SUSTAINABLE AVIATION

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Update on UK Sustainable Aviation Fuel potential

Achieving net zero aviation requires Sustainable Aviation Fuels (SAF) to play an immediate and rapidly growing role this decade and beyond 2050, as a mainstay solution to decarbonising those longer distance flights that generate most global aviation carbon emissions. They will help deliver 'Jet Zero' by working alongside other vital elements like airspace modernisation and the longer-term development and rollout of zero emission aircraft, initially expected on shorter domestic or regional routes, with carbon removal technologies capturing what carbon emissions remain.

To support SAF deployment, the UK Government is introducing a SAF mandate equivalent to at least 10 % of jet fuel by 2030, and is targeting five UK production plants under construction by 2025. Sustainable Aviation and partners **ICF**, leaders in global SAF consulting, have produced some emerging analysis on the latest potential for UK made SAF to supply that mandate, support the net zero pathway to 2050 and create economic opportunities for the UK – if the right policy solutions are in place to drive production. This analysis will be finalised and input into an updated, comprehensive Decarbonisation Road-Map in 2023.

On the potential for SAF, this latest analysis shows that:

- The UK has sufficient SAF feedstocks (e.g., household, commercial, agricultural and forestry waste and waste industrial gases) for domestic production to meet well over the **10%** UK SAF mandate requirement by 2030.
- However, announced UK plants to make SAF would meet only around **50%** of this demand. Moreover, even these announced plants may not be built without measures to deliver price certainty to enable them to raise the finance needed for construction. Only one is currently producing SAF.
- Without UK production, meeting the mandate would rely heavily on SAF imports to close the gap. This carries risks, including to UK energy security, with global demand expected to outstrip supply for SAF by 2030.
- Failure to deliver UK production also forfeits significant economic and levelling up benefits across the nations and regions of the UK:
  - Previous analysis by Sustainable Aviation has shown a UK sustainable aviation fuels (SAF) industry could create **20,000** jobs and **£3bn** in economic activity by 2035.
- Real progress has been made since Sustainable Aviation published its last Road-Map in 2020:
  - Including the **£165m** Advanced Fuel Fund announced by Government to support UK advanced fuels projects. UK airlines are routinely using SAF – albeit in small quantities.

However, the UK's SAF potential will count for nothing if plants are not built in sufficient numbers, quickly. The UK is falling behind internationally and action is needed now:

UK SAF needs a rapid announcement of policies to drive investment in UK production facilities; specifically a price support mechanism like a Contracts for Difference. This support can be time-limited, but it is essential for driving investment

SAF should be be incentivised within the UK ETS and the hundreds of millions of pounds paid by airlines into the scheme reinvested into projects supporting UK aviation to decarbonise

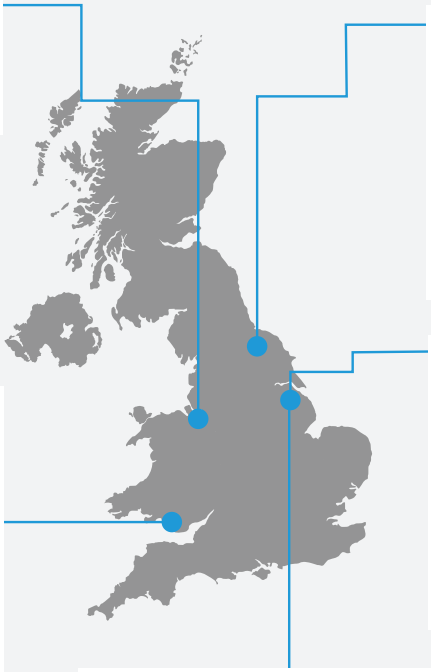
A strategy to ensure that there will be sufficient waste feedstocks and renewable energy allocated to aviation to produce SAF in the quantities needed is essential

The Government committed to having **5 SAF plants under construction by 2025 in its Jet Zero Strategy.** With the right market conditions, these could include:

FULCRUM BIOENERGY

Stanlow Refinery, Cheshire

Fulcrum plans to use **600,000 metric** tonnes of waste to produce **100 million litres each year** of SAF at its proposed facility in Cheshire.



ALFANAR

Port Clarence, Teesside

Alfanar has committed to a **£1 billion Teesside facility** that will produce **120 million litres of SAF** from waste each year. This will create **700 jobs** during construction and **240 full-time** jobs once fully operational.

LANZATECH

Port Talbot, South Wales

LanzaTech plans to build the world's first commercial-scale alcohol-to-jet (ATJ) SAF facility using ethanol feedstock made from steel mill waste gases and other wastes. The proposed facility in South Wales is expected to produce around **100 million litres per year of fuel.**

VELOCYS

Altalto Immingham, Humberside

Altalto is a joint development between Velocys and British Airways to convert hundreds of thousands of tonnes per year of non-recyclable everyday household and commercial waste into SAF.

PHILLIPS 66

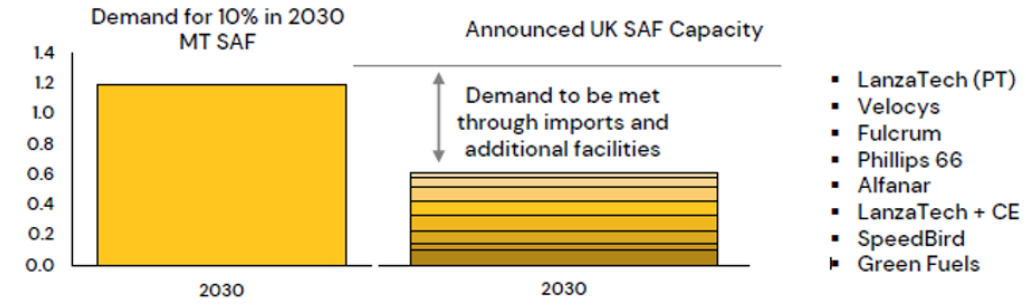
Humberside

Phillips 66 Humber Refinery produces SAF today from Used Cooking Oil, delivering its supply via existing pipeline infrastructure that feeds directly into UK airports.

What is SAF?

Sustainable Aviation Fuel (SAF) is a replacement for fossil jet fuel, derived from a variety of feedstocks converted into fuel via industrial processes. It has to meet strict sustainability criteria such as delivering at least 70 % less lifecycle emissions vs traditional jet fuel and not displace or compete with food crops. SAF has similar physical properties to traditional jet fuel; when blended, it can be used in today's aircraft and refuelling infrastructure without modifications.

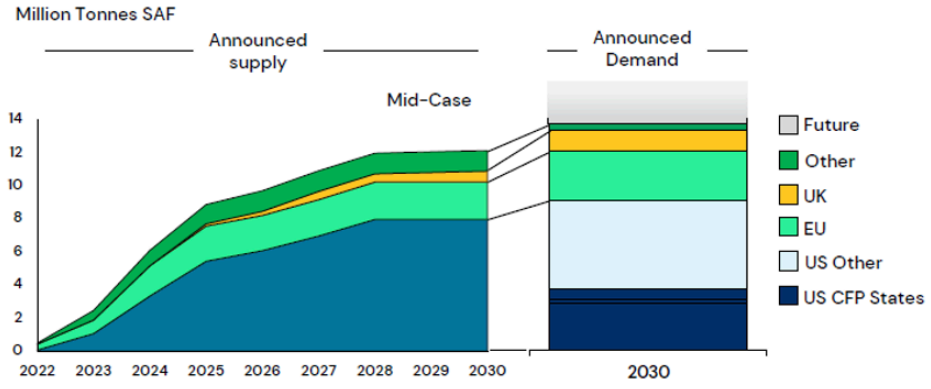
Announced SAF projects only meet 50% of 10% SAF mandate but only if built by 2030



Source: ICF Analysis, Press announcements

With policy certainty, both announced and additional refining capacity could get the green light by 2030, helping close the SAF gap and provide UK businesses with the experience and skills to sell their SAF solutions globally.

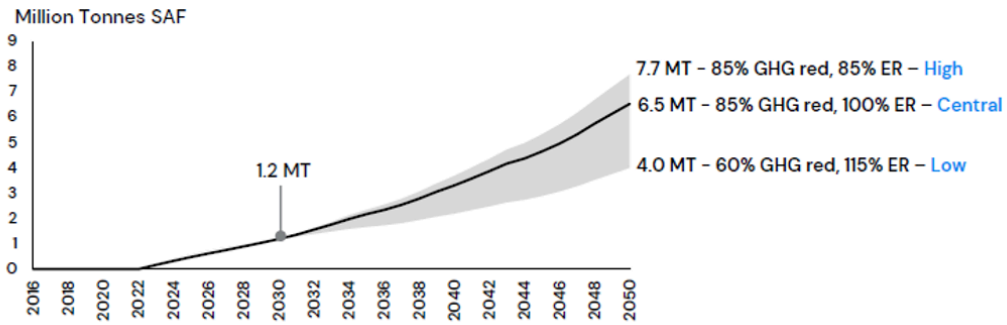
Global demand far exceeds announced production strengthening the case for domestic supply



Source: ICF Analysis of public announcements

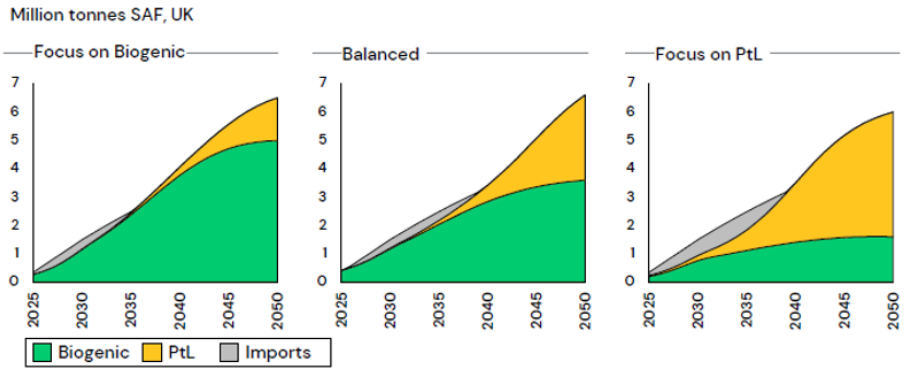
The UK will be competing for imports in the face of global demand from EU mandates and targets being set in the US, Japan, Turkey, Canada, Australia and others. The UK would need to pay for all the costs to access scarce global supply with none of the jobs, economic or energy security advantages.

1.2MT SAF required to meet a 10% mandate in 2030, increasing to around 6.5MT to meet 2050 ambitions



Longer term, the UK has sufficient feedstock availability for domestic SAF production to meet expected UK aviation demand for SAF, in line with a 2050 net zero trajectory.

Illustrative deployment scenarios



By 2050, in a balanced scenario, around half of SAF could be waste-based and half next generation power-to-liquid SAF that uses captured carbon dioxide and green hydrogen as feedstocks. It will be essential that aviation's sustainable fuel and hydrogen production needs are considered in the UK's renewables energy mix.

About SA

Sustainable Aviation (SA) is a unique alliance of the UK's airlines, airports, aerospace manufacturers, air navigation service providers and SAF producers, and is the first alliance of its kind in the world. Sustainable Aviation's Decarbonisation Road-Map published in February 2020 showed how UK aviation can meet 70% increased passenger demand by 2050 whilst reducing net carbon emissions to zero.

In 2023 Sustainable Aviation will publish an updated Decarbonisation Road-Map showing how net zero aviation can be delivered, taking account exciting recent developments in zero emission technologies like hydrogen powered aircraft, the progress of UK airspace modernisation and advances in carbon removal, which alongside the latest most efficient aircraft each have a key role to play in net zero flight. More information at **www.sustainableaviation.co.uk**

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