10 years of EU fuels policy increased EU’s reliance on unsustainable biofuels

July 2021

Summary

In 2020, the EU recorded the lowest energy demand of the decade due to the Covid -19 pandemic. Despite this, the volume of biofuels consumed in the EU transport sector has not reduced, because some key countries like Germany and Italy have increased the sha res of blended biofuels, while many others kept the shares in transport almost constant. This is most likely to meet the EU transport targets under the Renewable Energy Directive (RED) and the Fuel Quality Directive (FQD) for 2020. From 2019 to 2020, the bio components in transport diesel and gasoline rose from 7.4% to 8.1% and 6.1% to 6.8% respectively. Overall, we estimate the share of crop biofuels was in the range of 4.8% - 5.1% in 2020, a significant increase compared to 4.4% in 2019.

For biodiesel, virgin vegetable oils (rapeseed, palm oil, soy) make almost 80% of the feedstock used in EU production. Rapeseed oil makes the largest share (36%) of the feedstock, followed by palm oil (30%). Overall, the share of palm oil imports used for biodiesel produ ction reached an all - time high in 2020, with 58% of EU palm imports used for biodiesel. Spain was the largest producer of palm oil biodiesel in 2020 (using 1.7 Mt), closely followed by the Netherlands (1.5Mt) and Italy (1.4 Mt). The absolute volume of soy oil used in biodiesel production increased by 17% (0.9 Mt to 1.1 Mt) from 2019 and in 2020 soy biodiesel represented 7% of the EU biodiesel production. The EU consumed 2.6 Mt of used cooking oil (UCO) for biodiesel production, of which around 73% was impor ted from third countries. Germany alone consumed around 43% of the total UCO destined for biodiesel. There is also a 0,7 Mt of animal fats used in the biodiesel feedstock mix, which is a 30% increase from 2019. Currently, the nominal capacity of Fatty Acid Methyl Ester (FAME) and Hydrotreated Vegetable Oil (HVO) production are 20.3 Mt and 5.1 Mt respectively, mainly processing virgin vegetable oils. But the HVO capacity is expected to double by 2025, and most of this additional capacity is proposed by oil c ompanies like Neste, ENI, Total, Repsol and Preem. This brings the risk of a dramatic increase in demand for unsustainable biofuels feedstocks.

Similar to biodiesel, the ethanol production in Europe depends heavily on food crops like corn, wheat and sugar beet (based at least on the capacity of members of the trade association ePURE representing ~ 65% of the total EU capacity). According to the latest data, food/feed crops cover about 90% of the feedstock used by ePURE members. Corn being the largest feed stock (49%),

followed by wheat (21%), sugar (19%) and the advanced ligno -cellulosic feedstock accounted for only around 4 %. The current ethanol production capacity of the EU is about 6 Mt per year, and a 0.3 Mt additional capacity is expected by 2025. Be sides, the EU's reliance on imported bioethanol is quite significant. In 2020, the EU's ethanol import reached an all - time high 1.3 Mt, and a large fraction of this import came from the countries with duty - free access. This is mainly because of the EU's re cent trade agreements with third countries (e.g. EU - Mercosur trade and the Comprehensive Economic and Trade Agreement (CETA)) for ethanol imports. Around 93% of the supplied ethanol comes from food crops (based on Stratas Advisors).

Since 2011, EU drivers have burned around 39 Mt of palm and soy biodiesel together, which emitted around 381 Mt CO2eq (including ILUC emissions from the GLOBIOM model). This is three times more than what would have been emitted if EU drivers would have used fossil diesel instea d. The significant increase in the share of crop based biofuels in 2020 shows the negative impacts of 10 years of EU fuels policy and highlights the need to adopt stricter safeguards in EU policy. Given the frightening trend observed in the past years, it is important for the EU to ensure the upcoming revision of the RED includes measures to immediately stop using palm and soy biodiesel and phase out all crop based biofuels by 2030.

1. Introduction

In 2009, the EU Renewable Energy Directive (RED) was created to promote the use of renewables as a replacement to fossil fuels in the transport sector – mandating member states to comply with a 10% renewable energy share in the final transport energy consu mption (RES - T) by 2020. In parallel, the Fuel Quality Directive (FQD) required fuel suppliers to reduce the carbon intensity of fuels by 6% by 2020. However, these directives overlooked sustainability safeguards and did not account for the whole life cycle of the fuel supply chain and land use change related emissions. This resulted in the consumption of a large amount of unsustainable biofuels with worse overall greenhouse gas (GHG) emissions than fossil fuels. In 2012 and 2016, the European Commission rel eased two modelling studies that quantify the land use related emissions of biofuels. They both showed that when projected indirect land use change (ILUC) emissions are taken into account, all vegetable oil based biodiesel has more emissions than fossil di esel. The more recent report showed emissions are particularly high for palm and soy oil that have three and two times the emissions of fossil diesel respectively.

Considering the loopholes in the RED (for example unaccounted ILUC emissions), the recently adopted recast of the RED (known as RED II) in 2018 paves the way to reduce the consumption of unsustainable biofuels, to some extent, and to promote the use of advanced non -food feedstock. This revision increased the initial 10 % target in 2020 to 14% in 2030 , albeit with some flexibility for member states to decrease it. It maintains a limit on crop biofuels, based on their share in 2020 (with 1 percentage point flexibility) and a delegated act limits the share of palm oil - a 'high ILUC risk' feedstock - at 2019 level until 2023, with a complete phase - out by 2030. However, the EU law still allows other crop based feedstock in the RED, including soy.

The revision of RED II is currently in the making, to be released by mid - July 2021. This revision is expected to aim for a more ambitious renewables target in transport of 24%, as signaled in the Clean Target Plan, rather than the existing 14 %. A recent study by T&E warns that such a high target would most likely perpetuate the use of unsustainable biofuels in transport, overshadowing other cleaner sources. This is why it's important to understand the current state of play on the biofuels production and consumption in the EU, to analyse how existing policy is driving biofuels to market and to make informed policy recommendations to reduce environmental damage . This briefing is an update of the data that T&E has been publishing since 2016. So far, it focused specifically on vegetable oil biodiesel produced and used in the EU[1], mainly based on the annual biodiesel report by Oilworld [2]. This time we include a high level analysis of ethanol production and consumption based on Stratas Advisors [3] and other publicly available data sources.

2. Use of unsustainable feedstock for biofuels increased despite the pandemic

Until last year, we observed a steady increase i n the overall consumption of vegetable oils for biodiesel production. Surprisingly, last year was not an exception despite the global pandemic that seemingly reduced mobility and other fuel consuming activities. The main reason for the continuingly increas ing trend in biofuel volumes is that, in 2020, some European countries increased their biofuels blending, while others kept the volumes almost constant, to meet the RED and FQD compliance targets. Additionally, there is a rapid increase in the share of dom estically produced hydrotreated vegetable oil (HVO, 23% of biodiesel in 2020) in the diesel pool, which requires significantly more vegetable oil input than fatty acid methyl ether (FAME) production. For instance, 1 tonne of vegetable oil can yield around 0.98 tonne of FAME biodiesel via the transesterification process, whereas it can only yield about 0.82 tonne of HVO (NExBTL process)[4]. As usual, the vegetable oil demand is met mainly by imported feedstock strongly linked to deforestation such as palm and soy oil.

1 https://www.transportenvironment.org/publications/more - palm - oil- and- rapeseed - oil - our - tanks - our - plates

2 https://www.oilworld.biz/t/publications/annual

3 https://stratasadvisors.com/

4 Khandelwal M, van Dril T, (2020) . Decarbonization options for the Dutch biofuels industry

Table 1 Diesel, gasoline, biofuels delivered and the share of biofuels in transport in the EU from 2011 – 2020 (Eurostat, 2021 [5]; Stratas Advisors, 2021)

EU-27 (Mt)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*
Diesel pool (incl. biofuels)	247	242	241	238	243	247	255	255	257	236
Biodiesel + HVO*	11,2	12,1	10,6	11,6	11,6	11,3	12,4	13,7	14,2	14,4
Biofuels in diesel pool (%)	4,5%	5,0%	4,4%	4,9%	4,8%	4,6%	4,9%	5,4%	5,5%	6,1%
Transport diesel (incl. biofuels)*	179	175	174	178	182	187	191	192	193	177
% biocomponent in trasport	6,3%	6,9%	6,1%	6,6%	6,4%	6,0%	6,5%	7,2%	7,4%	8,1%
Total gasoline (incl. biofuels)	76,1	70,7	68,4	67,0	67,6	67,9	68,7	72,3	73,1	64,6
Biogasoline*	4,0	3,9	3,6	3,6	3,6	3,6	3,8	4,1	4,2	4,1
Biofuels in gasoline (%)	5,2%	5,5%	5,2%	5,3%	5,4%	5,3%	5,5%	5,6%	5,8%	6,4%
Transport gasoline (incl. biofuels)*	74,7	69,5	67,2	67,0	66,1	66,2	66,8	67,3	68,9	60,8
% biocomponent in trasport	5,3%	5,5%	5,3%	5,3%	5,5%	5,4%	5,7%	6,0%	6,1%	6,8%

* estimate based on data from Stratas Advisors and recent trends in the Eurostat data

Table 1 shows the total gas/diesel oil, gasoline and the biofuels delivered in the EU - 27 countries over the decade. Due to the COVID -19 pandemic, the EU - 27 recorded a 9% reduction in the total fuel delivery and, the volumes of total diesel and gasoline red uced by 8.3% and 11.6% respectively, in 2020 compared to the previous year. In contrast, there is a slight increase in the biodiesel volume (1.3% increase), while the consumed volumes of ethanol slightly decreased (3% reduction). So, the total biofuel volu me has not reduced dramatically, despite the drastic reduction in the total fuel consumption.

This means that the percentage share of biofuels in the EU fuel supply has gone up from 2019 to 2020. This is mainly because some big countries like Germany and Italy increased the share of biofuels by more than 1 percentage point in the total fuel consumption. For instance, in Germany, the percentage of biodiesel in the total diesel pool increased from 4.6% in 2019 to 5.9% in 2020. Hence, the overall biodiesel a nd bioethanol shares in diesel and gasoline supply in the EU have risen from 5.5% to 6.1% and 5.8 to 6.4% respectively from 2019 to 2020. This increase in the share of biofuels is directly reflected in the transport sector which is the main destination (al most 100%) for the biofuels. **From 2019 to 2020, the bio components in transport diesel and gasoline rose from 7.4% to 8.1% and 6.1% to 6.8%, respectively.**

Based on the observed gross inland deliveries data [6], Stratas data on the feedstock mix in biofuels consumption, the recent trend in the share of transport in the total energy consumed in Europe, and the share of road and rail (with multipliers) in transport energy consumption [7], we estimate the RED II denominator for 2020 to be between 230 to 240 Mtoe, c ompared to the 274.5 Mtoe in 2019 [8]. The range in our high level estimate reflects the assumptions on the percentage shares of transport fuels in the total fuel delivered. The upper bound is according to the recent trend from 2016 (~ 75% and 95% of the delivered diesel and gasoline fuels) a nd the lower bound assumes a slightly reduced share (70% and 90% for diesel and gasoline, considering the possible fuel stockpiling during the lockdown). In both the estimates, the

5 https://ec.europa.eu/eurostat/web/energy/data/database
6 Eurostat table "Supply and transformation of oil and petroleum products - Gross Inland deliveries
7 Eurostat table - "Final energy consumption in transport by type of fuel"
8 https://ec.europa.eu/eurostat/web/energy/data/shares

volumes of biofuels are kept constant i.e. all the biodiesel and bioethanol goes to transport application. With the estimated fuel consumption in transport and the Stratas estimate on supply feedstock mix, we estimate that the share of crop based biofuels is between 4.8% to 5.1% compared to 4.4% in 2019.

3. Biodiesel

The gr aph below (Figure 1) shows the evolution of EU biodiesel production volumes and feedstock mix. From 2019 to 2020, there is negligible difference in the volumes of palm, rapeseed and used cooking oil (UCO), but a 17% increase in soy and 29% in tallow and g rease (animal fats).

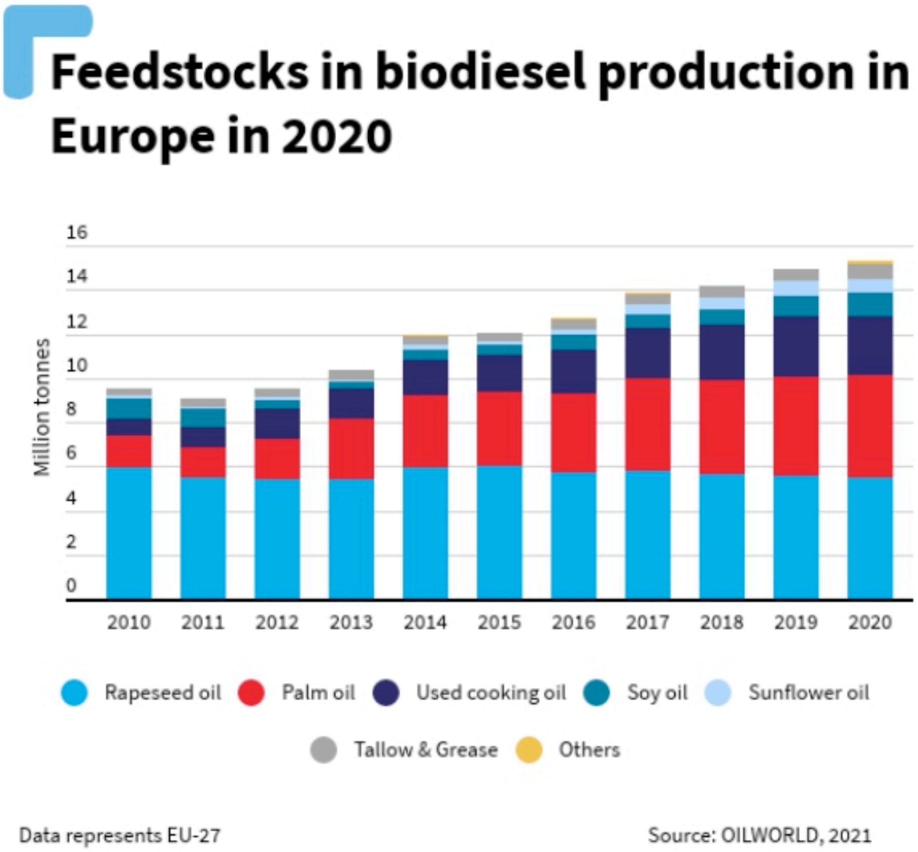

Figure 1: Share of different feedstock in biodiesel production in Europe (OILWORLD, 2021)

3.1. No slowdown of unsustainable biofuels

3.1.1. Trends in the final use of ra peseed, palm and soy oil

The vegetable oils, mainly rapeseed, palm and soy oil, are increasingly used in energy applications (such as transport biofuel, heating, electricity production, etc.) than for non - energy uses (i.e. in the food, oleochemical, and feed industry), see Figure 2. This is particularly alarming for the imported palm oil, for which the consumption for non - energy uses (mainly food) has been reducing over the decade (from 3 Mt in 2011 to 2.3 Mt in 2020), while the use for energy (mainly for biodiesel) has tripled sin ce 2011, to 5. 8 Mt in 2020. Comparing the last two years, the total amount of imported palm oil remained almost the same, but slightly more palm oil was diverted to the energy applications than to the food industry. There is a slight increase (from 69% in 20 19 to 71% in 2020) in the share of palm oil used for EU energy production. This indicates that the non - energy sector has reduced palm oil consumption, which might be substituted by other vegetable oils.

Until now, the non - energy uses like food, feed and oleochemical sectors remain the main destination for soy oil. The use of soy oil in energy has fluctuated over the past decade (with a recorded low of 0.3 Mt in 2013), but the overall trend is upward. Particularly, the share in energy production has been steadily increasing since 2018. The absolute volumes of soy oil in energy went from 0.7 Mt in 2018 (34% of the total) to 1.1 Mt in 2020 (44% of the total), solely because of the increasing soy biodiesel.

Energy applications have been the main destination for rapeseed oil for many years already. The volumes and trends of rapeseed use in both energy and non - energy applications was fairly constant over the decade, compared to the other vegetable oils. Almost 80% of the rapeseed oil is supplied from within Eur ope.

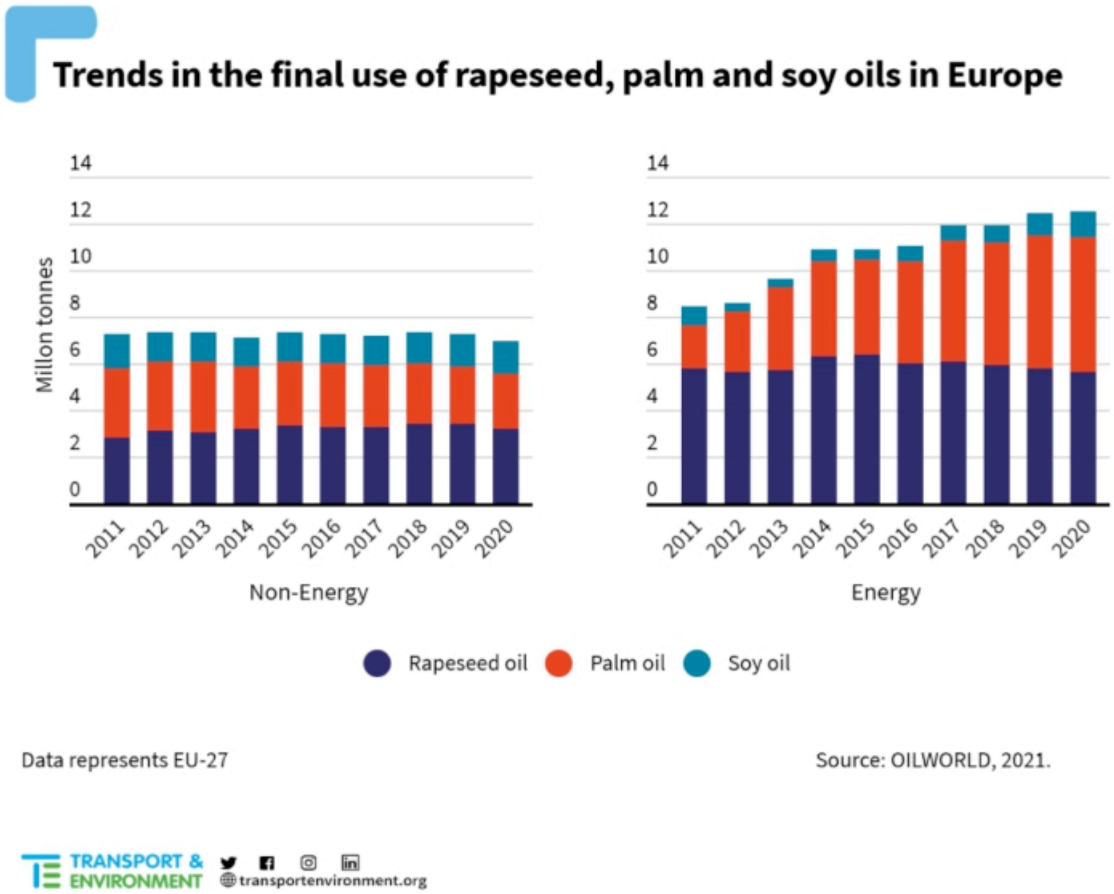

Figure 2: Trends in the use of palm, rapeseed and soy oil in Europe

The fluctuations in the consumption of these vegetable oils, mainly palm oil, for energy use might be partially explained by the EU's anti - dumping trade policy against biodiesel i mport from Argentina and Indonesia, introduced in 2013. This trade policy reduced the import of refined biodiesel from these countries, but EU member states started importing crude palm and soy oil to produce biodiesel inside the EU instead. Since then, the EU biodiesel production capacity and the reliance on cheap imported vegetable oil has increased dramatically and it still continues. Moreover, the EU countries had to meet their RED and FQD targets in 2020, while the EU measures freezing and phasing - out palm biofuels enter into force only in 2021.

3.1.2. More biodiesel, more unsustainable feedstock

Despite the reduced overall fuel demand, the European Union used more unsustainable virgin vegetable oils in 2020 than any year before. Figure 3 compares the absolute volumes of palm, soy and UCO used for biodiesel production for 2019 and 2020. It can be seen that the volumes of virgin oils are increasing while the UCO slightly reduced between these years.

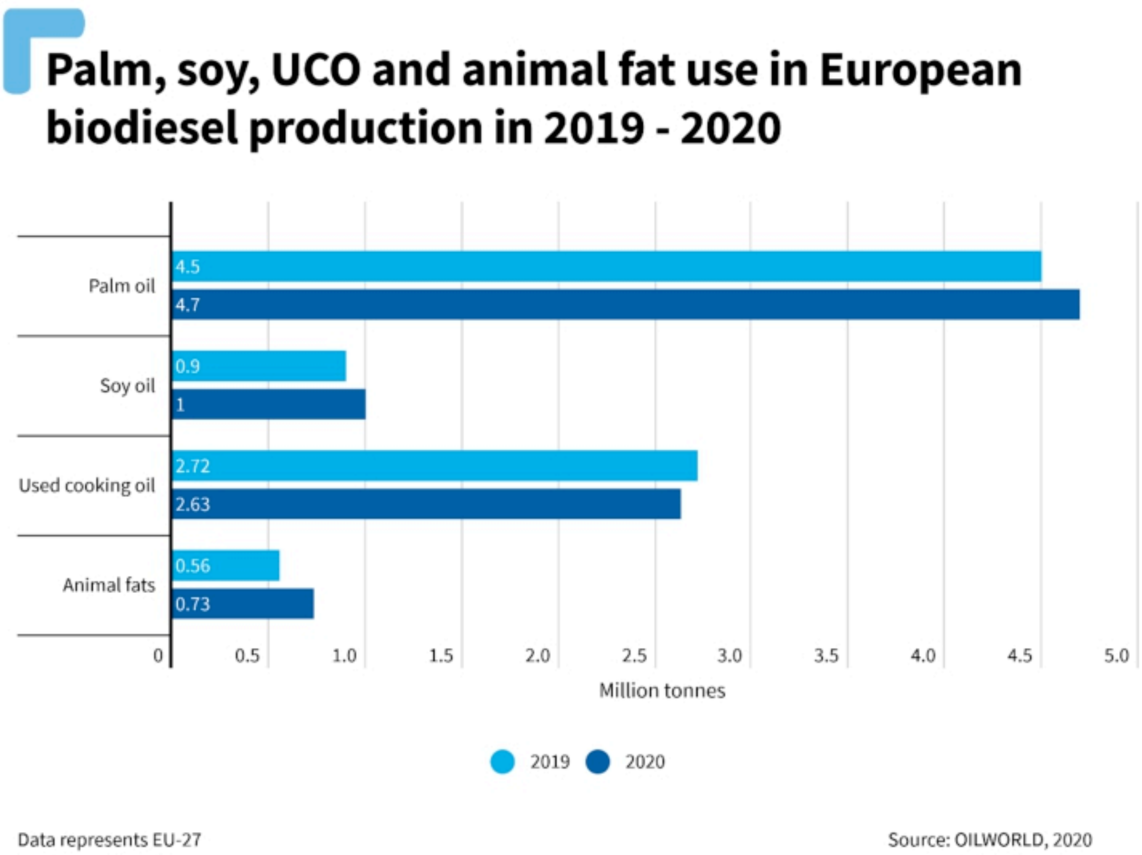

Figure 3: Comparison of production and consumption of biodiesel in the key countries

Palm oil

In 2020, Europe imported 8.1 Mt of palm oil and 58% of that was used in biodiesel production, compared to 56% in 2019. The estimated amount of palm oil used for biodiesel in 2020 has slightly increased by 4.4% (4.5 Mt to 4.7 Mt) compared to 2019, while the overall palm oil consumption remained almost at the same level. In the past 5 years, overall palm oil consumption has increased by 13% (from 2016 – 2020), and in particular the volume used for biodiesel has gone up by 30%. In 2020, palm oil biodiesel repr esented 31% of the total EU biodiesel production (including UCO), compared to 30% in 2019. The imported palm oil contains not only virgin palm oil, but also palm fatty acid distillate (PFAD). PFAD is a by - product from the palm oil industry, which can be us ed as raw material in other industries like oleochemicals, cosmetics and as feed. Around 0.5 Mt of the total imported palm oil is PFAD from Indonesia, and there is no data available for the other possible imports (e.g. from Malaysia reported ~ 74 kt PFAD e xports to the EU in 2020 [9]). The use of PFAD in biodiesel production creates a need for substitution in the other industries, and that might be met with unsustainable feedstock like virgin palm oil. As seen in 2019, Spain was the largest producer of palm oi l biodiesel using 1.7 Mt (a 3.6 % increase in volume from 2019), closely followed by the Netherlands (1.5 Mt a 6% reduction) and Italy (1.4 Mt - 14% increased volume) in 2020.

As highlighted above, the increased use of palm oil in biodiesel was expected b ecause, as per RED II, the palm oil volumes have to be frozen at 2019 levels until 2023, and completely phased out by 2030. Hence, it's obvious that the producers wanted to maximize the potential volumes before the freeze and the REDII measures will enter into force only in 2021. Also, increasing biofuels use in 2020 helped reach the FQD and RED - T targets. This is worrisome because, considering the direct and indirect effects over the life cycle, palm oil biodiesel could emit almost three times the emission s as fossil diesel. On the other hand, some countries have already adopted an earlier phase -out of the policy support to palm oil in their national markets. This is the case in France, Austria, Denmark in 2021, Sweden, the Netherlands and Portugal in 2022 and Germany in 2023. In parallel, Malaysia requested the WTO for a panel to examine the EU's plan to phase out and some member states plan for early ban on palm oil. This request has been granted by the WTO in June 2021, and it might take up to 6 months fo r the panel to produce a report on this.

Soy oil

In 2020, Europe consumed around 2.5 Mt of soy oil, which is a 4.7% increase from 2019. Similar to palm oil, the biodiesel share of the total soy oil has increased from 39% to 43%, and the absolute volu me of soy oil used in biodiesel production increased by 17% (0.9 Mt to 1.1 Mt). In 2020, soy biodiesel represented 7% of the EU biodiesel production, which is a slight increase from 6% in the previous year. The increase in soy oil biodiesel volume might ha ve been driven by the need to reach RED and FQD targets. The adoption of phase out plans for palm oil (even if they will be fully implemented as of 2021) and producers' possible willingness to use soy instead can be another explanation. This trend is troub lesome, because soy could easily become the new palm oil. In this regard, a recent study[10] commissioned by T&E showed that the EU's weak biofuels policy is encouraging forest destruction in South America, where soy cultivation is already a major cause

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[9] http://mpoc.org.my/overview - and- outlook - of- malaysian- palm - oil- exports - to - europe/

[10] https://www.transportenvironment.org/sites/te/files/Soy%20land%20use%20change%20and%20ILUC%20risk.pdf

of de forestation in the Amazon and other critical ecosystems and warned against the potential replacement of palm oil by soy. The fact that soy expansion is directly and indirectly causing deforestation makes soy biodiesel highly unsustainable, with life cycle emissions (including ILUC emissions) twice as high as fossil diesel. RED II doesn't label soy as high ILUC risk feedstock in the Commission Delegated Regulation (EU) 2019/807 [11]. Hence, the additional demand for soy biodiesel on the European market would aggravate the deforestation and land use problem.

10 years of biofuels policy

Since 2011, we have burned around 39 Mt of palm and soy biodiesel together, which emitted about 381 Mt CO2eq (including ILUC emissions). This is 245 Mt more than what would have been if we used fossil diesel instead[12]. The recent ILUC delegated act limits palm oil (the only 'high ILUC risk' feedstock) at 2019 level till 2023, and then phases it out completely by 2030. However, the RED II still allows the other crop based feed stock, including soy. At this rate, if we do not stop the consumption of palm and soy immediately, this will lead to another 273 Mt CO2eq emissions in the next 10 years, that is about 174 Mt of CO2eq more than the conventional diesel emissions. These figur es are based on an optimistic assumption that palm and soy will be phased out starting from 2023 to 2030, and excluding the fact that some countries (e.g. Germany, France, Austria, etc.), have already adopted an earlier phase -out of the policy support to p alm oil in their national markets.

In another perspective, the decade - long biofuels policy of the EU has driven up the demand for cheap crop -based biodiesel like palm oil, which resulted in massive land conversions. Around 8.4 million hectares of land was needed for all crop based biofuels, to grow rapeseed, palm, soy, and sunflower crops. Soy and palm are grown in tropical regions, typically displacing rainforests in South America and Southeast Asia; EU's biofuel demand for these feedstocks required 4 million hectares of land. Particularly , for the increased palm oil demand, roughly 1.1 million hectares of mature land had to be made available for new palm plantations in Southeast Asian countries like Indonesia and Malaysia. This land conversion happened mainly in the forest covers, which ar e the last refuge for the remaining orangutan population, estimated to be 65,000 in 2017 [13]. Recent estimates show that the population density of orangutans about 15 years ago was around 0.45 to 0.76 individuals per square kilometer [14].

Considering the average population density, the EU's thirst for palm oil biodiesel has likely destroyed an estimated 10% of the world's remaining orangutan habitats.

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11 https://eur - lex.europa.eu/lega l- content/EN/TXT/PDF/?uri=CELEX:32019R0807

12 Life cycle emission factors (CO_{2eq} per MJ fuel (incl. GLOBIOM ILUC factors)) : Diesel = 94 g/MJ; Palm biodiesel = 282 g/MJ; Soy biodiesel = 197 g/MJ (More information can be found here)

13 https://www.worldwildlife.org/species/orangutan

14 Greenpeace, 2017, Borneo orangutans in decline, official survey shows

Used cooking oil (UCO) and animal fats

The volume of UCO to produce biodiesel has seen an alarming steady increase over the past decade – almost tripling since 2011. However, the Oil World data estimate shows it reduced by 4% from 2.7 Mt in 2019 to 2.6 Mt in 2020, and it contributes about 17% o f the total European biodiesel production. The RED II considers UCO as a waste biofuel, subject to double counting under part B of the Annex IX, which is the main driver for UCO consumption in biodiesel. Even though there is a cap of 1.7% on UCO supplied f or energy in transport, countries can request to derogate from this cap. There are several concerns about credibility and traceability of the "used" oil, especially the imports. According to the UN's trade data [15], the EU imported 1.9 Mt of UCO from third c ountries, which is around 73% of the total EU UCO consumption destined for biodiesel. It is very difficult to trace and verify the origin of all the imports and there is an on - going suspected fraud investigation in the Netherlands on the origin of imported used cooking oil. A recent study commissioned by T&E on UCO, warns that the raising EU's imports of dubious "used" cooking oil could indirectly fuel deforestation. Hence, there is a need for a robust verification and monitoring mechanism to ensure the sustainability of UCO. Only very rec ently, a group of five countries (Luxembourg, Germany, the Netherlands, Belgium and France) signed a joint statement asking for an improved public and private supervision of supply chains for renewable fuels[16].

Along with UCO, animal fats (tallow & grease in Figure 1) are also recognised as a waste feedstock under RED II that can be double counted (only categories I and II are subject to double counting). In 2020, a total of 1.2 Mt of animal fats was used in Europe, which is a 10% increase from 2019, and a lmost 60% of it went to biodiesel production. The absolute volume of animal fat used in biodiesel production has seen a steady increase from 0.3 Mt in 2011 to 0.7 Mt in 2020. In particular, there is a 30% increase in the absolute volumes of animal fats for biodiesel production from 2019 to 2020.

3.2. Geographical origin, production and consumption of biodiesel

3.2.1. A high dependence on imported feedstocks and imported biodiesel

A large fraction of the feedstocks for EU biodiesel production is sourced by imports. Figure 4 shows the import origin of palm, soy and UCO in Europe in 2020. Nearly 82% of the palm oil demand is supplied by Southeast Asian countries, namely Indonesia (50%), Malaysia (26%) and Papua New Guinea (6%). Around 12% of the Indonesian imp orts are made of PFAD.

In 2020, the EU imported 1.9 Mt UCO (that is 73% of the total used UCO in biodiesel production) and, like palm oil, most of it (46%) came from Asian countries like Malaysia (20%), China (15%) and Indonesia (11%). There is a 13.5% in crease (from 1.67 Mt) in the imported volumes of UCO compared to 2019. Also, in 2019, China contributed the largest import share around 32%. About half of the soy

[15] https://comtrade.un.org/data/

[16] Joint Statement on improving supervision for the use of renewable energy in the Renewable Energy Directive

oil consumed (0.46 Mt of 1.1 Mt) in the EU is imported from third countries, but mostly neigh boring European countries that are not part of the union. Ukraine (39%), Serbia (16%) and Norway (15%) contributed the most, and the import volumes by origins were fairly constant from 2019 to 2020.

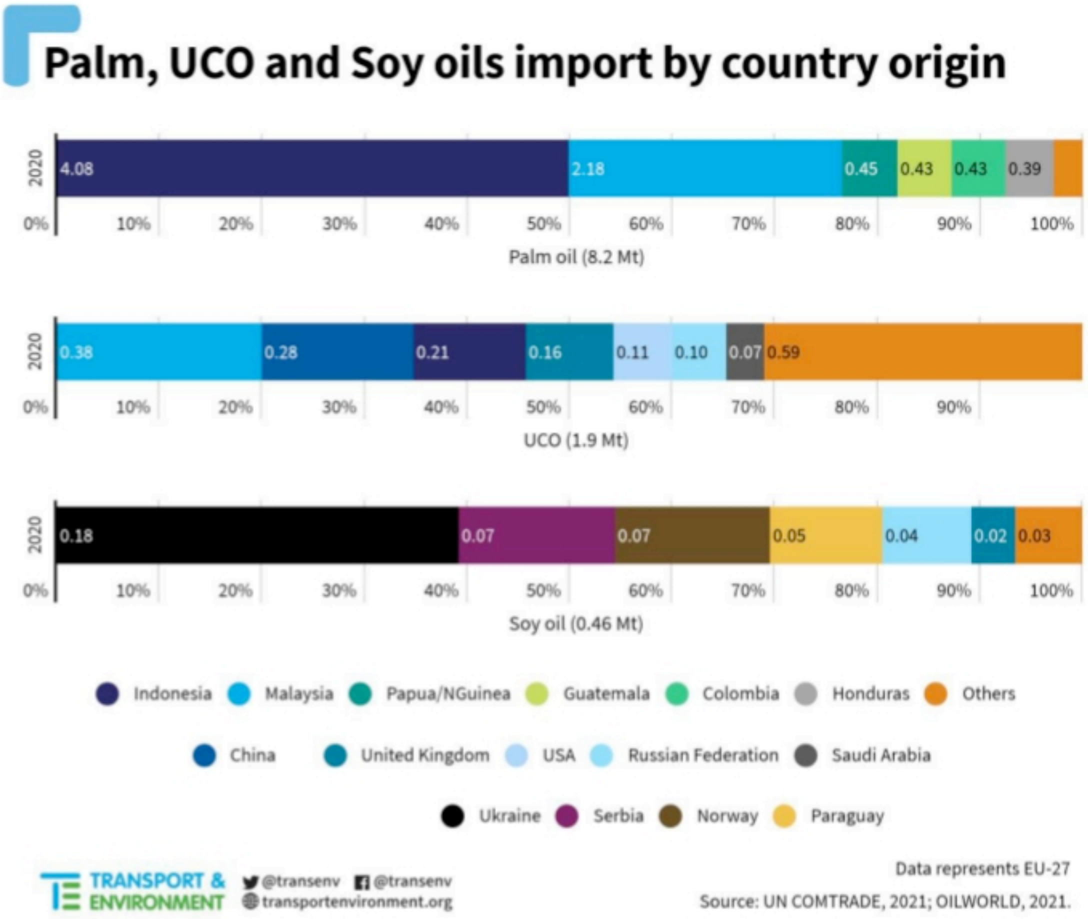

Figure 4: Imports of palm, soy and UCO by countr y origin

In addition to increasing production, the EU imports a huge amount of refined biofuels each year from third countries. Figure 5 shows the volumes and the origins of imported biodiesel for EU27 + the UK. It must be noted that this is only the impor t, but not the net import/export trade (net import of 2.3 Mt for EU27 + UK). There is a clear spike in imported biodiesel starting from 2018 (it almost tripled from 2017), which is mainly because of the removal of biodiesel anti - dumping duties by the EU on Argentina and Indonesia. The World Trade Organization (WTO) forced the EU to cut the anti - dumping duty in late 2017. However, from 2018 there was a slight reduction in imports every year. The import quantity went from 3.18 Mt in 2019 to 2.72 Mt (adjusted from EU28 data to EU27) in 2020, which is a 15% reduction.

From 2018, the largest fraction of the biodiesel imports came from Argentina, followed by Indonesia, China and Malaysia. In 2020, Argentina and China alone contributed almost two thirds of the E U import. Surprisingly, in 2020, the share of Malaysia and Indonesia reduced significantly, while the EU import from China almost doubled. The feedstock mixes in the imported biofuels are unknown and hard to trace, but it is possible to make assumptions ba sed on the country of origin - e.g. soy for Argentina, at least 50% UCO for china, etc. It is also not clear how these estimates/assumptions on the import feedstock mix are made in the Eurostat data.

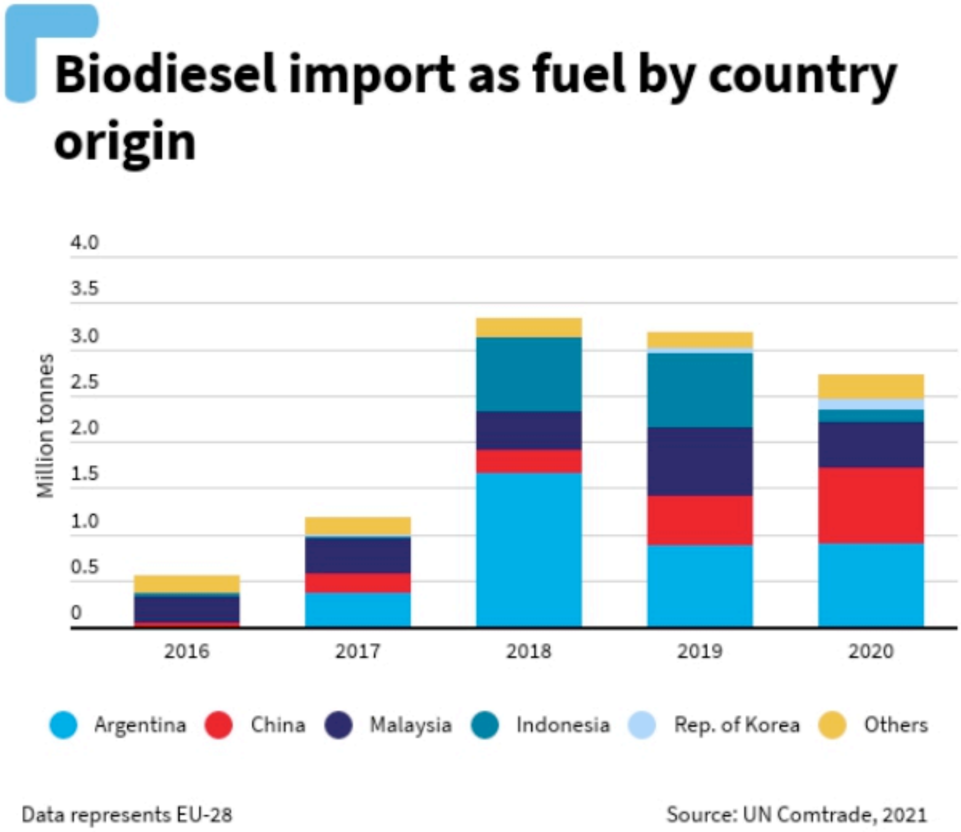

Figure 5 Biodiesel import as refined fuel by country origin (UN Comtrade, 2021)

3.2.2. Biodiesel and HVO p roduction capacity

Currently, Europe has around 20 Mt conventional biodiesel (only FAME) production capacity, and a negligible amount of additional capacity (0.2 Mt) is foreseen between 2020 and 2030. This is mainly because most countries have already maximised the biodiesel blending volume targets, or they can reach the possible demand with the existing capacity and potential imports.At least, 59% of the current FAME capacity is using virgin vegetable oil as primary feedstock. In contrast to FAME, there is a huge capacity in crease expected for HVO. The current operating HVO capacity is 5.1 Mt, but it is expected to almost double by 2025. This additional capacity is proposed mainly by the oil companies like Neste, Preem, ENI, Total, and Repsol. The largest new capacities will be located in the Netherlands (1 Mt - Neste & Gunvor), Sweden (1.1 Mt - Preem), Italy (0.57 Mt - ENI & Sarroch), Finland (0.56 Mt from Neste & UPM), Poland (0.3 Mt from Plock), France (0.3 Mt - Total) and Spain (0.25 Mt - Repsol).

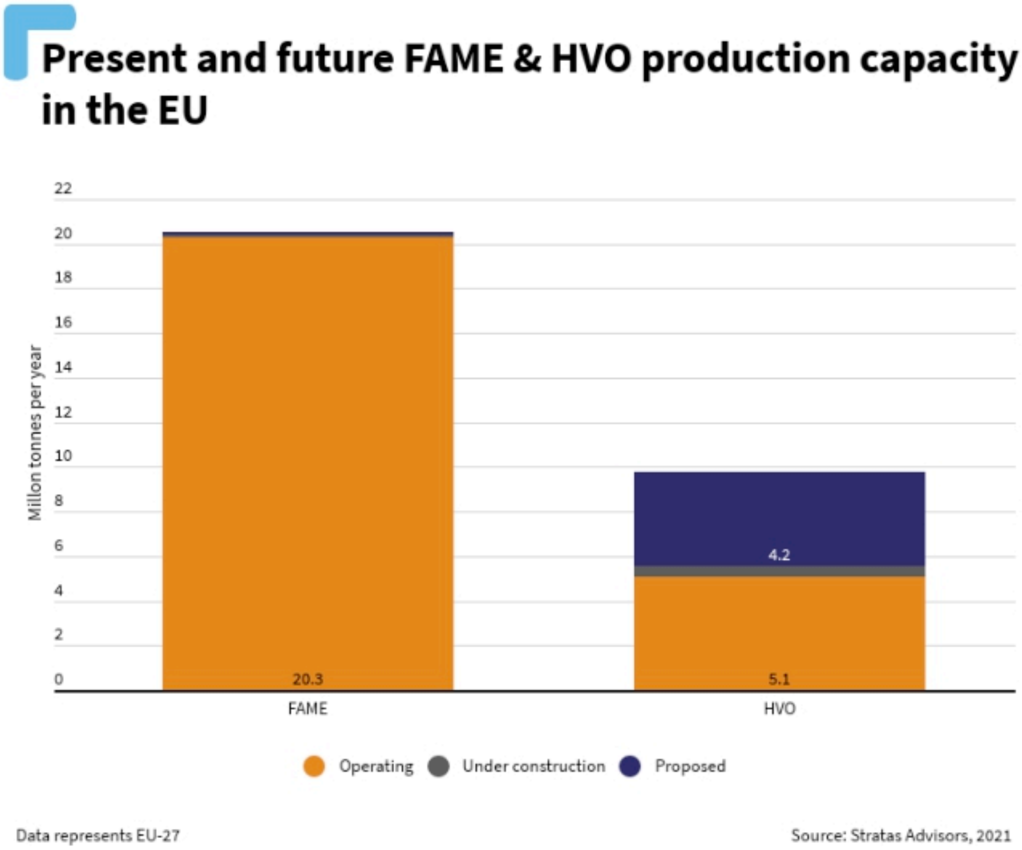

Figure 6: Nominal capacity of the current and future biodiesel and HVO production facilities (Stratas Advisors, 2021)

Figure 7 indicates the shares of different feedstock in the proposed capacity. It must be noted that this figure indicates only the "prima ry" feedstock, which means the facilities could possibly process more than one feedstock. Of the total 4.2 Mt proposed HVO capacity, around 16% of the primary feedstock is expected to be mainly unsustainable vegetable oils like palm, PFAD, and soy. Also, U CO accounts for 18% of the announced capacity with no indication of the origin, a 7% of the capacity is specified as "other cellulosic", and a 26% of the capacity is expected to be met by tall oil and cellulosic feedstock. Around 21% is expected to come fr om animal fats, a huge increase in demand for that feedstock. The main reason for this interest of oil companies on HVO, also known as "renewable diesel", is that it is a drop - in fuel with no blending limits at the moment and their current fossil refineries can be turned into HVO production. As aforementioned in section 2, the HVO production process requires around 20% more feedstock than the FAME process. Eventually, the increased share of HVO will drive up the demand for vegetable oil feedstock in biofuel production, while the EU must phase out the use of unsustainable oils in the biodiesel industry.

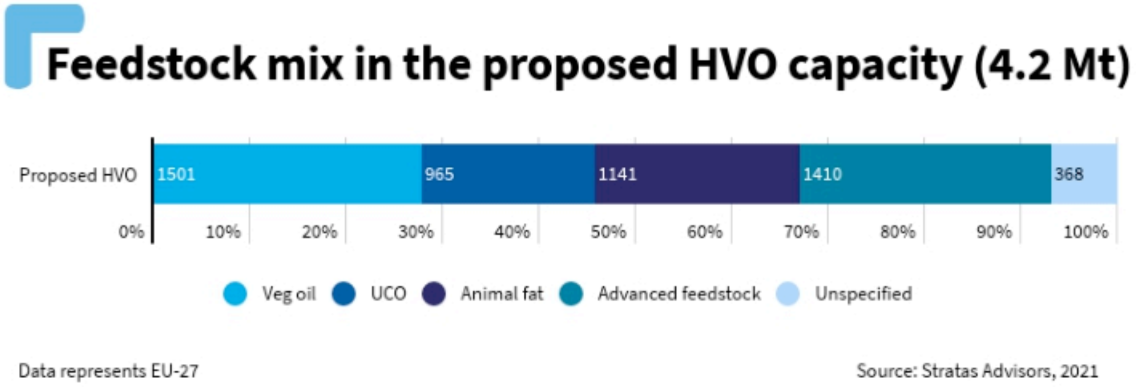

Figure 7: Anticipated primary feedstock for the proposed HVO production capacities from 2020 - 2030 (Stratas Advisors, 2021)

The map in Figure 8 illustrate s the operating and proposed capacities of HVO production facilit ies in each country in Europe.

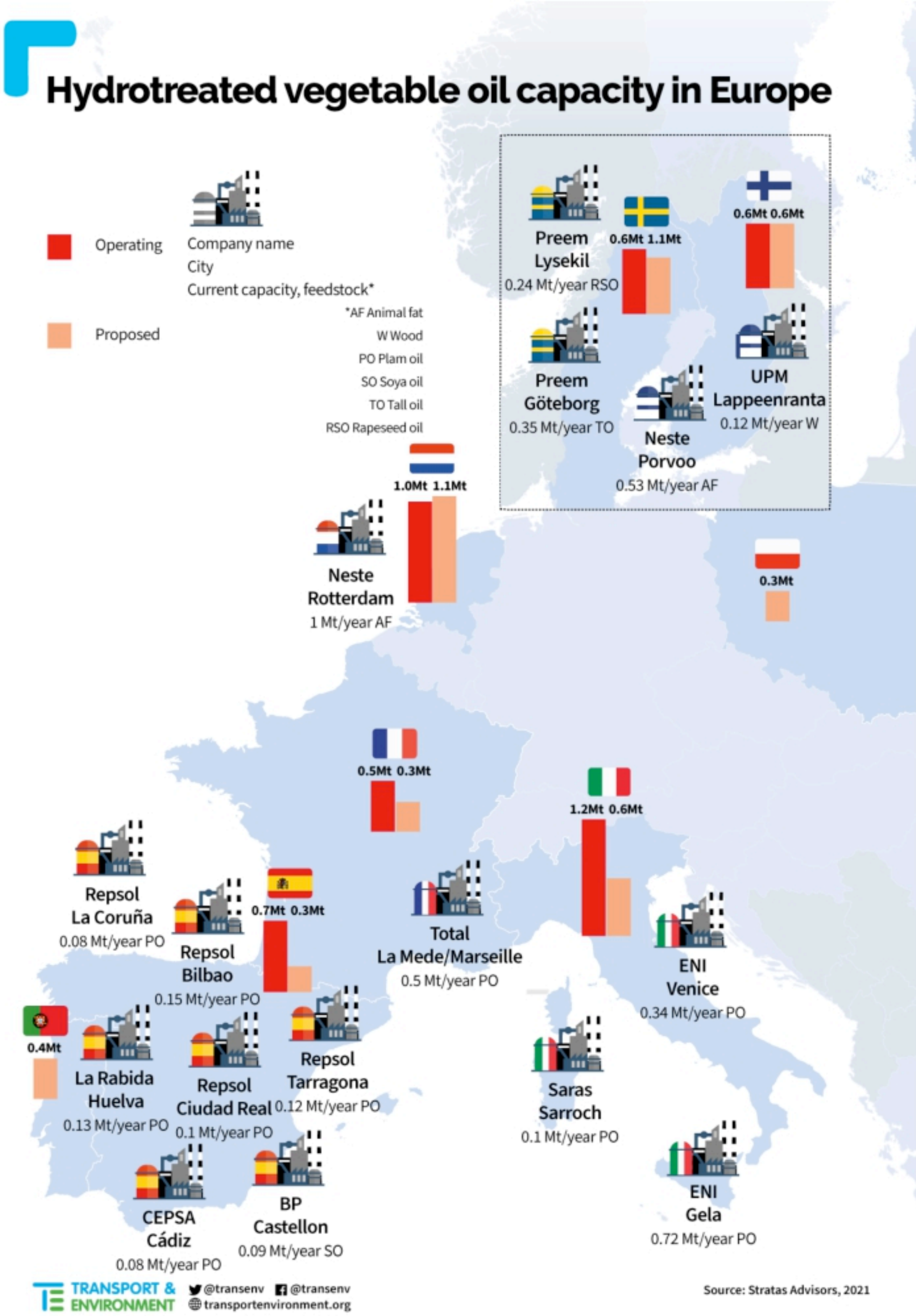

Figure 8: Operating and proposed HVO production capacities as in 2020 (individual plants show currently operating capacities and primary feedstock)(Stratas Advisors, 2021)

3.2.3. National production & consumption

Figure 9 shows the production and consumpti on volumes of biodiesel for five key countries that have a major influence on the European biodiesel market.

The largest fraction of the EU produced biodiesel in 2020 comes from Germany, using 3.6 Mt of feedstock (mainly rapeseed (51%) and UCO (31%)). Als o, Germany is the largest market for biodiesel with around 3 Mt, that's only 83% of the domestic production volume. Similarly, the Netherlands and Spain, which are the second and third largest biodiesel producers, consume a lot less biodiesel than their pr oduction volumes. The Netherlands used around 2.6 Mt of feedstock (mainly palm (59%) and rapeseed oil (17%)) and Spain used about 2.4 Mt (of which 78% palm), but these countries consumed only around 20% and 39% of their production volumes respectively. Thi s means a significant fraction of their produced biofuels disappear in the Intra - EU trading to other EU countries. In contrast, the production volume in France can supply only around 70% of its demand, and the remaining demand was met mainly by the Intra - EU trade.

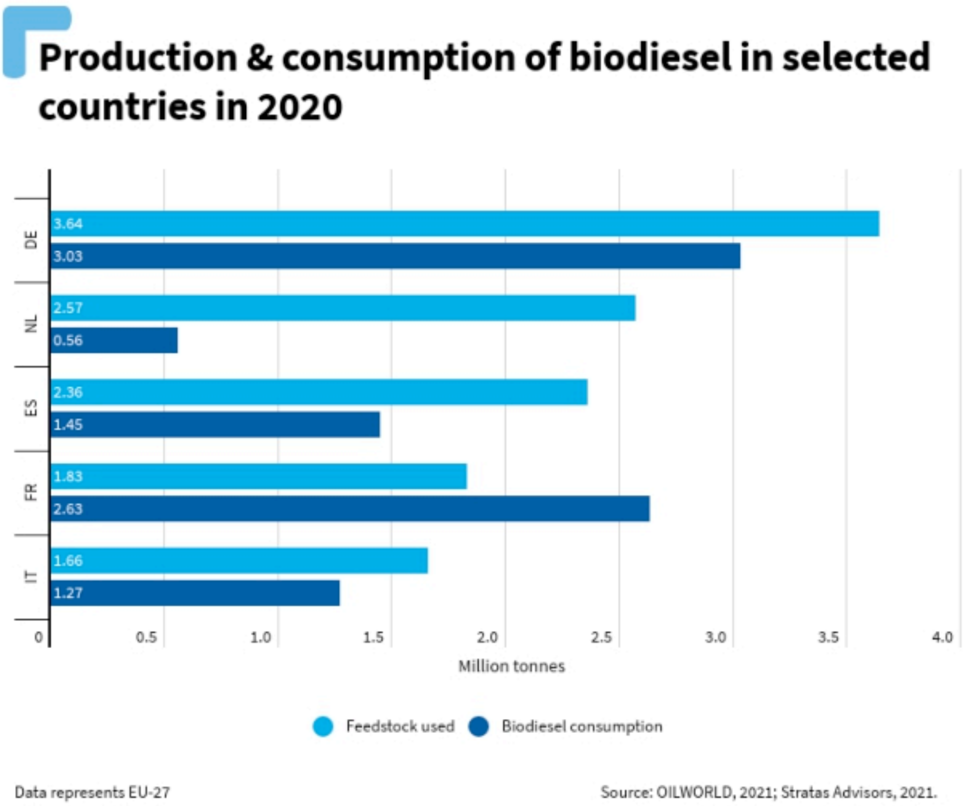

Figure 9: Production and consumption of biodiesel in five key countries

4. Bioethanol

4.1. Production and consumption mix

The European bioethanol production data (i.e. feedstock mix and the origin of feedstock) for 2020 is not available yet, and the high level analysis in this section is done based on the latest available data from 2019, based on Stratas. Figure 10 shows the current production feedstock mix by the ePURE members, and the operating and prop osed production capacities in Eu rope.

On th e production mix, the European e thanol producers' association ePURE, repr ese nting about 65% of European ethanol install capacity, reported that in 2019, 99 % of their feedstock orig inated from Europe[17]. Corn being the largest feedstock (around 49%), followed by wheat (21%), sugar (19%) and the advanced ligno - cellulosic fee dstock accounted for around 4.3 %. Even though these fractions co rrespond only to the data of ePURE members, this is more or less in line with the consumption mix reported by Stratas Advisors at least for the past three years [18].

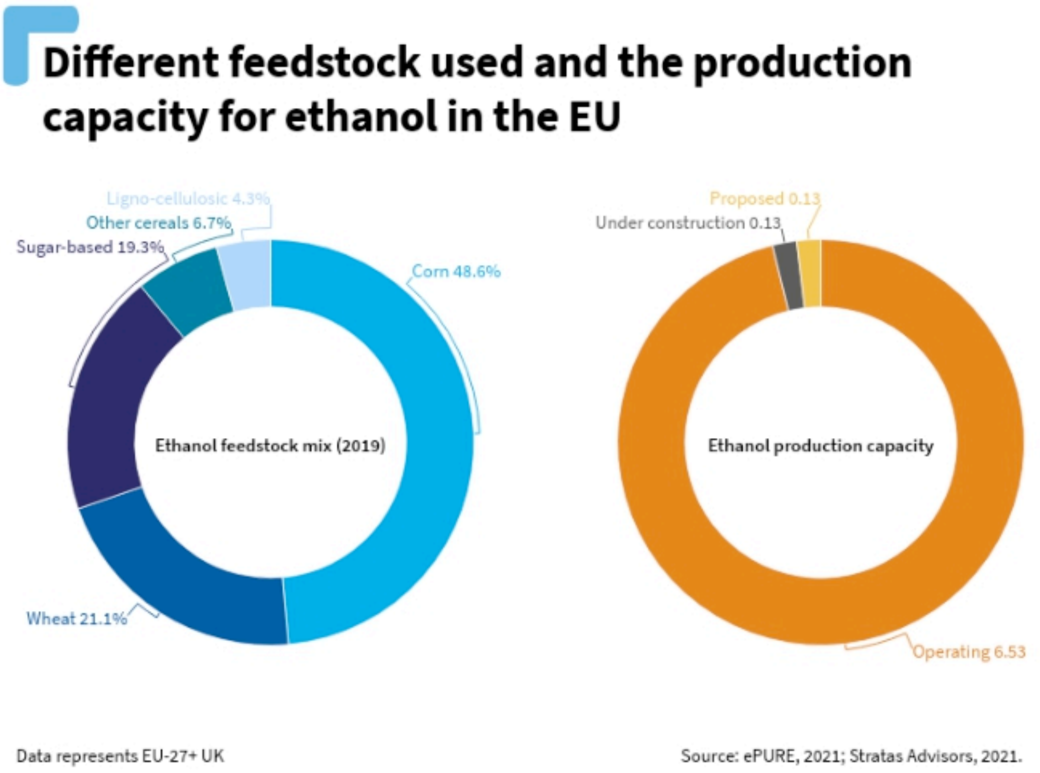

Figure 10: Feedstock mix in ethanol production in 2019 (shows only ePURE members) (ePURE,2 021) [19] **and the current and announced production capacity (Stratas Advisors, 2021)**

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[17] https://www.epure.org/wp - content/uploads/2020/11/200813 - DEF - PR- ePURE - infographic - European-renewable - ethanol- key - figures - 2019_web.pdf

[18] https://stratasadvisors.com/

[19] https://www.epure.org/resources - statistics/statistics - infographics/

As for biodiesel, the EU's reliance on imported bioethanol is quite significant. The latest trade statistics from the UN database show that the total imports of ethanol in the EU grew from 1 Mt in 2019 to 1.3 Mt in 2020 (see Figure 11). This 30% overall increase is particularly worrying after a record - setting increase in 2019 when volumes doubled from 2018. The "net" imported ethanol (considering both import and export trades) contributes about 20% of the ethanol consumption in transport in the EU. It must be noted that, according to ePURE report, in 2019 almost 68% of the imported ethanol enjoyed duty -free access to the EU market. The USA, Pakistan and Peru have been the main e xporters since 2018, and represent 27%, 10% and 8% respectively, of the imported ethanol in 2020. Imports from Brazil and Canada skyrocketed by 14 and 5 times respectively, from 2019 to 2020. This is mainly because of the EU - Mercosur trade agreement[20] and t he removal of tariffs under the Comprehensive Economic and Trade Agreement (CETA)[21] for ethanol imports from Brazil and Canada respectively.

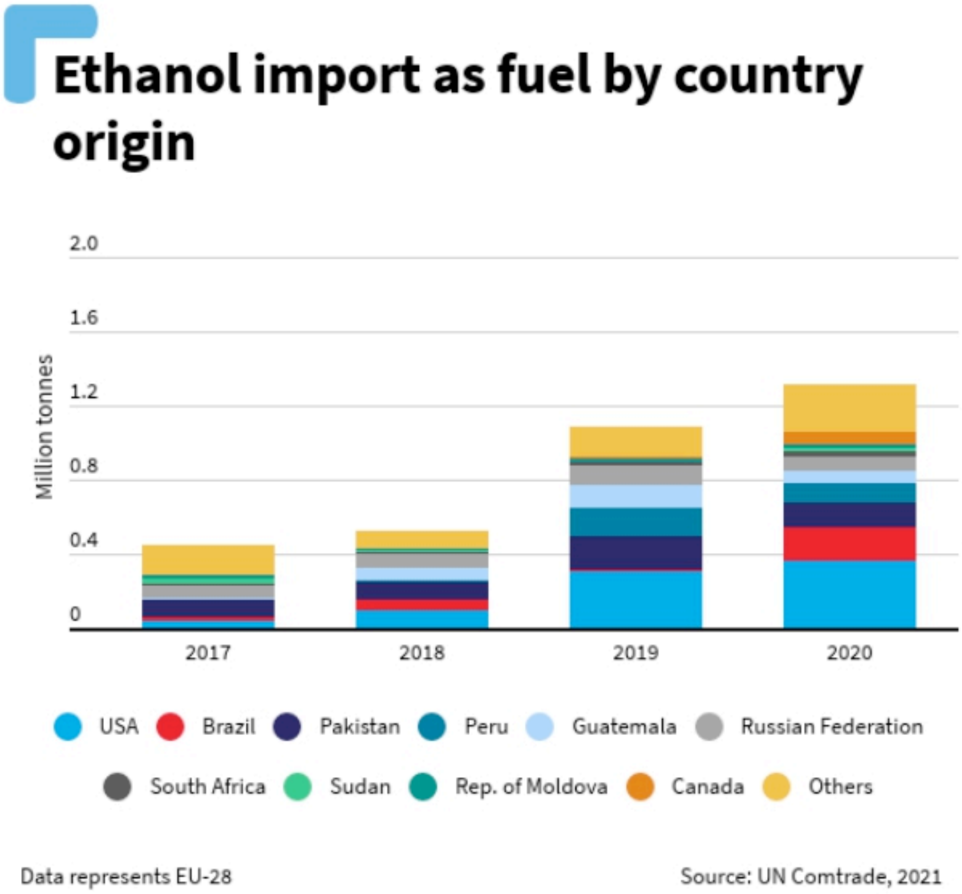

Figure 11: Ethanol import from third countries by country origin

20 https://bioenergyinternational.com/opinion - commentary/30567

21 https://bioenergyinternational.com/markets - finance/eu- canada - sign- ceta - set - new - high - standards - for- global - trade

Figure 12 shows the shares of different feedstock in bioethanol consumption mix from 2016 – 2020. This data represents the volumes delivered, which includes the net import/export of ethanol in the fuel market. In 2020, the total operating bioethanol produc tion capacity was about 6 Mt (around 8190 million litres) in Europe. Almost 90% of this capacity (of ePURE members) uses crops (e.g. corn, wheat, rye, etc.) as primary feedstock, and the remaining 10% is able to process waste based feedstock. France has th e highest installed capacity of 1.3 Mt per year, closely followed by Germa ny with (1.2 Mt), Hungary (653 k t) and Belgium (450 k t).

As in the production mix, the corn and wheat based ethanol represent the largest fractions of EU's total ethanol supply in 20 20 - 44% and 26% respectively (this includes the net import/export). Around 93% of the supplied ethanol comes from food crops (this is an estimate based on Stratas assumptions on imported bioethanol feedstock, and the net trade balances).

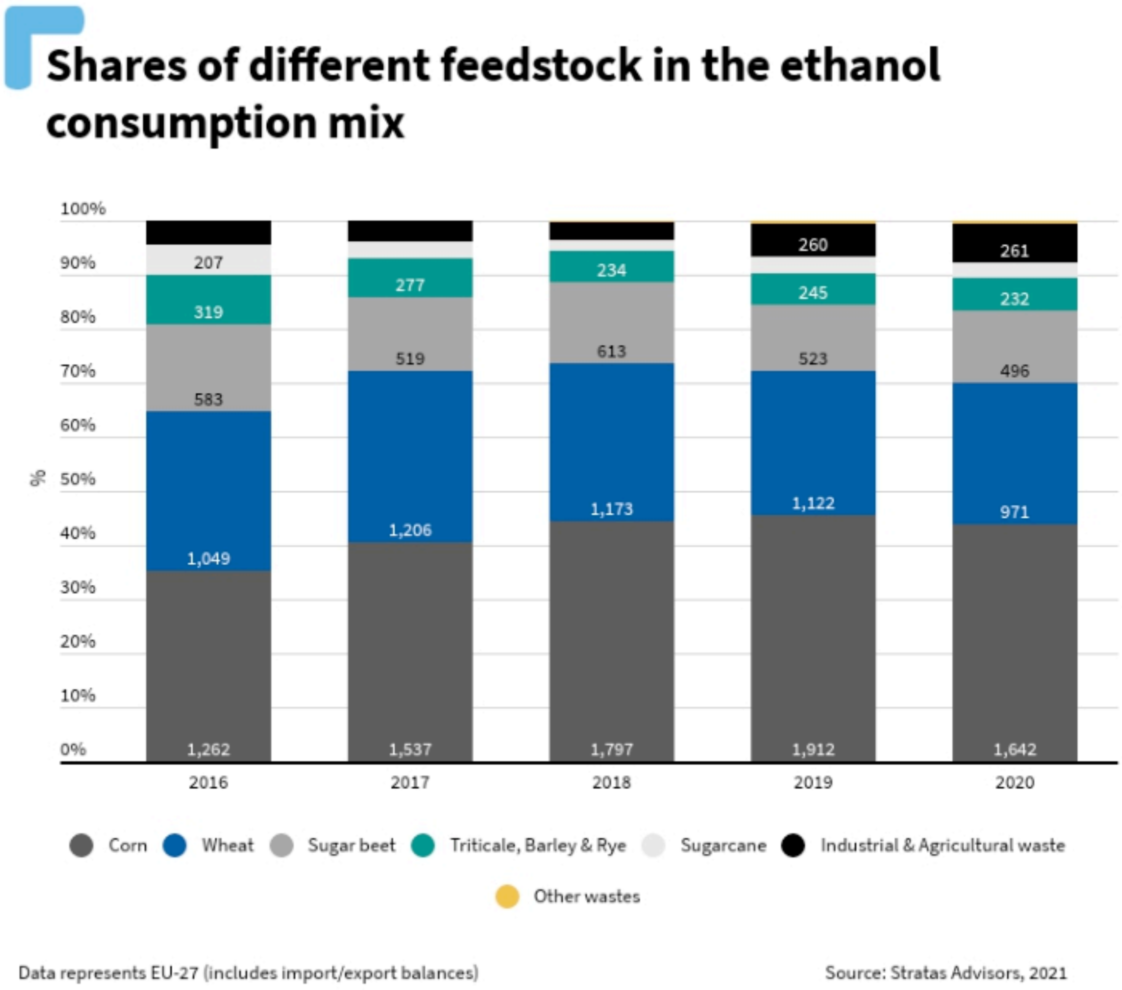

Figure 12: Fee dstock mix in the ethanol consumed in Europe

3. Recommendations

With the overall high climate ambition and the upcoming revision of the RED II, the EU is at a turning point in its climate change policy. Deforestation -causing and high - emitting biofuels sho uld not have a place in this context nor receive any form of support. Given this, the EU should not increase the renewable targets dramatically to avoid the flooding of unsustainable biofuels into the market, and be realistic about the potential of advance d biofuels.

The data analysis in this briefing shows that, despite some restrictions in place, unsustainable biofuels are still very much present in the European market and even increasing. In view of the decarbonisation goals, we recommend the EU and th e EU member states to:

- Immediately end policy support to high ILUC risk biofuels (palm oil biodiesel, including PFAD) at EU level, to avoid waiting for 2030.
- Label soy oil biodiesel as a high ILUC risk biofuel, to be phased - out like palm oil, immediately.
- Phase- out the support to all crop biofuels by 2030 at the latest.
- Set a realistic target for renewables in transport (or carbon intensity target) that excludes crop biofuels, incentivizes only realistic amounts of advanced biofuels and prioritizes electrification as well as electricity based fuels (hydrogen & efuels main ly in aviation & shipping).
- Strengthen the monitoring and verification mechanism for biofuels supply chains, especially for UCO.
- Ensure more transparency of the energy used for transport at national level, including requirements for member states to centr alize and disclose publicly the data about origin, feedstocks and emissions (including ILUC) of biofuels placed on their market.

Further information

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