First transatlantic sustainable aviation fuel flight saved 95 metric tons of CO_2, results show

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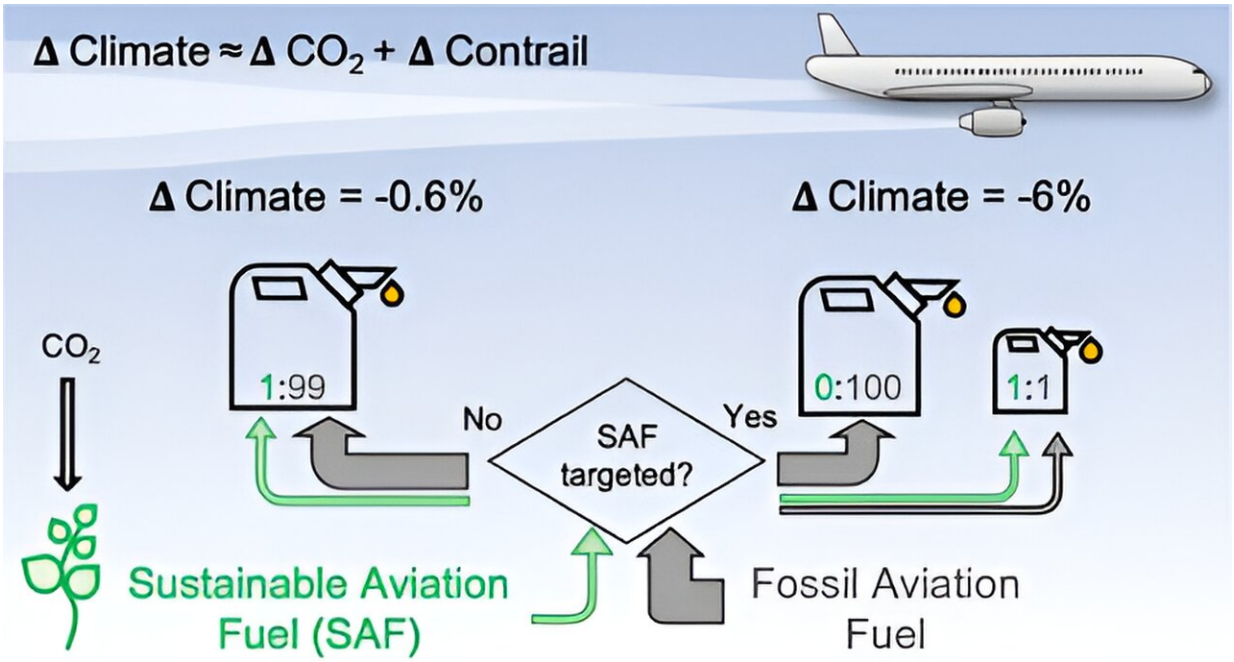

Graphical abstract. Credit: *Environmental Science & Technology* (2022). DOI: 10.1021/acs.est.2c05781

Findings from the Virgin Atlantic-led Flight100 project, which involved a consortium of experts from Imperial College London, University of Sheffield, Boeing, Rolls-Royce, BP, and others, show that Sustainable Aviation Fuel (SAF) is safe to use with existing infrastructure and can

deliver significant reductions in CO_2 emissions.

SAFs are fuels derived from non-petroleum based renewable sources, like waste cooking fats or plant matter, that are capable of being used as a replacement for, or blended with, fossil fuels.

The trial flight from London Heathrow to New York JFK in November last year also showed that SAF can improve local air quality, contribute to a reduction in persistent contrail formation and reduce fuel use.

Crucially, Flight100 did not require any engine, airframe or fuel infrastructure changes and operated on safety standards equivalent to every other commercial flight.

Imperial and Sheffield researchers led the scientific work to assess the climate effects of the flight, with a team of researchers from Imperial completing work to confirm that SAF reduces particulate matter emissions.

The project was enabled by multi-jurisdictional support across aviation authorities, led by the UK's Civil Aviation Authority (CAA).

Dr. Marc Stettler, from the Department of Civil and Environmental Engineering, who led the Imperial team of researchers for the project, said, "Flight100 was a unique opportunity to learn and demonstrate that SAF can be used in high proportions. It was truly collaborative and as a result of the project we have established relationships through which we continue to advance science and translate that scientific understanding to operations. Flight100 must be used as the impetus for an acceleration of deployment of SAF and other actions to mitigate aviation's climate effects.

"The UK government has recently committed to achieving at least 10%

SAF in the UK aviation fuel mix by 2030. While this is a promising step, our research suggests that we could also significantly address the effects on contrails by intelligently allocating this fuel to flights that are likely to cause significant warming impacts."

Safe replacement for fossil fuels

The trial results showed that the use of 100% SAF enabled the flight to save 95 metric tons of CO_2, or 64% of the emissions from a standard London Heathrow to New York JFK flight.

It also enabled a 40% reduction in non-CO_2 emissions and an improved overall fuel burn efficiency, meaning the fuel produced 1% more energy compared to the same amount of fossil fuel. This improvement means that SAF could potentially reduce the amount of fuel needed for flights, alongside the environmental benefits it offers.

However, more work is needed to produce enough SAF for regular long-haul flights. Following the successful trial flight, Virgin Atlantic has called for industry to continue to collaborate for aviation to use SAF on all flights globally and for the UK Government to prove further support to create a UK SAF industry.

Shai Weiss, chief executive officer of Virgin Atlantic, said, "Flight100 proves that SAF reduces CO_2 and can be used at 100%, with benefits in fuel efficiency and local air quality. SAF is the only mid-term solution to reduce our carbon emissions, but to meet our target of 10% by 2030 we need a scale up of 60x current UK SAF production.

"Government must step in to support by attracting private investment and deliver on its Jet Zero policy. Flight100 proves that if enough SAF is made, we will fly it."

More information: flywith.virginatlantic.com/con … xecutive-Summary.pdf

Provided by Imperial College London

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