

The hidden realities of 'Sustainable Aviation Fuels': 5 things the industry doesn't want you to know



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On 28th November Virgin Atlantic will be flying from London to New York on an aircraft powered 100% by so-called 'Sustainable Aviation Fuel'. With UK politicians, the aviation industry and even the UN¹ presenting SAF as the answer to the decarbonisation challenge it seemed a good moment to take a look at what Virgin Atlantic won't be telling you about their flight:

- 1) 100% SAF reduces tailpipe emissions by 0% compared with using kerosene.** Why? SAFs are still hydrocarbon fuels and produce the same volume of CO₂ emissions as kerosene when combusted. Any CO₂ savings claimed will be 'net' savings during the production phase, as with a carbon offset. It's assumed that any biological material used to make fuel generates zero CO₂ emissions on the basis that plant growth will have absorbed CO₂ from the air relatively recently so the combustion simply re-releases that CO₂. Adjustments are then made for the energy intensity of the production process and other factors to claim a net reduction compared to kerosene. But as the fuel being used for this flight will be from waste materials, they will not have resulted in any additional reduction in atmospheric CO₂, as the waste biomass existed anyway.
- 2) One flight using 100% SAF won't solve the supply issue.** At the moment flights are only permitted to use SAF in a 50% blend. This flight aims to show that it is technically feasible to operate a flight entirely using an alternative hydrocarbon fuel. But this isn't the issue holding back SAF use in aviation because SAF supply is still very limited (approximately 2.6% of total UK aviation fuel use currently and the global picture last year was closer to 0.1%).
- 3) Waste-based fuels can't be scaled up sustainably.** The UK has set a target of eliminating biological waste going to landfill, and many so-called wastes already have other uses. The key alternative on the table – synthetic e-fuel – can be produced from captured carbon combined with green hydrogen. But it's only being produced in tiny quantities as it's much more expensive than fuel from waste and needs a large amount of renewable energy.
- 4) The hype about SAF isn't matched by official forecasts.** While ministers sometimes talk about SAF as though it offers a magical solution to aviation emissions (particularly when challenged about private jet use), Department for Transport modelling tells a different story. Even under the Government's preferred 'High Ambition' Jet Zero pathway SAF plays a smaller role in decarbonising aviation than 'out of sector' emissions reductions (offsets and carbon removals) and the demand reductions generated by pricing carbon.
- 5) This hype risks the challenge of decarbonising aviation being hushed up.** The independent Climate Change Committee has described the Jet Zero Strategy as relying too heavily on nascent technology and fuels and ignoring the need to limit demand growth. At present, sustainable aviation is an aspiration, not a reality. While we wait for genuine zero-emission fuels and technologies to be developed we need to start cutting emissions in the only way that definitely works: flying less.

¹ The Virgin flight comes hot on the heels of a UN conference in Dubai (running from 20th-24th November) that will focus on developing a framework and vision for SAF and other 'cleaner' energies for aviation. This is the third conference by UN aviation body ICAO on aviation alternative fuels (CAAF3), and all ICAO states have been invited. <https://www.icao.int/Meetings/CAAF3/Pages/default.aspx>

AEF recently commissioned a major new report from alternative fuel experts, Ceruly: ‘Scrutinising the future role of alternative fuels in delivering aviation decarbonisation’. The report is in three parts, the first explaining and exploring the discipline of lifecycle analysis; the second considering policies around waste; and the third looking at aviation decarbonisation more broadly. It questions the use of the term ‘SAF’ on the basis that “sustainability is an aspect of a fuel production system that must be assessed”, and it makes clear that “the combustion CO2 emissions for carbon-based alternative fuels are the same as the combustion emissions for fossil fuels.”

Our hope is that the report will help increase understanding about alternative aviation fuels, and will clarify the importance of claims around net emissions savings.

We’ll be publishing both this report, and a new policy paper from AEF that draws on Ceruly’s work – ‘Sustainable Aviation Fuels: hope or hype?’ – on 16.11.23.

Some good questions to put to airlines using SAF:

- When you say the fuel cuts emissions by x%, you mean there’s a net reduction, as with an offset, not that the plane itself emits less, is that right?
- The feedstocks that you’ve used here – how much of aviation fuel needs could they provide if scaled up?
- How much of your airline’s total annual emissions will reduce as a result of your use of SAF?
- Do you think that all alternative aviation fuels are sustainable?
- SAF use generally operates on a ‘book and claim’ system. Customers or airlines receive credit for any SAF purchased, and the SAF is then added to the fuel mix at an airport closer to the point of production and often used by another airline (that receives no credit). Do you think this creates risks in terms of consumer transparency and potential for double claiming of emissions reductions?

Want to read more?

In February this year the Royal Society published a report called “[Net zero aviation fuels: resource requirements and environmental impacts](#)” which concluded that all options for alternative fuel feedstocks for aviation were problematic to scale.

In May T&E reported that 8,800 dead pigs are needed to fuel a flight from Paris to New York, raising concerns over the availability of ‘waste’ biofuels like animal fats. See their report “[‘Pigs do fly’: Growing use of animal fats in cars and planes increasingly unsustainable](#)”

In August, Prof David Lee at Manchester Metropolitan University, which provides expertise to the UK Department for Transport on aviation environmental issues, wrote a paper with academics from Griffith University in Australia called “[Implications of preferential access to land and clean energy for Sustainable Aviation Fuels](#)”. It concluded that “The scaling up of SAF to not only maintain but grow global aviation is problematic as it competes for land needed for nature-based carbon removal, clean energy that could more effectively decarbonise other sectors, and captured CO2 to be stored permanently. As such, SAF production undermines global goals of limiting warming to 1.5 °C”.