Aviation biofuels:
How ICAO and industry plans for 'sustainable alternative aviation fuels' could lead to planes flying on palm oil

A report by Biofuelwatch
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Executive Summary

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Introduction

Greenhouse gas emissions from aviation are rising faster than those from almost any other sector, and the aviation industry association IATA predicts that the number of air passengers will double over the next 20 years. This growth is incompatible with the Paris Agreement goal of keeping global warming to within 1.5°C. The aviation industry – backed by the UN's International Civil Aviation Organisation (ICAO) – is therefore looking for ways to be seen to address greenhouse gas emissions without sacrificing growth and shareholder profits. The industry promises "carbon-neutral growth" from 2020.

There is no possibility of passenger planes flying without burning liquid fuels in the foreseeable future. Even the most ambitious efficiency improvements could not cancel out the growth of emissions from a doubling of air passengers over the next 20 years. ICAO and the industry therefore intend to rely on carbon offsets – condemned by over 100 civil society organisations last year – and on biofuels. Biofuels are treated as "carbon neutral" under UN reporting guidelines – even though scientific evidence shows that they are overall as bad or even worse for the climate than the fossil fuels they replace.

ICAO is holding a high-level conference on "Alternative Aviation Fuels" in Mexico City from 11th to 13th October 2017. Its Secretariat has proposed a "vision" that would see biofuels provide 32% of aviation fuel by 2040 and 50% by 2050. The latter would require almost 3.5 times as much biofuels as are produced worldwide today.

Aviation biofuel: The state of play

Biodiesel and ethanol cannot be used in aircraft, but, so far, four pathways for aviation biofuels have been approved as meeting technical jet fuel specifications. Two of them use sugars, from sugar crops, cereals or potentially from ligno-cellulosic biomass such as wood. One pathway involves gasifying biomass such as wood and then converting the gas further to produce fuels identical or near identical to those made from petroleum, including jet fuel.

Finally, vegetable oils and animal fats can be put through a process developed for oil refining to produce Hydrotreated Vegetable Oil (HVO). Most HVO fuel today is HVO diesel, which can so far only be used for road transport. However, an application has been submitted to the international standards agency to allow up to 15% blends of HVO diesel for use in planes. HVO jet fuel, on the other hand, can be used in up to 50% blends already.

Only one refinery worldwide – operated by AltAir in California – regularly produces aviation biofuels. AltAir's refinery produces small amounts of HVO jet fuel, together with much larger quantities of HVO diesel for cars.

Other companies have produced and sold small quantities of aviation biofuels, mainly from pilot plants, and generally as part of government-funded research and development projects.

Unlikely contenders: Aviation biofuels made from anything other than vegetable oils and animals fats

Biofuelwatch's full report looks in detail at each of the four pathways approved for producing biofuels for commercial aviation, as well as proposals for producing aviation fuels from Municipal Solid Waste (approved, albeit not strictly speaking a biofuel), and for fermenting carbon rich flue gases from steel mills or oil refineries to aviation fuels (not yet approved).

The report shows that the only aviation biofuel that can be produced in commercial quantities is HVO. The other technologies which have been approved or proposed face significant technical hurdles, and there is no persuasive evidence that those will be overcome any time soon, if ever.

Some of those immature technologies involve the use of genetically engineered microorganisms, raising serious concerns about the impacts should such GMO microbes escape into the environment. No comprehensive environmental or public health risk assessments have been carried out, but impacts could potentially be very serious as well as irreversible.

Palm oil for planes – the most credible feedstock for aviation biofuels

HVO accounts for 4% of all biofuels, but is growing at over ten times the rate of biofuels overall. 60% of all HVO is produced by Neste Oil, but other oil companies are also converting oil refineries to HVO production, building new HVO refineries, or co-processing vegetable oils and animal fats with petroleum.

Palm oil is the cheapest type of vegetable oil, and is also cheaper to refine to HVO than almost any other feedstock. Genuine wastes and residues that could be refined to produce HVO, such as tallow and used cooking oils are in far too short supply and high demand. Most HVO contains palm oil, including a palm oil fraction called PFAD which Neste Oil and others controversially classify as a 'residue' even though it is an important feedstock for different industries.

Airlines are particularly sensitive to fuel costs. Large-scale uptake of aviation biofuels will require the price gap between petroleum-based kerosene and jet fuels to close, or to be bridged by subsidies.

HVO jet fuel remains unaffordable, except in very small quantities. Approval of 15% HVO diesel blends for aircraft would lower prices dramatically. Since HVO diesel is more expensive than conventional kerosene, new subsidies would still be needed before airlines would favour the use of large quantities of such fuel.

The dangers of hype

Mere expectation of a large new demand for agricultural products such as palm oil can spur large-scale land grabs, even if the demand does not actually materialise: according to ActionAid, European investors took control of over 6 million hectares of land in Sub-Saharan Africa between 2009 and May 2013 with the stated aim of producing biofuels, especially for the EU market. Yet by 2013, virtually no African feedstock had ever been used for EU biofuels. There is thus a risk that an ICAO "vision" of large-scale aviation biofuels could by itself spur land-grabs in a similar manner.

Conclusions

Any significant uptake of aviation biofuels would almost certainly require large-scale palm oil use. Whether or not this will happen depends on subsidy decisions by ICAO and governments. It will therefore be vital for civil society groups to oppose subsidies for aviation biofuels.

At the same time, it is important to place the debate about biofuels in the wider context of aviation. Greenhouse gas emissions from aircraft today – let alone in future, at the projected growth rates – are incompatible with stabilising global warming at 1.5^{o}C or even 2^{o}C.

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