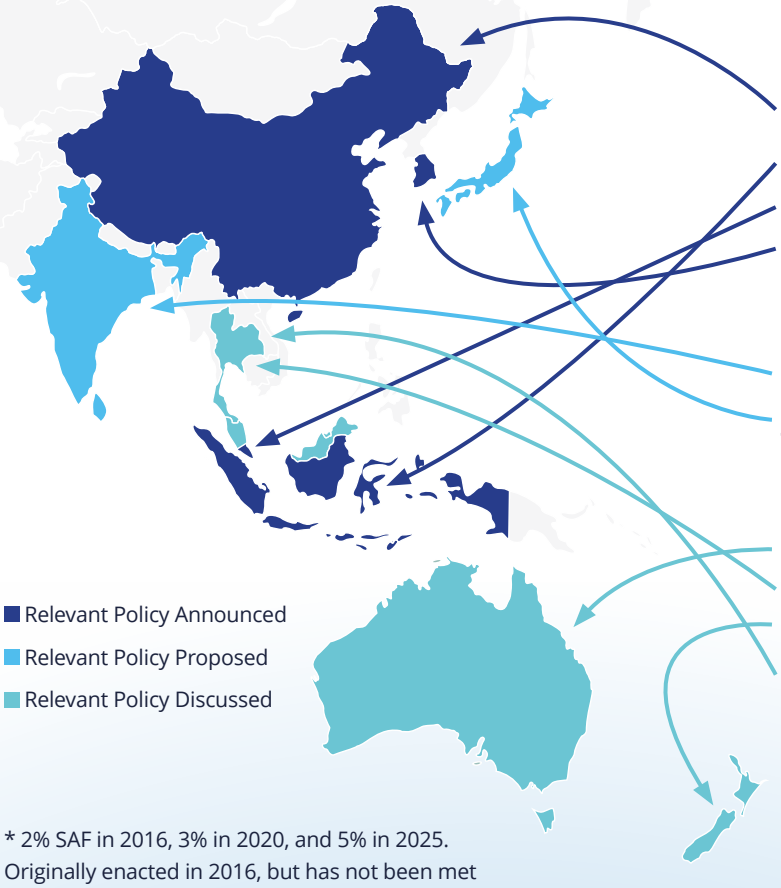
Mandate on jet fuel suppliers

Buy-out at £4.70/l (£5,875/t) for main obligation, £5/l (£6,250/t) for PtL target

HEFA capped at 71% in 2030 and 35% in 2040

Global SAF legislative landscape
continued

Asia-Pacific: National initiatives taking shape



Announced
China - 50kt SAF (2022 - 2025)
Indonesia - 1% vol. 2027*
Singapore - 1% vol. 2026 (3-5pc vol. 2030)
South Korea - 1% vol. 2027

Proposed
India - 1% vol. 2027 (5pc vol. 2030)
Japan - 10% vol. 2030 (under review)

Under Discussion
Australia
Malaysia - 1% vol. TBD (47% vol. 2050)
New Zealand
Thailand - 1% vol. 2026 (8pc vol. 2036)

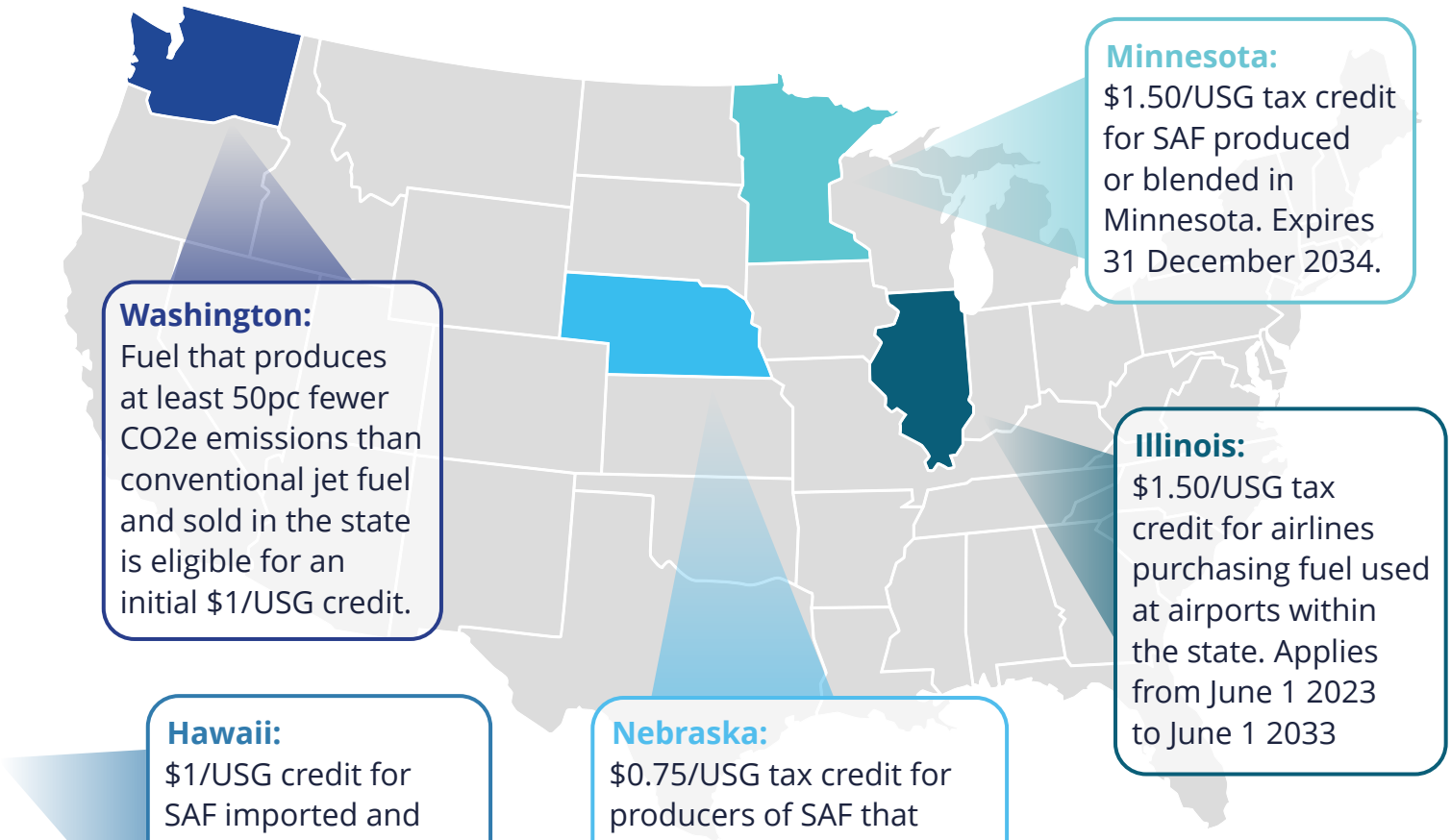
* 2% SAF in 2016, 3% in 2020, and 5% in 2025. Originally enacted in 2016, but has not been met

Global SAF legislative landscape
continued

US: focus on incentives

The US has a target to supply 3bn USG of SAF in the domestic market by 2030 under the SAF Grand Challenge, but the growth of the US SAF market has so far been driven mainly by federal and state financial incentives.

- SAF produced in the US generates a D4 RIN, the same type of credit used by obligated parties to fulfill Renewable Fuel Standard (RFS) compliance for road fuels like biodiesel and renewable diesel.
- At the federal level, the Inflation Reduction Act's "45z" producers tax credits will be in place until the end of 2027, offering tax credits for SAF production up to $1.75/USG.



Minnesota:
$1.50/USG tax credit for SAF produced or blended in Minnesota. Expires 31 December 2034.

Washington:
Fuel that produces at least 50pc fewer CO2e emissions than conventional jet fuel and sold in the state is eligible for an initial $1/USG credit.

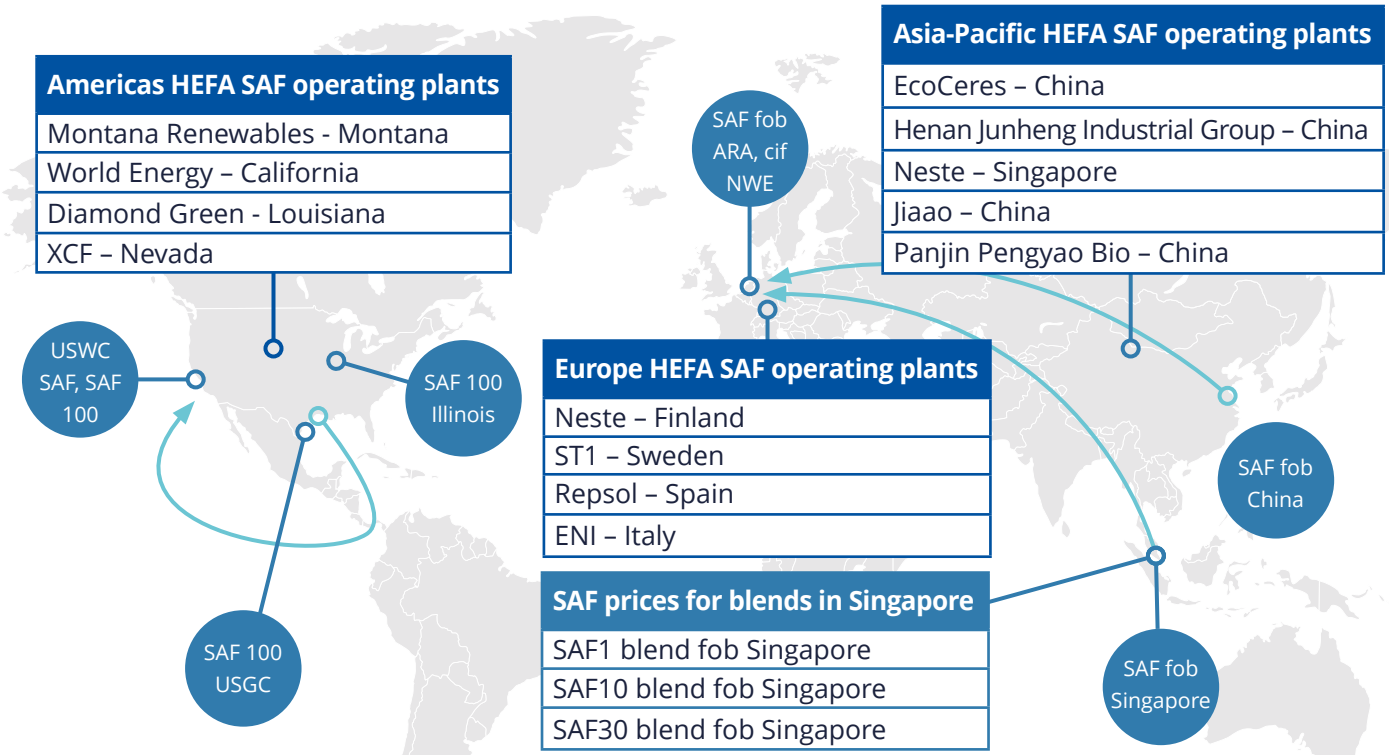
Illinois:
$1.50/USG tax credit for airlines purchasing fuel used at airports within the state. Applies from June 1 2023 to June 1 2033

Hawaii:
$1/USG credit for SAF imported and sold for distribution in the state. Expires 1 January 2036. Plus production tax credit.

Nebraska:
$0.75/USG tax credit for producers of SAF that reduce GHG emissions by at least 50pc compared to conventional jet fuel. Credits can be received for five taxable years between 1 January 2027 and 1 January 2035.

SAF pricing and risk management

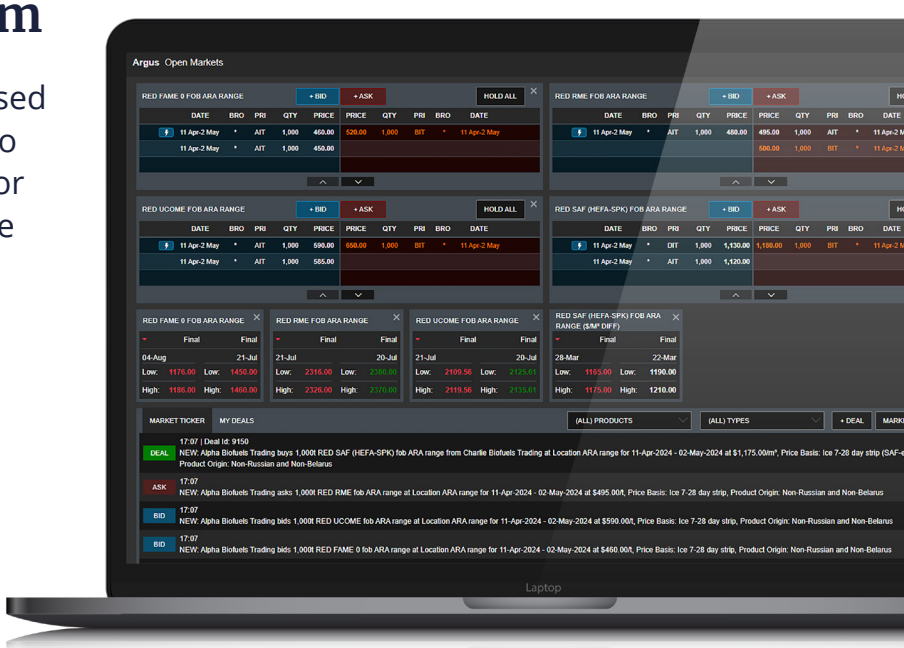
Global suite of Argus SAF prices tracking evolving market flows



Argus Open Markets (AOM): first HEFA-SPK price-discovery platform

Argus Open Markets (AOM) is a web-based platform enabling market participants to post bids and offers and initiate trade for physical commodities in real time on the spot market.

- 2.6mn t of trade initiated on AOM in 2024 across all biofuels



SAF pricing and risk management
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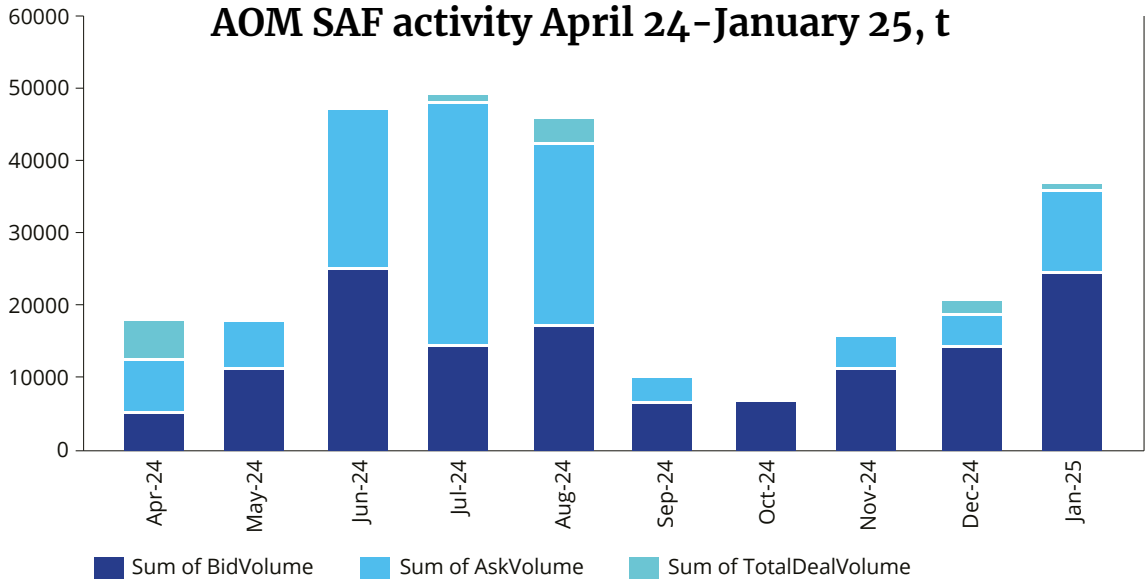
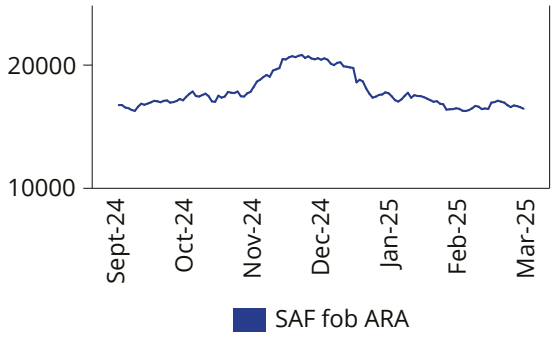
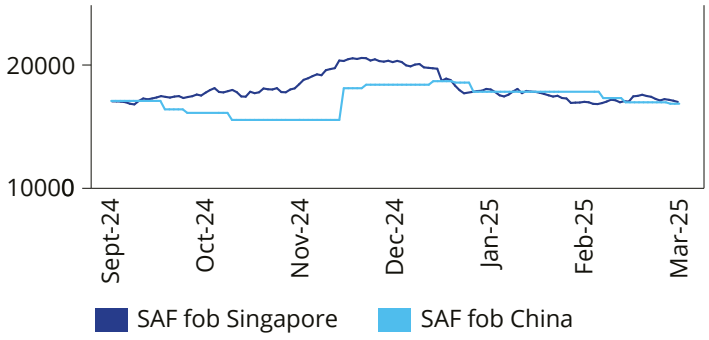
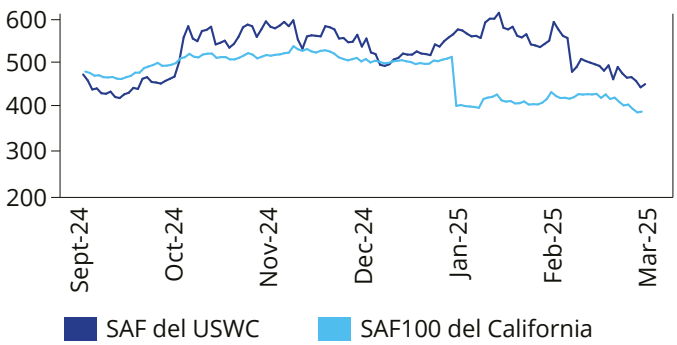


Risk management tools developing

Intercontinental Exchange (ICE) launched the first SAF futures contract settling on Argus HEFA-SPK FOB ARA barge assessment in December 2024, with the contract first trading in January.







How is global UCO availability affecting the SAF market?

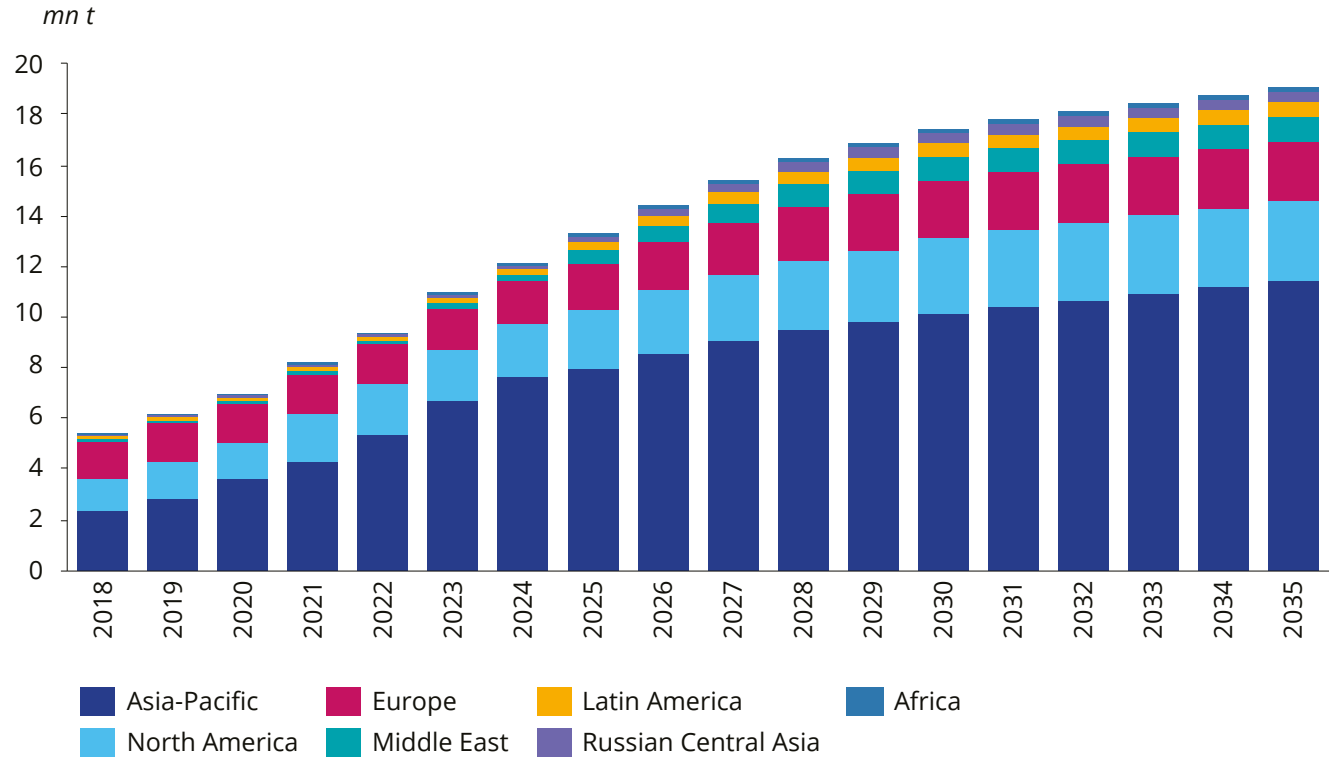
Availability of UCO to tighten as demand for the feedstock grows

UCO availability

We estimate global used cooking oil availability to be around 8.9mn t in 2024. Global collection sits at 57%, with a large portion of theoretical availability around the world not currently collected. UCO availability is expected to increase to 10.8mn t by 2030 as populations and the share of urban areas increase throughout the world.

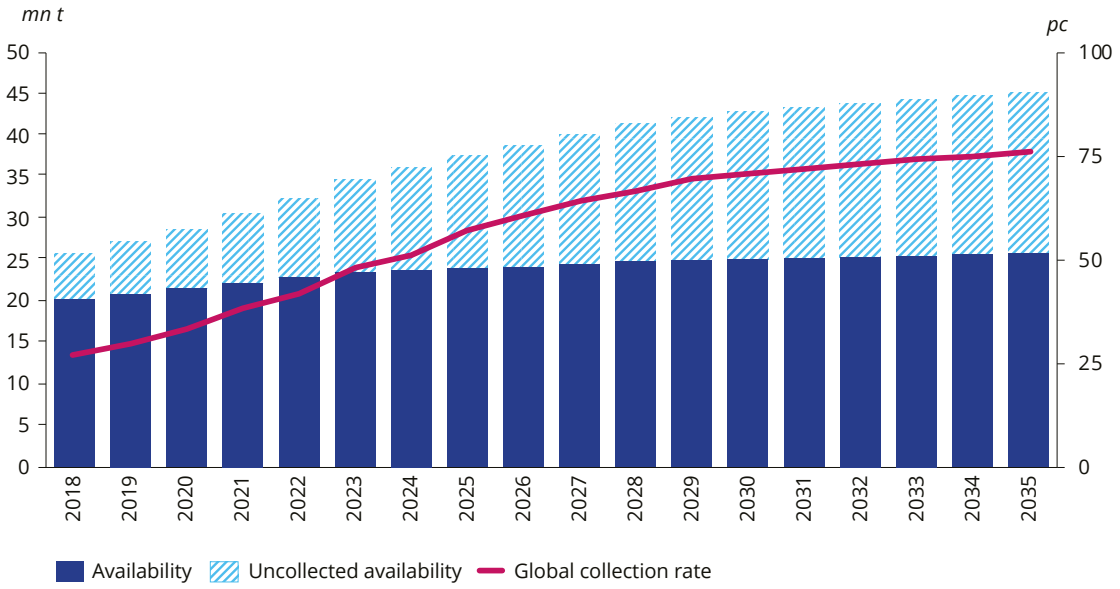
UCO availability is concentrated in Asia-Pacific due to the region's high vegetable oil consumption, vast population, and urban density. In 2024, Asia-Pacific will represent close to 60% of all UCO that is collected. Collection rates in Latin America, the Middle East, and Russian Central Asia represent a tiny fraction of our estimated global UCO availability in part due to very low rates of collection.

UCO supply by region



How is global UCO availability affecting the SAF market?
continued

Additional potential UCO collection



What is left for SAF?

SAF is expected to take up a significant portion of UCO availability. Europe's ReFuelEU Aviation legislation and LCFS programs in the US will significantly increase demand for UCO as a feedstock for SAF production.

Higher margins associated with SAF production are likely to support the security of UCO for SAF production, diverting some feedstocks away from the more traditional biodiesel industry. Total theoretical availability is expected to sit around 16mn t in 2025.

In the last couple of years there has been a noticeable decrease in vegetable oil consumption around the world and the OECD-FAO Agricultural Outlook has since revised their vegetable oil consumption projections substantially downwards. As a result, we anticipate collection rates to hit their practical maximum sooner and estimate global UCO collection will set at 69% by 2035.

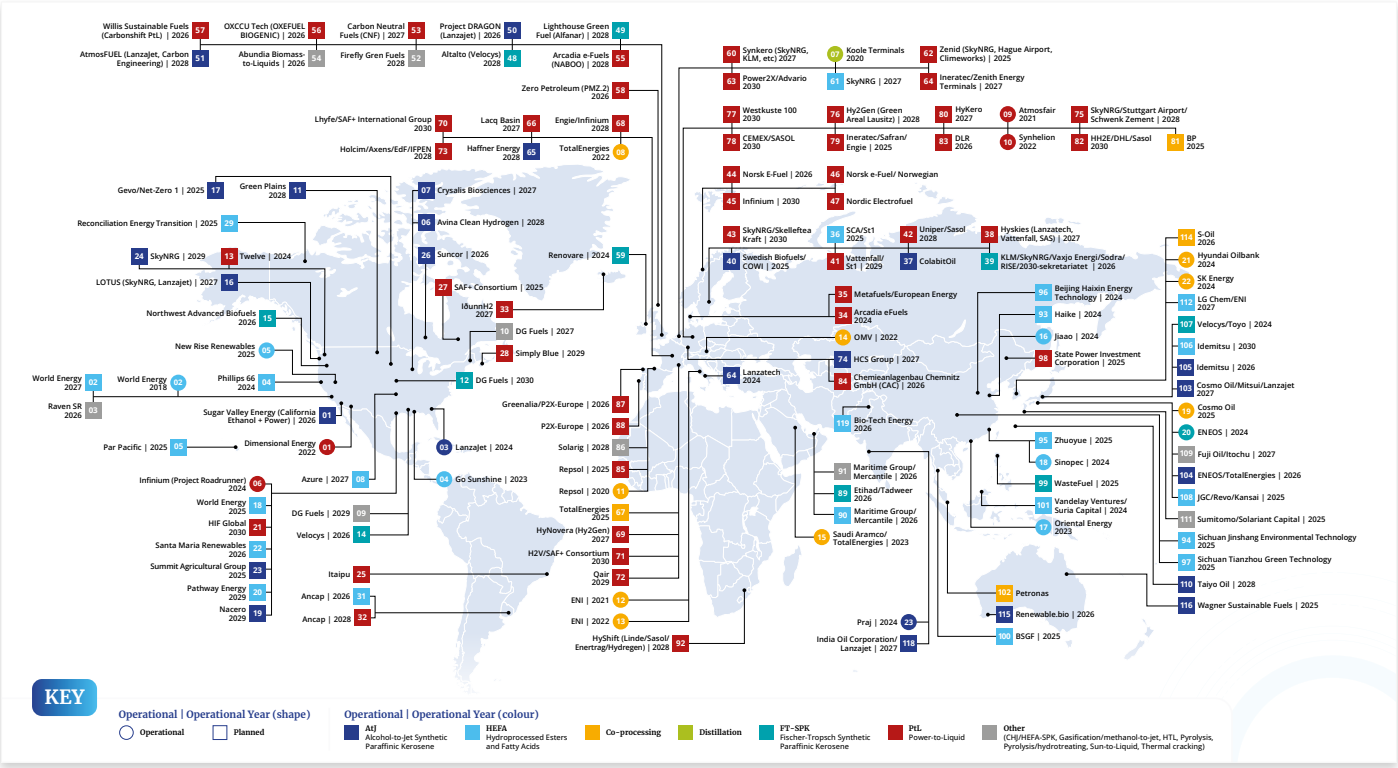
Collection rates are very unlikely to reach 100% of UCO in any market. Collection rates in western Europe are understood to be around 85%, and this rate of collection is likely the "maximum" rate that can be achieved without widescale residential UCO collection.

Will SAF supply keep up with demand?

Scan the QR code on page 12 for more information.

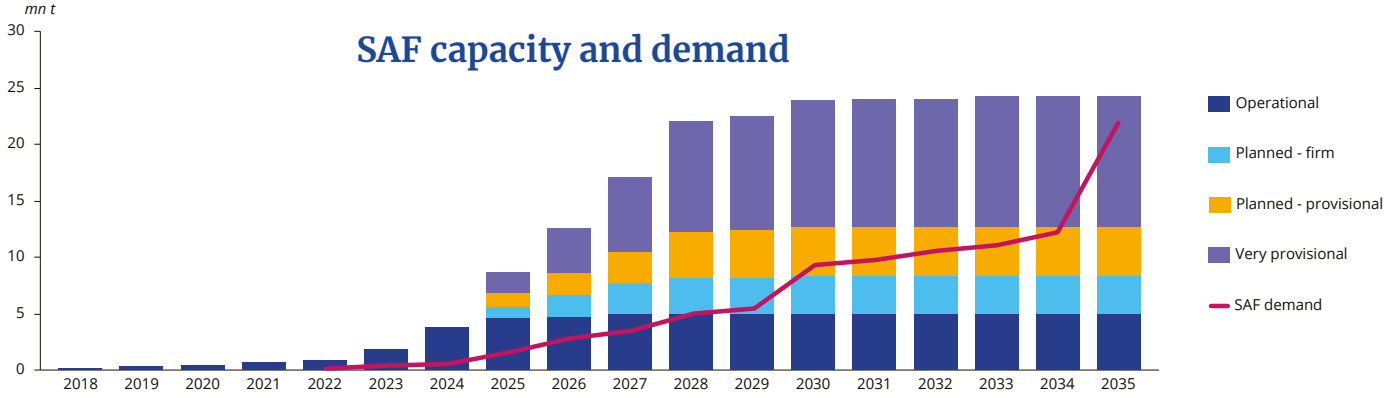
A view of global SAF capacity

Get a view of global SAF capacity around the world. The data behind the map is also available in Data and Downloads on Argus Direct for subscribers.



Forecasted SAF capacity and demand provided by Argus Biofuels Analytics

Based on announced projects, SAF capacity has the potential to surpass 20mn t by the end of the decade and could increase almost threefold to 11.8mn t by 2035. Most of this upcoming capacity is expected to be hydrotreatment facilities, although we do anticipate an increase in other processing technologies at limited capacity by 2035.



Argus SAF Hub: Providing transparency to how SAF is priced, produced and delivered.

Stay up to date on the growing SAF market with access to the latest prices, news and analysis.

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