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Europe leads, Asia accelerates: Suzanne McKenzie on global push for recycled jet fuel

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In an exclusive AgroSpectrum interview, Suzanne McKenzie, Sales Director, Lifecycle Oils Ltd, UK, explains how Sustainable Aviation Fuel (SAF) produced from used cooking oil goes through advanced filtration, hydrotreating, and hydrocracking before being blended to meet strict jet specificationsâ??distinctly different from fossil fuels derived via crude oil distillation. She notes that second-generation SAF from waste streams can slash lifecycle emissions by up to 80 per cent versus fossil fuel, without competing with food crops or land.

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Mandates in the UK, EU and Asia are accelerating adoption, though scaling production and infrastructure remains a major challenge. Suzanne highlights constraints around finite UCO supply, price gaps, and rapidly growing SAF demandâ??forecast to reach 15 million Mt by 2030 versus ~1 million Mt today. Looking ahead, she sees diversification into algae oils, tall oil, cover crops and Power-to-Liquid e-fuels as essential to achieving aviationâ??s Net Zero ambitions.

I. SAF Production & Environmental Impact

From Fryer to Fuel: Could you walk us through the lifecycle of SAF made from used cooking oil, highlighting the key technological and operational steps that differentiate it from conventional jet fuel?

First, we collect the used cooking oil (UCO) from across the food industry, including food manufacturers, quick service restaurants and food service providers, as well as from household waste sites around the UK. This is then transported to our processing plant in Wednesbury.

We then filter the UCO to remove all contaminants and process it using a unique multi-stage filtration and settling process to turn it into a specification suitable for use as a feedstock for producing SAF, HVO, Biofuels and our patented LF100 biofuel. The pre-treated UCO is then hydrotreated â?? a process where hydrogen is used to remove the oxygen from the free fatty acids, converting the carbon bonds into long-chain hydrocarbons.

The hydrocarbons are then hydrocracked to break them down into shorter molecules through isomerisation, which is critical for creating a fuel with the right freezing point and combustion properties for use in jet engines.

The resulting fuel is then blended with conventional jet fuel to the required level to meet to required specification for SAF. Conventional jet fuel is created by fractional distillation and cracking, where the oil is heated and separated into different fractions, including one that can be used as jet fuel.

Sustainability Metrics: How does SAF made from waste streams like used cooking oil perform in terms of carbon intensity, lifecycle emissions reductions, and broader environmental benefits compared to traditional fossil jet fuels?

The sustainability credentials of SAF depend heavily on the feedstock used to create it. First-generation SAF â?? made from virgin crops like palm oil or rapeseed oil â?? come with inherent trade-offs from a sustainability perspective.

Growing feedstock crops for SAF can be carbon-intensive and are associated with deforestation, land conversion, biodiversity loss, and high water consumption. They require agricultural land, which means directly competing with the food chain for resources.

Second-generation SAF, like UCO processed by Lifecycle Oils, offers substantial environmental advantages by avoiding these issues entirely. Thereâ??s no extra land required, and no additional resources required to grow new crops. Itâ??s repurposing a waste stream, and one we have great access to as weâ??re partnered with 96% of household recycling centres across the UK.

As a result of using previously waste materials, UCO-derived biofuels can slash lifecycle carbon footprints by an estimated 80 per cent when compared to conventional fuels, and 40 per cent when compared to first-generation biofuels.

II. Industry Adoption & Market Dynamics

Adoption Trends: How quickly are airlines and airports embracing SAF, and what patterns are you seeing in Europe versus other regions? Are current mandates and voluntary targets driving meaningful uptake?

There is a clear trend â?? countries worldwide see SAF as the best way to cut aviation emissions in the mid-term.

As a result, airlines and airports worldwide are steadily increasing their SAF use, with the SAF mandates driving much of the uptake â?? especially in Europe and the UK, where we already have a 2 per cent SAF mandate in place for 2025, which will rise to 6 per cent and 10 per cent respectively by 2030.

Across the Asia-Pacific region, weâ??re also seeing new policies, targets and emerging targets on SAF. Japan is exploring a 10 per cent SAF mandate by 2030 for departing flights, and Singapore is introducing a 1 per cent SAF target for 2026, which could rise to 3-5 per cent by 2030. South Korea and India are both considering a 1 per cent target for 2027.

In terms of voluntary uptake, weâ??re seeing commitments tied to net-zero pledges from airlines, but itâ??s the mandates that are likely to drive real change.

Feasibility & Scalability: SAF adoption faces technical and logistical challenges. From your perspective, what are the main bottlenecks in scaling production, blending, and distribution for commercial aviation?

One key challenge is bringing production capacity on board to meet demand! Current forecasts predict that by 2030, global demand for SAF will be around 15 million Mt, and by 2035, this looks set to reach 40 million Mt. In 2024, global SAF production was around 1 million Mt, with current predictions suggesting global capacity will only grow to around 18 million Mt by 2035. Thereâ??s a big gap!

There are also challenges in developing the blending and depot infrastructure at major airports, so that the SAF can be integrated into existing supply chains.

From a UCO perspective, the challenge is supply â?? UCO is a finite and increasingly in-demand resource for all kinds of biofuels. While there is room to scale, itâ??s not infinite, and will only ever form part of the SAF mix.

The final challenge is price. SAF is currently more expensive than jet fuel â?? and significantly so! In a fuel-hungry industry where profit margins are tight, and are currently focused on securing the cheapest fuel possible, the market is naturally resistant to more expensive solutions, however much better for the planet.

III. Policy & Regulatory Levers

Government Role: How critical are policy incentives, mandates, and regulatory frameworks in accelerating SAF adoption? What works best: carbon pricing, blending obligations, or subsidies for feedstock collection?

Blending mandates are already creating a guaranteed market for SAF and accelerating adoption worldwide. It seems likely these mandates will be the main drivers over the coming decade.

Carbon pricing is an interesting prospect that could have a meaningful impact on the price difference between SAF (and especially UCO-derived SAF) and conventional jet fuel, which could make it more appealing to airlines.

Tax subsidies definitely make a big difference â?? the US Sustainable Aviation Fuel tax credit directly reduces the final cost of SAF, making it more competitive and attractive to airlines. In the UK, there is talk of a revenue certainty mechanism, which could also stabilise costs and attract future investment into the SAF market.

Lifecycle Oils collects UCO from takeaways, high-end restaurants, high street chains, industrial facilities and food manufacturers of all shapes and sizes, so naturally weâ??d love subsidies on collection â?? but given the rising demand and limits on supply for UCO globally, it seems unlikely that this would be introduced.

Cross-Border Policy Alignment**: **Given aviationâ??s global nature, how do differing regulatory regimes in the EU, UK, and Asia impact the economics and deployment of SAF produced from recycled oils?

The fuel markets are all connected, and there are so many different factors in play (tax credits, mandates, tariffs, lifecycle emissions criteria, etc.) across the globe that the picture becomes very complex regarding market demands and incentives to supply.

In terms of the global UCO market, weâ??re already seeing some impact in terms of reduced overseas supply, as Asian countries increase biofuel blends and consider SAF mandates.

Asia is a key source of UCO, but as Asian countries (e.g., Japan, India, Singapore) introduce their own SAF mandates, they will increasingly seek to utilise their domestic UCO supply. This will have a knock-on effect in Europe and potentially drive up prices as supply constraints come into play.

IV. Economics & Supply Chain

Cost and Competitiveness: **SAF is often more expensive than conventional jet fuel. How do supply chain constraintsâ??such as feedstock availability, collection logistics, and refinery scaleâ??affect long-term pricing and commercial viability ?**

With oil prices depressed, and aviation fuel exempt from tax in many cases, gaining parity with jet fuel prices is a real challenge â?? especially if the projections are right, and future demand for SAF significantly outstrips supply.

There is a chance that future carbon pricing, or the introduction of a jet fuel tax, could close this gap â?? but the commercial viability of SAF is primarily supported by mandates, and a global desire to decarbonise aviation and achieve â??Jet Zero.â??

Investment & Industry Partnerships: What role do corporate offtake agreements, private investment, and airline collaborations play in scaling SAF production sustainably and profitably?

Long-term corporate agreements help guarantee demand, which is essential for gaining finance for production projects and for sustainable profitability.

Aligning with corporate sustainability objectives, like reducing Scope 3 emissions, can also support scaling SAF production. If decarbonising aviation is a real priority, then SAF is the most realistic and implementable solution we have. â??Book and claimâ?? credits or premiums systems can be effective ways of subsidising SAF production, while helping corporates to fulfil sustainability ambitions.

Global Potential*:* ***Used cooking oil is a finite resource. Beyond this feedstock, what other waste or renewable sources hold the most promise for SAF at scale, and how can Lifecycle Oils help lead that diversification ?***

At Lifecycle Oils, our focus is on UCO â?? itâ??s about utilising a waste product to create sustainable fuels as part of a more circular economy, and our mission is to continue to scale this model by engaging with companies across the food industry and beyond.

Ultimately though, the supply is finite â?? and if weâ??re going to deliver SAF at scale, it will only be part of the solution, and to meet the mandate, we will need to increase the feedstocks used. In terms of more sustainable solutions, using oilseed cover crops is an option, and there is real potential in oils derived from algae â?? though this is still in the very early stages of development. Tall Oil is another good source of feedstock to produce fossil-free biofuel. It is crude tall oil (CTO) and a byproduct of the wood pulping process. This demonstrates a pathway for producing SAF from a renewable, forestry-based feedstock, which can reduce lifecycle emissions compared to traditional jet fuel.

Alternative fuel options and SAF alternatives like synthetic Power-to-Liquid (PtL) synthetic e-fuels, or even the introduction of hydrogen flight, could also be part of the long-term solution to decarbonisation.

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