

The great SAF challenge:

Preparing Europe's sustainable aviation fuel sector for take-off

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Key takeaways:

- **The evolving EU and UK regulatory environment** for SAF production presents major opportunities for SAF investment, but also restrictions and hurdles that do not yet take account of market realities particularly around feedstock availability and technology maturity.
- **The SAF market in the EU and UK** benefits from strong demand mandates and good airline/government engagement, but these are tempered by regulatory complexity, supply uncertainties, and financing barriers.
- **What comes next after HEFA-based SAF** caps out post-2030 remains a question in need of an urgent (financial, regulatory and practical) solution, as new production technologies face scale-up challenges.
- **Closer regulatory and market alignment** between the UK and EU could accelerate SAF progress – for example in revenue certainty mechanisms and grading of SAF according to the carbon intensity of production.
- **Infrastructure hurdles**, including the chicken-and-egg dilemma around SAF facility investment at airports and upstream in pipelines, storage, blending, segregation and import capabilities, need to be overcome through a combination of risk tolerance and regulatory adjustment.
- **Multiple financing roadblocks exist, as do potential solutions** – from adapting to EPCM construction models, diversification of offtake options, airline investment consortia, 'grandfathering' first movers and growing private sector and corporate involvement.

What's working – and what isn't – in the EU/UK SAF market

Extrapolating previous years' volumes and the ReFuel EU and UK SAF Mandate requirements, UK and EU SAF market participants now have a degree of clarity around what future demand for SAF will look like.

This provides a pretty reliable, though likely a relatively conservative, figure on which investment, production and marketing decisions can be based.

There is also significant government support and buy-in from major airline groups for SAF project development under various national, international and corporate-level and industry-wide sustainability initiatives.

However, the realities of the SAF market and its regulatory framework remain complicated, constraining development activity and stalling investment.

There are eight to 11 possible SAF development pathways, restrictions on feedstocks that may be used to produce SAF, and jurisdictional differences in the definition and regulatory treatment of SAF.

Simplification of the market – for example, treating SAF projects essentially as refineries which are well-understood and have a long and successful history of financing and development – would help assist financial decision-making.

Government support measures also need to be geared at ushering the SAF market towards a point where it can function on its own, based on supply and demand.

At present, the SAF market framework in the EU and UK is comprised of artificially constructed regulatory forces that allow the industry to operate but prevent it from maturing in a meaningful way.

Long-term demand for SAF

The EU and UK SAF markets face an unusual demand curve due to regulatory changes set to take effect in 2030 that mandate a sharp step up in the proportion of SAF that must be added to conventional jet fuel.

The EU's ReFuelEU Aviation Regulation requires that aviation fuel suppliers must supply fuel to aircraft operators at EU airports containing an average minimum SAF share (2% from 1 January 2025, rising to 6% by 2030 and thereafter in increments to 70% by 2050).

The regulation also requires that SAF should contain a minimum amount of renewable fuels of non-biological origin (RFNBO) (1.2% by 2032, rising in increments to 35% by 2050).

Under the UK SAF Mandate, in 2025, the 'main obligation' requires 2% of the total fossil jet fuel supplied to airlines to be comprised of SAF. This will increase annually to reach 10.6% in 2030 and 23.7% in 2040.

Looking at where the SAF industry is in 2025, in the context of these targets and taking into account the average three-to-five year gestation period of SAF projects, there is clearly a huge gap in the market's supply trajectory.

It seems very unlikely that SAF production will be sufficient to meet the demand stipulated by regulation from 2030.

At present, supply is easily capable of keeping up with demand due to the incremental rises in SAF consumption and the ready availability of HEFA SAF, which in turn means that airlines are less inclined to agree offtake agreements for SAF as there is no pressing need to lock-in supply.

However, the 2030 regulatory cliff-edge for SAF contribution to jet fuel supply promises to tip the market into severe under-supply, potentially prompting significant price rises for SAF.

What happens after HEFA?

Under the UK mandate, fuel suppliers can use all hydro processed esters and fatty acids (HEFA) produced to discharge their main obligation until 31 December 2026. From 2027 however, the amount of HEFA that can be used to discharge the main obligation starts to incrementally decline such that by 2040, HEFA can only discharge 42% of the then applicable main obligation.

This tapering is designed to promote the development of alternative sustainable fuels.

There are three main pathway contenders for post-HEFA SAF production, namely: gas-to-liquid (gasification); power-to-liquid (PtL); and alcohol-to-jet (AtJ).

The successful development and scaling up of these alternative fuels will rely partly on regulatory support, which at present is patchy and inflexible.

The UK government has signalled the intention to provide a revenue certainty mechanism, which involves a contract between SAF producers and the government guaranteeing a strike price for eligible SAF over a designated period.

This mechanism recognises that the SAF market is not yet mature enough to yield realistic prices on its own.

The ReFuel EU mandate does not offer any such revenue certainty mechanism, which makes it more difficult to market possible HEFA alternatives.

The EU has ringfenced the PtL production pathway, which aims to use renewable electricity to produce (green) hydrogen and combine it with captured CO₂ to create a synthetic SAF, through a sub-quota but this may also restrict the industry from maturing successfully due to the nascency of green hydrogen production.

Under the ReFuelEU Aviation Regulation, the PtL obligation starts in 2030, requiring 0.7% of total jet fuel demand to be PtL-SAF, and increases incrementally to 35% by 2050.

The other two leading SAF production pathways also have their pros and cons.

Gasification has high capex costs for project development but once up and running this pathway benefits from relatively low running costs, as it is fairly feedstock agnostic meaning it can run on lower-cost inputs (such as municipal solid waste).

AtJ is showing promise in the US, where regulation is less prescriptive about the source of ethanol than the UK or EU, where green methanol produced from biomass using renewable energy sources and captured carbon may be a more viable option.

The EU and UK regulations however prohibit AtJ SAF made from certain food/feed crops as being eligible SAF, thereby limiting the viability of this production pathway in the EU and UK.

Logistics and infrastructure

Requiring significant investment, logistics and infrastructure investment faces a chicken-and-egg dilemma; without the necessary supporting infrastructure, the SAF market cannot reach its potential, however logistics companies are reluctant to back projects in the absence of a well-functioning market and certainty in future supply and demand.

As well as facilities at airports to allow for delivery of SAF, the industry needs major upstream investment in pipelines, storage, blending, segregation and import capabilities.

As with SAF production, EU and UK regulations – including prohibitions on blending different types of SAF and the requirement for every airport to have capacity for SAF delivery – complicate the infrastructural requirements.

But without the investment in infrastructure now, there will not be sufficient capacity to store, manage and distribute the SAF supply required by regulations in 2030.

Challenges to investing in SAF projects

The key challenges of project financing SAF projects and the associated infrastructure are manifold, but some will hopefully be overcome as the imperative for greener aviation grows.

Current challenges include:

Offtakes

Securing long-term, fixed price offtake agreements for SAF from airlines, while SAF supply is plentiful and prices are significantly higher than conventional jet fuel, is a major barrier for SAF producers and potential lenders that might otherwise finance SAF projects.

At present, there is significant reliance on a small number of major airline groups to invest in SAF supply; a possible solution to this might be for smaller airlines to form consortia to jointly invest in SAF production.

There is also a need for more sharing of expertise on how to structure offtakes, as the finance community is looking for strategic support from offtakers, not just a willingness to pay the market rate for SAF.

SAF valuation

The long-term valuation of SAF is currently impossible in the absence of a fully-functioning market.

Levelised cost models may provide some price guidance for the various production pathways, however revenue support will likely continue to be necessary until the market matures.

Feedstock supply and pricing

Regulatory restrictions on SAF produced from certain biogenic sources and on the carbon-intensity of the various production pathways mean SAF producers have relatively little room for manoeuvre.

It may be that regulation evolves to reflect the reality of feedstock availability and power sources for production processes if and when the market becomes tighter.

Logistics

As outlined above, the route to market for SAF production into aviation supply to airports will also need to be considered and significant investment will be needed in upstream infrastructure as well as airport facilities.

Logistics companies will likely need to expand their risk tolerance to put infrastructure in place before the market grows, and it may be that regulation adjusts to be more flexible about individual airport delivery requirements.

SAF technology

At least one of the three leading alternatives to HEFA production pathways of gasification, PtL and AtJ needs to be successfully proven at scale to boost confidence and allow the industry to learn and develop further.

Given the fluidity of the market and the number of competing technologies, lenders are likely to favour SAF projects using technology that has a wide product slate and which can pivot to produce an alternative clean fuel (such as synthetic diesel or gasoline), should market conditions change.

Many would-be SAF producers are looking to go from lab-scale to multi-billion dollar projects in a single leap, when perhaps a more gradual scale-up would be easier to achieve.

Lack of finance sources

There is currently a very small pool of targeted finance and revenue providers for SAF projects, however this could be widened if other players entered the market in some capacity.

For example, creditworthy intermediaries (aggregators) such as trading houses or government-backed entities could interpose between SAF producers (selling long term) and end-customer(s) (buying short/mid-term).

Given SAF's international supply chain, there are also opportunities for export credit agencies to support SAF projects, as well as a possible role for private sector actors looking to benefit from predicted SAF price rises and corporate investors looking for ways to reduce their scope 3 emissions.

Construction

Engineering, Procurement and Construction (EPC) contracts for building SAF projects becoming more difficult and expensive to obtain.

Engineering, Procurement & Construction Management (EPCM), which disaggregate the construction packages, are likely to be the most economically viable construction route for SAF projects.

Regulatory risk

The regulatory environment governing SAF continues to evolve, which acts as a deterrent to investors who fear being caught out by rule changes.

One solution to this could be grandfathering of first mover projects, insulating them from regulatory changes for a defined period to give investors certainty.

Some regulatory changes that cause disruption for some projects could ultimately be positive for the industry as a whole – for example, if there were to be a globally agreed definition for SAF.

This article is based on a panel discussion featuring held at Dentons' London office on 25 June 2025, featuring: [Colm Ó hUiginn](#), Partner, and [Claire Hunter](#), Counsel at Dentons; [Jason Rajah](#), Partner at Energex; [Jared Pearl](#), SAF & Infrastructure Specialist at Energex; [Peter Conway](#), Director at Energy Estate; and [Gorka Penalva](#), Commercial Director NWE at Exolum.