EWABA Position paper on the ReFuelEU Aviation proposal

November 2021

EWABA represents the interests of the EU waste-based and advanced biodiesel industry. In 2020 our 35+ members produced 1.737.000t of biodiesel using waste-based feedstocks in Part B of Annex IX of Directive 2018/2001 (the Renewable Energy Directive or REDII), namely used cooking oil (UCO) and animal fats, and different waste lipids advanced feedstocks from part A of Annex IX of the same Directive.

Our industry believes that the decarbonization of the aviation sector is a pressing climate objective for the EU. The use of sustainable aviation fuels (SAF) constitutes a key solution to achieve that objective, to be combined with other important measures such as tactical air traffic control, air transport management and engine efficiency optimization.

Our industry supports the use of SAF as a key decarbonizing tool for the aviation sector. But not all SAF are the same. We believe that the ReFuelEU Aviation Proposal as currently drafted is indiscriminate in its approach and in consequence it:

1. Eliminates the level playing field between transport sectors and technologies,
2. Diverts scarce waste-based feedstocks to a less efficient use,
3. Increases net GHG emissions in the EU transport sector taken as a whole, and
4. Thwarts investments in much needed SAF developing technologies such as alcohol-to-jet, Fischer-Tropsch and e-fuels.

1. Elimination of the level playing field between transport sectors and technologies

Waste lipids can be processed by different technologies for the production of biofuels. For the purposes of this paper we will be referring to:

a) Waste lipids Biodiesel – using a transesterification process for the production of Fatty Acid Methyl Ester (FAME), and
b) Waste lipids HEFA – which is essentially Hydrotreated Vegetable Oil (HVO) with an additional isomerization process to render the resulting fuel airworthy.

Only HEFA can be used in aviation. Biodiesel (FAME) can be used in the road and maritime sectors but cannot be used in aviation engines because of its cold fuel properties.

By establishing a blending mandate that mostly relies on HEFA using limited waste lipids from the onset, the ReFuelEU Aviation proposal is breaking the existing level-playing field between transport sectors and technologies. If adopted as currently drafted, the proposal will create a protected market for the single technology processing waste lipids for aviation and to the detriment of the waste lipid processes for road and maritime use.

2. Diversion of waste-based biodiesel feedstocks to a less efficient use

The impact assessment accompanying the ReFuelEU Aviation proposal does not substantiate the actual availability figures concerning waste lipids. It only refers to UCO (currently the most commercially available type of waste lipid) stating that "*there is sufficient*" in the 2025 to 2050 period (section 6.1.2. of the Impact assessment. In **Annex I** of this response, we address a few recent assessments of UCO availability showing that:

- The existing EU UCO generation is below 1 million tons
- Already today the vast majority of EU sourced UCO comes from imports
- Domestic collection has stalled and imports have started a downward trend

Given the existing volumes of waste lipids and the fact that a growing number of companies within our industry already report that sourcing waste lipids is increasingly complicated amid extremely feedstock competition within current market conditions, it is unavoidable to assume that the blending mandate as currently envisaged will lead to further scarcity and diversion of limited feedstocks to aviation use. The joint demand for waste lipids emanating from the proposal to revise the Renewable Energy Directive (REDIII), FuelEU Maritime and ReFuelEU Aviation will exceed by more than 10-fold the EU domestic collection capability. The EU industry already relies extensively on imports, and we observe that imports are entering into a declining phase as key exporting countries have important installed capacity and will progressively use their own waste lipids to decarbonize their own transport sectors.

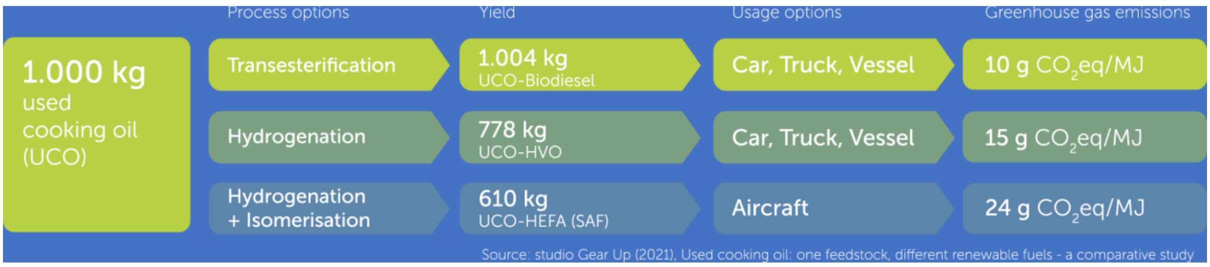
The proposed SAF blending mandate envisages the prioritization of waste lipids for aviation use to the detriment of their more efficient use in road and maritime sectors. The ReFuelEU Aviation impact assessment offers limited to no substantiation for the claim that no diversion will occur, only stating that "*The potential displacement of biofuels from road to aviation is expected to be low*." (section 6.1.2). This diversion would leave other instruments within the Fit for 55 package (i.e. the REDIII and the FuelEU maritime proposal) without a key decarbonizing technology, waste-based and advanced biodiesel, in a key decade (2025-2035) during which both a majority of internal combustion engine vehicles will still run on EU roads, and an important efforts needs to be undertaken to reduce GHG emissions in the maritime transport sector.

In addition, this diversion of waste lipids will lead to overall higher GHG emissions in the EU transport sector taken as a whole, given that waste lipids-based HEFA for SAF is a more energy intensive technology than waste lipids-based biodiesel for the road and maritime transport sectors, as briefly outlined in the below section.

3. Increase of net GHG emissions

Waste-based biodiesel for road and maritime use (produced through the transesterification process) is a more efficient process than waste-based HEFA for aviation (produced through hydrogenation and isomerization processes).

The different yields and GHG emissions are explained in the graph below taking UCO as a reference, although the results are applicable to other waste lipids:



Given that waste lipids are globally limited, diversion from road/maritime to aviation necessarily leads to higher GHG emissions because the diverted feedstock is processed by a less efficient technology saving less GHG than what otherwise would have been saved in road/maritime fuel production.

The use of HEFA certainly reduces emissions when compared with fossil kerosene when the aviation sector is considered alone. However, if we take a holistic view of the EU transport sector as a whole, comprising road, aviation and maritime sub-sectors the feedstock diversion towards HEFA production does result in overall higher GHG emissions.

Based on the findings of an assessment of different UCO processing technologies performed by Dutch consultancy Studio Gear Up (accessible here) we estimate that a 2% blending mandate in 2025 would require up to 1.5 million tons of waste lipids diverted from waste-based biodiesel production from the road and maritime sectors, resulting in a minimum of 1 million tons of additional GHG emissions released to the atmosphere. And this amount is only set to increase in parallel to the upwards trajectory of the blending mandate.

4. Wrong investment signals

Aviation is indeed a hard to decarbonize sector, for this reason the current SAF mandate which over-relies on waste lipids HEFA SAF for the key decade 2025-2035 will thwart investment in much needed developing technologies such as alcohol-to-jet, ethanol-to-jet, gasification/Fischer-Tropsch and e-fuels. These technologies use widely available scalable feedstocks such as agricultural and forestry residues, energy crops, municipal solid waste and renewable energy and actually constitute the best SAF solutions to decarbonize the aviation sector.

As a policy promotion mechanism the SAF blending mandate as drafted will plainly fail in promoting these technologies whose cost of production is much higher than that of HEFA's, as illustrated in the graph below from ICCT *"Changes to the Renewable Energy Directive revision and ReFuel EU proposals: Greenhouse gas savings and costs in 2030".*

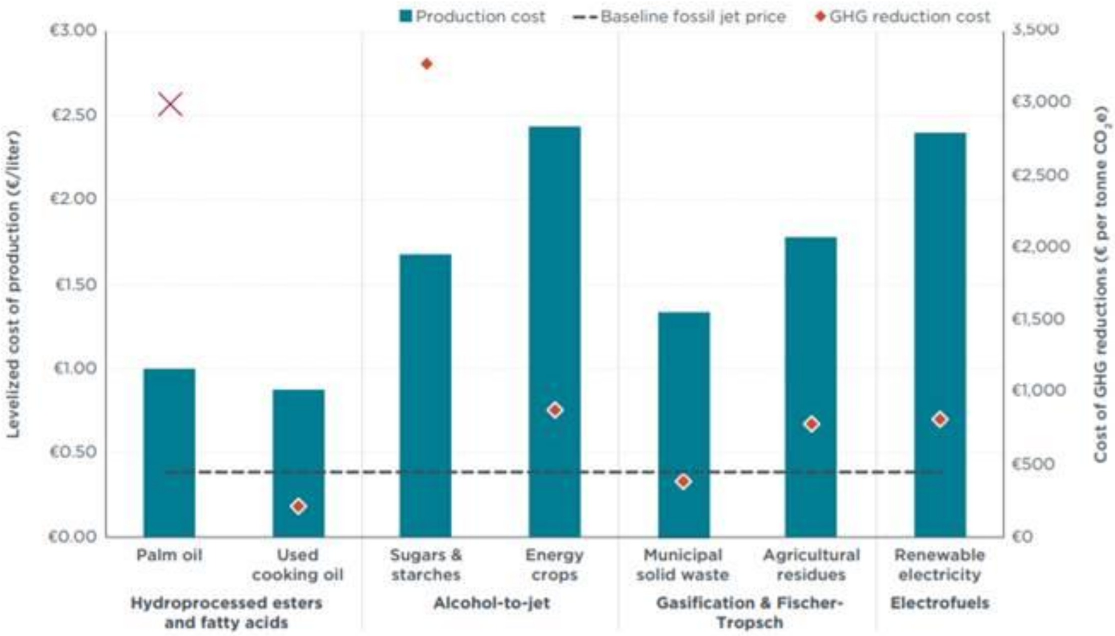


Figure 2: Estimated costs of selected sustainable aviation fuels relative to petroleum jet fuel price and their associated cost of GHG reductions

Note: Palm oil does not deliver any GHG reductions after taking into account indirect land-use change emissions; therefore, it does not have an associated cost of delivered carbon reductions. Source: Pavlenko, Searle, and Christensen, "The Cost of Supporting Alternative Jet Fuels in the European Union."

Our proposed solutions

In order to avoid the different negative unintended consequences outlined in the above sections our industry advocates for improving the ReFuelEU proposal with the following provisions:

- Include a specific sub-mandate for non-waste lipids advanced biofuels from part A of Annex IX of the REDII.
- Include a much higher sub-mandate for e-fuels as from the first year of the date of applicability of the Regulation.
- Promote waste lipids in an equal manner in the road, maritime and aviation sector via:
    - A 2% minimum incorporation sub-target in the REDIII for biofuels produced from feedstocks in part B of Annex IX of the REDII.
    - A 0.6% limitation for part B (re. aviation fuels) in the ReFuelEU proposal.
    - Inclusion of a limitation for waste lipids in Part A (re. aviation fuels) in the ReFuelEU proposal.
- Broaden the feedstock base for SAF production to include other sustainable wastes and residues such as for example category 3 animal fats (as long as it is proven that there is no conflicting use in the food and feed sectors), and potentially sustainable crop-based feedstocks.
- Consider postponing the date of applicability of the Regulation to 2027.

ewaba
European Waste-based & Advanced Biofuels Association

Annex I - EWABA - assessment of UCO feedstock availability references

Background information

From:	European Waste-based & Advanced Biofuels Association (EWABA)
Subject:	Feedstock availability – References

This paper sets out findings from recent reports on used cooking oil (UCO) availability following the European Commission's legislative proposals for the decarbonization of the transport sector within the so-called Fit-for-55 package.

Executive Summary

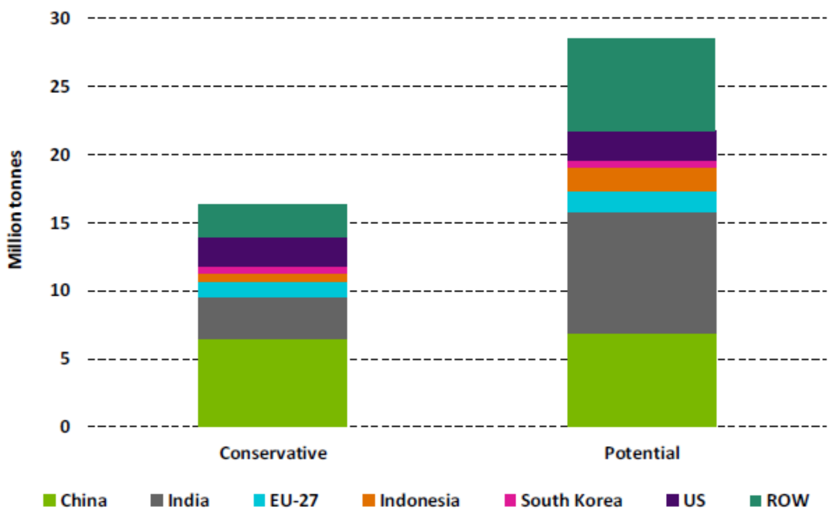
1. British Consultancy **LMC** recently estimated a global used cooking oil (UCO) availability (conservative figure) of **15 million tons** by 2030.
2. French consultancy **Greenea** estimates the potential UCO availability in the US, EU and Asia to be around **11.3 million tons** and shows how UCO collection in the EU has stalled as increasing imports have been registered in the past few years. The report however indicates that increasing imports cannot be maintained in the near-term.
3. **Imperial College London** has very recently estimated European UCO collection **potential** at **3.1 million tons** by 2030. However, this forecast is based on **a factually wrong reference to a 2016 Greenea report**. Though the Greenea report estimates that the 2016 UCO generation in Europe to be approx. 0.7 million tons, the Imperial study indicates this figure at approximately 1.7 million tons.

We elaborate on these 3 items below.

1. LMC Global Waste Oils & Fats Report 2021 (accessible here)

British consultancy LMC produced a report this year including an assessment of "conservative" and "potential" Used Cooking Oil (UCO) supply outlook (reproduced below). The first bar is stating slightly +15 million tonnes as "conservative", although this is in fact a realistic (yet immensely difficult to achieve) figure. To collect these volumes would require significant efforts in terms of public education, logistics and policy incentives to achieve the "conservative" figure of 15 million tonnes of UCO collected globally (i.e. China must collect x5 times as much UCO as it does now and India x25 times as much).

UCO supply outlook, 2030



Source: Global Waste Oils & Fats Report 2021

- It is important to stress that availability does not equal collectability and available volumes are not easily collected due to numerous limiting factors. The 2nd bar with 27 million tonnes as "potential" is completely unrealistic and impossible to obtain/collect as it portrays the total potential availability of used cooking oil globally.

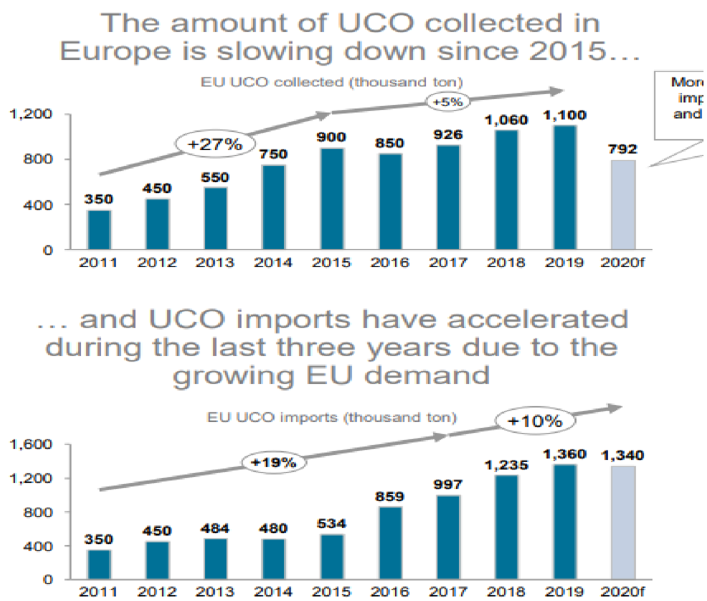
- The "potential" bar shows that India could have approx. 8-9 million tonnes which is a highly unrealistic figure given that India now collects inadequate volumes to supply even their own very small waste biodiesel industry. In addition and very importantly, India has passed legislation imposing a ban on UCO exports to incentivize domestic use of waste oils. India is expected to face real struggles to even approach the "conservative" figure (close to 2.5 million tonnes) as the country currently collects less than 100,000 tonnes per year.

- China, the EU's largest supplier at the moment (circa 650,000t of Chinese imports per year) is a complicated case too. The "conservative" bar shows a realistic estimate of 6 million tonnes Chinese UCO supplied to the world, but this would be approx. 4-5 times what China has tapped today already. In addition, it's possible that China will introduce a domestic biodiesel mandate (as its currently the case in Shanghai) and divert a lot of the feedstock it collects outside the EU and towards the US, where a lot of newly build production of HVO (renewable diesel) has been announced.

2. Greenea Horizon 2030: Which investments will see the light in the biofuel industry? (accessible here)

This report illustrates: i) EU's dependence on foreign UCO, ii) the maturity of EU domestic UCO collection, iii) fierce global competition for UCO and iv) the limitations in terms of additional UCO supplies from origin countries such as India, China, US, etc.

- This report shows the decelerating growth of UCO collection in the EU (see chart below). Domestic EU collection stood at approx. 1 million tonnes for the 2018-2020 period, pre-covid. However, growth in collection has fallen to single digits as most industrial/HORECA UCO recycling is now mature and EU household collection faces a lot of limitations.



Source: Greenea Analysis, Custom Data, USDA

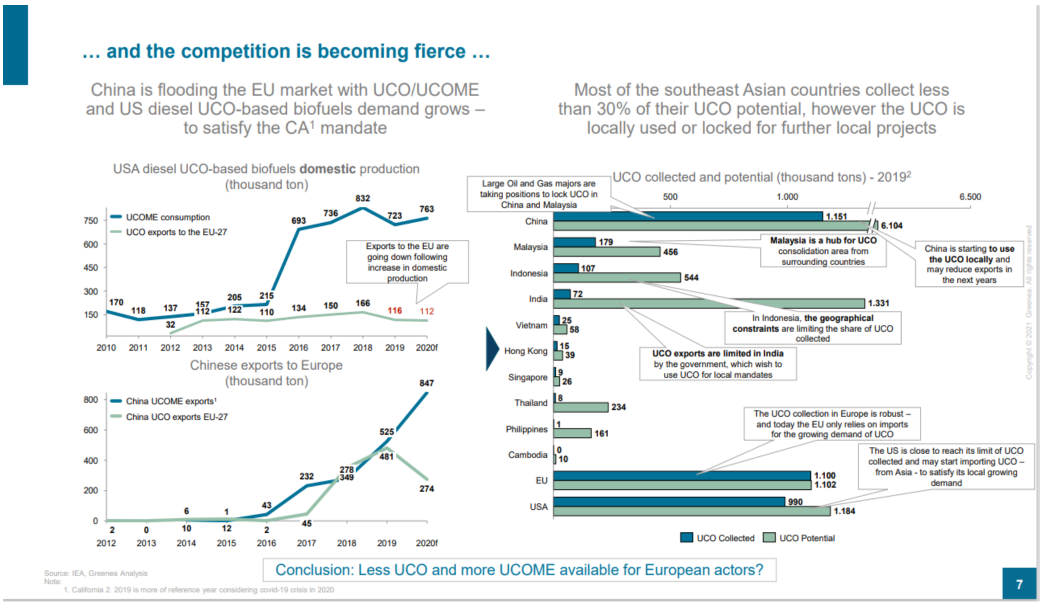
- Europe is over relying on UCO imports for the past years to produce biofuels. Increasing imports are being widely questioned by NGOs due to several reasons: i) competing uses with animal feed and oleochemicals sectors, ii) major UCO exporting third countries (China, USA, countries in the middle east, south-east Asia and South America) are seeing an explosion in their own installed capacity for waste-based biodiesel, HVO and (and HEFA SAF) production, therefore their waste lipids are to be put to use to decarbonize their own transport sectors and not for EU imports.

- The EU's dependence on foreign UCO has now surpassed domestic UCO and has a share of 55-65% of all UCO used in the EU. The growth of UCO imports has accelerated over the past years and all of this before incentives for aviation are introduced.

- As part of the same Greenea Horizon report, there are two additional figures that show the actual/potential collection of UCO from major suppliers and another one on competition stemming from the two traditionally largest suppliers of UCO to Europe (US, China).

- The left figures on slide 7 of the report (reproduced below) are particularly interesting as they show that less and less Chinese and American UCO is becoming available for the European market, while Chinese UCOME exports have seen a sharp rise in the past two years and US domestic UCOME consumption has also increased significantly since 2016.

- The second bar chart on the right (see below) shows current (3.66 million tons) and potential (11.3 million tons) of UCO collected for some of the major UCO suppliers around the world. It is very visible that the EU has almost reached full maturity**.** The US is close to maturity while the largest potential is currently located in India and China. As mentioned above, China has already started using UCO domestically to decarbonize its own fleet and the EU is facing strong competition from the US and especially California (higher mandates, announced multiple HVO/SAF projects) that will need increasing volumes of UCO in the coming years. India collects very limited UCO volumes for now, but actual potential is restricted by a lot of factors, most notably government restrictions to import/export UCO.



3. Sustainable Biomass Availability in the EU, to 2050, Imperial College London Consultants, September 2021 (Accessible here)

Imperial College London with the support of independent consultants Dr. Calliope Panoutsou and Dr. Kyriakos Maniatis, prepared a report that estimates the sustainable biomass potential availability in the EU and UK by 2030 and 2050.

This study establishes that the potential for UCO in EU-27 & UK in 2030 is 3.1 million tons, assuming a household collection rate of 15% and a professional collection rate of 90%.

However, this estimation is based on a factually wrong reference to a Greenea UCO study from 2016, (accessible here). In the table reproduced below the Imperial study states that *"As of 2016, total generated UCO in the EU is approximately **1.7 million tonnes/yr**"*, when in fact this figure in the Greenea report refers to the **availability** at that time. UCO **collection** in 2016 (according to the Greenea study) was closer to **0.7 million tonnes** (see exhibits 31 and 32 in the Greenea report).

The 2016 Greenea report further estimates that a maximum of **330,000t** additional UCO per year could be realistically collected beyond the 0.7 millon tonnes collected in 2016. That represents a total of ~**1.1 million tonnes** actual collection in 2030 (from around **0.7 million tonnes** collected in 2016). Therefore, the 3.1 million tonnes/yr potential for 2030 appears as highly exaggerated and there is no further reference as to where this potential figure derives from.

Table 8 Utilised Cooking Oil collection in EU, UK, China and Japan[59]

Country/ region	Annual quantity	Notes
EU27& UK	As of 2016, in all the EU countries combined, the total generated UCO is approximately 1.7 million tonnes/yr, with 0.9 million tonnes/year in households and 0.8 million tonnes/yr in professional sector.	The recovery rate is 5.6% and 86% for households and professional sector respectively[60]. Some countries such as Belgium, Sweden, Austria and Netherlands have proven that household collection can be highly efficient.

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