AVIATON BIOFUELS IN 2011

As of December 2010, five test flights using biofuel blends in commercial aircraft have been carried out worldwide. Each of those test flights involved plant oil which was converted to a close resemblance to kerosene through a process called hydrotreatment. Jet fuel from plant oil is expected to be certified, i.e. declared safe for use in commercial aviation, around March 2011[i]. Lufthansa has announced plans for the first 'test flights' with biofuel blends, including palm oil, during commercial flights with passengers from April and Finnair is hoping to start commercial biofuel use over the next year[ii].

Aviation fuel made from wood and other solid biomass, through a process called Fischer-Tropsch gasification (or F/T Biomass-to-Liquid), has already cleared this hurdle, although the energy inputs and production costs are so high that airlines have shown far less interest in this compared to biofuels from plant oils. Aviation biofuels from sugars are being studied, but are still in the early development stages.

Commercial use of biofuels in aircraft is thus imminent and there are strong interests behind it being scaled up quickly. The aviation industry and policy makers speak about largely novel biofuels which, they claim, will not compete with food or forests – algae, camelina, the salt-resistant herb salicornia, as well as jatropha, which, despite large-scale plantation developments has so far produced no commercial supplies of oil. Palm oil is rarely mentioned in this context, yet jet fuel from palm oil appears to be the only realistic choice for commercial aviation biofuels over the next few years.

What are the drivers for the development of aviation biofuels?

The aviation industry sees biofuels as one of the main ways of reaching 'zero carbon growth', that is, continuing to expand indefinitely while, at least on paper, keeping their carbon emissions stable[iii]. Their endeavours are being supported by public-sector subsidies for research and development, such as the European Union's SWAEFA (Sustainable Ways for Alternative Fuels and Energy in Aviation) project and the burn-FAIR (Future Aircraft Research) project supported by the German government.

Aviation companies are aided by the fact that under the terms of the EU Emissions Trading Scheme (which will cover aviation from 2012), all biofuels are classed as carbon-neutral.

Biofuels used in any other sectors, whether in road transport, power stations or blended with heating oil, are supposed to meet 'sustainability and greenhouse gas standards' in future. Those standards are deeply flawed, not only because the standards are inadequate and, for example, allow biofuels directly linked to human rights abuses to be classed as 'sustainable', but also because companies will simply be able to pay their own consultants to tick boxes, without any verification. 'Greenhouse gas savings' are assumed for most biofuels even though several scientific studies have shown that, once the full climate impacts of biofuels is taken into account, nearly all of them turn out to be even worse than the fossil fuels they replace. Airlines, however, will not even have to pay consultants to 'meet' the standards and their biofuels will be deemed to 'save', not 35, or 40 or 50% greenhouse gas emissions compared to fossil fuels, but 100%, regardless of where they come from.

Another reason behind the development of aviation biofuels are military interests for 'energy security'. The US Navy, US Air Force and the Royal Netherlands Air Force have all tested biofuels in fighter jets. Honeywell subsidiary UOP, who have supplied the biofuels for most of the test flights and are one of the leading developers of jet fuel from plant oil are investing primarily in supplying the US Navy and US Air Force with biofuels.

Palm-oil-powered flights?

In the near future, aviation biofuels are most likely to be made from hydrotreated plant oils. The Finnish oil and biofuel company Neste Oil is by far the largest producer of those. According to a 2009 report by the International Air Transport Association: "Being the only commercial operator, Neste Oil is a world leader in production of renewable hydrocarbon fuels"[iv]. When their fourth refinery opens in Rotterdam in 2011, they will be producing nearly two million tonnes of hydrotreated biofuels per year. Converting some or all of those refineries to produce jet fuel will require little additional investment. Nearly all of Neste Oil's biofuels are made from palm oil. Neste Oil will be supplying the biofuels for Lufthansa's 'commercial test flights' and they have entered into a supply agreement with Finnair. Finnair state that they would like Neste Oil to use 'waste wood', yet their existing refineries can only run on plant oil. Lufthansa has admitted that palm oil will be used in their 'test flights' . They were hoping to replace it with jatropha oil, but could not procure enough of that. Neste Oil has shown no interest in moving away from palm oil and commercial jatropha supplies are not even on the horizon.

The second-largest producer of hydrotreated plant oil worldwide is US company Dynamic Fuels. They have just opened their first refinery, which could produce up to 188,822 tonnes of hydrotreated biofuels in future – less than one-tenth of Neste Oil's capacity. They show little interest in supplying commercial airlines, let alone European ones – instead, like UOP, they aim to produce jet fuel for the US Navy and Air Force. Dynamic Fuels also list palm oil as a possible feedstock[v].

In the short term, airlines that want to use biofuels on a commercial scale have little alternative but to buy Neste Oil's which will be largely based on palm oil. Biofuel companies in the road transport and power sector often speak about palm oil biofuels as being 'transition biofuels', until other ones become available, yet once tropical forests and peatlands, farmlands and soils have been destroyed for palm oil, the damage to biodiversity, climate and people is irreversible.

Neste Oil and the 'sustainable palm oil' myth

Neste Oil have been certified as a supplier of 'sustainable palm oil' by the Roundtable on Sustainable Palm Oil (RSPO) and they view the contract with Lufthansa as a further endorsement of their 'sustainable palm oil commitments. Their main supplier is the Malaysian conglomerate IOI. IOI owns 152,000 hectares of oil palm plantations in Malaysia and a further 83,000 hectares in Indonesian. Here are some examples of their practices, none of which have prevented their customer Neste Oil from being classed as a 'sustainable supplier' by the RSPO:

- Bulldozing large tracts of rainforests as well as local farmers' paddy fields and fruit trees in Sarawak;
- In March 2010, a Malaysian court ruled in favour of the indigenous Kayan community of Teran Kanan and declared IOI's land leases in the area 'null and void', stating that they had been obtained illegally and unconstitutionally - a major if rare victory for indigenous communities;
- Investing in a 1 million hectare oil palm expansion programme in Sarawak recently announced by the provincial government which will primarily convert 'native customary forest', i.e. rainforests that belongs to indigenous peoples, such as the Penan;
- In West Kalimantan, unauthorised conversion of forests and peatlands for oil palm plantations, fraudulent claims in EIAs, plantations illegally set up without EIAs, increase in fire hotspots in IOI plantations, exclusion of local communities from land being converted to plantations which is likely to trigger land conflicts, according to a report by Friends of the Earth.

Camelina and other unproven feedstocks

Biofuels from wood and other solid biomass as well as from sugars are still in the early research and development stages. In the case of solid biomass, it has long been possible to turn it into liquid fuel, but more energy is required than is gained and fundamental problems would have to be overcome before this technology was viable. This research must be seen in the context of an already highly unsustainable demand for wood and UK industry plans to burn over 3.5 times as much wood for electricity and heat every year than is produced in this country[vi]. In February 2010, Solena and British Airways announced plans for an aviation biofuel refinery using 'waste biomass', however the scheme appears not to have progressed much further. The company which will supply the technology, Rentech, only operates two very small pilot plants.

Biofuels from sugar are nowhere near commercialisation either and much of the work involves synthetic biology to try and create new types of microbes.

Camelina, algae salt-resistant plants such as salicornia produce oil which can be hydrotreated – the problem here is not one of refining them into biofuels, but of getting sufficient quantities of oils from them. According to a recent study, algal biofuels have a worse energy and water balance than virtually all other biofuels and, due to the high energy inputs, do not reduce greenhouse gas emissions[vii].

Salicornia oil was to help power a test flight by Mexican airline Interjet. The test had to be abandoned because the company was unable to obtain any.

Camelina is a much-hyped new biofuel feedstock, mainly in the US and Canada. Like oilseed rape, it can be grown in rotation with wheat and other grains, it thrives in the same climate, and yields depend on regular water and fertiliser use. Unlike oilseed rape, fairly little of it has been planted as yet, there is far less knowledge about and experience with it and per hectare yields are substantially lower. In 2008, researchers in Montana succeeded in obtaining a maximum of 1.35 tonnes of camelina oil per hectare[viii], yet real yields in the same state are just over half this figure[ix]. Average rapeseed oil yields, by comparison, are around 3 tonnes per hectare.

Aviation biofuels as the latest reason for plantation expansion in Chiapas

In July 2010, a high-level meeting promoting the development of aviation biofuels in Mexico was held in the state of Chiapas. The Governor of Chiapas claimed that his state was setting an example, having dedicated 50,000 hectares of land to oil palms and 10,000 hectares to jatropha. Those plantations are causing the destruction of the Lacandona rainforest and are linked to violent land evictions by police and military acting on behalf of plantation companies. There are no plans to produce aviation biofuels in Chiapas, yet the expected new aviation biofuel market provides policy makers with yet another reason to pursue monoculture plantation expansion at the expense of forests and people.

Jatropha – Large-scale landgrab, small-scale oil

Millions of hectares of jatropha have been planted across tropical and subtropical countries. Large-scale plantings began around 2006 and harvests are expected after three years. Yet four years on, commercial supplies are non-existent. In July 2010, Australian biofuel firm Jatoil announced their first 'commercial shipment' of jatropha for aviation fuel: A mere ten tonnes. In December, another Australian firm, Mission NewEnergy, press-released their first 'commercial' jatropha shipment: Sixty tonnes.

Despite claims about jatropha 'thriving' with little water on poor soils, the very opposite is true: In order to yield oil, jatropha requires fertile soils and more water than virtually any other biofuel feedstock[x]. Yet yields are at best low, generally unreliable, crop failures are widespread and the shrubs are vulnerable to pests and diseases which can to spread to nearby food crops[xi]. A recent report by the World Agroforestry Centre concludes: “The results of this survey, taken from interviews with hundreds of Jatropha farmers throughout Kenya, show extremely low yields and generally uneconomical costs of production... Jatropha currently does not appear to be economically viable for smallholder farming when grown either within a monoculture or intercrop plantation model”[xii].

Nonetheless, large-scale evictions and displacement of communities, increased hunger and deforestation for jatropha are being documented from ever more regions.

How much land?

According to a SWAEFA report, reaching the industry's goal of 'zero carbon growth' by 2030 will require 225 refineries the same size of Neste Oil's largest, 800,000 tonne a year ones[xiii]. A single such refinery will require 200,000 hectares of oil palm plantations and even more land for any other existing feedstock. This means that a minimum of 45 million hectares of land would be needed to meet the official aim of the International Air Transport Association. By comparison, oil palm plantations cover just over 12 million hectares of land worldwide at present and the global land area used to grow biofuels is between 20 and 25 million hectares.

If camelina was used instead, even with an optimistic rate of 1.3 tonnes per hectare, 138 million hectares of land worldwide would need to be converted to it simply in order to meet the industry's stated goals.

If just one British airline, Ryanair, was to replace all kerosene with biofuels, they would require at least 407,500 hectares of oil palm plantations – or 1.25 million hectares of camelina ones.

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i The technical term is HRJ – hydrotreated jet fuel and although plant oils account for the bulk of those, some animal fats can also be used this way,

ii www.greenaironline.com/news.php?viewStory=1016

iii see for example www.iata.org/SiteCollectionDocuments/AviationClimateChange_PathwayTo2020_email.pdf

iv http://vernosystems.com/wp-content/pdf/IATA2009ReportonAlternativeFuelsonlineversion.pdf

v http://dynamicfuelsllc.com/wp-news/frequently-ask-questions/

vi www.fridayoffcuts.com/dsp_newsletter.cfm?id=366

vii Environmental Life-Cycle Comparison of Algae to Other Bioenergy Feedstocks, Andres F. Clarens et al, 19th January 2010, Environ.Sci.Technol, 44(5)

viii www.montana.edu/cpa/news/nwview.php?article=5592

ix www.nass.usda.gov/Statistics_by_State/Montana/Publications/Press_Releases_Crops/camelina.htm

x The Water Footprint of Bioenergy, Winnie Gerbens-Lenes et al, PNAS, 23rd June 2009

xi Jatropha! A Socio-Economic Pitfall for Mozambique, Justica Ambiental & Uniao Nacional de Camponeses, August 2009, www.swissaid.ch/global/PDF/entwicklungspolitik/agrotreibstoffe/Report_Jatropha_JA_and_UNAC.pdf

xii Jatropha Reality Check, World Agroforestry Centre, 2010, www.worldagroforestry.org/downloads/publications/PDFS/B16599.PDF

xiii www.swafea.eu/LinkClick.aspx?fileticket=ytqgDKzdx08%3D