

# NESTE: THE FINNISH COMPANY PREPARING TO PUT PALM OIL IN AIRCRAFT FUEL TANKS

## SUMMARY

Neste aims to become the world's largest aviation biofuel producer in 2019 and to rapidly scale up its production in the next five years. The company is well placed to do so, since it is the world's biggest producer of biofuels from Hydrotreated Vegetable Oil (HVO), as well as being an existing supplier of aviation fuels (so far primarily fossil fuels). Hydrotreating is the only technology mature enough and within a price range that is feasible for commercial aviation biofuels. Furthermore, Neste has already signed agreements with several airlines and airports to supply HVO aviation biofuels.

Neste relies heavily on palm oil – both crude palm oil and an extract of crude palm oil called palm fatty acid distillate (PFAD). The company has decided to locate its aviation biofuel production in Singapore, i.e. in the centre of the world's largest palm oil producing region. Neste claims that its crude palm oil is guaranteed to be 'sustainable' and 'deforestation-free'. Even if this was true, the indirect greenhouse gas emissions of palm oil biofuels are still three times as bad for the climate as those of the fossil fuels they replace. Neste can meet EU sustainability standards for biofuels by sourcing palm oil from older plantations, commonly ones for which rainforest was destroyed before 2008. However, investigations show that Neste cannot even guarantee that all its crude palm oil is free from more recent or ongoing deforestation. At least one of the mills supplying

Neste was found to have sourced palm oil from illegal plantations inside a national park in Sumatra during three separate investigations, most recently in 2017.

An undisclosed proportion of Neste's feedstock – very possibly the majority – consists of PFAD which Neste cannot even trace back to plantations. PFAD is diverted from other users who in turn replace their supply mainly with crude palm oil. This means that the impacts on forests and the climate are very similar whether PFAD or crude palm oil is used. Moreover, further increases in PFAD demand could easily make it more expensive than crude palm oil and thus cause it to directly (rather than indirectly as at present), drive the expansion of oil palm plantations. Neste's description of PFAD as a 'residue' is misleading. PFAD is in fact treated as a food-based biofuel under biofuel legislation in several European countries.

A Neste refinery. Kārlis Dambrāns/Flickr



## NESTE'S AVIATION BIOFUEL TECHNOLOGY AND PARTNERSHIPS

As of late 2018, there is one medium-sized refinery which regularly produces aviation biofuels – the Paramount refinery in California, owned by World Energy. This is set to change in 2019: the Finnish biofuel and oil company states on its website: *"In 2019, Neste plans to produce more renewable jet fuel than all other providers combined. By 2022, Neste plans to increase its production remarkably to meet the demand."* [1] Neste undoubtedly has the infrastructure and commercial agreements in place to deliver on this commitment.

During 2018, Neste signed collaboration agreements with San Francisco International Airport, [2] Air BP, [3] Alaska Airlines, [4] Dallas Fort Worth International Airport. [5] The Swiss government, however, pulled the plug on Neste's supply agreement with Geneva Airport. [6]

Neste claims to be producing 60% of the world's Hydrotreated Vegetable Oil (HVO). [7] HVO, as shown in a Biofuelwatch report in 2017, [8] is the only technology for producing aviation biofuels that is now mature enough to allow for commercial-

scale use. The technology works with any type of plant oil or animal fat, although refining unsaturated fats such as rapeseed or soybean oil requires more hydrogen than saturated fats such as palm oil. Palm oil is the cheapest of all mass-produced virgin vegetable oils on the world markets and this, coupled with the lower hydrogen requirement, makes it the lowest cost HVO feedstock, except for wastes and residues, such as used cooking oil and tallow, which are in very limited and short supply. [9]

In 2017, HVO accounted for 6% of all biofuels worldwide, but it is the fastest expanding type of biofuels. [10] So far, almost all of it has been used in road transport. Upgrading HVO fuels for use as jet fuel adds to the cost. In a report published by the Danish

Energy Agency, it is estimated that such upgrading adds 25% to the cost. [11]

Neste plans to produce significant quantities of HVO jet fuel at its Singapore facility. Furthermore, the company has partnered with Boeing to collaborate on obtaining permission from the international standards agency ASTM for blends of cheaper non-upgraded HVO with fossil fuel kerosene to be used in jet engines. This follows on from a (technically) successful flight test with a 15% straight HVO blend in 2014. [12] If Neste and Boeing's application to the ASTM succeed, the cost of aviation biofuels will drop immediately, which could well lead to rapid commercial take-up.

The difference between World Energy – today's leader in aviation biofuel production – and Neste – is stark:

World Energy's HVO capacity is less than 120,000 tonnes a year, and its ambition is to increase this to just over half a million tonnes in 2022. By that time, Neste's HVO capacity is expected to have grown from a current 2.6 million tonnes to 4 million tonnes. Those figures apply to all HVO, not specifically



An oil palm plantation in Jambi, Indonesia. CIFOR/Flickr

to aviation biofuels. World Energy continues to rely on some of the least controversial feedstocks, sourced from wastes and residues, although diverting many of those residues from other uses still results in quite significant indirect greenhouse gas emissions. Neste, on the other hand, has always depended heavily on crude palm oil and PFAD (see below).

If Neste had wanted to rely on non-palm feedstock for aviation biofuels, it would have chosen to produce those in its refineries in Rotterdam, The Netherlands or Porvoo, Finland. Instead, it has chosen to produce HVO aviation fuels at its Singapore plant, i.e. a major palm oil trade hub sandwiched between the world's two biggest palm oil producers.



## NESTE'S PALM OIL BIOFUELS: "SUSTAINABILITY" CLAIMS IGNORE INDIRECT IMPACTS AND PAST DEFORESTATION

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Neste commissioned its first HVO unit in Finland in 2007. Its Annual Report for that year admitted: *"What has attracted the most attention in the public arena has been the raw materials we use...It is palm oil that has generated the largest number of questions and the most opposition."* [13] Today, Neste prides itself on full traceability of crude palm oil from the beginning, and 100% 'sustainability' certification as of 2013 – although this applies only to crude palm oil, not to the crude palm oil fraction called PFAD (see below). [14]

Neste's sourcing and sustainability policies ignore all indirect impacts. Thus, even if all of Neste's crude palm oil HVO complied with those standards, the greenhouse gas emissions from indirect land use change would still make it three times as bad for the climate as the fossil fuel it replaces, as confirmed in data produced for European Commission. [15]

EU biofuel standards (which Neste claims to apply to all its biofuels) require palm oil to not be sourced from land deforested after January 2008. Palm oil sources from plantations grown on land deforested prior to 2008 is considered "sustainable". The same is true for the Roundtable on Sustainable Palm Oil (RSPO).

There is a high likelihood that a high percentage of Neste's palm oil come from plantations for which rainforest was cut down prior to 2008: all of the palm mills from which Neste is sourcing [16] are located in Sumatra, Borneo and the smaller Indonesian island of Belitung, in provinces which have seen – and continue to see - rampant deforestation linked to palm oil. For example, in Riau province, one of Neste's sourcing regions, 65% of forests were destroyed between 1982 and 2008, and around 46% of that deforestation was for the purpose of producing palm oil. [17] A 2016 study showed that, between 2012 and 2014, Riau remained one of the two Sumatran provinces with the highest deforestation rates. [18] On Belitung, 185,960 hectares of rainforest were destroyed in the 20 years starting in 1995, with just 50,155 hectares remaining by 2015. [19] A comparison between Neste's map of suppliers, and a map of 1995 land cover on Belitung strongly suggests that Neste is sourcing from converted rainforest land on that island, too. [20] Yet, because those particular plantations were established before 2008, [21] they are certified as 'sustainable'.

## IS NESTE SOURCING CRUDE PALM OIL LINKED TO ONGOING RAINFOREST DESTRUCTION?

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Several palm oil companies supplying Neste are implicated in recent or ongoing rainforest destruction and land conflicts: For example, as of November 2018, Golden Agri Resources has been the subject of five formal complaints filed with the Roundtable on Sustainable Palm Oil (RSPO) related to its land acquisitions in Liberia and alleged violations of Indonesian laws. [22] Earlier in 2018, its subsidiary, Golden Veroleum Liberia, left the RSPO after a complaint against it was upheld. A Greenpeace report links Wilmar International, another Neste supplier, to the destruction of 21,500 hectares of rainforest in West Papua after the company adopted a no-deforestation policy in 2013, due to its ties with a company called GAMA Corp. [23] Those cases relate to companies from which Neste's obtains palm oil, though not to the specific plantations from which it is sourcing.

A recent report by Eyes on the Forest [24] – a coalition of Indonesian NGOs and WWF – revealed something more alarming still: some of the palm oil which Neste purchased from two mills in Riau, Sumatra was *"not fully traceable and could be tainted with deforestation"*, specifically deforestation from the Tesso Nilo National Park. This was the case despite the mills having obtained RSPO certification.

One of the mills in questions (owned by RGE) was found to have used palm oil from illegal plantations inside the national park. That was confirmed by three separate investigations, in 2011-12, 2014-15 and 2017. Neste's website continues to list both mills as ongoing suppliers.



An illegal agricultural fire in Tesso Nilo National Park, Sumatra, Indonesia. [World Resources Institute/Flickr](#)

## HOW MUCH PALM OIL DOES NESTE USE?

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Between 2012 and 2016, Neste reduced its crude palm oil use from 1.36 million tonnes to around half a million tonnes – or 19% of its feedstock (compared to 31% in 2015). However, in 2017, crude palm oil use went up again, to 663,000 tonnes. [25]

As mentioned above, Neste also uses Palm Fatty Acid Distillate (PFAD), which it classifies as ‘wastes and residues’. The company refuses to disclose how much of its ‘wastes and residue’ feedstock is PFAD. [26] When crude palm oil is refined to food-grade palm oil, fatty acids are separated out because they make the oil smell and taste rancid. The fatty acids (i.e. PFAD) are then widely used to make soap, oleochemicals (from rubber to cosmetics), and livestock feed. Worldwide, around 2.5 million tonnes of PFAD a year are produced, representing 4% of crude palm oil (CPO). According to research published by the International Council on Clean Transportation, [27] diverting PFAD to biofuels results in other industries replacing it with CPO. The study predicts that around the livestock and oleochemical industries will replace 80% of the PFAD diverted from their industries to biofuels with crude palm oil, and the remainder with soy and rapeseed oil. Thus, using PFAD for biofuels drives up other users’ demand for crude palm oil - hence the impacts are ultimately little different than those of using unrefined crude palm oil for biofuels.

Neste nonetheless argues that PFAD should be treated as a residue, in the same way as, for example, tallow. It is true that the indirect impacts of diverting residues, such as food-grade tallow, to biofuels are also severe. However, there are significant differences between such residues on the one hand and PFAD on the other hand.

Firstly, price difference between PFAD and crude palm oil is far smaller than that between, for example, a tonne of tallow compared to a tonne of beef or pork (from which tallow is derived). [28] Furthermore, PFAD prices are not moving in tandem with crude palm oil prices: The long-term price differential is around 20%, [29] however throughout 2015, the price of PFAD was just 14% below that of CPO. [30] In January 2018, the price at which Malaysian PFAD was trading on the markets was a mere 4% below the price of Indonesian crude palm oil. During September 2018, the price difference between Malaysian PFAD and CPO was 11%. [31]

Secondly, while the proportion of tallow compared to beef and pork is fixed, the percentage of fatty acids in crude palm oil could be easily raised by leaving a slightly longer time gap between harvesting and processing palm fruits, as Neste admits. [32] If PFAD demand for biofuels rises further – especially if biofuel producers were to favour it over crude palm oil – there is no reason why producers could not respond by making crude palm oil with a higher fatty acid content. If this happened, PFAD use would directly, rather than indirectly, lead to palm oil expansion, because more CPO, and thus more hectares of land would be needed per tonne of food-grade palm oil.

Consequently, UK government does not allow PFAD to be classified as a ‘residue’ for biofuel purposes. [33] Biofuel guidance in Sweden, Finland and Norway also states that PFAD should not be double counted towards renewable energy targets as a “waste or residue”. [34]



## CONCLUSION

Neste is the world's largest producer of Hydrotreated Vegetable Oil (HVO). It plans to start producing significant quantities of jet fuel from upgraded HVO from 2019, and it is also working with Boeing to try and gain permission for airplanes to fly with blends containing cheaper HVO diesel. If successful, this could trigger significantly increased take-up of aviation biofuels. Neste's HVO contains significant quantities of crude palm oil and, furthermore, an undisclosed proportion of the fatty-acid fraction of crude palm oil, called PFAD. Neste prides itself of its sustainability policy and crude palm oil tracing and certification, although those do not so far apply to the PFAD is sources. Indirect impacts – which cause palm oil biofuels to have an estimated greenhouse gas footprint three times as bad as the fossil fuels it replaces – are ignored by Neste. What is more, Indonesian NGOs and WWF have published evidence which shows that Neste cannot even guarantee that its palm oil is free from product from deforestation for illegal plantations inside a national park.

## REFERENCES

- [1] <https://www.neste.com/companies/products/renewable-fuels/neste-my-renewable-jet-fuel>
- [2] <https://bioenergyinternational.com/biofuels-oils/sfo-announces-landmark-agreement-for-use-of-sustainable-aviation-fuels>
- [3] <https://www.businessgreen.com/bg/news/3064335/neste-and-air-bp-ink-green-jet-fuel-partnership>
- [4] <https://www.canadianbiomassmagazine.ca/biofuel/neste-and-alaska-airlines-sign-mou-to-expand-use-of-bio-jet-fuel-7026?jji=1542969809628>
- [5] <https://www.neste.com/neste-and-dallas-fort-worth-international-airport-dfw-are-collaborating-drive-sustainable-aviation>
- [6] <https://www.neste.com/releases-and-news/swiss-authorities-decision-leads-cancellation-renewable-jet-fuel-project-geneva-airport>. The Swiss government has not published the reasons for its decision.
- [7] Neste Annual Report 2017: <https://www.neste.com/corporate-info/news-inspiration/material-uploads/annual-reports>
- [8] <http://www.biofuelwatch.org.uk/wp-content/uploads/Aviation-biofuels-report.pdf>
- [9] <http://biofuelwatch.org.uk/world-energy/>
- [10] [http://www.ren21.net/gsr-2018/chapters/chapter\\_03/chapter\\_03/](http://www.ren21.net/gsr-2018/chapters/chapter_03/chapter_03/)
- [11] [ens.dk/sites/ens.dk/files/Analyser/technology\\_data\\_for\\_renewable\\_fuels\\_-\\_june\\_2017\\_update\\_september2018\\_0.pdf](https://ens.dk/sites/ens.dk/files/Analyser/technology_data_for_renewable_fuels_-_june_2017_update_september2018_0.pdf)
- [12] [theicct.org/sites/default/files/publications/Green-Diesel-Aviation\\_ICCT-Working-Paper\\_20180321\\_vF.pdf](https://theicct.org/sites/default/files/publications/Green-Diesel-Aviation_ICCT-Working-Paper_20180321_vF.pdf)
- [13] [ir-service.appspot.com/view/ahBzfmlyLXNlcnZpY2UtaHJkchYLEg5GaWxlQXR0YWNobWVudBjV7goM?language\\_no=0](https://ir-service.appspot.com/view/ahBzfmlyLXNlcnZpY2UtaHJkchYLEg5GaWxlQXR0YWNobWVudBjV7goM?language_no=0)
- [14] [neste.com/corporate-info/sustainability/sustainable-supply-chain/palm-oil-traceability](https://neste.com/corporate-info/sustainability/sustainable-supply-chain/palm-oil-traceability)
- [15] [transportenvironment.org/sites/te/files/Factsheet%20palm%20oil%20biofuels%20TE%20May%202018.pdf](https://transportenvironment.org/sites/te/files/Factsheet%20palm%20oil%20biofuels%20TE%20May%202018.pdf), Footnotes 1,2,3
- [16] [neste-traceability-dashboard.com/nestes-palm-oil-dashboard](https://neste-traceability-dashboard.com/nestes-palm-oil-dashboard)
- [17] [assets.panda.org/downloads/riau\\_co2\\_report\\_wwf\\_id\\_27feb08\\_en\\_lr\\_.pdf](https://assets.panda.org/downloads/riau_co2_report_wwf_id_27feb08_en_lr_.pdf)
- [18] [c402277.ssl.cf1.rackcdn.com/publications/870/files/original/EoF\\_%2806Apr16%29\\_No\\_One\\_is\\_Safe\\_English\\_FINAL.pdf?1460552904](https://c402277.ssl.cf1.rackcdn.com/publications/870/files/original/EoF_%2806Apr16%29_No_One_is_Safe_English_FINAL.pdf?1460552904)
- [19] The Change of Carbon Stocks and CO<sub>2</sub> Emission as the Result of Land Cover Change for Tin Mining and Settlement in Belitung Island Indonesia, Dedi Hermon, Journal of Geography and Earth Sciences, June 2016
- [20] Compare with [neste-traceability-dashboard.com/nestes-palm-oil-dashboard](https://neste-traceability-dashboard.com/nestes-palm-oil-dashboard) [researchgate.net/figure/Spatial-Model-of-Change-of-Land-Cover-in-Belitung-Island-in-1995-2015-20-years\\_fig1\\_310736778](https://researchgate.net/figure/Spatial-Model-of-Change-of-Land-Cover-in-Belitung-Island-in-1995-2015-20-years_fig1_310736778)
- [21] [rspo.org/uploads/default/pnc/PT\\_Steelindo\\_Wahana\\_Perkasa\\_POM\\_ASA2\\_CU830203\\_Indonesia1.pdf](https://rspo.org/uploads/default/pnc/PT_Steelindo_Wahana_Perkasa_POM_ASA2_CU830203_Indonesia1.pdf)
- [22] [forestpeoples.org/sites/default/files/documents/Press%20Statement%20-%20GAR%20Complaints\\_0.pdf](https://forestpeoples.org/sites/default/files/documents/Press%20Statement%20-%20GAR%20Complaints_0.pdf)
- [23] [chainreactionresearch.com/the-chain-martuasitorus-resigns-from-wilmar-board/](https://chainreactionresearch.com/the-chain-martuasitorus-resigns-from-wilmar-board/)
- [24] [eyesontheforest.or.id/reports/investigative-report-enough-is-enough-jun-2018](https://eyesontheforest.or.id/reports/investigative-report-enough-is-enough-jun-2018)
- [25] See [neste.com/corporate-info/news-inspiration/material-uploads/annual-reports](https://neste.com/corporate-info/news-inspiration/material-uploads/annual-reports), Annual Reports 2015, 2016, and 2017
- [26] In an email to Biofuelwatch, dated 31st July 2017, a Neste representative stated: "For competitive reasons Neste has decided not to disclose the proportions of specific waste and residue feedstocks and therefore unfortunately we cannot give clarifications to those specific requests."
- [27] [theicct.org/sites/default/files/publications/Waste-not-want-not\\_Cerulogy-Consultant-Report\\_August2017\\_vF.pdf](https://theicct.org/sites/default/files/publications/Waste-not-want-not_Cerulogy-Consultant-Report_August2017_vF.pdf)
- [28] For tallow and meat prices, see [statista.com/statistics/280442/commodity-prices-of-pork-in-the-united-kingdom-uk/](https://statista.com/statistics/280442/commodity-prices-of-pork-in-the-united-kingdom-uk/), [statista.com/statistics/675826/average-prices-meat-beef-worldwide/](https://statista.com/statistics/675826/average-prices-meat-beef-worldwide/), and [mla.com.au/globalassets/mla-corporate/prices-markets/documents/trends-analysis/co-products/mla\\_market-information-report-co-products\\_march\\_2018.pdf](https://mla.com.au/globalassets/mla-corporate/prices-markets/documents/trends-analysis/co-products/mla_market-information-report-co-products_march_2018.pdf)
- [29] [theicct.org/sites/default/files/publications/Waste-not-want-not\\_Cerulogy-Consultant-Report\\_August2017\\_vF.pdf](https://theicct.org/sites/default/files/publications/Waste-not-want-not_Cerulogy-Consultant-Report_August2017_vF.pdf)
- [30] See endnote 24
- [31] 1<sup>st</sup> January prices available at [palmoilanalytics.com/price/2](https://palmoilanalytics.com/price/2) and [palmoilanalytics.com/price/15](https://palmoilanalytics.com/price/15) 28<sup>th</sup> September prices accessed at [www.commodity3.com/](https://www.commodity3.com/) on 28th November.
- [32] [neste.com/corporate-info/sustainability/sustainable-supply-chain/pfad-residue-palm-oil-refining-process](https://neste.com/corporate-info/sustainability/sustainable-supply-chain/pfad-residue-palm-oil-refining-process)
- [33] [assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/740218/rtfo-guidance-feedstocks-including-wastes-and-residues-year-11.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740218/rtfo-guidance-feedstocks-including-wastes-and-residues-year-11.pdf)
- [34] <https://d5i6is0eze552.cloudfront.net/documents/Annet/Palm-Fatty-Acid-Distillate-in-biofuels-.ZERO-and-Rainforest-Foundation-N.pdf?mtime=20160302113207> in relation to Finland and Norway, and personal communication with Rainforest Foundation Norway regarding legislation in Norway, 6th December 2018



Sumatran elephant in Tesso Nilo national park. Jennykapau/Wikimedia Commons

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