

Used Cooking oil demand likely to double, and EU can't fully ensure sustainability

EU demand for UCO likely to surpass sustainable supply

April 2021

Summary

Due to the incentives provided under the EU rules on renewable fuels for transport, Used cooking oil (UCO) for biofuels has become increasingly popular in the EU. However, Europe is not able to keep up with the increased demand, and more than half the UCO in the European biofuels market travels all the way mainly from China, but also from the US, Malaysia and Indonesia. According to estimates by consultancy CE Delft, the demand for UCO could increase substantially, potentially doubling compared to today, thus increasing the dependency on imported UCO.

While UCO biofuels can deliver significant GHG savings compared to fossil fuels when it is really a waste, there are concerns and investigations about the legitimacy of the UCO used for biofuels - for example, whether it is really “used” or a waste product. This is because the current EU sustainability rules cannot guarantee that the UCO imported and consumed in Europe is fully traced and sustainable, so rising the demand beyond sustainable supply levels would increase these concerns and risks of using “fake” UCO, potentially leading to indirect impacts such as deforestation.

To avoid these risks, the EU must ramp up the verification and monitoring requirements along the supply chain - including checks to detect and prevent adulterated UCO from entering the biofuels market - as well as detailed assessments of the quantities available of UCO in the EU member states.

1. Used Cooking Oil in Europe

Introduction

The EU Renewable Energy Directive (RED) regulates the use of renewable fuels in the transport sector. While the RED has driven the use of unsustainable biofuels such as palm, soy and wheat due to flawed sustainability criteria, the EU has indicated it will (slowly) move away from these crop biofuels and promote the use of advanced biofuels from waste and residues. In the REDII (adopted in 2018) there is a dedicated target for advanced fuels, which contains a sub-target for advanced biofuels - those listed in the annex IX part A of the REDII (which includes technologies that are at an infant stage). The feedstocks listed in the annex IX part B (mature technologies, including used cooking oil and animal fats) can count towards the advanced fuels target up to a maximum of 1.7%. While this is a limitation,

part B feedstocks can use a multiplier of 2x (meaning that one unit of volume used can count twice towards the target), which is a way of promoting them. Furthermore, EU member states can request the Commission for a derogation to the 1.7% cap.

Is the UCO we use in Europe sustainable?

According to the RED, UCO can deliver significant GHG emissions savings (up to 90%, when it is really a waste with no other use in other sectors) compared to fossil fuels. But for UCO to achieve such emission savings, a few limiting elements must be considered:

- **Competing industries and status as “waste”.** Whether UCO can be considered a waste will depend on the specificities of each region/country. UCO is also used in other industries such as oleochemical and outside of Europe for animal feed (e.g. in China and the US).
- **Limited production capacity.** There is only so much volume of UCO that can be generated on the basis of how much vegetable oil people and industries consume.
- **UCO is needed for decarbonisation purposes outside of Europe.** More than half of the UCO used in Europe is imported, but producing countries also need to decarbonise, if all countries are to meet the objectives of the Paris agreement.

The incentive provided to UCO by the RED has been signalled as a potential incentive for fraudulent practices, i.e. artificially increasing the volumes of UCO available to the market by mixing it with virgin vegetable oil.

The European Court of Auditors indicated in 2016¹ that the double-counting may have led to fraudulent practices. The report states that “*The possibility of double counting biofuels produced from waste and residues has led to a situation where biodiesel produced from UCO ‘is often traded at a higher price than biodiesel from vegetable oil’.* **This entailed a risk of virgin oil being adulterated to be sold as UCO.**” The report also highlighted that certification schemes were not providing enough evidence and verification about the origin of UCO. Despite additional guidance by the Commission, the ECA indicates that they “**cannot conclude that verification had effectively improved**”. As a conclusion, the current system in place in the EU can’t guarantee that all the UCO used in Europe is actually used cooking oil.

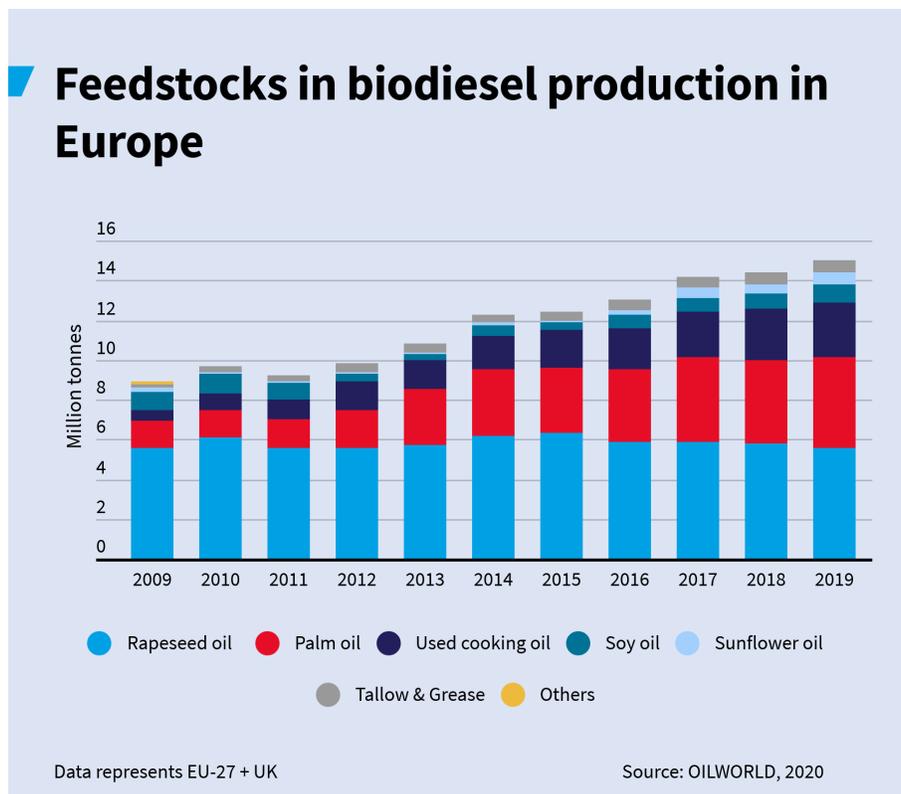
In the past few years there have been a number of allegations of fraudulent practices linked to the UCO biodiesel industry, namely in the UK and The Netherlands, questioning the legitimacy of the imported UCO batches. The most recent case is still under investigation in The Netherlands², where a company is suspected to have forged the sustainability certificates, casting doubts on whether the volumes of UCO sold and used are actually sustainable.

¹ https://www.eca.europa.eu/Lists/ECADocuments/SR16_18/SR_BIOFUELS_EN.pdf

² <https://www.euractiv.com/section/agriculture-food/news/new-fraud-investigation-casts-doubt-over-used-cooking-oil-origins/>

Shares of UCO in the EU biodiesel market

UCO for biodiesel ((including UCOME and HVO)³ has become more and more popular in the past years. Since 2011 its use has tripled and today it represents almost 20% of the total biodiesel production in Europe⁴.



Crop based biodiesel remains the most popular type of biodiesel used in the EU markets. The recent measures adopted in Europe to tackle the most unsustainable feedstocks (i.e. palm oil) could lead to an increase of other feedstocks. Provided that UCO is considered a waste-based biofuel which receives preferential treatment and in view of its current technology maturity, we can expect UCO demand to continue increasing in Europe. An increased use could also be boosted by the upcoming EU laws on shipping and aviation renewable fuels - FuelEU and ReFuelEU.

Already today, more than half the UCO we use in Europe for biodiesel is imported. Provided the difficulties to fully guarantee the sustainability or the veracity of the UCO batches (and the complexity increases if the feedstocks is produced outside of Europe, as it is harder to track and trace), it is not possible to conclude that all the UCO used in Europe is sustainable.

³ UCOME is “used cooking oil methyl ester” and HVO is “hydrogenated vegetable oil”. These are two different ways of producing biodiesel. UCOME/FAME is predominant in the biodiesel market worldwide.

⁴ <https://www.transportenvironment.org/publications/more-palm-oil-and-rape-seed-oil-our-tanks-our-plates>

The research

T&E has commissioned research to an independent consultant to look at different aspects related to the use of UCO as biodiesel feedstock in Europe. The study, conducted by CE Delft, looks at the sources of UCO (Europe and where possible at global scale too), current demand and supply, analysis of different estimations on the future potential supply for 2030. CE Delft also analyses the current certification framework and its shortcomings, identifying weaknesses and potential ways to improve it, including technologies to identify adulterated UCO.

2. Current and projected use

The use of UCO for biodiesel is based on waste oil collection schemes, targeting specifically private collection (i.e. citizens bringing their waste cooking oil to collecting containers placed in the street by the competent authorities) and the set-up of collection schemes in restaurants, hotels, hospitals, etc. Several EU countries have functioning schemes in place, but the growth in the collection depends very much on the interest of both the local & regional authorities and the citizens.

2.1. Current and expected demand and supply of UCO

2.1.1. Demand of UCO now and in 2030

In 2019 Europe consumed 2.8 million tonnes of UCO for biodiesel production - about 18.5% of the total EU biodiesel production⁵. Of this amount, Europe was able to provide for less than half of it (1.3Mt was sourced from Europe), based on waste oil collection schemes set up in several EU countries. The collection of UCO in Europe is largely developed particularly in Western Europe and based on the professional sector. Only a few EU countries have well set-up household collection schemes, namely Belgium, the Netherlands and Austria.

CE Delft estimates that the demand for UCO for biofuels in Europe will only increase from now. This is the case even considering the current limitation of annex IX part B biofuels set at 1.7%, since not all member states reach that share of UCO currently. The 1.7% limit is assumed to continue in the upcoming review of the RED, expected in summer 2021. The researchers thus estimate that the demand for UCO for transport in Europe **could go up to 6.1-6.4 Mt**⁶ (from the current 2.8 Mt). This estimation is based on the EU Commission's projected energy consumption in the transport sector as part of the analysis conducted for the Climate Target Plan⁷ (CTP) impact assessment. Using the energy consumption by 2030 as a basis, CE Delft has assumed that the 1.7% limitation on annex IX part B feedstocks will remain and be applied for all sectors, and that the limitation will be completely filled up with UCO.

⁵ <https://www.transportenvironment.org/sites/te/files/publications/Vegetable%20oil%20data%20briefing%202020%20%282%29.pdf>

⁶ This estimation assumes that the current 1.7% limit on Annex IX part B biofuels will remain, and that it will be entirely filled up by UCO.

⁷ https://ec.europa.eu/clima/policies/eu-climate-action/2030_ctp_en

The role of aviation and shipping in the demand for UCO by 2030

Currently, there is almost no use of renewable fuels of any sort in the aviation and shipping sectors. That means that road transport is responsible for the vast majority of UCO biodiesel use in Europe.

The EU is now stepping up action for the uptake of renewable transport fuels in aviation and shipping and will present the FuelEU and ReFuel EU initiatives in spring/summer 2021. These legislations will mandate the use of renewable fuels in aviation and shipping.

It is still unclear what types of fuels will specifically be promoted under ReFuel and FuelEU. If UCO were to be part of the frameworks, the aviation and shipping sectors will also be responsible for the increased demand for UCO by 2030. On the basis of the approach used above (applying the 1.7% limitation to the demand for energy in aviation by 2030), CE Delft has estimated that **the aviation sector⁸ could be responsible for 1Mt-1.1Mt of the UCO demand** by 2030. Provided the limited availability, it is likely that the use of UCO in the aviation sector will displace the current use in road onto the aviation sector - just moving the fuel and its potential benefits elsewhere.

In the case of shipping, the scope of the CTP (used for the estimates above) only covers inland waterways in Europe - which results in **80 kton of UCO demand**. To try and understand the demand of UCO for a wider shipping scope, T&E has estimated (using the same approach of applying a 1.7% limitation to the total energy demand) the **whole shipping sector could have a demand of 0.74Mt of UCO** by 2030. This estimation takes into account the 2030 energy demand by projected for all entering, departing and intra EU shipping - which is wider than the CTP scope.

2.1.2. Supply of UCO now and in 2030

In 2019 Europe was already highly dependent on imported feedstock as we imported 1.5 Mt of UCO from China, US, Malaysia and Indonesia. The favorable laws on biofuels in Europe make it attractive for producer countries to export UCO to Europe. The fact that today the EU is able to supply only less than half of the UCO demand means that the European production can't keep up with demand and must rely on imports.

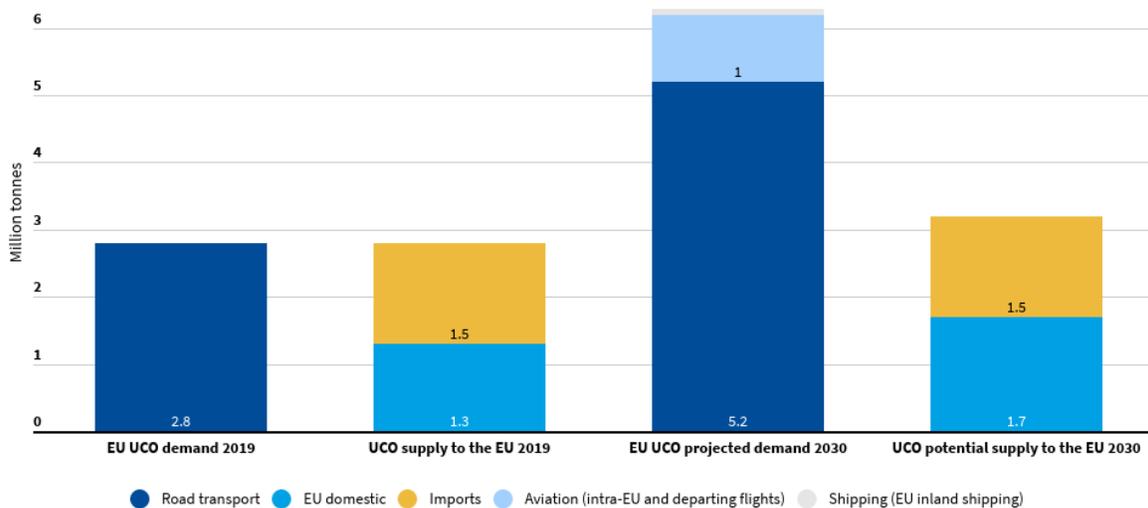
The CE Delft analysis looks into the potential supply of UCO for EU biofuels production by 2030, taking into account domestic and imported UCO. While it is possible to have an estimation of the EU potential from now to 2030, it is hard to estimate what the global *available* supply to Europe would be, as the generation of UCO in producing countries varies depending on collection schemes, competing uses, regulations and plans to use UCO in domestic decarbonisation efforts. Some studies show very high estimates, but these seem to not take into account uses of UCO in other sectors, and seem to also include other fats and oils that are not UCO (such as gutter oil).

To estimate what potential supply could be used by Europe by 2030, CE Delft has used conservative estimates based on research that present a solid estimation approach (GREENEA, 2016; E4tech and

⁸ Which includes flights departing from the EU and intra-EU flights.

studio Gear Up, 2019; EC, DG TRADE, 2020). As a result, CE Delft concludes that **3.1-3.3Mt of UCO could be supplied to Europe by 2030**. This is based on an increase of the EU+UK production up to 1.7Mt (from 1.3Mt today, due to improvements in collection schemes), and maintaining the same imports levels as today (1.5Mt). While the import *potential* might be higher, the risk of displacement effects due to competing uses (for example, producing countries using the UCO domestically) sets a limit on the increase in imports.

EU UCO for biofuels demand/supply in 2019 vs EU potential demand/supply in 2030



Source: Oilworld (2020) and CE Delft (2021)

The potential excessive demand presented above will add pressure to the UCO market and, indirectly, to the global vegetable oil market. If UCO is promoted in the EU transport sector above the sustainable levels of supply, the industries that currently use UCO will need to use other materials. Similarly, producing countries that export a significant part of their UCO production to the EU will need to seek other “solutions” in their decarbonisation efforts. Such displacement effects would lead to an increase in the demand and use of vegetable oils such as palm oil in order to fill the gap that UCO would leave⁹, indirectly leading to deforestation, destruction of habitats and biodiversity, GHG emissions. It is crucial

⁹ <https://www.bbc.com/news/science-environment-48828490>

that policy developments take this risk into account and avoid promoting biofuels from UCO in an unsustainable way.

3. Certification and verification

All the biofuels put in the EU market must comply with the sustainability criteria set out on the RED. The certification is based on proof of sustainability associated with each delivery/batch, which is passed along the chain of custody. As mentioned above, it has been signalled that the current certification schemes can't fully guarantee the sustainability of the biofuels used in Europe, including UCO. CE Delft has identified a few weaknesses in the biofuels certification schemes that may lead to these practices: 1) low transparency along the supply chain; 2) low traceability (down to the point of origin); 3) lack of verification in the voluntary schemes; 4) opportunity for double bookkeeping.

Can adulterated UCO be detected?

The EU does not mandate the implementation of routine checks to identify potential adulterated UCO. The adulteration of UCO with virgin oil is a new problem, but not the other way around. Mixing used cooking oil into virgin vegetable oil batches (i.e. gutter oil, which has been illegally sold for human consumption, creating a public health problem) has been a concern for many years in countries like China, India and South Africa. The science on this regard is quite developed and utilised since a few years and there are different methods to identify adulterated virgin oil mixed with up to 75% UCO. Even if the research on detection focuses on identifying adulterated virgin oil, it shows that there might be good opportunities to further refine these checks and apply them to identifying adulterated UCO. Also, the industry has indicated¹⁰ that they are actively working to develop a system to identify the composition of UCO, which would contribute to the fight against fraudulent practices in the sector. Such measures should become common practice for the sustainability certification of UCO batches.

4. Stronger safeguards for a more sustainable use of UCO

In view of the upcoming review of the RED (expected in summer 2021) and the ReFuel and FuelEU initiatives, T&E calls on the EU to learn from past mistakes with biofuels and ensure that strong safeguards are in place to avoid negative environmental, climate and social impacts linked to UCO and generally to advanced biofuels. We thus recommend to:

- **Keep the limitation set for Annex IX part B.** Even with the current limitations, the demand for UCO for EU transport could increase beyond what the EU (and the world) can supply sustainably - assuming that the share of UCO in transport is used up to the limit of 1.7% currently applicable. On that basis, countries should not go beyond the soft cap of 1.7% currently in the RED, and prioritize the use of sustainable UCO sourced domestically.

¹⁰ <https://www.euractiv.com/section/agriculture-food/interview/industry-mulls-system-to-verify-used-cooking-oil-composition/>

- **Ensure the right fuels for aviation and shipping.** The amount of sustainable UCO available is extremely limited and most of it is already used in the road sector. As part of the upcoming ReFuelEU initiative, support for advanced biofuels pathways should focus on technologies that rely on different types of feedstocks (e.g. agricultural residues) and the RED limit on Annex IX part B should also apply to aviation. Regarding shipping, FuelEU Maritime should focus on renewable hydrogen and ammonia.
- **Reinforce the sustainability criteria for waste & residue biofuels.** This should include: mandatory impact assessment at national/subnational level to understand the available quantities of UCO/advanced biofuels that can be used, taking into account the use of UCO in competing industries; a thorough understanding and application of key principles such as cascading and circularity to understand where the resources are better used; the consideration of indirect emissions in the GHG emissions accounting.
- **Robust monitoring of the supply chain.** The EU must require and monitor a robust and verifiable supply chain, with the ability to track the origin of the fuels back to the point origin in order to ensure the fuels put in the EU market are sustainable and legit. The EU Court of Auditors has criticised the lack of overview of the supply chain and potential risks linked to UCO.
- **Improve the system of certification schemes.** So far, biofuel certification schemes have failed to account for the full lifecycle impacts of the renewable fuels as indirect emissions are not considered. Life cycle environmental and climate impacts should be also part of the certification process. In the specific case of UCO, the Commission should put efforts into implementing the best ways to **detect (and thus prevent) adulterated UCO** on the basis of harmonised testing of batches.

Further information

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