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Report Highlights:

While the coronavirus (COVID-19) outbreak is forecast to cut fossil transport fuel use by roughly twelve percent in the EU, bioethanol and biodiesel use is projected to decline by approximately ten and six percent, respectively. EU consumption of biofuels is supported by the ten percent blending target for biofuels in transport fuels set for 2020. Another factor is the expanding domestic supply and blending of hydrogenation derived renewable diesel (HDRD). The Renewable Energy Directive II (RED II), which will be enforced on January 1, 2021, sets a binding target for the use of advanced biofuels of 3.5 percent by 2030. In 2020, blending of advanced biofuels is projected to reach 1.5 percent, of which the majority is produced from waste fats and oils. The EU market for wood pellets is less affected by the COVID-19 crisis than the liquid biofuels market, but further expansion could be limited by individual Member State sustainability requirements.

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I. Executive Summary

Policy and Programs

The current European Union (EU) policy for renewable energy is set in the 2009 EU Energy and Climate Change Package (CCP) and the 2009 Fuel Quality Directive (FQD). The Package includes the "20/20/20" mandatory goals for 2020, one of which is a 20 percent binding target for renewable energy in the overall energy mix of the EU, and a 10 percent renewable energy blending target for the transport sector for all EU Member States. According to the EU's most recent biannual progress report (April 2019), the EU is on track to meet its 20 percent target and will also likely meet the binding 10 percent renewable energy target for the transport sector, in part facilitated by 'double-counting' provisions for biofuels and renewable electricity. In the 2009 Renewable Energy Directive (RED), which is part of the CCP, specific sustainability requirements are defined for conventional liquid biofuels. Several years later, the European Commission (EC) amended these sustainability requirements in the so-called "Indirect Land Use Change Directive," most notably by capping the use of "conventional" (food and feed-based) biofuels at seven percent of transport energy use and setting non-binding national targets for advanced biofuels such as cellulosic ethanol at 0.5 percent of transport energy use. The supposition is that advanced biofuels generally achieve higher carbon emission reductions than conventional biofuels and minimize potential conflict with food and feed production.

In 2018, the European Union adopted Renewable Energy Directive II (RED II), which will enter into force on January 1, 2021. It sets a new overall renewable energy target of 32 percent by 2030 and a 14 percent target for the transport sector. RED II caps the share of conventional / crop-based biofuels to one percent above EU Member State 2020 consumption levels, up to the overall cap of seven percent of final consumption of road and rail transport for each EU Member State. RED II also set an ambitious binding target for the use of advanced biofuels to 3.5 percent by 2030. In addition, the EU introduced sustainability criteria in the RED II for biomass and expanded sustainability criteria for

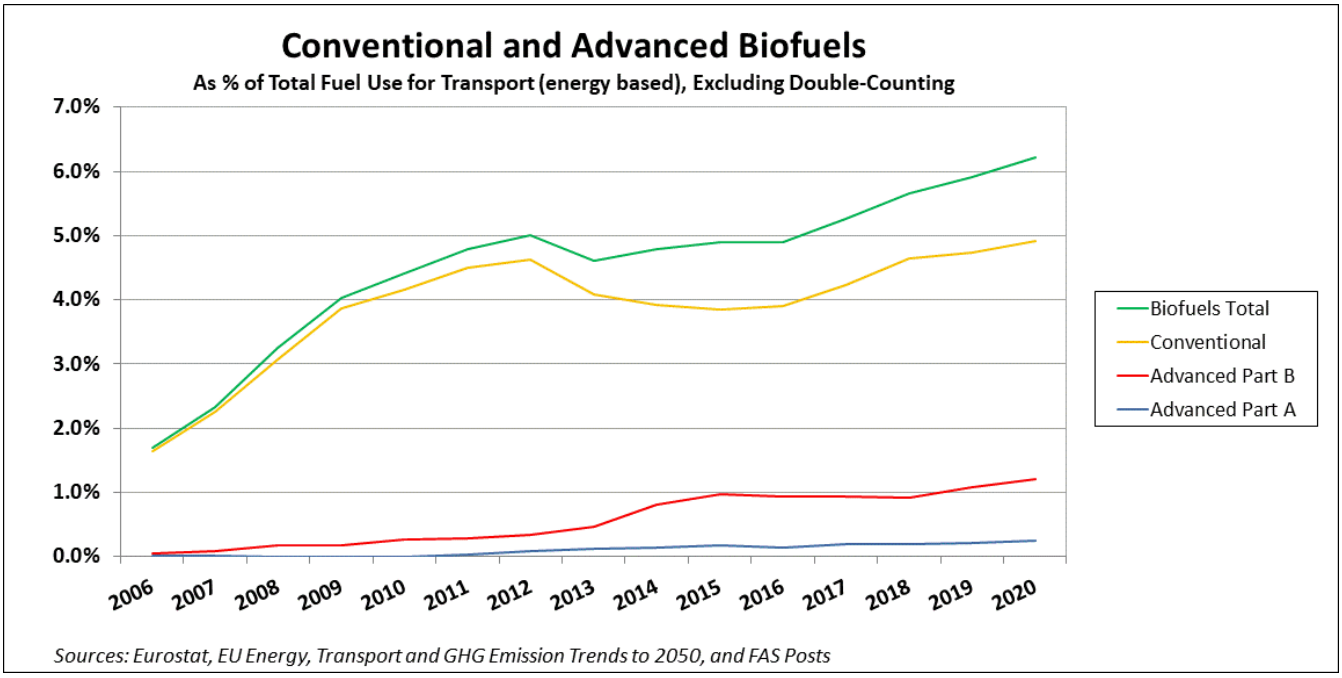
biofuels. The European Commission (EC) is preparing additional legislation to implement the new rules, most of which will need to be adopted before the entry into force of RED II.

There have also been several recent developments related to the EU's Anti-Dumping (AD) duties on biofuels. In May 2019, the EU repealed the duties imposed on U.S. bioethanol exports since 2013. The EU also imposed countervailing duties on imports of biodiesel from Indonesia in December 2019.

Conventional and Advanced Biofuels

In 2019, before the global coronavirus (COVID-19) virus outbreak, consumption of both bioethanol (1.4 percent) and biodiesel (including hydrogenation derived renewable diesel or HDRD, 6.4 percent) increased in the EU. The rise of bioethanol consumption was slight and barely surpassed the level of 2011. In contrast, consumption of biodiesel and HDRD has increased significantly since 2013, mainly driven by the increased supply of double-counting biodiesel and HDRD produced from waste feedstocks.

As a consequence of the COVID-19 lockdowns in 2020, EU bioethanol consumption is forecast to decline by approximately ten percent (minus 760 million liters) and fall back to the 2013 – 2016 level. Biodiesel and HDRD consumption is forecast to decline by nearly six percent (minus 1.1 billion liters), back to the 2018 level. The proportional reductions of biofuels use reflect the respective fossil fuel consumption trends in 2020. The International Energy Agency (IEA) forecasts motor gas and light diesel consumption to decline by respectively 12.6 percent and 11.7 percent, respectively.



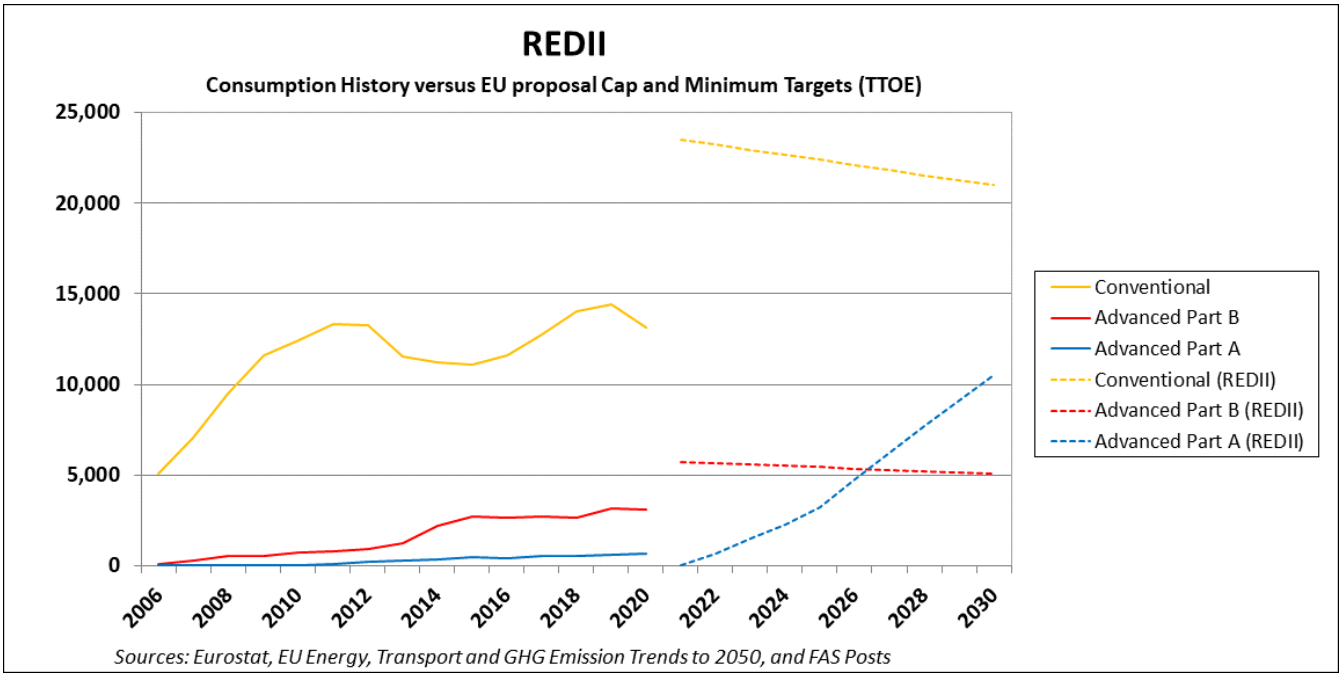
One of the factors causing the relative minor reduction of biodiesel and HDRD consumption is the six percent greenhouse gas (GHG) reduction mandate for all fuels that comes into force in 2020, which benefits the use of biodiesel and HDRD relative to bioethanol. Another factor is the expanding supply of HDRD in 2020, about 425 million liters, as more plants entered commercial production. In contrast,

biodiesel production is forecast to decrease by seven percent, a cut of roughly 570 million liters. Movement restrictions and restaurant closures had a suppressing effect on used cooking oil (UCO) collection and is expected to result in lower use of UCO for biodiesel production.

While combined biodiesel and HDRD production is forecast to decline only 0.8 percent (145 million liters), bioethanol production is forecast to decline by nearly twelve percent, a cut of about 500 million liters. Due to the shrinking markets, imports of both bioethanol and biodiesel as transport fuel are forecast to decline in 2020.

Looking at the blending rates (see graph above), the percentage of biofuels use as a portion of the total transport fuel use is forecast to continue its steady upward trend which began in 2017. In 2020, total biofuel blending with fossil fuels (on an energy basis and with double-counting of advanced biofuels) is forecast to reach 8.1 percent. This is a minor increase compared to the blending of 7.6 percent achieved in 2019. Exclusive of double-counting, blending in 2020 is forecast to reach 6.2 percent (5.9 percent in 2019), with 3.8 percent for bioethanol (3.8 percent in 2019) and 7.1 percent for biodiesel and HDRD (6.7 percent in 2019), see the graph above. Blending of food-based biofuels is estimated at 4.9 percent (4.7 percent in 2019), still well below the seven percent cap set by the Indirect Land-use Change (ILUC) Directive, and for 2021-2030 by the RED II.

Blending of advanced, non-food based biofuels is estimated at 1.5 percent in 2020. The majority of these advanced biofuels, accounting for 80 percent of the blending, is produced from waste fats and oils (listed in Part B of Annex IX of the RED), and only a small percentage, 20 percent, is produced from agricultural and forestry by-products such pine oil and cellulosic feedstocks (listed in Part A).



The historical Eurostat transport fuel statistics and EC projections for transport fuel use (EU Energy, Transport and GHG Emission Trends to 2050) combined with the seven percent cap for conventional biofuels in the RED II translate to a consumption maximum of about 23,000 thousand metric tons of oil

equivalent (ttoe) in 2022 and 21,000 ttoe in 2030 (see graph above). It should be noted that this volume can be cut by the proposed multipliers for reaching the overall mandate of 14 percent renewable energy in transport; electric transport (4x for road and 1.5x for rail transport), the use of biofuels by the aviation and maritime sector (1.2x), and advanced biofuels produced from agricultural and forestry by-products (Part A) and waste fats and oils (Part B), which both count double towards the mandate. It should also be noted that EU Member States may decide to set lower limits for the contribution from food-based biofuels.

Given the double-counting and the readiness of the technology, renewable diesels and HDRD (produced with Part B inputs) are likely to be the preferred transport biofuel. The RED II sets a limit of 1.7 percent but Member States can modify this limit, if justified, taking into account the availability of the feedstock. Sourcing feedstocks from third countries could support a production expansion in order to keep these renewable transport fuels competitive. The EC is able to add feedstocks listed in Part A and B of Annex IX, but cannot remove them.

Based on the proposed minimum blending rates for advanced biofuels produced with feedstocks listed in Part A of the RED II, the consumption of these second generation biofuels must increase significantly from 2020 (see graph above). The RED II target for advanced biofuels (Part A) of 0.2 percent in 2022 equals the current consumption level, but the target is set to increase to 3.5 percent in 2030, which requires a quantity of about 10,000 ttoe. This would be only twenty percent lower than the current production of conventional biofuels, and require about a hundred cellulosic biofuel plants with an annual capacity of 200 million liters. For this expansion investments must be made in domestic biorefineries and requires sourcing of eligible feedstocks, or, as an alternative, sourcing of such advanced biofuels from outside the EU. The current available cellulosic biofuels are produced from tall oil (HDRD), glycerol (biomethanol) and saw dust (bioethanol). The most significant production expansion of cellulosic biofuels is forecast to take place in Finland and Sweden. This expansion will most likely be based on the refining of tall oil.

Biomass for Heat and Power

With a consumption of about 29 million metric tons (MMT) of pellets in 2018, the EU is the world's largest wood pellet market. Based on EC mandates and EU Member State incentives, the demand is expected to further expand to 30.8 MMT in 2020. Residential use for heating, about forty percent of the total pellet market, is a relatively stable market compared to industrial heat and power generation. In some EU Member States, households receive subsidies or tax deductions for heating with biomass as an input. In most countries, however, government funding is limited. Italy and Germany are the main growth markets for residential pellets.

Demand for industrial pellets, mostly for power generation, depends primarily on EU Member State mandates and incentives. The main market for industrial pellets is the United Kingdom, which is anticipated to temporarily to decline in 2020. Another important industrial market for pellets is Denmark. The Dutch power sector is preparing to scale up its co-firing and is expected to be the third largest market for industrial pellets in the EU. If EU demand and trade flows remain consistent with current patterns, the United States has the potential to supply 65 percent of the EU import demand, which would represent a trade value of potentially US$1.6 billion in 2020. Third country imports could,

however, be affected by the implementation of sustainability requirements by individual EU Member State governments.

II. Policy and Programs

Impact of the COVID-19 Pandemic on the European Biofuels Sector

The European Union's economy became severely disrupted in March 2020, when most EU Member States began to enforce COVID-19-related lockdown measures for their populations. The EC and Heads of Member State's held the first videoconference on the response to the COVID-19 outbreak on March 10, 2020, during which the EC received a mandate to respond and coordinate Member State actions. As a result, the EU launched a "Response Investment Initiative" that aims to mobilize up to €37 billion to support small and medium-size enterprises (SMEs), labor markets and other parts of the EU economy. The EU biofuels market is and will be impacted in the short and medium-term by the effect of the pandemic on transport energy demand and economic activity. Estimates for 2020 EU-wide fuel pool declines are detailed in Section II. With biofuel blending requirements essentially holding across the continent, biofuel use has fallen in line with the collapse of transport fuel pools.

Impact of COVID-19 on biofuel support schemes

In the medium term, the combination of low fossil fuel prices and large, public spending to rescue economies across Europe creates risk that some Member States may reduce their investments in renewable energy support schemes. This occurred after the 2008 economic crisis when several Member States reduced investment in renewables and research and development schemes.[1] It remains to be seen what will happen, and if the resulting impact will be positive or negative for biofuels.

Reactions from the EU biofuel industry

As a result of lower prices and lower demand, the EU biofuel industry and farmers groups and the EU organization representing the EU Member State national business associations are lobbying the EC with competing demands for relief. The European associations representing the European biofuels value chain sent a letter in March 2020 to alert the EC of the sector's difficulties. The EU biofuels sector is specifically worried about derogations to blending obligations under RED (see below) in some Member States. Romania is currently the only Member State allowing fuel retailers to market fuels with a reduced biofuel content below current blending mandates during the State of Emergency period declared by the government. The trade association representing the EU ethanol industry, ePURE, also wrote to the EC on April 10, 2020, to oppose a request from the EU organization representing EU Member State national business associations to relax import tariffs on ethanol imports. ePURE wishes to ensure that "Europe's fuel ethanol production capacities are shielded from the threat of damaging imports." Furthermore, Copa-Cogeca, the umbrella organization representing EU farmers and cooperatives, called for biofuel blending obligations to be maintained throughout the crisis. Copa-Cogeca also called on the EC to establish safeguard measures against ethanol imports from the United States or Brazil.

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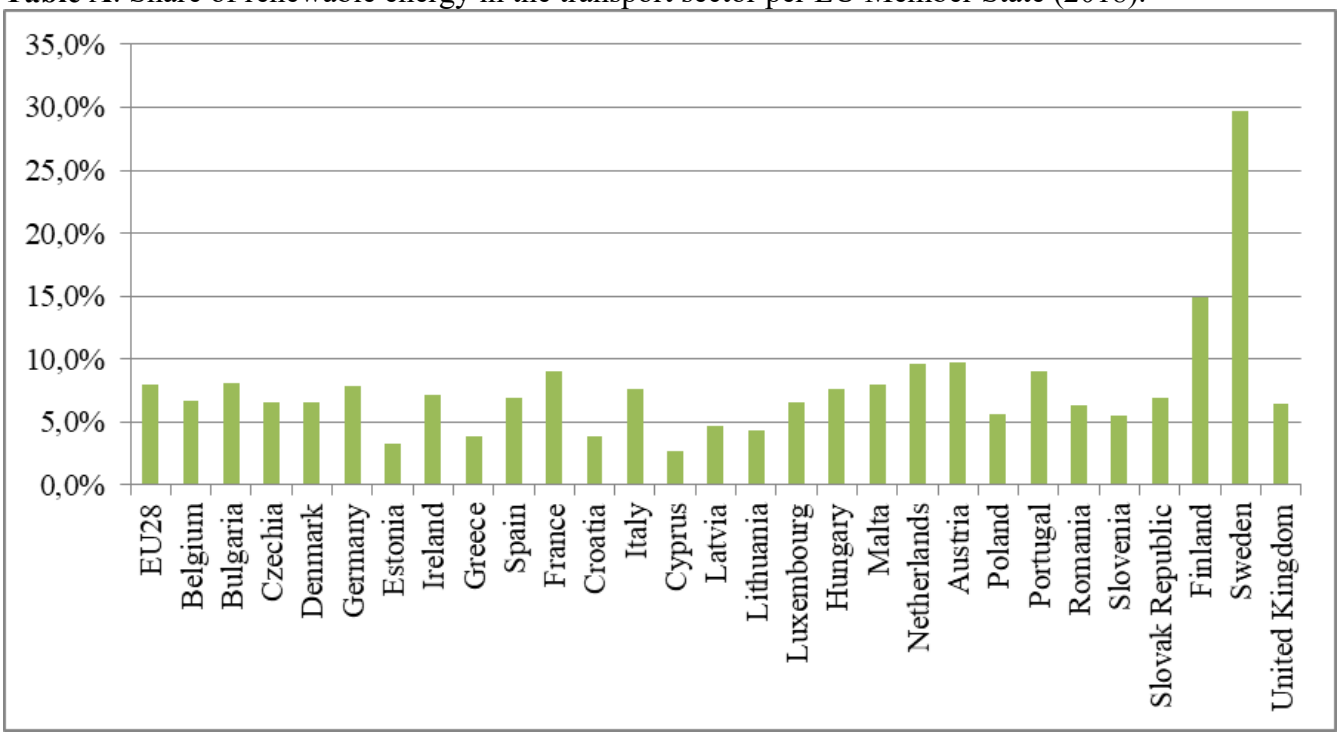
[1] EPRS, *Impact of COVID-19virus on energy markets, https://tinyurl.com/y78a4jb2*

The EU's Renewable Energy Directive (RED)

The EU Energy and Climate Change Package (CCP) runs from 2010-2020. The Renewable Energy Directive (RED), which is part of the CCP package, entered into force on June 25, 2009, and will expire on December 31, 2020. The CCP requires the EU to achieve a binding target whereby 20 percent of its overall energy use would be powered from renewable sources by 2020. The RED also requires that the transport sector of each EU Member State reach a renewable energy target of ten percent of total energy use. Concerned that several CCP measures were having adverse environmental impacts and that not all EU Member States were contributing to the EU-wide 20 percent renewable energy target, the EC adopted the Indirect Land Use Change or ILUC Directive in 2015 -- this amended both the RED and the Fuel Quality Directive (FQD). The amendment capped the share of conventional biofuels used to meet the transport sector's target at seven percent and required that advanced biofuels comprise a minimum share of 0.5 percent of the transport sector's energy use by 2020. To further incentivize advanced biofuel use, the amendment allowed EU Member States to double count the contribution of advanced biofuels to meeting these binding targets.

RED's achievements

Table A: Share of renewable energy in the transport sector per EU Member State (2018).



Source: Eurostat, SHARES 2018

In April 2019, the EC published its most recent Renewable Energy Progress Report. This report concludes that the EU, as a whole, achieved a 17.52 percent share of renewable energy in 2017. The vast majority of EU Member States are well on track to reach their 2020 binding targets for overall renewable energy use and will likely meet the binding ten percent target for the transport sector aided by double-counting. A double-counting mechanism for advanced (which include waste-based biofuels) is in place in 20 Member States. This double-counting has proven to be a policy incentive in the EU for

waste-based biofuels which, as modeled, deliver high GHG savings. According to the latest data available, in 2018 the EU as a whole achieved an 18.0 percent share of renewable energy with the transport sector achieving 8.0 percent.[2]

Member States RED Initiatives

Under the RED, each EU Member State is responsible for developing policy and tools to implement the provisions outlined by the RED. For further details, please see FAS biofuels reports from individual Member States, and the FAS GAIN report: Biofuel Mandates in the EU by Member State in 2020, published on June 2, 2020. As such, RED required that all Member States transpose RED legislation and targets into national legislation; in the past, several Member States did not fully comply. Please see the EU Biofuels Annual 2017 for information on the EC's action against various Member States for RED compliance.

RED and Sustainability Criteria

To qualify for RED and FQD targets, biofuels consumed in the EU must comply with strict sustainability criteria provided in Article 17 of the RED. Rigorous requirements are set by the RED on the minimum level of GHG savings, safeguarding against the conversion of high-carbon content lands and protection of biodiversity, and monitoring requirements for any potentially adverse effects. In order to demonstrate compliance with the EU sustainability criteria, biofuels need to be validated by either national verification systems or by one of the 17 voluntary schemes approved by the EC and valid in the EU. Please see below for more information, and the EU Biofuels Annual 2019 for information on the sustainability criteria under the RED.

GHG Savings

GHG impact of biofuels, bioliquids, and fossil fuels are calculated using 'default' values outlined in the FDQ and listed in the RED Annex V. More information on the GHG savings calculations can be found in the EU Biofuels Annual 2019.

Voluntary Schemes

One way to ensure that biofuels meet the sustainability and GHG savings requirements of the RED is to have the biofuel certified by a voluntary scheme. Some of the Member States have developed national voluntary systems, while others rely on voluntary schemes adopted by the EC. The EC considers voluntary schemes as its preferred means of obtaining certification. However, despite several initiatives by third countries, bilateral agreements on biofuels certification have never been negotiated (even though this option was mentioned in the RED). A full listing of the 14 schemes approved by the Commission is available on DG Energy's website. On January 30, 2019, the EC announced the recognition of a voluntary scheme developed by the U.S. soybean industry. Commission Implementing Decision 2019/142 recognizing U.S. Soybean Sustainability Assurance Protocol (SSAP-RED) program which entered into force on February 19, 2019, and shall apply until June 30, 2021.

[2] For the EU without the United Kingdom (EU-27), the share of renewable energy amounted to 18,9 percent with the transport sector achieving a share of 8,3 percent.

Biomass Sustainability

While the current RED sets detailed sustainability criteria guidelines for liquid biofuels, the EC did not establish mandatory sustainability criteria for wood pellets and other forms of solid biomass. In the absence of EU-wide binding criteria for solid biomass, several Member States (including Belgium, Denmark, and the Netherlands) developed their own rules in response to the growing use of imported wood pellets, particularly for use in industrial power plants. All Member State sustainability schemes on biomass have to be notified to the EC even though there are no specific EU criteria on sustainability. An EU-wide criteria was introduced in RED II as discussed below.

The Fuel Quality Directive

The FQD complements the RED and mirrors some of the RED's content such as the sustainability criteria. A key requirement of the FQD is that all fuel suppliers must meet a six percent reduction (from 2010) in GHG emissions by 2020 across all fuel categories supplied to the market. This is designed to be consistent with the ten percent use of biofuels and shift demand towards biofuels with higher GHG savings. In addition, the FQD limits ethanol blends to ten percent or less when ethanol is used as an oxygenate, and places limits on palm oil and soy oil content of biodiesel. The EC does not plan to extend the GHG reduction target beyond 2020. Instead, the RC addressed the issue of the decarbonization of transport fuels after 2020 in the RED II.

In October 2019, the European Environment Agency published a report on the quality and greenhouse gas intensities of transport fuels in the EU in order to monitor the progress of the FQD. This report looks at data from 2017 as reported by 22 EU Member States. It shows that while average GHG intensity of fuels is 3.4 percent lower than it was in 2010, performance fell short of the 2017 indicative target of four percent and risks not meeting the 2020 binding target of six percent. The projected reduction in 2020 is 4.7 percent, assuming a constant rate of change from 2017 thru 2020.

The Renewable Energy Directive II (RED II)

The European Union adopted the new Renewable Energy Directive for the period 2021-2030 (RED II) after two years of debate in June 2018. The full text was published in the Official Journal in December 2018. Directive 2018/2001 will enter into force on January 1, 2021.

RED II Renewables targets

The RED II sets an overall binding renewable energy target of at least 32 percent by 2030 with a 14 percent target for the transport sector, and a clause for a possible upward revision by 2023. Within the 14 percent transport sector target, food-based biofuels are capped at a maximum of up to one percent higher than Member States' 2020 levels, but with a maximum cap of seven percent for each Member State. If the cap on first generation biofuels in a Member State is less than seven percent, the country may reduce the transport target by the same amount (for example, a country with a food and feed crop cap of six percent could set a transport target at 13 percent). Member States can also set a lower limit for conventional biofuels than prescribed in RED II. It is still unknown if the COVID-19 crisis will have an impact on the allowed 2020 levels going forward.

For advanced biofuels, the RED II introduces two different sets of targets for feedstock listed in Part A of Annex IX and feedstock listed in Part B. Feedstock listed in Part A must be supplied at a minimum of 0.2 percent of transport energy in 2022, 1.0 percent in 2025 and increasing to at least 3.5 percent by 2030. Biofuels produced from feedstock listed in Part B will be capped at 1.7 percent in 2030. Advanced biofuels can be double counted towards both the 3.5 percent target and towards the 14 percent target.

TABLE B: Advanced Biofuel sources, Part A and Part B of Annex IX in RED II.

Part A	**Part B**
• Algae if cultivated on land in ponds or photobioreactors • Biomass fraction of mixed municipal waste • Biowaste from private households subject to separate collection • Biomass fraction of industrial waste not fit for use in the food or feed chain • Straw • Animal manure and sewage sludge • Palm oil mill effluent and empty palm fruit bunches • Crude glycerin • Bagasse • Grape marcs and wine lees • Nut shells • Husks • Cobs cleaned of kernels of corn • Biomass fraction of wastes and residues from forestry and forest-based industries • Other non-food cellulosic material • Other ligno-cellulosic material except saw logs and veneer logs	• Used cooking oil • Some categories of animal fats

RED II Sustainability Criteria for Biofuels

With regards to the sustainability criteria for biofuels, most of the criteria are the same as the ones in the RED. To qualify for counting towards RED II targets, biofuels consumed in the EU must comply with strict sustainability criteria provided in article 29 of the RED II. The most important shift in RED II is the introduction of specific criteria for high-risk ILUC biofuels. One of the more heated debates of the RED II surrounded the use of biofuels produced from areas that had underwent recent deforestation or conversion of grasslands to croplands. These areas are referred to ILUC areas. The RED II required that the EC determine the definition of high-risk ILUC biofuels.

In May 2019, the EU published in the Official Journal Delegated Act 2019/807 determining high-risk ILUC biofuels. The EC defines high ILUC-risk feedstock as feedstock for which the share of expansion

of the production into land with high carbon stock is higher than ten percent since 2008 (with an annual expansion of more than one percent). Given the EC's calculations, only palm oil falls under this definition.

The use of high risk ILUC biofuels will be capped at 2019 levels until 2023 and then phased out by 2030. The Delegated Act also lays out criteria for certifying low-risk ILUC biofuels, which were already defined in article 2 of the RED II, and permits producers to certify their low-risk ILUC feedstock. Palm oil producers will also be able to certify their feedstock as low-risk if they comply with the general sustainability criteria of the RED II as well as "additional measures" such as cultivation on unused or abandoned land or are classified as small holders (less than 2 hectares).

Voluntary Schemes

Similar to RED, RED II voluntary schemes recognized by the EC will ensure that biofuels meet the sustainability and GHG savings requirements of the Directive. Existing voluntary schemes recognized by the EC must adjust their certification approaches to the new rules. The EC began the process of recognizing voluntary schemes that cover the revised sustainability criteria during the first half of 2020. The EC is also required by RED II to adopt implementing acts specifying detailed implementing rules, including adequate standards of reliability, transparency and independent auditing, and require all voluntary schemes to apply those standards.

RED II GHG Savings

The RED II introduces new GHG emission criteria that biofuels used in transport must comply with to be counted towards the overall 14 percent target. The EC is allowed to revise and update the default values of GHG emissions when technological developments make it necessary. Economic operators have the option to either use default GHG intensity values provided in the RED II or to calculate actual values for their pathway.

Table C: Greenhouse gas savings thresholds in RED II.

Plant operation start date	Transport biofuels	Transport renewable fuels of non-biological origin	Electricity, heating and cooling
Before October 2015	50%	-	-
After October 2015	60%	-	-
After January 2021	65%	70%	70%
After January 2026	65%	70%	80%

The sustainability criteria apply to:

- Plants with a total rated thermal input above 20MW for installations producing power, heating, cooling, or fuels from solid biomass fuels.

- Plants with total rated thermal input capacity equal to or exceeding 2MW for installations using gaseous biomass fuels.

RED II Sustainability Criteria for Forestry Biomass

The RED II introduces EU-wide sustainability criteria for biomass; notably RED only had sustainability criteria for liquid biofuels. Biofuels, bioliquids and biomass fuels produced from forest biomass will be required to meet specific criteria to minimize the risk of using forest biomass derived from unsustainable production. Such criteria include that the country in which forest biomass was harvested has laws applicable in the area of harvest as well as monitoring and enforcement systems in place. Forestry biomass will also need to follow land-use, land-use change and forestry (LULUCF) criteria, notably with regards to the existence of management systems to ensure that carbon stock and sink levels in the forest are maintained, or strengthened over the long term. Member States are also allowed to establish additional sustainability criteria for biomass fuels.

Sustainability will be assessed at the country level or at the sourcing area level. As such, smaller U.S. foresters should be able to efficiently demonstrate the sustainability of their wood pellets and continue to export to the EU. The EC has until June 30, 2021, to define the operational guidance required to demonstrate compliance with the sustainable forest management criteria and the LULUCF requirements.

The European Green Deal to Launch New Environmental Legislation

On December 11, 2019, the EC presented its Communication on the European Green Deal. The flagship proposal is a draft European Climate Law that will make the EU's 2050 climate neutrality objective binding across the Union. To achieve this objective, the EU Green Deal Communication lists fifty action items and environmental performance goals that will guide the EC's action for the next five years. The Deal includes a Farm to Fork Strategy and a Biodiversity Strategy, published on May 20, 2020, that will shape agricultural production and trade policy objectives. The Biodiversity Strategy announced the publication of a Commission's assessment study on the EU and global biomass supply and demand and related sustainability. The goal for the EC is to better understand and monitor the potential climate and biodiversity risks of biomass feedstock for energy.

As part of the Green Deal, the EC also announced that it will re-open, and proposed to revise, the recently completed legislation of the EU Renewable Energy Directive II (RED II) by 2021. The EC will also review the EU Regulation on LULUCF, which sets CO_2 emissions limits for biomass used for renewable energy. It is still unclear if these policy changes will affect oilseeds production and demand in the EU. More information on this issue will be available in the last quarter of 2020.

The EU Common Agricultural Policy (CAP)

The CAP funds agricultural and rural development support throughout the EU and currently accounts for 38 percent of the total EU budget. The current CAP's programs entered into force in January 2014 and were supposed to be replaced by a new CAP on January 1, 2021. The EU's budget, the Multiannual Financial Framework, funds the CAP in six-year increments. The CAP categorizes thematic programming into two main "pillars;" the first oriented towards market measures and direct payments to farmers, and the second pillar oriented towards rural development. The EC published its legislative proposal for CAP post-2020 on June 1, 2018. The co-legislators in the European Parliament and Council are currently considering the proposal, and are likely to reach an agreement in 2021. However,

due to the myriad of economic impacts of COVID-19, policy makers are now discussing extension of the existing CAP past its current mandate into 2022 or 2023, and to allow for the EC to put forward a new CAP proposal that would be integrated into the legislative priorities of the Green Deal.

Market Access

Duties

The EU changed its anti-dumping and anti-subsidy (counter veiling) rules in 2018. In December 2017, the EU published a new regulation (2017/2321) changing how the EU calculates anti-dumping (AD) duties. The EU then instituted new rules for all AD and counter veiling (CV) duty and anti-subsidy investigations after June 8, 2018. The rules shorten the investigation period for provisional measures to seven months, makes changes to "lesser duty rules" that allow the EU to impose higher duties, and expands the ability to incorporate the cost of compliance with EU social and environmental legislation. Most favored nation (MFN) duty rates for biofuels and wood pellets are listed below; for a historical discussion of how EU harmonized system (HS) customs codes have changed and influenced trade please see the EU Biofuels Annual 2017.

Table D: MFN Duty Rates for Biofuels and Wood Pellets.

HS Code	Description	Duty Rate
38260010	FAME above 96.5 and up to 100% by volume	6.5%
38260090	FAME greater than 30% and up to 96.5% by volume	6.5%
271020	Petroleum oils containing FAME up to 30% by volume	3.5%
220710	Undenatured ethanol	€19.2/hl
220720	Denatured ethanol	€10.2/hl
440131	Wood pellets	0%

Anti-dumping duties against U.S. bioethanol

In February 2018, the EC initiated a 15-month review of the current AD duties of 9.5 percent for U.S. bioethanol, which were set to expire that month. The EU had originally put in place these definitive measures in February 23, 2013 (Regulation 157/2013). The EU General Court ruled against the duties in 2016, which the EC appealed. For background information on this case development, see: EU Biofuels Annual 2017. By May 15, 2019, the 15-month appeal process concluded and the AD duty on bioethanol imports from the United States was repealed (Regulation 2019/765).

Anti-dumping and countervailing duties against U.S. biodiesel

In 2009, the EU initiated AD and CV duties of up to €409.2 per MT on imports of U.S. biomass-based diesel (both biodiesel and renewable diesel) mainly targeting the U.S. federal blenders tax credit of $1/gallon (Council Regulation 598/2009 and Council Regulation 599/2009). In July 2014, the EC

initiated a 15-month review of the duties and on September 15 2015, the EU extended the duties an additional five years to September of 2020 with Commission Regulation 2015/1519. As noted previously, due to the COVID-19 crisis and decreased production of biodiesel in the EU, Copa-Cogeca asked the EC to maintain the AD and CV duties on biodiesel from the United States beyond September 2020.

Other biodiesel anti-dumping and countervailing duty actions

There have been several other recent market defense developments related to AD and CV duties. On September 19, 2017, the EC removed AD duties on Argentine and Indonesia's biodiesel exports, in response to losing a five-year dispute with both countries in the WTO in October 2016. For more information about the history of the case please see EU Biofuels Annual 2019.

However days after lifting the AD duties on biodiesel, in January 2018, the EC announced a Notice of Initiation of anti-subsidy (counter veiling) proceedings for Argentina. In February 2019, the EC imposed CV duties on Argentinean biodiesel between 25.0 and 33.4 percent depending on the company (Implementing Regulation 2019/244). Duties are linked to an undertaking offer by the Argentine industry which aims to prevent prices from falling below a certain floor price. Implementing Decision 2019/245 establishes price and volume limits – not disclosed publicly - for Argentinean biodiesel. It spares producers who agree to a minimum price from the imposition of CV duties and as long as volume limits are not exceeded. This is in line with Article 18 of the WTO Agreement on subsidies and countervailing measures. Nevertheless, the EU biodiesel industry is concerned with this managed trade agreement and calls on the EC to be vigilant in monitoring prices.

In December 2019, the EC imposed CV duties on imports of biodiesel from Indonesia with Implementing Regulation 2019/2092. The CV duty ranges from 8 to 18 percent depending on the company.

EU-Mercosur Trade Agreement

In June 2019, the European Union and Mercosur reached a political agreement for a comprehensive trade agreement. The two parties are still currently revising the text to come up with the final version of the agreement. While no official text is available, the EC published a document summarizing negotiations results. With regards to ethanol, the EU agreed to allow annual imports of 450,000 MT (570.15 million liters) of ethanol for chemical uses duty-free, as well as 200,000 MT (253.4 million liters) of ethanol for all uses, including fuel, with an in-quota rate of one-third of the MFN (most favored nation) rate. The volume will be phased in fully in six equal annual stages.

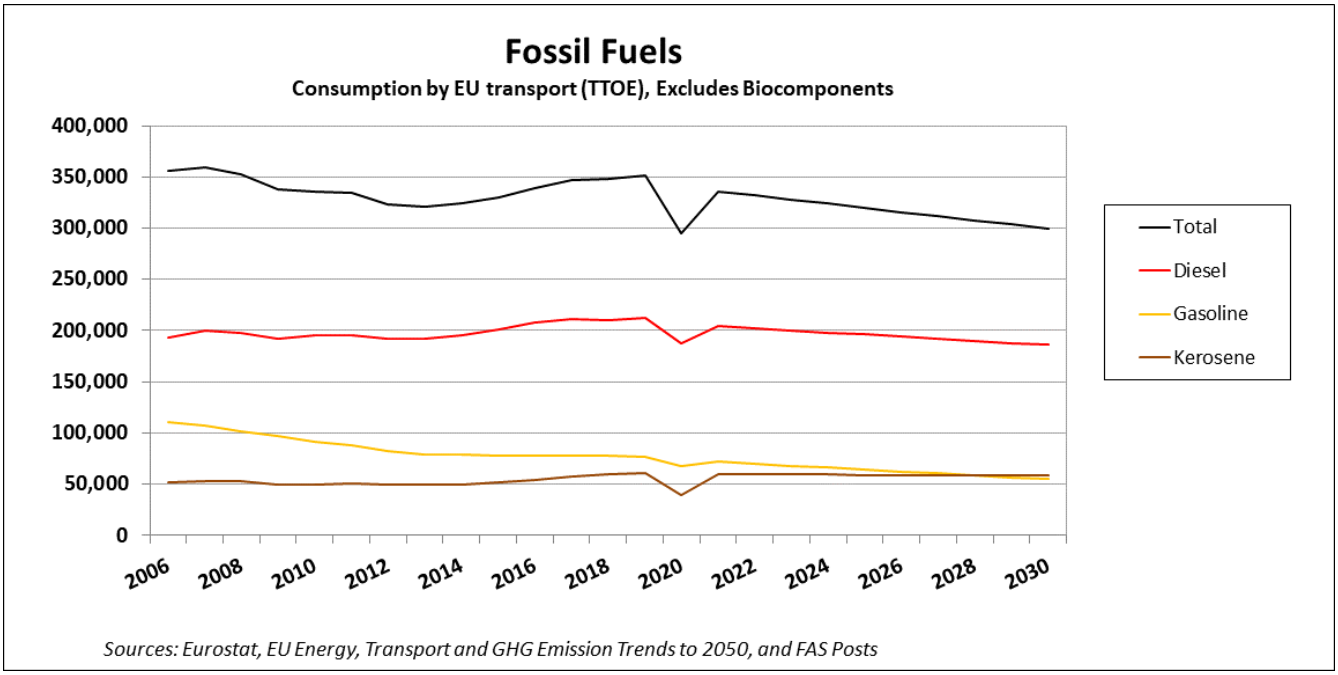
Brexit

The United Kingdom withdrew from the European Union as of February 1, 2020, and the Agreement on the withdrawal of the UK from the EU entered into force on the same day. This Agreement provides for a transition period, which will end on December 31, 2020. During the transition period, Union law is applicable to and in the United Kingdom. For more information: European Commission - Preparedness notices

III. Gasoline and Diesel Pools

Table 1. Fuel Use (Million Liters)										
Calendar Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020f
Gasoline Pool 1/ 2/	120,230	112,499	108,548	107,876	106,310	106,432	106,931	107,154	106,831	93,369
Diesel Pool 1/	247,131	242,445	241,133	240,668	247,633	251,937	256,621	259,244	261,700	230,700
On-road	190,568	186,913	187,296	191,869	196,868	202,805	207,333	208,625	210,700	180,000
Agriculture	11,897	11,372	11,590	11,358	11,518	11,777	12,075	14,246	14,300	14,400
Construction & Mining	3,781	3,668	3,697	3,737	3,953	3,990	4,218	5,588	5,700	5,500
Shipping & Rail	6,053	6,062	5,163	4,799	5,213	5,198	5,174	5,031	5,100	5,000
Industry	8,252	7,939	6,640	5,886	6,105	5,789	5,762	5,578	5,700	5,500
Heating	26,579	26,492	26,747	23,019	23,976	22,378	22,060	20,175	20,200	20,300
Jet Fuel Pool 1/ 3/	58,167	56,738	56,526	57,021	58,949	61,222	65,632	68,384	69,615	45,458
Fuel Pools Total 1/	425,528	411,683	406,206	405,565	412,892	419,590	429,184	434,781	438,146	369,527

Source: Eurostat. Figures of 2019 and 2020 are Post's estimates.



The transport fuel consumption figures in this report are based on official Eurostat statistics (until 2018), and the forecasts (2021 - 2030) are based on the EU Reference Scenario 2016. This study is one the EC's key analysis tools in the areas of energy, transport, and climate action. Due to the COVID-19 outbreak, resulting lockdowns, and the anticipated economic recession, the forecast for 2020 is highly uncertain. The Short-Term Outlook of the EC forecasts a decrease in overall transport fuel use by up to 50 percent during the lockdown period. The Global Energy Review 2020 of the International Energy Agency (IEA) projects a more significant reduction of global gasoline use than diesel use during the first quarter of 2020. However, the report also states that gasoline demand could be supported by the unwillingness of citizens to use public transport.

The transport fuel consumption figures for the years 2019 and 2020 in this report are based on the Monthly Oil Data Service of the IEA. Compared to use in 2019, the IEA (May release) projects a reduction of motor gas use by 12.6 percent, of light diesel oils by 11.7 percent, and of jet fuels by 34.7 percent in the EU in 2020. In this report it is assumed that the light diesel oils are solely used for on-road transport and off road transport in the agriculture, construction, and mining sectors, and that the majority of the decline is allocated for the on-road use (see table above). The IEA's projection of a road transport fuel reduction of approximately twelve percent on an annual basis roughly matches the Eurostat figures of April, showing a reduction of motor spirit and gas/diesel oil by 52 percent and 26 percent, respectively. Apple Mobility data shows for most EU Member States a reduction of activity in March (-40%), April (-40%), and May (-20%), but a return to normal road activity since the start of June.

In the EU Reference Scenario, the EC projects the transportation sector to continue growing until 2030. While passenger road transportation is forecast to increase, the efficiency of vehicles is also expected to improve. In addition, the demand for electrically chargeable vehicles is forecast to emerge as a more viable option for consumers. Both the increased efficiency and electrification will reduce the use of gasoline significantly by 2030 (see graph above). The use of diesel is expected to fall but not as significant as gasoline use. Diesel is forecast to remain the primary fuel for heavy duty vehicles. The scenario of the EC projects that fossil fuels continue to be by far the dominant energy source in the marine shipping sector. The EU Reference Scenario, published in 2016, projected air transport to be the sector with the highest growth of all passenger transport modes. It should be noted that the EU Reference Scenario is based on pre-COVID-19 information, and the crisis will likely have a long-term impact on the transport energy mix. Use of energy by agriculture, construction and mining, and by other industries, heavily depends on the economic outlook in the EU. For more information see the publication of the EC: EU Energy, Transport and GHG Emission Trends to 2050.

IV. Ethanol

Bioethanol (ethyl alcohol), or simply ethanol, is produced by fermenting the carbohydrate components of plant materials. The most commonly used feedstocks are grains (corn, other coarse grains, and wheat kernels) and sugarcane. 'Synthetic' ethanol made from petroleum fuels is restricted to a very small market and is not included in this report. Ethanol used as transport fuel is referred to as bioethanol in this report

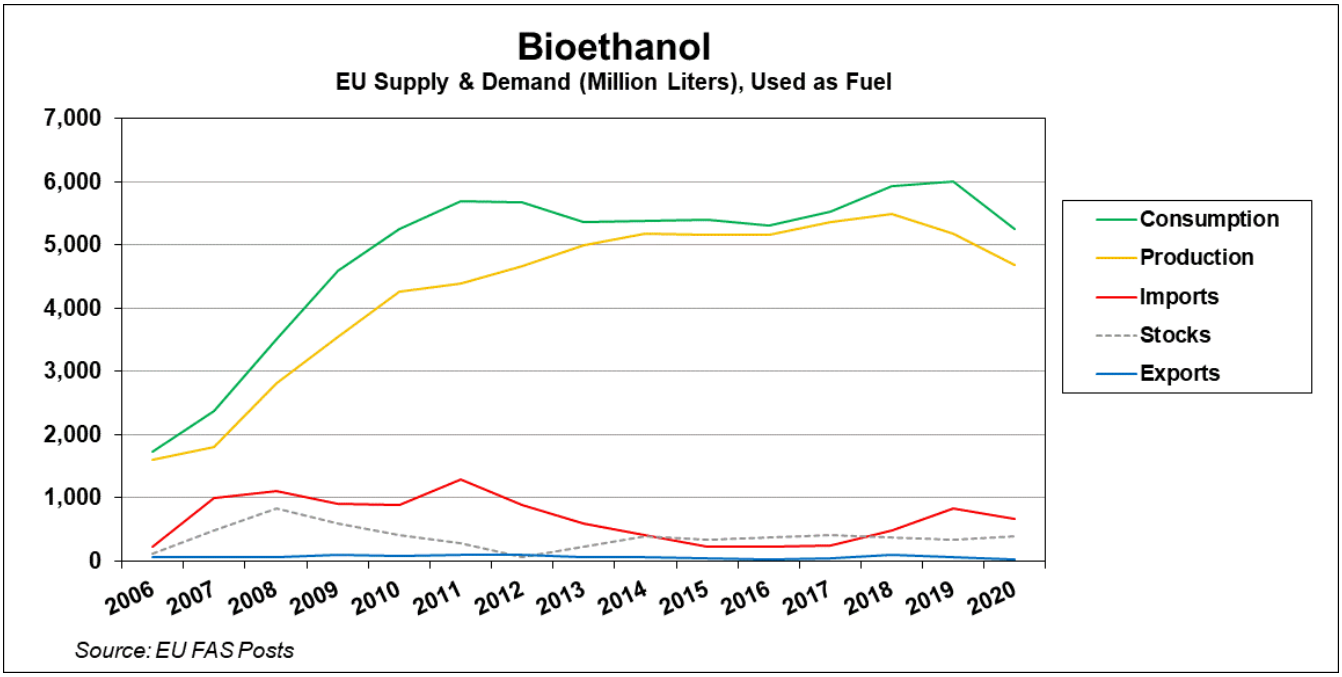
EU Production, Supply and Demand Table

Table 2. Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	2011[r]	2012[r]	2013[r]	2014[r]	2015[r]	2016[r]	2017[r]	2018[r]	2019[e]	2020[f]
Beginning Stocks	445	322	91	256	422	381	417	450	399	356
Fuel Begin Stocks	408	284	57	219	384	335	381	416	368	328
Production	5,171	5,348	5,741	5,949	6,080	5,887	6,037	6,101	5,759	5,395
Fuel Production	4,392	4,658	5,000	5,190	5,165	5,159	5,373	5,497	5,190	4,684

>of which is cellulosic (a)	0	0	0	50	50	50	40	10	10	25
Imports	1,485	1,086	763	501	474	439	419	496	1,124	1,250
Fuel Imports	1,285	886	595	418	228	229	238	481	835	665
>of which is ETBE (b)	261	188	197	109	107	24	9	7	13	15
Exports	149	145	113	113	92	78	91	146	103	82
Fuel Exports	99	95	63	63	42	28	41	96	53	32
Consumption	6,629	6,520	6,226	6,172	6,502	6,212	6,333	6,502	6,823	6,493
Fuel Consumption	5,703	5,676	5,370	5,380	5,399	5,315	5,535	5,930	6,013	5,253
Ending Stocks	322	91	256	422	381	417	450	399	356	427
Fuel Ending Stocks	284	57	219	384	335	381	416	368	328	391
Refineries Producing First Generation Fuel Ethanol (Million Liters)										
Number of Refineries	68	70	71	66	60	55	58	57	56	57
Nameplate Capacity	7,760	8,470	8,480	8,610	8,480	8,480	8,925	8,795	8,860	8,925
Capacity Use	57%	55%	59%	60%	60%	60%	60%	62%	58%	52%
Refineries Producing Cellulosic Fuel Ethanol (Million Liters)										
Number of Refineries	0	0	0	1	1	1	2	2	2	2
Nameplate Capacity	0	0	0	50	50	50	60	60	60	60
Capacity Use				100%	100%	100%	67%	17%	17%	42%
Co-product Production (1,000 MT)										
DDGs	2,932	2,962	3,223	3,380	3,454	3,535	3,716	3,876	3,673	3,232
Corn Oil	86	136	148	159	151	147	147	192	203	187
Feedstock Use for Fuel Ethanol (1,000 MT) (c)										
Wheat kernals	4,458	3,285	3,200	3,306	3,661	3,932	5,197	3,542	3,087	2,491
Corn Kernals	2,965	4,687	5,092	5,483	5,218	5,060	5,065	6,608	6,990	6,441
Barley Kernals	735	400	647	447	414	379	383	492	331	351
Rye Kernals	692	367	790	819	712	638	507	481	379	356
Triticale	517	725	567	743	1,031	1,285	720	1,260	948	972
Sugar Beets	9,477	10,588	11,694	11,330	10,010	8,830	8,292	7,530	6,374	5,786
Cellulosic Biomass	0	0	0	200	200	200	160	40	40	100
Market Penetration (Million Liters)										
Fuel Ethanol Use	5,703	5,676	5,370	5,380	5,399	5,315	5,535	5,930	6,013	5,253
Gasoline Pool (d)	120,230	112,499	108,548	107,876	106,310	106,432	106,931	107,154	106,831	93,369
Blend Rate	4.7%	5.0%	4.9%	5.0%	5.1%	5.0%	5.2%	5.5%	5.6%	5.6%

Sources/Notes: r = revised / e = estimate / f = forecast EU FAS Posts. Original data collected in MT, then converted to liters using a conversion rate of 1 MT = 1,267 liters for bioethanol. Ethanol production: Eurostat statistics, ePURE, and FAS Post projections. Production capacity as of December 31 of year stated. Ethanol use: Eurostat statistics and FAS Posts projections. Trade data: See Notes section. (a) For more information see

section Advanced Biofuels. (b) ETBE in million liters of ethanol. HS code 29091910, ETBE contains 45 percent ethanol. (c) Calculated co-product production (theoretical maximum) based on estimated feedstock use in fuel ethanol production. (d) Includes biocomponents.



Consumption

Table 3. Fuel Ethanol Consumption
Main Consumers (million liters)

Calendar Year	2013[r]	2014[r]	2015[r]	2016[r]	2017[r]	2018[e]	2019[e]	2020[f]
Germany	1,532	1,557	1,485	1,485	1,465	1,505	1,470	1,010
United Kingdom	1,038	808	789	757	911	759	747	747
France	778	797	803	823	842	777	796	620
Netherlands	246	252	278	237	253	335	380	380
Poland	305	311	323	329	329	299	328	329
Sweden	356	327	263	215	172	249	253	253
Spain	337	371	375	253	277	319	256	234
Italy	362	267	281	287	230	190	146	133
Total	5,370	5,380	5,399	5,315	5,535	5,930	6,013	5,253

r = revised / e = estimate / f = forecast EU FAS Posts. Source: EU FAS Posts

From 2013 – 2016, EU consumption of bioethanol stabilized at around 5.350 billion liters. The stagnating use is a result of cutting off the supply of imports, the double-counting of biodiesels, the adjustment of national blending mandates, and the decline of gasoline use. From 2017 – 2019, consumption picked up again and increased to roughly 6 billion liters. This growing trend was a result of the gradual increase of blending targets towards the 2020 mandate, the improved competitiveness of bioethanol versus gasoline, and the rising imports from, mainly, the United States. For more

information about the mandates see our FAS GAIN report: Biofuel Mandates in the EU by Member State in 2020, published on June 2, 2020.

COVID-19 Impact

Due to the COVID-19 outbreak, the resultant lockdowns, and anticipated economic recession, EU bioethanol consumption is forecast to decline by 12.6 percent in 2020. This forecast is based on the aggregate of the FAS posts' input for each individual EU Member State. The Monthly Oil Data Service of the International Energy Agency (IEA) indicates an equal reduction of motor gas use (by 12.6 percent) in the EU in 2020. In some EU Member States, the increase of blending mandates is anticipated to temper the reduction of biofuels consumption relative to fossil fuel consumption. Another factor which supports bioethanol consumption is that the blending rate achieved in 2020 will determine the maximum level for the food-based biofuels blending until 2030 (for more information see the Policy and Programs chapter). While in other Member States, the greater price drop of gasoline relative to bioethanol is anticipated to negatively affect the blending bioethanol and/or the sales of the higher blends such as E10 and E85.

Below are the individual EU Member State's details which serve as the basis for the overall reduction of EU bioethanol consumption of 12.6 percent (about 760 million liters). All estimates provided are based on current assessments in May and early June, and many will undergo significant revisions in the months ahead. In absolute terms, the most significant reductions are forecast in Germany and France.

- In Germany, bioethanol consumption in transport is expected to decline by roughly 30 percent in 2020 as a result of the COVID-19-related lockdown. Two-thirds of the cars registered in Germany run on gasoline and only on one-third on diesel. The reduction in trucks, which run on diesel, is much less severe than for cars. As a result, the impact of transport restrictions is stronger on gasoline use than on diesel use. German bioethanol consumption was already on the decline in 2019. Preliminary data for 2019 showed a consumption decrease of two percent from the previous year, mostly a result of significantly lower ethanol use for ETBE, while bioethanol blending remained constant.
- In France, gasoline consumption is estimated to have declined roughly 75 percent during the first eleven weeks of the COVID-19 lockdown, from March 16 until June 1. Based on a recovery of the transport activity during the summer and the remainder of the year, annual gasoline use is forecast to decline by about 20 percent. As a consequence, annual bioethanol use is forecast to decline by almost 22 percent this year. Before the COVID-19 crisis, French bioethanol consumption was increasing due to an expansion of the number of gas stations that sell E10 and E85, combined with a lower price for these fuels compared to pure fossil gasoline. Since December 2017, it has also been possible to turn any vehicle into a FlexFuel vehicle and tank E85 by installing a "DriveCleanBox."

In the following EU Member States, bioethanol consumption for transport is projected to decline less than the overall EU average:

- In the United Kingdom, the increase of the blending mandate in 2020, and expected corresponding increase in biofuel consumption, will dampen the effect of the lockdown measures. Industry analysts have initially estimated that the impact of the response to the COVID-19 pandemic will result in a 20-25 percent decline in gas and diesel sales in 2020. As a

result, bioethanol consumption will stagnate in 2020, and may even see a decline. The earliest possible introduction date for E10 is likely to be October/November 2021, but the impact of the COVID-19 crisis on government rule-making may mean E10 introduction is pushed into 2022.

- In the Netherlands, overall bioethanol use for transport is not forecast to decline significantly based on the increase of the mandate from 12.5 percent in 2019 to 16.4 percent in 2020. In addition, beginning in October 2019, fuel distributors are obligated to offer E10 at their stations (and at least half of the offered blends must be E10). This is expected to support the use of ethanol during 2020 and beyond.
- In Poland, consumption of biofuels depends on the price of gasoline and diesel, as well as the policy to implement EU regulations. The National Indicative Target (NIT) for use of biofuels in transport rose from 8.0 percent in 2019 to 8.5 percent for 2020, helping offset some of the decline in transport fuel use. The NIT will grow to 8.7 percent in 2021 and to 8.8 percent in 2022.
- In Spain, consumption of bioethanol depends on demand for gasoline and its price competitiveness compared to other renewable fuels. Since 2014, gasoline demand has been growing which results in a larger fuel pool. In Spain, the COVID-19-related movement restrictions have changed market dynamics, resulting in a reduction of fossil fuels demand (and preventing further growth in the consumption of biofuels). The impact of the smaller fossil fuel pool is partially offset by the introduction of E10 (since January 2020) and the growth in mandates.
- In the Czech Republic, the volume based mandate for bioethanol remains at 4.1 percent in 2020. The consumption of fossil fuels in transportation is reported to have declined by one-third in the first quarter of 2020. This may result in an overall decrease in biofuel consumption in transportation as well.
- In Belgium, the blending requirement for biofuels increased from 8.5 percent to 9.55 percent, retroactively for the whole year. This means that from April 1, 2020, until the end of the year, the blending mandate is 9.9 percent, and 9.55 percent in energy content as of January 1, 2021. However, the COVID-19 pandemic heavily disturbs the market as personal vehicle traffic has mostly come to a halt. As a result, bioethanol consumption is forecast to decrease by one- third and biodiesel by 20 percent.
- In Italy, the consumption of bioethanol declined due to the shutdown of the single bioethanol producer in the country. The cellulosic ethanol plant, with a capacity of about 50 million liters, started production in 2013, but has been closed since November 2017. As a result, bioethanol consumption roughly halved since the closure and is forecast to decline another nine percent in 2020.
- In Romania, the blending mandate nearly doubled in January 2019 from 4.5 percent to 8 percent. As expected, the increase led to higher demand. In the absence of local production able to cover the larger demand, fuel retailers increased import volumes. In April 2020, the Romanian Government approved legislation on blending derogations. According to the Emergency Ordinance, fuel suppliers may submit a request to market fuel with a reduced content of biofuels during the state of emergency. For more information see the FAS GAIN Report: Romania Approves New Biofuels Blending Exemptions, published April 30, 2020. Total fuel consumption nearly declined by half due to lock down measures, but, given the recovery expected in the second half and the likelihood that large fuel retailers will introduce E10 as opposed to applying for exemption from blending, bioethanol use is forecast to fall by only eight percent in 2020.

- In Austria, bioethanol consumption has stagnated since 2014. Gasoline and bioethanol consumption will be hit much more by the COVID-19 crisis than diesel and biodiesel consumption. There are new discussions on the introduction of E10 which have not been opposed by car drivers' clubs, like in previous years, since motors have been developed which can cope with the higher bioethanol share. The introduction of E10 could come, at the earliest, in 2021.
- In Ireland, the composition of fuel mirrors that of the United Kingdom. Forthcoming policy proposals are delayed by the COVID-19 pandemic, and may also be placed on hold to take the United Kingdom's proposed adoption timeline for E10 into consideration, whenever announced.

In the following EU Member States, bioethanol consumption is projected to increase despite the COVID-19 crisis and resultant lockdown measures:

- The Hungarian government declared a state of emergency on March 11, 2020. Despite the low oil prices and the government's new regulations (in effect after May 4) to restart the economy, Hungary's gasoline consumption is forecast to decrease by eight percent this year. Nevertheless, it is anticipated that the introduced blending mandates will offset the decline in sales and bioethanol consumption will increase by 14 percent on the year. As of January 1, 2019, the biofuel blending ratio was set at 6.4 percent, but with the amendment of Government Decree No. 279, Hungary aims to achieve ten percent renewable energy content in transport fuels. To achieve this, from January 2020, fuel retailers are obliged to offer E10 fuel at their stations, and the mandatory bioethanol share of 95-octane petrol must be at least 6.1 percent (separate from other bio-components like ETBE).
- In Sweden, gasoline and bioethanol consumption declined slightly during the loose lock down, but is expected to increase during summer (in part because citizens appear to prefer to travel in cars rather than with public transportation). As a result, transport fuel consumption in 2020 will be roughly the same as last year. Sweden received an exemption from the EU state aid rules to withdraw tax exemptions for pure and high blend biofuels. This exemption will terminate on December 31, 2020. Sweden has received a pre-notification of one-year extended tax exemption to December 31, 2021, but this has not yet been confirmed. If the tax exemption for the pure and high blend biofuels were to be be lifted, reportedly a quarter of the Swedish biofuels market would be lost.
- In Finland, bioethanol use for transport use is forecast to increase in 2020, as use is supported by mandates. As a result of expanding use, imports are expected to increase. The Finnish Parliament approved a law that establishes a gradually increasing biofuel target until it reaches 30 percent in 2029.

Production & Production Capacity

After stabilized production from 2014 - 2016, EU bioethanol production expansion resumed in 2017 and 2018. This recovery was mainly supported by increased domestic consumption, with only a slight uptick in exports. In 2019, however, profit margins for ethanol producers eroded due to increasing feedstock prices, while producers faced increasing competition from imported U.S ethanol. As a consequence, EU bioethanol production declined by 5.6 percent to 5,190 million liters. In 2020, the reduced demand for bioethanol due to the COVID-19 crisis is forecast to cut EU production by 9.8 percent to 4,680 million liters. The production cut is forecast to be less significant than the bioethanol

consumption cut (12.6 percent), as part of the reduced demand will likely be covered by lower imports and stock building.

Because demand for bioethanol fell, and the demand for disinfectants increased due to the COVID-19 virus outbreak, a number of producers used a portion of their capacity for ethanol-for-transport to produce ethanol-for-disinfectants. The European renewable ethanol producers association (ePURE) identified fourteen plants in nine EU Member States which made the switch. According public information, most plants only allocated one to five percent of their capacity to the production of sanitary ethanol. Based on this information, the elevated production of technical ethanol, at the expense of bioethanol production, is estimated at a few hundred million liters on an annual basis. For this report, the volume is set at a minimum level of 120 million liters annually. While increased demand for bioethanol for disinfectants and hand sanitizer has emerged, it will not compensate for the drop in fuel use, forecast to decline nearly 760 million liters.

Table 4. Fuel Ethanol Production
Main Producers (million liters)

Calendar Year	2013[r]	2014[r]	2015[r]	2016[r]	2017[r]	2018[e]	2019[e]	2020[f]
France	995	1,018	1,039	987	1,000	1,138	1,076	848
Hungary	392	456	591	633	633	645	645	645
Netherlands	524	519	563	443	532	563	570	510
Germany	851	920	870	882	810	799	687	506
Spain	442	454	494	328	377	522	547	487
Belgium	451	557	557	570	620	646	620	400
United Kingdom	278	329	538	658	684	684	380	380
Poland	235	181	214	241	258	259	286	285
Austria	223	230	223	224	235	251	241	203
Total	5,000	5,190	5,165	5,159	5,373	5,497	5,190	4,680

r = revised / e = estimate / f = forecast EU FAS Posts. Source: EU FAS Posts

Production is forecast to fall most significantly in the markets with the most significant cuts in consumption (Germany and France), and the EU Member States which have an export surplus, (the Netherlands, Belgium and France). In Germany and the United Kingdom production had already declined in 2019.

- France is the largest producer of bioethanol in the EU. French production exceeds domestic consumption, and most of its exports are destined for the United Kingdom. However, due to the stringent lockdown demand has been most significantly cut in the domestic market. In 2020, demand is projected to be fall by roughly 180 million liters, and production by roughly 230 million liters.
- In the Netherlands, production expansion during 2017 and 2018 was supported by the increasing use of existing capacity. The main ethanol plant in the Netherlands is located in the port of Rotterdam. Using 1.2 MMT of feedstocks each year, it can switch between wheat, corn, barley and sorghum. Since 2013, the plant has mainly operated using corn, which boosted Dutch imports from the Ukraine. In 2020, the plant partly switched to the production of sanitary ethanol.

- In Belgium, bioethanol production exceeds domestic consumption by a factor of three. The main foreign market for Belgian bioethanol is Germany. Belgium has three bioethanol plants, and the largest covers nearly fifty percent of domestic production. However, this plant temporarily stopped production with the collapse in demand during the COVID-19 lockdown. The other two plants continued production, but likely reduced their production levels.
- In Germany, bioethanol production was already declining in 2019. The German Bioethanol Industry Association attributes the decline to the difficult market conditions at the beginning of 2019, characterized by reduced demand and lower ethanol prices. For 2020, significantly lower production of fuel ethanol is expected due to the reduction in transport fuel demand. A number of companies have re-directed some of their bioethanol capacity to the production of disinfectants.
- In the United Kingdom, bioethanol production capacity is estimated at 1.125 billion liters -- two plants are operating but at reduced production levels. Continued imports from the United States, in addition to reduced fuel demand in 2020, have forced further production declines. The United Kingdom has returned to importing U.S. ethanol since the EU released its AD duties in May 2019. U.S. Census data reports U.S. exports of just over 100 million liters of ethanol shipped to the United Kingdom in 2019. The 2019 market share of U.S. corn ethanol was nine percent, and is expected to further rise in 2020.
- Spain-based bioethanol facilities have managed to cope with the impact of the COVID-19 outbreak and reportedly maintained a large rate of utilization capacity by delivering ethanol for medical purposes.
- In Hungary, both capacity and production expanded significantly during the past five years. Fuel grade ethanol is fully corn-based and produced by two plants, each processing about 1.1 MMT of corn. Combined, these plants produce 645 million liters of fuel ethanol annually, most shipped to other EU countries. Because of difficult market situation for fuels, these plants will likely focus more on starch production in 2020. Besides fuel ethanol, the plants produce a wide variety of other products such as isoglucose, dextrose, gluten, starch, corn oil, animal feed, and ethanol for pharmaceuticals, food, and beverages.
- Austria has one bioethanol plant with a capacity of 250 million liters. The major feedstock for bioethanol production is wheat and corn. Recently, the plant retooled some of its production capacity to create its own line to produce disinfectants. For more information see the FAS GAIN Report - Agricultural Processor AGRANA Starts Disinfectants Production, published on April 17, 2020.

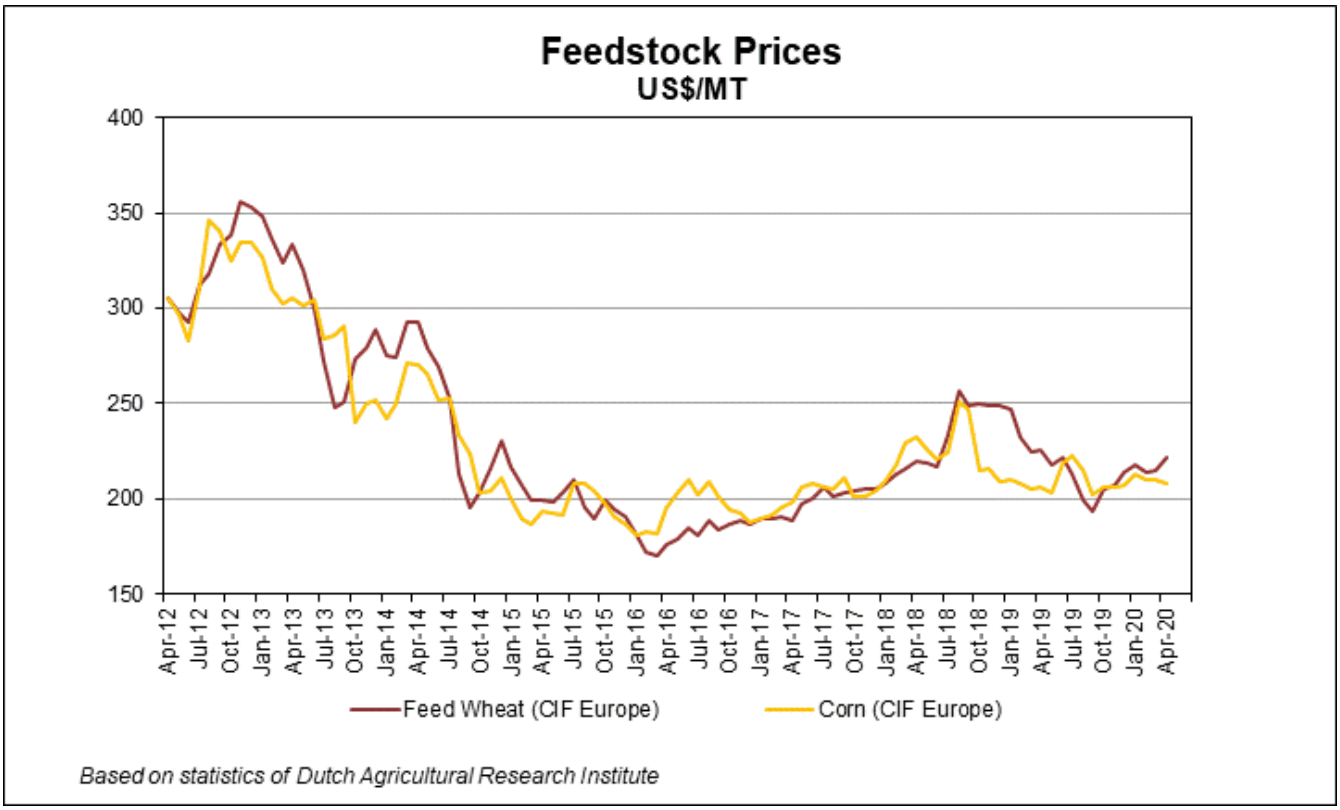
Total EU ethanol production capacity, for fuel, industrial and food uses, is estimated at roughly 8.9 billion liters in 2019. Further expansion of first generation bioethanol is expected to be limited. Expansion of cellulosic bioethanol production remains constrained due to the high cost and lack of certainty in the EU policy making process (see Policy and Advanced Biofuels Chapter).

Feedstock Use and Co-products Production

In the EU, bioethanol is mainly produced from grains and sugar beet derivatives. Wheat is mainly used in Germany, France, and the United Kingdom. An abundance of corn on the domestic market in Central Europe, in particular in Hungary, supports corn-base ethanol production. Corn is also the preferred grain in the Netherlands, Spain and increasingly in the United Kingdom. In the latter case, ethanol plants are located at seaports, and corn is predominantly sourced from the Ukraine. Ethanol producers

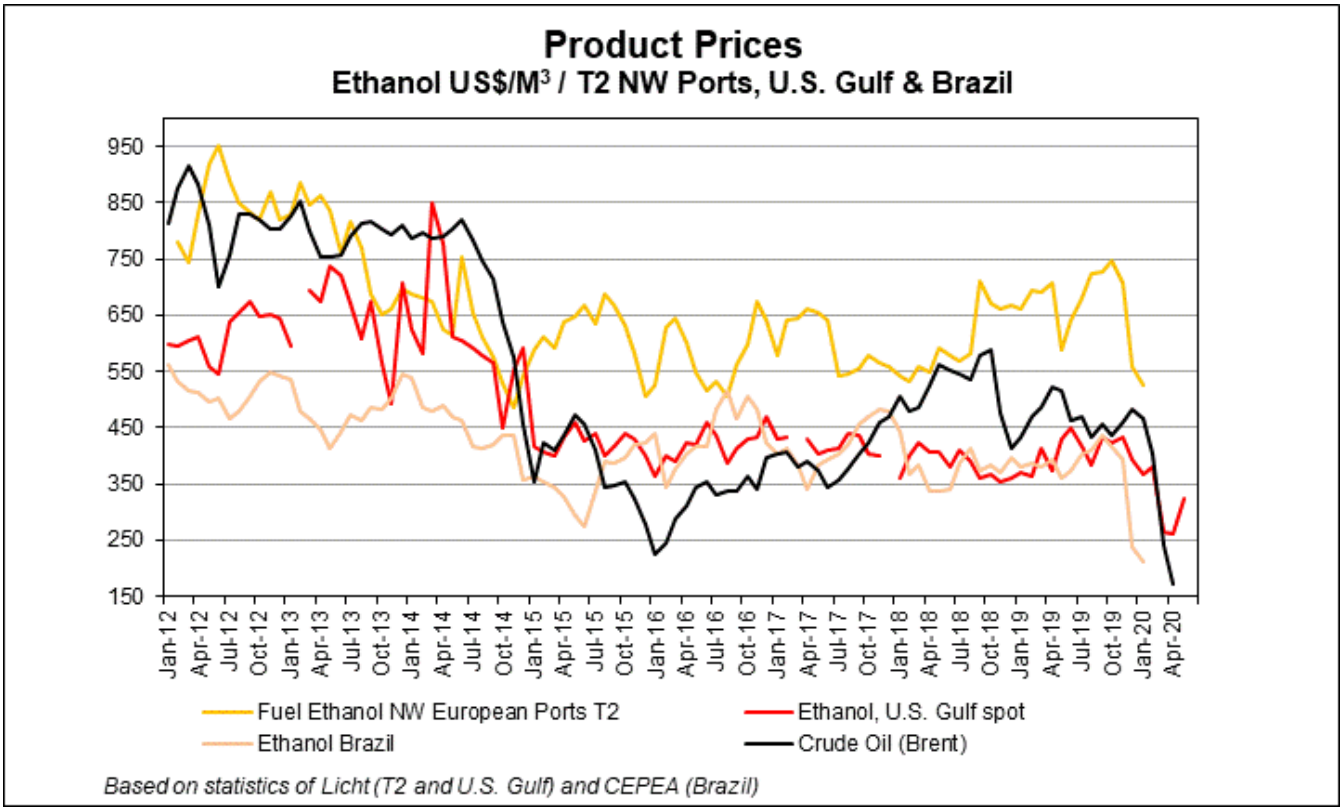
in northwestern Europe prefer to market their distillers dried grains (DDG) as non-genetically engineered (GE) for the domestic feed market so there is an incentive to use non-GE corn.

In 2018, the EU grain harvest was reduced due to a dry and hot summer. This affected the profitability of the ethanol sector, and ethanol production was cut in some EU Member States. After a larger grain harvest was realized in 2019, a smaller crop is forecast for 2020, mainly due to a smaller wheat crop. Therefore, the use of wheat has been reduced more than any other feedstock for bioethanol production in 2020, followed by corn (see the table at the beginning of this chapter). French and German producers drive the majority of these cuts. Also, the Belgian producer, which temporarily halted production, predominantly used wheat as its feedstock. For more information see the FAS GAIN EU Grain and Feed Annual, published on May 2, 2020.



In France, Germany, the United Kingdom, the Czech Republic, and Belgium, sugar beets and its derivatives are also used for the production of bioethanol. Sugar beets are only processed for bioethanol in a few sugar beet processing plants in France that have on-site ethanol distillation capacity. In some other Member States, like Austria and Belgium, beet pulp or concentrated juice may serve as a feedstock for ethanol production. Bioethanol produced from sugar beets has faced tough competition from decreasing grain prices (see graph above), and as a result fell from 2013-2017. In 2018 and 2019, beet ethanol production was limited by a low beet harvest in 2018. The industrial use of raw sugar juice for fermentation and bioethanol production is forecast to again decrease in MY2020/2021 as processors favor sugar production over bioethanol production. For more information see the FAS GAIN EU Sugar Annual.

In the EU, the required cereals volume for 2020 production (4.7 billion liters of bioethanol) is estimated at 10.6 MMT, a reduction of 1.1 MMT compared to 2019. This is roughly 3.5 percent of total EU cereal production. Co-products of the bioethanol production process are DDG (Distillers Dried Grains), wheat gluten and yeast concentrates. In 2020, the maximum theoretical (calculated, using the conversion factors listed at the end of this report) production of co-products is forecast to reach 3.3 MMT, a reduction of about 0.35 MMT from 2019. This is 1.8 percent of total EU feed grain consumption.

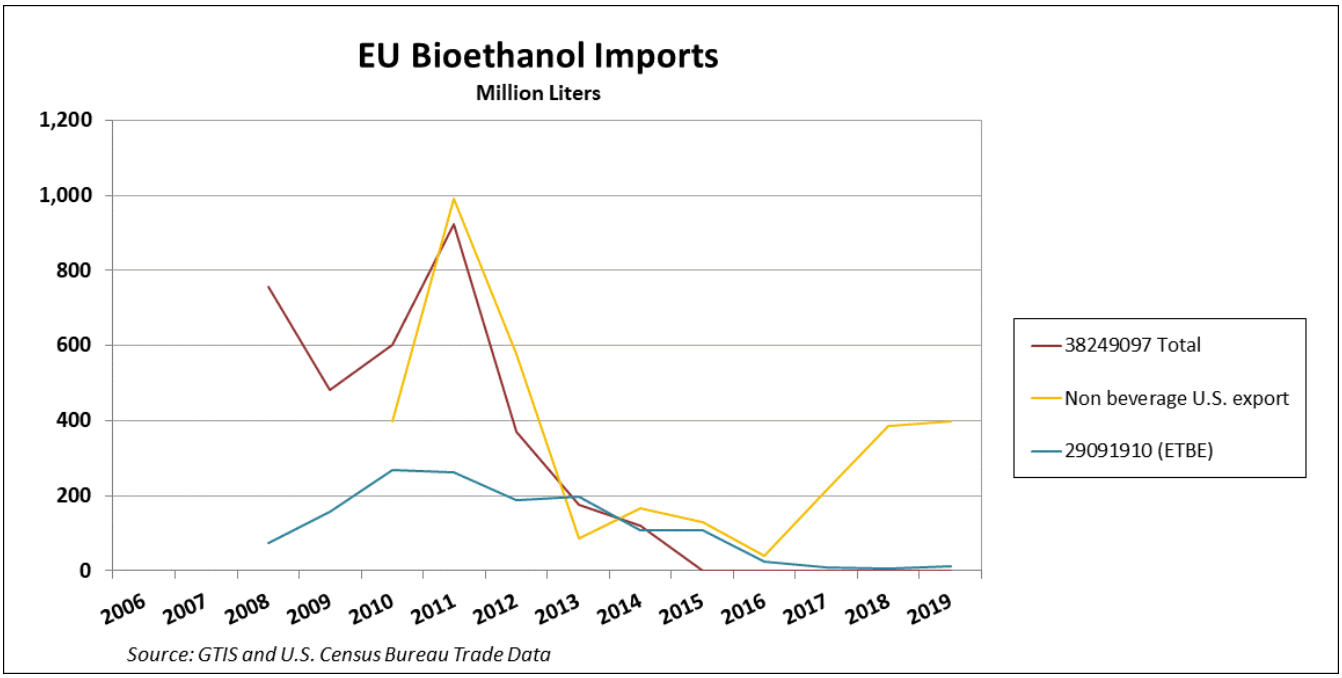


Trade

On February 23, 2013, the European Commission (EC) imposed an AD duty on ethanol imports from the United States, both pure ethanol classified in HS/CN Chapter 22 as well as the ethanol content of "light" fuels (mostly gasoline) classified in Chapter 27. The duty was set at €49.20 per 1,000 liters for five years (see the Policy and Programs chapter). Adding to the already high Most Favored Nation (MFN) import tariffs of €102 per 1,000 liters for denatured ethanol, and 192 euros per 1,000 liters for undenatured ethanol, the total duty on 1,000 liters of U.S. denatured and undenatured ethanol rose to €151.2 and €241.2, respectively. These rates significantly suppressed U.S. exports of bioethanol to the EU. Nevertheless, despite the competitive disadvantage of high duties at the border, 385 million liters of U.S. non-beverage ethanol classified under Chapter 22 were shipped to the EU in 2018.

On May 14, 2019, the EC repealed the AD duty on bioethanol imports from the United States. With the lifting of this duty, the remaining factors limiting the export of U.S. bioethanol to the EU are the high MFN duties that remain unchanged and the sustainability requirements when fuel ethanol is shipped -- most importantly the required minimum 50 or 60 percent Greenhouse Gas (GHG) emissions savings

over fossil fuels (depending on when the plant was built). Given the remaining constraints and reasonable expectations for the Gulf-T2 price spread, the near-term impact of dropping the AD duty is not expected to result in more than a modest sales increase (remaining far short of the one billion liters sold in 2011). In 2019, 443 million liters of U.S. non-beverage ethanol classified under Chapter 22 was shipped to the EU, a minor increase of four percent compared to 2018.



In 2019, the EU imported about 13 million liters of bioethanol as ethyl-tert-butylether (ETBE). In addition, the EU imported an estimated 400 million liters of bioethanol under a zero duty regime. Combined EU bioethanol imports doubled from about 240 million liters in 2017 to 480 million liters in 2018, and increased another 74 percent to roughly 835 million liters in 2019. Any "light oils" that may contain ethanol are not included in the balance or trade estimates, but any volumes arriving in Europe in this form already blended with gasoline are expected to be small (and would not appreciably affect the balance). Between January – April 2020, EU ethanol imports rose by fifty percent, mainly due to elevated imports from the United States. During the remainder of the year, imports are forecast to fall due to shrinking EU demand, and are anticipated to reach a total volume of about 665 million liters.

V. Biodiesel / Renewable Diesel

Unless otherwise mentioned, the term biodiesel includes traditional biodiesel, fatty acid methyl ester (FAME) and hydrogenation derived renewable diesel or HDRD (also known originally as hydrotreated or hydrogenated vegetable oil or HVO).

The EU is the world's largest biodiesel producer. Biodiesel is also the most important biofuel in the EU and, on an energy basis, represents about 85 percent of the total transport biofuels market. Biodiesel was the first biofuel developed and used in the EU, adopted by the transportation sector in the 1990s. At the time, rapid expansion was driven by increasing crude oil prices, the *Blair House Agreement*, and resulting provisions on the production of oilseeds under Common Agricultural Policy (CAP) set-aside

programs, and generous tax incentives, mainly in Germany and France. EU biofuels goals set out in Directive 2003/30/EC (indicative goals) and in the RED 2009/28/EC (mandatory goals) further pushed the use of biodiesel.

COVID-19 Impact

Reduced demand for biofuels is driven by falling demand for on-road transport rather than reductions in blending mandates, which are holding across Europe (except in Romania). Diesel-biodiesel demand is less impacted by the lockdown measures than gasoline-ethanol demand. This is because declines in heavy-duty commercial vehicle use are expected to remain less severe than declines in light-duty passenger use of diesel, whereas demand for ethanol-gasoline light-duty vehicle use is impacted by lockdown measures alone. Beyond differences in total fuel demand, demand for biodiesel is not expected to decline as much as ethanol because blending increases across several EU Member States are expected to be greater for renewables in diesel than ethanol in gasoline as countries move to meet RED and FQD requirements (see Policy and Programs chapter).

Prices on the European diesel market (FAME 0 prices) declined from €710/m^3 ($767) on February 17, 2020 to €492/m^3 ($527) on March 23, 2020. In April and May 2020, prices remained low, but stable, in a range of €490-539/m^3 ($527-582). Biodiesel feedstock availability, especially the used cooking oil waste stream supply, has been sharply curtailed with restaurant and food service industry activity falling off from March to early Summer in most EU Member States and external third country suppliers.

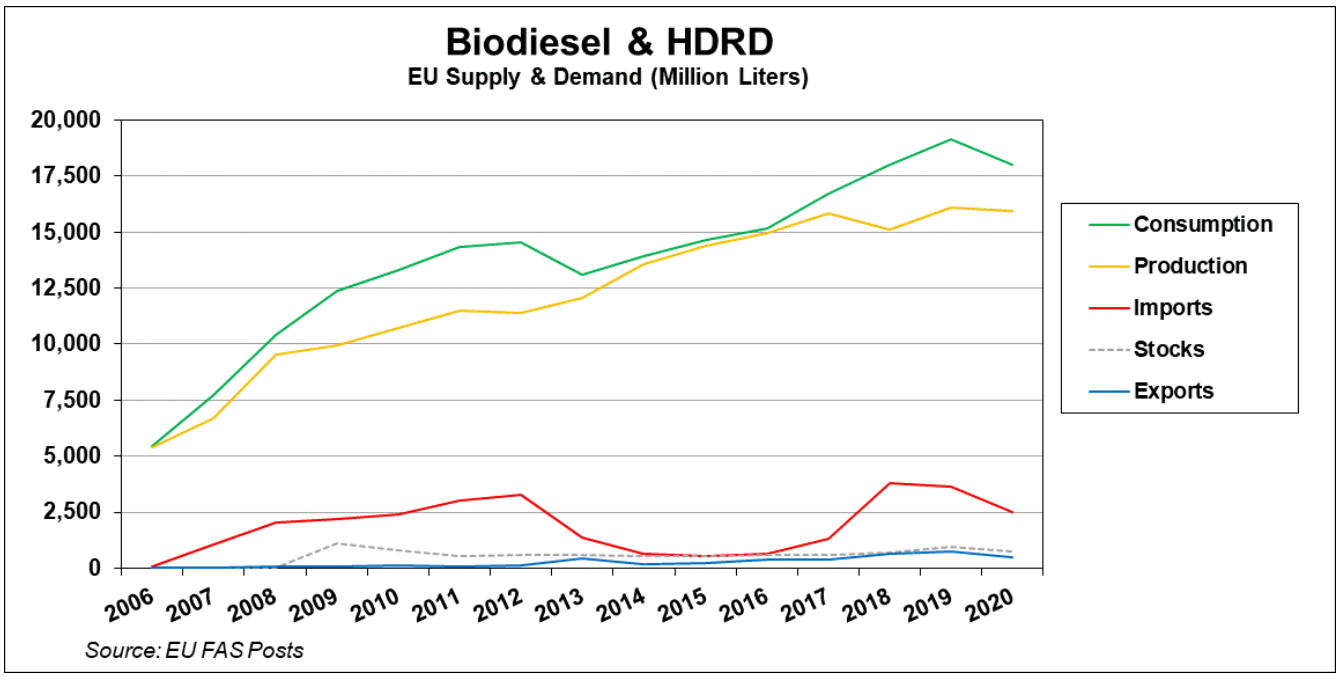
EU Production, Supply and Demand Table

Table 5. Biodiesel & Renewable Diesel (HVO), Million Liters

Calendar Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Beginning Stocks	530	575	580	520	565	590	610	670	930	765
Production	11,475	11,382	12,064	13,549	14,397	14,950	15,818	15,110	16,099	15,955
>HVO Production	436	960	1,604	2,311	2,470	2,190	2,582	2,606	2,986	3,412
Imports	3,031	3,294	1,392	631	540	629	1,332	3,784	3,641	2,500
Exports	98	115	416	181	244	408	372	645	769	500
Consumption	14,363	14,556	13,100	13,954	14,668	15,151	16,718	17,989	19,136	18,000
Ending Stocks	575	580	520	565	590	610	670	930	765	720
Production Capacity, Biodiesel (Million Liters)										
Number of Biorefineries	286	284	244	220	201	196	188	187	187	188
Nameplate Capacity	25,171	25,494	25,024	22,834	21,928	21,476	20,338	21,248	21,350	21,441
Capacity Use	43.9%	40.9%	41.8%	49.2%	54.4%	59.4%	65.1%	58.8%	61.4%	58.5%
Production Capacity, Renewable Diesel (HVO) (Million Liters)										
Number of Biorefineries	4	4	5	10	11	11	12	12	15	15
Nameplate Capacity	1,694	1,694	1,828	2,831	3,395	3,395	3,446	3,446	5,049	5,049
Capacity Use	25.7%	56.7%	87.7%	81.6%	72.8%	64.5%	74.9%	75.6%	59.1%	67.6%
Feedstock Use for Biodiesel + Renewable Diesel (HVO) (1,000 MT)										
Rapeseed oil	6,800	6,500	5,710	6,100	6,400	6,700	6,900	6,450	6,300	6,100

UCO	690	800	1,150	1,890	2,400	2,644	2,660	2,460	2,990	2,790
Palm oil	980	1,535	2,340	2,240	2,340	2,300	2,800	2,590	2,410	2,400
Soybean oil	950	720	870	840	540	630	700	750	950	900
Animal fats	340	360	420	900	1,030	730	785	900	1,000	1,110
Sunflower oil	280	300	290	310	210	255	246	247	245	235
Other (pine oil, fatty acids)	60	220	335	370	559	444	604	667	738	765
Market Penetration, Biodiesel + Renewable Diesel (HVO) (Million Liters)										
Biodiesel+HVO, on-road use	13,142	13,981	12,639	13,798	13,421	13,401	14,432	16,556	18,000	16,700
Diesel Pool, on-road use 1/	190,568	186,913	187,296	191,869	196,868	202,805	207,333	208,625	210,700	180,000
Blend Rate	6.9%	7.5%	6.7%	7.2%	6.8%	6.6%	7.0%	7.9%	8.5%	9.3%
Diesel Pool, total 1/	247,131	242,445	241,133	240,668	247,633	251,937	256,621	259,244	261,700	230,700

Sources/Notes: r = revised / e = estimate / f = forecast EU FAS Posts. Original data collected in MT, then converted to liters using a conversion rate of 1 MT = 1,136 liters for biodiesel; 1,282 liters for HDRD; 969.8 liters for diesel. Production capacity as of December 31 of year stated. Diesel use 2011-2018: Eurostat; all other: FAS Posts. Trade data: trade Data Monitor (TDM); HDRD trade is assumed to be happening under a biodiesel customs code as no separate trade code for HDRD exists. Feedstock use: Data is not available. The figures above represent estimates by EU FAS posts. Beginning/ending stocks: In the absence of reliable data and with the exception of 2017 and 2018, data for stocks is based on the assumption that average stocks amount to the equivalent of two weeks' supply of consumption.



Consumption

Biodiesel (FAME and HDRD) consumption is driven almost exclusively by EU and Member State mandates and, to a lesser extent, by tax incentives. For more information on the various mandates, see our report: Biofuel Mandates in the EU by Member State in 2020_Berlin_European Union.

In 2020, EU biodiesel consumption is expected to decrease by six percent from the previous year as a result of the COVID-19 induced movement restrictions, economic recession, and resulting reductions in diesel use. The decline is expected to be less than the decline for the entire diesel and renewable pool since some increases in overall blending are expected. Differing country circumstances indicate wide variances in year-on-year biodiesel consumption changes.

To further elaborate, the six percent GHG reduction mandate that becomes applicable for all fuel suppliers in the EU in 2020 (see Policy and Programs chapter) is not high enough to compensate for the effects of lower diesel use. It is, however, expected to favor the use of FAME with high GHG reduction values and HDRD, especially in those countries that are already close to the seven percent volumetric limit for FAME stipulated in the FQD[3].

Lower crude oil prices are not expected to significantly boost demand. With high taxes on fuel, the price of crude oil only accounts for a small share of the fuel price at the gas pump. Taxes on diesel fuel in the EU[4] range from €0.33 per liter in Bulgaria to €0.65 per liter in the United Kingdom (roughly $1.36 to $2.67 per gallon[5]).

The highest biodiesel consumption reductions by volume are forecast for France, Spain, Germany, the United Kingdom, and Belgium; while the highest reductions in percentage terms are forecast for Belgium, Spain, Portugal, Ireland, and France.

- In France, a strong decrease (between minus ten and minus 15 percent) in biodiesel consumption is forecast. The increase in the biodiesel blending mandate in 2020 is not expected to offset lowered demand for diesel. Consumption of HDRD is expected to increase at the expense of conventional biodiesel.
- In Spain, increased consumption of virgin oil-based FAME was anticipated in 2020, incentivized by RED II conventional food and feed-based biofuels baseline setting for the 2020 - 2030 period. This, combined with the European Commission (EC) approval of the U.S. Soy Sustainability Assurance Protocol for biofuels (SSAP-RED), was seen as an opportunity to improve domestic crushers' margins and solidify importers' preferences for U.S. soybeans. However, the enforcement of double-counting in the fourth trimester of 2019 triggered the use of double-counting eligible biofuels, thus reducing compliance volumes and demand for virgin oils. In addition, COVID-19 related movement during the second trimester of 2020 sharply lowered demand for fossil fuels and biofuels. The evolution of biodiesel consumption in Spain will depend on the post-lockdown evolution of the economic activity and consumer behavior regarding diesel-based collective transport modes as opposed to light-duty gasoline-based individual vehicles
- In Germany, the first two months in 2020 saw an uptick in biodiesel consumption in response to the higher GHG reduction mandate. However, COVID-19 related movement restrictions (albeit not as severe as in some other Member States) are forecast to significantly lower use in 2020.

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[3] Annex II of the FQD limits the volumetric FAME content in diesel fuel to 7 percent. Higher percentages are possible but only if the resulting fuel is labelled accordingly.

[4] https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

[5] 1 gallon =3.785 liters, 1 Euro = USD 1.08938

- In the United Kingdom, industry observers are estimating a reduction of 20-25 percent in the total fuel supplied during 2020. The blend mandate has increased to 16 percent in 2020 over the previous year, which is just eight percent with double-counting. Post estimates for 2020 biodiesel consumption are tempered by the expected COVID-19 effect, and support a ten percent reduction for 2020 over the previous year.

In contrast, biodiesel consumption is forecast to increase in the Netherlands, Sweden, Hungary, and the Czech Republic, as their mandate increases are high enough to compensate for the COVID-19-related percentage reduction in consumption anticipated for the entire fuel pool.

- The current biofuels policy in the Netherlands requires that 7.75 percent (by energy content of biofuels) be used in 2017, 8.5 percent in 2018, 12.5 in 2019 and 16.4 percent in 2020. In 2018, biodiesel consumption increased from 260,000 million liters to 485,000 million liters, and is forecast to rise further to nearly 570,000 million liters in 2019 and 680,000 million liters in 2020.
- In the first two months of 2020, monthly consumption of Hungarian diesel fuel (fossil and biodiesel combined) increased by two and four percent, but the steady growth recorded for years ended as the Government declared a state of emergency on March 11 because of COVID-19 outbreaks. Diesel fuel consumption dropped by eight percent in March compared with the same month in the previous year, and retail sales declined by 25 percent at Petrol Association stations. In April, an unprecedented collapse in fuel demand was recorded. Retailers sold 40 percent less refined fuels as the COVID-19 related restrictions came into force. Despite the low oil/fuel prices, and the government's new regulations (in effect as of May 4) to restart the economy, diesel fuel consumption is forecast to decrease by five percent this year. However, the introduced blending mandates are forecast to offset the decline in fuel sales and a 22 percent increase in demand for biodiesel is projected in 2020.

Biodiesel consumption is forecast to remain flat in Austria, Bulgaria, Denmark, Croatia, Latvia, Lithuania, and Slovenia.

In 2019, EU biodiesel consumption is estimated to have increased by six percent as a result of mandate increases in Croatia, Finland, Hungary, Ireland, Italy, the Netherlands, Poland, Slovakia, and the United Kingdom. At the same time, consumption decreased in Greece, Belgium, Germany, and the Slovak Republic. The reduction in Germany is the result of a mandate designed to lower carbon emissions for all marketed transport biofuels rather than raise biofuel use on a volumetric or energy-basis. This resulted in higher consumption of biodiesel with higher GHG reduction values, and leading to reduced physical demand.

In 2019, France, Germany, Spain, Sweden, and the United Kingdom were the largest biodiesel consumers in the EU, accounting for 62 percent of the total EU biodiesel consumption (see table). Projections for 2020 indicate that Sweden and Spain could change places and Italy is expected to replace the United Kingdom in the top five.

For consumption developments prior to 2019 please consult page 27 of our report:
Biofuels Annual The Hague_EU-28_7-15-2019

Table 6. EU Biodiesel/HDRD Consumption Main Consumers (million liters)									
Calendar Year	**2012**	**2013**	**2014**	**2015[r]**	**2016[r]**	**2017[r]**	**2018[r]**	**2019[e]**	**2020[f]**
France	2,653	2,658	2,931	3,254	3,349	3,408	3,635	3,650	3,225
Germany	2,874	2,581	2,752	2,483	2,498	2,522	2,644	2,618	2,400
Sweden	415	569	568	720	1,613	1,922	1,850	1,865	1,930
Spain	2,563	941	1,036	1,091	1,293	1,546	1,979	2,275	1,900
Italy	1,598	1,447	1,269	1,581	1,236	1,488	1,249	1,413	1,420
UK	493	863	839	736	724	750	1,100	1,550	1,400
Poland	837	843	730	795	909	954	966	1,000	965
Netherlands	270	250	317	229	175	261	485	568	680
Austria	567	575	708	710	641	572	529	535	535
Belgium	354	364	375	436	452	573	650	620	500
Finland	131	195	469	475	119	391	399	409	420
Denmark	286	286	293	294	299	328	361	375	375
Czech Republic	275	259	342	344	308	345	316	361	375
Portugal	359	336	391	404	337	358	391	385	360
Hungary	77	86	98	169	178	185	199	272	330
Romania	181	153	172	190	268	278	276	346	310
Others	624	694	664	763	789	831	919	889	835
Total	14,556	13,100	13,954	14,668	15,151	16,718	17,989	19,136	18,000

r = revised / e = estimate / f = forecast EU FAS Posts. Source: FAS EU Posts based on information collected in MT, then converted to liters using a conversion rate of 1 MT = 1,136 liters for biodiesel and 1,282 liters for HDRD.

Production and Production Capacity

After a decline in 2018 (due to high competition from cheaper imports), EU biodiesel production recovered in 2019, benefitted by the imposition of CV duties on biodiesel from Argentina as well as an increase in domestic consumption which was higher than the increase in imports from other suppliers. EU HDRD production increased by 15 percent as new plants in France and Italy entered commercial production in April and August 2019, respectively.

With production continuing to shift from FAME to HDRD, biodiesel production is expected to decrease by four percent in 2020, while HDRD production is forecast to increase by 14 percent. The two plants mentioned above are producing throughout the year for the first time. FAME continues to face pressure from reduced consumption and lower, but still substantial, imports.

- Germany showed the strongest production increase for FAME in 2019 as it benefited from increased exports to other EU Member States, notably the Netherlands, Belgium, and the United Kingdom. Due to COVID-19, the outlook for domestic German consumption, as well as exports to other Member States, is less promising in 2020. As a result, German production is forecast to be hit hardest.

- In France, a ten percent decrease in biodiesel/HDRD production is forecast. The increase in HDRD production in Total's biorefinery located in La Mede (from 114 to 400 million liters) is not expected to offset the strong decrease in FAME production (down 20 percent). In April 2020, Saipol idled two of its five plants because of the decrease in fuel demand resulting from the COVID-19 lockdown. Despite these closures, Saipol's production still exceeded demand. Saipol kept crushing oilseeds, but produced vegetable oil instead of biofuels and tried to find new export markets for that vegetable oil, including China.
- For Spain, the reduction in consumption related to COVID-19, coupled with double-counting full enforcement since the fourth trimester of 2019, is expected to result in decreased FAME and HDRD production.
- The above-mentioned reductions in biodiesel production are partially compensated by higher HDRD production in Italy, with production shifting from FAME (down 13 percent) to HDRD (up 30 percent), higher FAME production in Poland (due to lower imports from neighboring Member States) and higher FAME production in Hungary (due to anticipated higher domestic consumption.)

Table 7. EU FAME Main Producers (Million Liters)

Calendar Year	2012	2013[r]	2014[r]	2015[r]	2016[r]	2017[r]	2018[r]	2019[e]	2020[f]
Germany	3,106	3,307	3,808	3,505	3,543	3,644	3,578	3,862	3,300
France	2,175	2,170	2,386	2,866	3,152	3,135	2,806	2,556	2,045
Spain	538	659	1,017	1,103	1,319	1,721	2,008	1,835	1,600
Poland	673	736	786	861	985	1,019	1,000	1,091	1,110
Netherlands	974	790	1,056	795	638	1,112	1,022	1,079	1,080
UK	352	640	554	572	496	490	500	510	510
Italy	326	521	452	625	398	599	511	511	450
Other	1,214	1,638	1,179	1,600	2,229	1,516	1,077	1,669	2,443
Total	**10,422**	**10,460**	**11,238**	**11,927**	**12,760**	**13,236**	**12,504**	**13,113**	**12,543**

Ranked by production in 2020 r = revised / e = estimate / f = forecast. Source: FAS EU Posts based on information in MT and converted to liters using a conversion rate of 1 MT = 1136 liters.

Table 8. EU HDRD Production (Million Liters)

Calendar Year	2012	2013	2014	2015	2016[r]	2017[r]	2018[r]	2019[e]	2020[f]
Netherlands	410	872	1,013	1,192	1,154	1,218	1,218	1,218	1,218
Italy	0	0	323	323	323	323	323	451	590
Spain	73	179	377	262	418	465	482	549	480
France	0	0	0	0	0	0	0	128	449
Finland	317	392	438	533	135	383	354	385	385
Sweden	160	160	160	160	160	160	192	218	256
Portugal	0	0	0	0	0	32	37	37	35
Total	**960**	**1,604**	**2,311**	**2,470**	**2,190**	**2,582**	**2,606**	**2,986**	**3,412**

Ranked by production in 2020 e = estimate / f = forecast. Source: FAS EU Posts based on information in MT and converted to liters (conversion rate of 1 MT = 1282 liters).

The structure of the EU biodiesel sector is quite diverse. Plant sizes range from an annual capacity of 2.3 million liters owned by a group of farmers to 680 million liters owned by a large multi-national company. Biodiesel (FAME) production facilities exist in every EU Member State, with the exception of Finland, Luxembourg, and Malta. In contrast, HDRD production is concentrated in only seven countries (see table above). The majority of HDRD capacity consists of dedicated HDRD plants, while in Spain and Portugal HDRD is co-processed with conventional fuel in oil refineries.

EU FAME production capacity increased by 0.5 percent in 2019 due to expansions in Poland and Greece. In 2020, a marginal increase of 0.4 percent is forecast, again due to increases in Poland and Greece. However, numerous plants throughout the EU are operating below capacity or are temporarily shut down due to negative market conditions, already present before the COVID-19 crisis.

With the start of commercial production in new plants in Italy and France, EU HDRD production capacity increased by a remarkable 47 percent in 2019. For 2020, HDRD production capacity is expected to remain flat.

Feedstock Use and Co-products Production

Rapeseed oil is still the dominant biodiesel feedstock in the EU, accounting for 43 percent of total production in 2019. However, its share in the feedstock mix has continuously decreased since its peak in 2008, when it accounted for 72 percent. This is partly due to higher use of recycled vegetable oil/ UCO and palm oil. In addition, EU rapeseed methyl ester (RME) has a difficulty competing with cheaper imported soybean oil methyl ester (SME) and palm oil methyl ester (PME). In 2020, rapeseed oil use is forecast to decline further as the prohibition on the use of three insecticides of the neonicotinoid class (i.e., clothianidin, imidacloprid and thiametoxam) is expected to take its toll on EU rapeseed production.

UCO was the second most important feedstock in 2019, accounting for 21 percent of total feedstock. The use of UCO received a bump after some Member States allowed double-counting (Austria, Belgium, Croatia, France, Hungary, Ireland, the Netherlands, Poland, Portugal, Slovenia, and the United Kingdom) and others introduced a GHG reduction component to their use mandates (Germany and the Czech Republic). However, since 2016, annual increases have grown smaller. In 2019, the largest EU producers of UCO-Methyl Ester (UCOME) were the Netherlands, Germany, the United Kingdom, Portugal, Spain, and Austria. Together they accounted for 90 percent of the use of this feedstock. Smaller amounts were produced in France, Italy, Poland, Ireland, Bulgaria, and Hungary. In 2020, the use of UCO is forecast to decrease by seven percent because of reduced availability of this feedstock. Throughout the EU, UCO collection dwindled during the COVID-19 pandemic as many Member States ordered restaurants to temporarily close down or restricted their services to take-away and delivery. While this leaves room for increased imports, China, one of the main suppliers of UCO to the EU, was also heavily affected by COVID-19 and related restaurant closures.

Palm oil was third in terms of feedstock use in 2019 (16 percent). Its use in 2019 decreased (down seven percent) compared to the previous year because of the availability of cheap PME from Indonesia. Palm oil was mainly used in Spain, Italy, France, and the Netherlands, and to a much lesser extent in Finland, Germany, and Portugal. Negligible amounts are also used in Romania, Greece, and Poland. In

2020, palm oil use is forecast to remain unchanged, as lower use in Spain is offset by increased HDRD production in France.

The use of **soybean oil** and palm oil in conventional biodiesel is limited by the EU biodiesel standard DIN EN 14214 and colder weather conditions. SME does not comply with the iodine value prescribed by this standard (the iodine value functions as a measure for oxidation stability). Additionally, PME has a higher cloud point than RME and SME, and does not provide enough winter stability in northern Europe. However, the incentive persists to maximize the use of SME and PME due to their lower cost. The standard can be met by using a feedstock mix of rapeseed oil, soybean oil and palm oil. The vast majority of soybean oil is used in Spain, followed by Germany and the Netherlands. Smaller amounts are being used in France, Belgium, Portugal, Bulgaria, Romania, Italy, Austria, and Greece.

Animal fats benefitted less from double-counting than UCO, as there are fewer Member States that allow double-counting for animal fat (Denmark, Finland, France, the Netherlands, and the United Kingdom) than for UCO. In addition, in Germany, Tallow Methyl Ester (TME) use does not count against the biofuel mandate and its production is exported to other Member States. Increased animal fat use is the result of new plants (or capacity increases at existing plants) rather than a function of feedstock prices, as using animal fat requires changes to the technical equipment. In 2019, Italy was by far the largest user of animal fat for biodiesel production, followed by the Netherlands and France. Finland, the United Kingdom, Germany, Denmark, Spain, Austria, Ireland, Hungary, and Poland also used animal fats but to a much lesser extent.

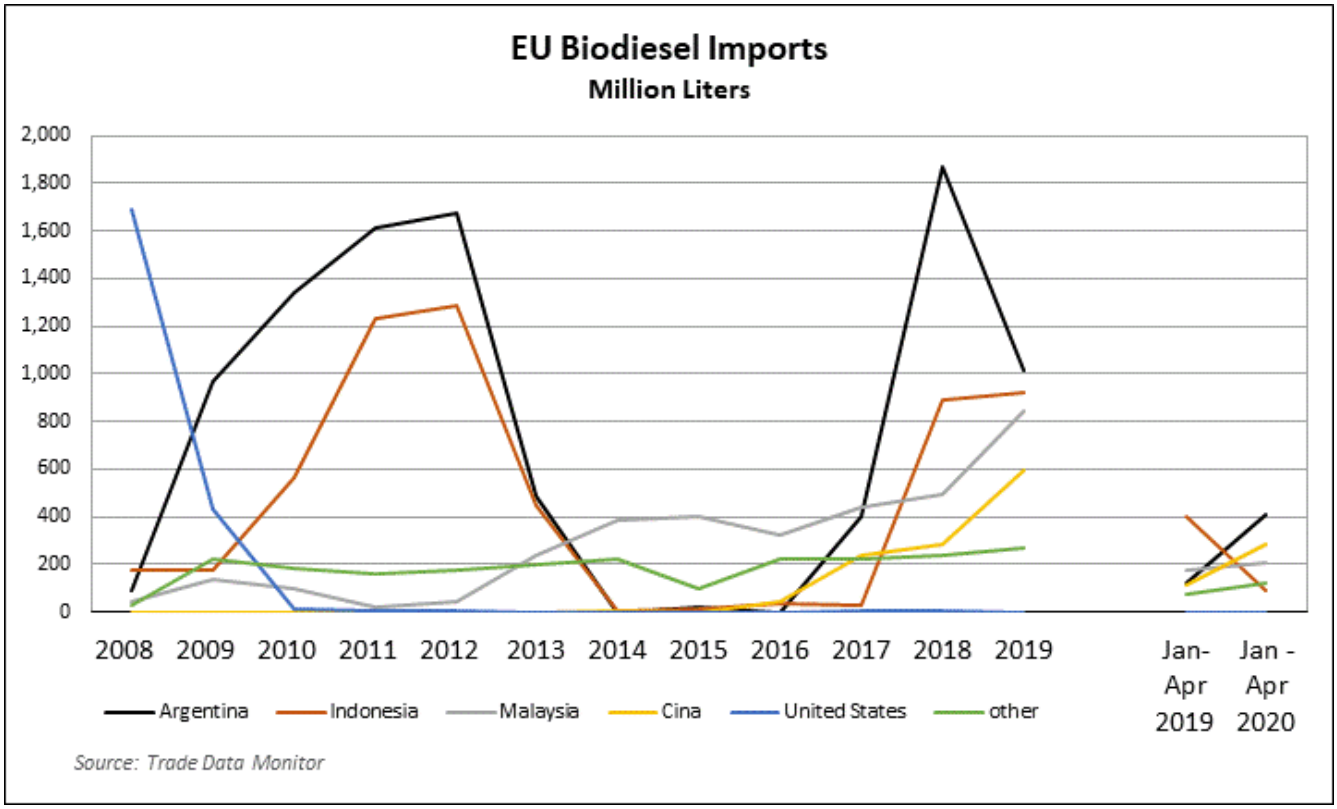
Sunflower oil comprised only one percent of the total biodiesel feedstock, and is mainly used in Greece, France, and Bulgaria -- collectively accounting for 63 percent of EU sunflower oil-based biodiesel production. Small amounts of sunflower oil are also being used in Romania, Hungary, Lithuania, Poland and Austria.

The category "**other**" includes pine oil and wood (Sweden), fatty acids (Germany and Finland), tall oil (Finland), and cottonseed oil (Greece).

Origin of feedstocks and by-products of feedstock generation

A large share of soybean oil is crushed from imported soybeans. In contrast, the majority of rapeseed oil is of domestic origin. The 2020 projection of 6.1 MMT of rapeseed oil used in RME is equivalent to about 15.3 MMT of rapeseed. This also generates roughly 9.2 MMT of rapeseed meal as a byproduct, most of which is used for animal feed. Similarly, the 900,000 MT soybean oil will be crushed from 4.5 MMT of soybeans and generate about 3.6 MMT soybean meal (see also FAS EU Oilseeds Annual).

Trade



In 2019, EU imports of biodiesel/HDRD decreased by 3.8 percent compared to 2018. Despite the EU imposing CV duties on biodiesel from Argentina in February 2019, Argentina was able to defend its place as the largest supplier of biodiesel to the EU. This was possible as Argentina offered an undertaking (an offer to prevent prices from falling below a certain floor price, see also see Policy and Programs chapter), which provided planning certainty for Argentine exporters and EU importers.

In 2019, the dominant suppliers of biodiesel to the EU were Argentina, Indonesia, Malaysia, and China, accounting for 28, 25, 23, and 16 percent of EU biodiesel imports, respectively. Imports from China more than doubled in 2019 compared to 2018, all of which is believed to be UCOME and PME.

In 2019, most biodiesel, roughly 3.5 billion liters, was imported under HS/CN code 3826.00.10 containing at least 96.5 percent biodiesel. The equivalent of 30 million liters was imported as blend under HS/CN code 3826.00.90 (containing between 30 and 96 percent of biodiesel), mostly from Norway and Bosnia & Herzegovina.

In 2020, EU biodiesel/HDRD imports are forecast to drop by 31 percent to 2.5 billion liters. The reasons behind the expected drop are CV duties that the EU imposed on biodiesel from Indonesia, as well as the new B30 program in Indonesia and B20 program in Malaysia that are expected to reduce these country's exportable supplies. The expected drop in EU consumption as a result of COVID-19-related movement restrictions further limits the opportunity for imports, including those from Argentina.

Currently, the EU does not have a separate customs code for HDRD. Thus, HDRD could enter the EU under a variety of CN codes, and imports are potentially underestimated.

EU biodiesel exports to destinations outside the bloc remain marginal and normally amount to only one percent of production (and are thus not discussed in this report).

Stocks

In the absence of reliable data, the data for stocks is based on the assumption that average stocks amount to the equivalent of two weeks' supply of consumption. However, after the lifting of AD duties on biodiesel from Argentina, and in anticipation of the outcome of EU anti-subsidy proceedings against Argentina, European traders and petroleum companies accumulated large stocks at the end of 2018. These are assumed to have been reduced throughout 2019 and, by the end of the year, returned to the assumed average level.

VI. Advanced Biofuels

The Renewable Energy Directive (RED), which is extended under RED II, establishes an overall policy for the production and promotion of energy using "advanced" biofuels in the EU. As lower carbon emission biofuels replace higher carbon emission fossil fuels (based on full life-cycle analysis) in the transportation sector, EU policy is structured to limit further expansion of "conventional" biofuels and incentivize expanding use of "advanced" biofuels. This is because advanced biofuels (as defined) are less likely to result in land use change and may use waste-stream feedstocks or feedstocks that do not require any land use. Please refer to the Policy and Programs chapter of this report for more information.

Hydrogenation derived renewable diesel (HDRD), also known originally as hydrotreated or hydrogenated vegetable oil (HVO), is a drop-in fuel that can fully replace fossil diesel, and, with some modification, can be used as jet fuel. It is therefore treated as an advanced biofuel in this report, but would only be considered advanced under EU policy when made with qualifying waste-stream feedstocks.

The Second Renewable Energy Directive (RED II) and Advanced Biofuels

On June 14, 2018, the EC, EU Council, and Parliament negotiators forged a political agreement on the new RED. The agreed RED II adopted the seven percent cap for conventional biofuels put forward in the Council Proposal, and set a climbing target for advanced biofuels produced from agricultural and forestry by-products (Part A of Annex IX) of 0.2 percent in 2022 to 3.5 percent in 2030. The RED II sets a limit of 1.7 percent for biofuels produced with waste fats and oils (Part B of Annex IX) but Member States can modify this limit if justified by taking into account the availability of the feedstock. The EC is able to add feedstocks listed in Part A and B of Annex IX, but cannot remove them. For more information about the policy related to advanced biofuels see the Policy and Programs chapter of this report.

Specific EU Member State mandates are important for the further commercialization of advanced biofuels. The following countries have implemented national mandates:

- In January 2016, Denmark approved a specific target for advanced biofuels, namely a 0.9 percent blending mandate by 2020 for use in transportation. The mandate excludes UCO and animal fats.
- On March 19, 2018, the Italian Ministry of Economic Development published a Decree which requires gasoline and diesel to contain at least 0.6 percent of advanced biofuels as of January 2018, rising to 1.85 percent in 2022. The mandatory quota for advanced biofuels is split -- 75 percent reserved for biomethane and 25 percent for other advanced biofuels. The respective shares will be reviewed every two years.
- In 2018, the Netherlands introduced an obligation for blending advanced biofuels respectively at 0.6, 0.8 and 1.0 percent for 2018, 2019 and 2020, respectively. The advanced biofuels must be produced from waste, not including UCO and animal fats.
- Since September 1, 2018, the Bulgarian mandate is split into five percent conventional first generation biodiesel and one percent advanced biodiesel.
- In February 2019, Finnish Parliament approved a law that mandates an advanced biofuel share of two percent in 2023, increasing to ten percent in 2030.

For more information on applicable mandates please refer to our FAS GAIN report: Biofuel Mandates in the EU by Member State in 2020, published on June 2, 2020.

With the goal of supporting the commercialization of advanced biofuels and a bio-based economy in general, the EC developed the following programs

On February 13, 2012, the EC adopted a strategy entitled "Innovating for Sustainable Growth: a Bioeconomy for Europe". The main goal of the strategy is to reduce the EU's dependency on fossil resources. For more information see the Bioeconomy website of the EC. One of the policy areas under the strategy is supporting biorefinery operations, including the production of biofuels. The EC funds biorefinery research and commercialization by the Horizon 2020 program.

In July 2014, the Bio-Based Industries Joint Undertaking (BBI JU) was launched. The Bio-Based Industries Joint Undertaking is a €3.7 billion Public-Private Partnership between the EC and the Bio-based Industries Consortium. The fund is a summation of €975 million of EU funds (Horizon 2020) and €2.7 billion of private investments. The goal of the program is to convert biomass into common consumer products through innovative technologies by biorefineries. On April 5, 2020, the BBI JU launched its seventh call for proposals with a total budget of €102 million. Examples of projects funded by the Bio-Based Industries Joint Undertaking (BBI-JU) are:

- The LIGNOFLAG project aims to build and operate a commercial flagship production plant for biochemical lignocellulose conversion to cellulosic ethanol with a yearly production capacity of up to 75 million liters. The companies are located in Germany, Hungary and Austria. The project started in June 2017 and will run for 5 years. The overall budget is €35.0 million with a €24.7 million contribution from the EC.
- Another example is the project OPTISOCHEM. Two companies cooperate to produce cellulosic bio-isobutene from straw. The bio-isobutene can be used as renewable feedstock to produce a wide range of chemicals such as biofuels, adhesives and flavors. The project is conducted in a pilot plant in France and in Germany. The project started in June 2017 and was granted €9.8 million by the BBI-JU as part of the EU's R&D Horizon 2020 program.

Commercial Production of Advanced Biofuels

Since 2012, the production of hydrogenated vegetable oils (HDRD) has taken off in the EU. HDRD can be produced from waste oils and fats and can be fully substituted for diesel. In 2019, HDRD production is estimated at 2.9 billion liters, and, with new plants in France and Italy, is expected to increase to 3.4 billion liters in 2020. HDRD consumption is forecast not to be significantly hit by the COVID-19 crisis because of the waste-based double-counting content of HDRD fuels and the superior technological properties by which a higher blending rate can be achieved.

The commercialization of cellulosic ethanol is lagging behind the development of HDRD. The main factors that prevent operators from investing in cellulosic biofuels are high research and production costs and regulatory uncertainty. The current capacity is about 60 million liters in the EU. However, production has been halted in Spain and Italy (see section Cellulosic Ethanol). Expansion of capacity has been announced in Austria (30 million liters in 2021), Romania (65 million liters in 2021), Bulgaria (50 million liters in 2021) and outside the EU in Norway (from 20 million to 70 million liters in 2021). It is anticipated that the EU capacity for cellulosic ethanol production could possibly increase to roughly 240 million liters in 2020. However, taking into account the novelty of the technology, the actual production is not expected to be more than 50 million liters.

The table below outlines the operational or close to operational advanced biofuel plants, at a commercial scale, in the EU.

Table 9. Advanced Biofuels Plants in the EU

Country	Process	Biofuel	Feedstock	*Capacity* (million liters per year)	Year of opening
Thermochemical					
Finland	H	HDRD	Oils and fats	430 (2 lines)	2007
The Netherlands	P/FT	Methanol	Biogas	75	2010
Spain	H	HDRD	Palm oil	945 (7 plants)	2011
The Netherlands	H	HDRD	Oils and fats	1,280	2011
Italy	H	HDRD	Palm oil, palm oil by-products, other oils and fats	465 (770 in 2020)	2014
Finland	H	HDRD	Tall oil	115	2015
Sweden	H	HDRD	Tall oil	220	2015
Portugal	H	HDRD	Palm oil	40	2017
France	H	HDRD	Oils and fats (50 percent palm oil)	640	2019
Italy	H	HDRD	Used vegetable oils, animal fats,	965	2019

			algae, and by-products		
Sweden	P/FT	Methanol	Pulp mill side-streams	6	2020
Biochemical					
Finland	HL/F	Ethanol	Saw dust	10	2018
Italy	BtL	Ethanol	Biomass	32	2020

Source: EU FAS Posts BtL=Biomass to Liquid, F=fermentation, FT=Fischer Tropsch synthesis, H=hydrogenation, HDRD=hydrogenation derived renewable diesel (also known originally as hydrotreated or hydrogenated vegetable oil or HVO), HL=hydrolysis, P=pyrolysis

Hydrogenation Derived Renewable Diesel and Pyrolysis Oil)

- *Finland and the Netherlands*: Neste Oil has developed a process of hydrogenation to produce HDRD. The product is sold as drop-in fuel for road and marine transport. The renewable fuels are available for customers in Finland, Sweden, Estonia, Latvia, Lithuania, the Netherlands and the United States (California and Oregon). In addition to drop-in biofuels, the Neste plants produce renewable naphtha, propane, and alkanes. In Finland, Neste operates one plant with two lines of roughly 215 million liters each. In 2010, Neste Oil opened up a renewable diesel plant in Singapore with an annual capacity of 910 million liters, and a similar scale plant in Rotterdam in 2011. Current annual production capacity at the plant in Rotterdam is a maximum of 1.280 billion liters. Neste is reportedly planning to build another plant in Europe with a capacity of roughly 2 billion liters. In 2018 and 2019, about 80 percent of the feedstock used by the three Neste plants consisted of waste fats and oils. The waste and residues consist of UCO, palm fatty acid distillate (PFAD), bleaching earth oil, technical corn oil, and animal fats. Netste's goal is to reach a 100 percent waste and residues share by 2025.
- *Finland*: In 2015, UPM (a forest product company) opened a HDRD plant in Lappeenranta. The capacity of the plant is roughly 115 million liters of advanced biofuels per year, and the plant is using tall oil, a residue of pulp production, as a feedstock. The company is studying the opening of another plant in Kotka with a capacity of about 550 million liters of advanced biofuels and biomaterials. The targeted feedstocks are forest by-products, such as saw dust and branches, and oil from the Brassica carinata crop grown in South America. The plant will be able to supply biofuels to the road, marine, and aviation transport sectors. Additionally, Green Fuel Nordic Oy partnered with a Dutch company, BTG, to produce 25 million liters of pyrolysis oil in 2020 at its plant in Lieksa. Other companies which are planning to erect advanced biofuel plants in Finland are: Nordfuel, BioEnergo, and Fintoil.
- *Spain*: CEPSA (since July 2011) and REPSOL (since 2013) are producing HDRD. In 2019, Spanish HDRD production increased to 549 million liters from 482 million liters in 2018. For more information see GAIN Report SP1723 – Spain's Biodiesel and Renewable Diesel Overview.
- *Italy*: In 2014, an HDRD plant was opened by Eni in Venice, Italy. Since then, the plant has produced approximately 325 million liters per year. Production is forecast to increase to 540 million liters in 2021 as a result of additional upgrades. The feedstock will include an increasing proportion of used oils, animal fats, and by-products from palm oil production. Following the

model adopted for Venice, Eni converted a Gela refinery in Sicily into a renewable diesel production facility (to produce 770 million liters per year). The reconversion started in April 2016 and the facility opened in August 2019.

- *Sweden*: In Gothenburg, Preem produces about 160 million liters of HDRD per year from tall oil. The company recently expanded its production capacity to 220 million liters, and is reportedly planning to further expand to 1.3 billion liters in 2023. The company is currently investigating the use and sourcing of other raw materials. Preem has the intention to begin the production of up to 300 million liters of bio-jet fuel in 2022. The Finnish company, St1 plans to produce up to 250 million liters of HDRD and jet fuel in Gothenburg, Sweden, beginning in 2022. The feedstocks will likely be UCO and tall oil. St1 is also investigating the construction of another plant with a capacity of 500 million liters of biofuels per year, beginning operations in roughly five years. One of the raw materials which will be used by Preem ans St1 for their expanded production is biocrude oil made from tall oil. To increase the supply of biocrude oil, SunPine is planning to increase its production from about 100 million liters to 150 million liters in 2020. Moroever, Pyrocell, owned by Preem and Setra, is planning to produce nearly 30 million liters of pyrolysis oil (in 2021 at the earliest).
- *France*: The Total HDRD plant located in La Mede (Southern France) started producing HDRD in July 2019. This plant has a maximum capacity of 640 million liters per year. Feedstocks were expected to be 60 to 75 percent vegetable oils, and 25 to 40 percent waste oil such as UCO and animal fats. Under pressure from NGOs, Total announced, in July 2019, that the plant would use less than 300,000 MT of palm oil per year, or less than half of their total feedstocks. An additional factor is that the palm oil's tax advantages for biofuel production were removed in January 2020 which will likely result in the plant using more canola oil and less palm oil than expected. Reportedly there are still tax advantages for palm fatty acid distillate (PFAD). Another project in France is the BioTFuel project, a cooperation of Avril, Axens, CEA, IFPEN, ThyssenKrupp and Total. This project aims to produce 230 million liters of advanced biodiesel and bio-jet fuel per year from one MMT of biomass. The demonstration-scale plant is located at Total's former Flandres refinery in Dunkerque.
- *Portugal*: Since 2017, GALP has been producing HDRD in their facilities in Sines. Production capacity is estimated at 40 million liters. For more information see the FAS GAIN Report - *Portugal Biofuel Market Outlook*, published July 3, 2017. Since Portugal's production is palm oil based, it will face limits imposed on this type of feedstock. Palm oil producers may certify their feedstock as low-risk ILUC to keep their presence in the EU market beyond 2023, whether manufactured within the EU using imported feedstock or as an imported biofuel.
- *Czech Republic*: Unipetrol RPA produces HDRD at an experimental scale of roughly 3.2 million liters per year.

Biomethanol

Biomethanol can be used as a platform chemical to produce other chemicals such as lactic acid and formaldehyde. It can also be used as a transport fuel and blended with biofuels, diesel, and gasoline, or used for the production of bio-methyl tertiary butyl ether (bio-MTBE), bio-dimethyl ether (bio-DME).

- *The Netherlands*: The advanced biofuel plant BioMCN, which began production in 2010 has a capacity of 250 million liters and produces bio-methanol from biogas. BioMCN produces about 75 million liters of biomethanol annually. On April 11, 2017, BioMCN announced they would

begin using CO_2, a byproduct of biogas production, to produce an additional 19 million liters of biomethanol. BioMCN also produces biomethanol in the United States which is shipped to the EU and used as renewable fuel. BioMCN is planning to begin building a green hydrogen plant in 2020, together with Nouryon and Gasunie, supported by a European Commission fund of €11 million. Production is anticipated to start in 2022.

Additionally, a consortium of Enerkem, Shell, Air Liquide, Nouryon and the Port of Rotterdam is planning to build a waste to biomethanol plant in Rotterdam. The facility will convert 360,000 MT of waste into 270 million liters of biomethanol. Enerkem has plans to realize a similar project in Spain.

- *Sweden*: In 2020, Södra began production of biomethanol at a pulp mill in southeastern Sweden. The plant has an annual capacity of about 6 million liters of biomethanol. The biomethanol is extracted from the pulp mill side-streams. The biomethanol can be used as an energy source for the mill, as renewable transport fuel, or as platform chemical. The first deliveries are expected to be be shipped to Denmark and used for the production of biodiesel.

Cellulosic Ethanol

- *Italy*: In November 2017, the Beta Renewables cellulosic ethanol plant in Crescentino, Piedmont shut down. Beta Renewables is a joint venture between Biochemtex, a company of the Italian Mossi Ghisolfi Group and the U.S. fund Texas Pacific Group (TPG). Operational since 2013, the Crescentino plant had an annual production capacity of 50 million liters using 200,000 MT of biomass. The feedstock consisted of wheat straw, rice straw and husks, and Arundo donax, an energy crop grown on marginal land. On February 8, 2020, Versalis, Eni's chemical subsidiary Versalis announced that all the plants at Crescentino will be up and running by the first half of 2020. However, the COVID-19 crisis has made the starting date uncertain. The plant, acquired in November 2018, has been upgraded with an investment of more than €15 million. The biomass power plant for renewable electricity generation and part of the water treatment plant with biogas production have already been restarted. The plant uses the PROESA® proprietary technology.
- *Finland*: A cellulosic ethanol plant, with an annual capacity of 10 million liters, started production in 2018. There are plans to expand production to about 50 million liters. The feedstock is saw dust. This Cellunolix® project is managed by St1 Biofuels Oy in cooperation with North European Bio Tech Oy. St1 plans to build three similar plants each with a capacity of 50 million liters in Kajaani (Finland), Pietarsaari (Finland) and Follum (Norway).
- *Norway* (outside the EU): The company Borregaard operates a plant with an annual capacity of 20 million liters. In Follum, a paper mill is planned to be converted into an ethanol plant applying the Cellunolix® technology. The plant will have a capacity of 50 million liters, and will use forest residues as feedstock. It is forecast to be operational in 2021.
- *Austria*: Austrocel, a cellulose producer, started building an advanced bioethanol plant at the beginning of 2020. The feedstock for the future production is sourced from the remainders of its cellulose production. The plant is expected to go into operation by the end of 2020 or beginning of 2021 and has a capacity of 30 million liters per year. The advanced bioethanol will be used to fill the 0.5 percent advanced biofuels mandate.

- *Other*: More biorefinery projects have been announced for the conversion of woody biomass into cellulosic ethanol. Projects are being planned for plants in Slovakia and Romania. Both plants will have a capacity of about 65 million liters and will each use about 250,000 MT of cereal straw. Construction of the plant in Romania has been delayed, and the opening is now scheduled in 2021 instead of 2020. Construction of the plant in Slovakia has been put hold reportedly due to an unclear legislative environment and market conditions for the second generation biofuels in the EU, as each EU Member State transposed the RED in their own way with their own definitions. In addition, starch plants are being converted to produce ethanol from the process' by-products. An example is a plant in Bulgaria, which is planned to be opened by the end of 2020. The plant has a total capacity of about 50 million liters, of which a share is fed with by-products.

  Other projects focus on the conversion of the sugars and lignin into high value products. An example is the cooperation of the U.S. technology provider Sweetwater Energy and the Estonian wood pellet producer Graanul to integrate their technology into existing and new plants in the Baltic States. Another project is the cooperation of the Dutch companies Avantium and Akzo Nobel to build a demonstration biorefinery in the port of Delfzijl in the Netherlands. For more information about biorefineries see our FAS GAIN Report - Case Studies for a Biorefinery of May 8, 2018.

Sustainable Aviation Fuel (SAF) and Marine Biofuels

The EC forecasts the consumption of jet fuels in aviation to steadily increase by 2050 due to the increase in transport activity despite improvements in efficiency. Fossil fuels continue to dominate, and only in 2035 is bio-kerosene forecast to slowly start penetrating the aviation fuel mix. For more information see the publication of the EC: EU Energy, Transport and GHG Emission Trends to 2050.

In 2011, the EC, Airbus, and the aviation and biofuel producers industries, launched the European Advanced Biofuels Flightpath. This action was scheduled to achieve two million tons, about 2.5 billion liters, of sustainable biofuels used in the EU civil aviation sector by 2020. In 2018, the organization determined that the progress was insufficient to achieve the two million ton target in 2020. The conclusion was that one of the main barriers for the introduction of bio-jet fuels is the investment needed to expand production to a commercial scale. Other complications were the lack of harmonization of EU Member State policies and the evolving political developments regarding the sustainability requirements for biofuels. As a result, the EC re-launched the Biofuels FlightPath to take into account recent evolutions and to tackle the current barriers identified for the production and marketing of bio-jet fuels.

In 2018, Finland's Neste produced about five million liters of bio-jet fuels. The current jet fuel capacity is about 120 million liters. Neste plans to ramp up its renewable jet fuel capacity to 1.2 billion liters in 2022. The majority of this capacity will be located in Singapore. In the EU, Copenhagen Airport, Schiphol Airport (Amsterdam), and Frankfurt Airport have biofuel distribution for airplanes. A part of the supply at Schiphol Airport is currently covered by imports from the United States. Additionally, SkyNRG is planning to produce biokerosene for Schiphol Airport in Delfzijl, a seaport in the Northern part of the Netherlands. The plant will convert waste fats and oils and will have a capacity of nearly 125 million liters. The company has reportedly an offtake agreement to deliver the biokerosene to KLM over ten years. Production is scheduled to begin in 2022.

Another potential for biofuels is the marine fuel market. Recently, Finnish Wärtsilä and the Dutch biofuel distributor, GoodFuels, have partnered to supply marine biofuels to ships in the Port of Rotterdam. The ship owner is aiming to use a diesel blend consisting of 30 percent biofuels with goal of using a blend of up to 100 percent biofuels in the near future.

VII. Biomass for Heat and Power

This chapter describes the EU market for solid biomass intended for the household and industrial production of heat or power. In the EU, 59 percent of the renewable energy consumed is generated by bioenergy. Of this, 70 percent is contributed by solid biomass, twelve percent by biogas, eleven percent by liquid biofuels, and seven percent by municipal waste (Bioenergy Europe based on Eurostat statistics of 2017). The biomass is sourced from the agricultural and related food processing sector, and the forestry sector. Wood chips and pellets are increasingly used as input for renewable heat and power production. Because wood pellets are generally traded over longer distances than chips, this chapter is restricted to the wood pellet market.

EU Production, Supply and Demand Table

Table 10. Wood Pellets (1,000 MT)

Calendar Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020f
Beginning Stocks	696	713	642	506	948	1,270	1,797	1,595	1,880	1,879
Production	9,470	10,650	12,200	13,100	14,100	14,400	15,400	16,900	17,700	18,500
Imports	3,115	4,367	6,096	6,547	7,163	8,095	8,693	10,355	11,480	12,500
Exports	68	90	132	105	141	118	195	170	181	200
Consumption	12,500	15,000	18,300	19,100	20,800	21,850	24,100	26,800	29,100	30,800
Ending Stocks	713	640	506	948	1,270	1,797	1,595	1,880	1,779	1,879
Production Capacity										
Number of Plants		497	516			637	707	719		
Nameplate Capacity	15,000	15,980	17,000	18,500	20,500	21,950	22,860	23,350	24,000	25,000
Capacity Use	63.1%	66.6%	71.8%	70.8%	68.8%	65.6%	67.4%	72.4%	73.8%	74.0%

Source: (a) The European Biomass Association (AEBIOM), (b) Trade Data Monitor, (c) FAS Post Estimates

The EU is the world's largest wood pellet market, with a consumption of roughly 29.1 MMT pellets in 2019. Based on EC mandates and EU Member State incentives, demand is expected to further expand to about 30.8 MMT in 2020. Future consumption will significantly depend on a range of market factors and EU Member State incentives and conditions.

Consumption

While the EU produces nearly thirty percent of world production, EU demand represents nearly fifty percent of the global market. During the past five years, residential (below 50 kW) and small to medium scale commercial (more than 50 kW) use of pellets represented approximately 55 percent of EU pellet consumption, leaving 45 percent for large scale industrial use of pellets, with a capacity of generally more than 5 MW (Source: Bioenergy Europe). The major users of wood pellets in the EU are the United

Kingdom, Italy, Denmark, Germany, Sweden, France, Belgium, the Netherlands and Austria. The COVID-19 crisis is forecast to have a limited effect on the total EU pellet consumption in 2020. A lower co-firing use is projected in the United Kingdom, partly due to lower power demand but routine shutdowns of the plants play also a role. The EU Member State lockdown measures have predominantly restricted transport activities resulting in a significant reduction in liquid biofuel use. Solid biomass applied for heat and power has been less affected, save for a shift from office to residential use.

Table 11. Main Pellet Consumers (1,000 MT)

Calendar Year	2013	2014	2015	2016	2017	2018	2019[e]
United Kingdom	3,700	4,900	6,700	6,900	7,470	8,540	9,000
Italy	2,500	3,400	3,300	3,200	3,400	3,300	3,300
Denmark	2,400	2,450	2,500	2,570	3,160	3,075	2,500
Germany	2,080	1,840	1,760	2,000	2,100	2,190	2,300
Sweden	1,860	1,650	1,650	1,605	1,530	1,765	1,850
France	691	1088	908	1,207	1,335	1,430	1,684
Belgium	1,500	1,200	1,600	1,340	1,375	1,490	1,550
Netherlands	1,200	500	120	190	360	610	1,200
Austria	880	815	850	895	960	950	950
Spain	380	425	450	475	530	570	675
Poland	500	490	350	300	345	450	500
Total	**18,300**	**19,100**	**20,800**	**21,850**	**24,100**	**26,800**	**29,100**

Source: AEBIOM and Member State sector organisations, e = estimate EU FAS Posts

Residential Use of Pellets

Residential use for heating, nearly 38 percent of the total pellet market, fluctuates annually, but is a relatively stable market compared to industrial heat and power generation. The demand depends on the winter temperatures and fossil fuel prices. Medium-sized users of pellets for energy generation (by industries or public buildings such as hospitals and swimming pools) is generally less dependent on weather conditions.

In Italy, Germany, France, and Austria, pellets are mainly used in small-scale private residential and medium-sized industrial boilers for heating. In some EU Member States, such as Sweden, Germany, Austria, France, Spain and the Czech Republic, household heating using biomass receives subsidies or tax deductions by national and local governments. In most countries, however, government funding is limited.

- Italy is the largest European market for household use of pellets. According to the Italian Association of Wood Energy Chain (AIEL), the use of pellets reached 3.3 MMT in 2019. However, only 15 percent of the demand is met by domestic production, with the remaining 85 percent covered by growing imports. In 2019, Italy imported 1.9 MMT of wood pellets, mainly from Austria, Germany, and Brazil. Imports from the United States totaled 66,866 MT, nearly 24 percent lower than the previous year, with bagged pellets being accounting for nearly all of

the consumption. The pellets are mainly distributed through retail shops, hardware stores, and fossil fuel suppliers.

- The vast majority of wood pellets in Germany are used for heating. Germany does not support the use of wood for electricity generation. German law mandates that all buildings erected in or after 2009 have to use a certain share (depending on form of energy used) of renewable energy to satisfy their heating/cooling requirements, and wood pellets are one of the options. Since January 2020, the support system for the replacement of heating systems with certain wood pellet ovens has changed from a lump sum to a cost percentage system. Since January 2020, 35 percent of the replacement costs can be refunded. When replacing an oil oven, this percentage increases to 45 percent. Prior to 2020, the replacement was subsidized with €1,400 to €3,600, depending on the type of wood pellet oven.
- In France, wood pellets are primarily used in individual residential heating systems (70 percent of the total) and industrial boilers. A minor use of wood pellets is collective residential heating. However, the share of industry and of collective residential heating increases as a result of incentive policies. For heat generation for the individual residential sector, there are tax credits and loans with zero percent interest rates. For the other sectors (collective residential sector, the services sector, agriculture and the industry), the Fonds Chaleur (Heat Fund) finances projects. The Heat Fund managed by the French national energy and environment agency (ADEME) supports renewable heating -- mainly biomass but also geothermal energy and solar heating. Most heating facilities use wood chips, but some of them also use wood pellets, favoring local wood and certified wood. The bulk of imports comes from Belgium, Germany and Spain.
- In Austria, wood pellets are mainly and increasingly used in household heating and receive subsidies by the federal government, the state governments, and the communities.
- According to data by the Spanish Biomass Valorization Association (AVEBIOM), Spain's consumption of pellets reached 690,000 MT in 2019. The mild winter temperatures suppressed a larger increase in consumption. Wood pellets in Spain are mainly consumed in residential use and to a lesser extent, industrial applications. In addition to wood, the use of olive kernel or tree nut shell, and to a lesser extent sunflower kernel, is a popular alternative in those areas where available.
- In the Czech Republic the use of wood pellets is relatively small but growing rapidly (from 65,000 MT in 2015 to about 110,000 MT in 2019). The number of pellet heaters is still relatively low. However, the situation might soon change because there is a subsidy program aimed at elimination of old heaters with high emissions. Citizens who decide to buy a new pellet heater can apply for a "heater subsidy" that can cover up to 85 percent of the price of the new heater.

Industrial Use of Pellets

In markets such as the United Kingdom, Belgium, and the Netherlands residential use is negligible and the demand for wood pellets is dominated by large scale power plants. The governments of these countries opted to fulfill their obligations for renewable energy use by the use of biomass for the generation of electricity. As these countries lack a sufficient domestic production of pellets they largely depend on imports.

- The conversion of large electricity plants firing biomass instead of coal is a key factor in the UK Government's plans to reach its renewable energy targets. The main support mechanism within

the United Kingdom's energy policy that has enabled the conversions falls under the Levy Control Framework and is called 'Contracts for Difference.' The government pays a premium above the market price for the electricity generated by the biomass power plant. The largest user of pellets in the United Kingdom converted four of the six units in its plant from coal to biomass combustion. Each of these four units combusts 2.3 MMT of wood pellets per year. Further conversion plans will see the last two units move to firing on natural gas. The second largest user in the United Kingdom has now started biomass combustion. At full capacity the power generation of this plant will utilize about 1.4 MMT of pellets. Another company of similar combustion size is scheduled to start using pellets in late 2020 - early 2021. The expected maximum use of this plant is roughly 1.5 MMT. It should be noted that for power generation of these three plants, wood pellets are the main feedstock but that other biomass such as elephant grass and willow may also be used. For 2020, the total use of pellets in the United Kingdom is forecast at 8.0 MMT because of the decline in electricity demand during the COVID-19 virus lockdown and anticipated routine shutdowns of facilities. Imports are forecast to rebound and increase in 2021, assuming no pandemic measures, serious shutdowns, and the opening of the third converted plant.

- In 2019, total Swedish pellet consumption declined slightly. However, this reduction is solely based on a cut in the residential use, partly due to pellet prices, which increased to their highest reported level in ten years. Swedish industrial use of pellets increased by 100,000 MT to nearly 1.2 MMT in 2019. In 2019, imports rose by 55,000 MT to 435,000 MT (including higher volumes from Russia and Finland).
- Since 2017, Danish annual pellet consumption has surpassed 3.0 MMT. This consumption was reached because combined heat and power (CHP) plants have been converted to using pellets, as the power sector is phasing out coal. A large portion of the pellets was imported. In 2019, Danish imports totaled 3.1 MMT, and were mainly sourced from the Baltic Region (1.3 MMT), the United States (0.5 MMT) and Russia (0.5 MMT). On May 19, 2020, the European Commission approved a €550 million state aid scheme to support the production of electricity by Danish biomass installations. The scheme will be in place until December 31, 2029. The goal of the program is to phase out coal and generate 55 percent of electricity from renewable energy by 2030.
- Finland has a target of 38 percent renewable energy use in 2020, a large portion of which will be produced using wood chips. However, the use of pellets is steadily increasingly, and forecast to reach 500,000 MT in 2020. The demand is predominantly met by domestic production, about 400,000 MT annually. Imports are mainly sourced from Russia.
- In France, the development of renewable power is supported by two complementary systems: feed-in tariffs and tenders. In 2016, imports of pellets from the United States were high because of a single new biomass plant. However, the objective of this plant is to use 100 percent local pellets, and, as a result, imports from the United States fell in 2017 and subsequent years. In France, wood heat facilities are subsidized and local wood is favored in subsidized in these facilities. The bulk of imports come from neighboring countries. As a result, there is very limited potential for U.S. pellets in the long run.
- Current Belgian industrial use is estimated at about 1.3 MMT per year. Of this, some 1.2 MMT is used for electricity production to the grid, while small private units are operated in the agricultural and other industry sectors for heating purposes.
- In the Netherlands, one power plant replaced fifty percent of its coal input with biomass in 2019, estimated at roughly 800,000 MT annually. This year, this plant is forecast to expand its co-

firing to eighty percent. Additionally, in October 2019, a power plant in Rotterdam began to utilize its assigned funds for co-firing with an annual volume of roughly 500,000 MT. In 2020, a power plant in the North of the country will begin co-firing to replace fifteen percent of its coal input, estimated at roughly 100,000 MT annually. As a result of the increased demand for co-firing, the import of wood pellets doubled from 0.6 MMT to 1.2 MMT in 2019, and is forecast to double again in 2020. In 2019, Dutch pellets were mainly sourced from the Baltics (430,000 MT), Russia (185,000 MT), Belgium (184,000 MT), the United States (130,000 MT), and Portugal (110,000 MT). For more information see the GAIN Report - Dutch Wood Pellet Imports Surge to a New Record in 2019, published on May 26, 2020. Important for the further expansion of co-firing and resultant imports is the approval of the certification programs, which are necessary to demonstrate sustainability. Other biomass projects, which solely use biomass, have received funding from the Dutch Government. They include the use of a wide variety of woody biomass types such as wood chips and pellets but also non-woody biomass types. With the further upscaling of co-firing and opening of other biomass heat and/or power plants, companies will have to source more biomass from abroad, likely in the form of pellets. For more information see the GAIN Report - The Dutch Industrial Market for Biomass, published on February 5, 2019.

- The use of biomass for Central European power generation is also growing. Annual capacity of biomass installations in Poland increased from 1,123 MW in 2015 to 1,493 MW in 2019. Polish pellet imports increased from 74,000 MT in 2017, to 141,000 MT in 2018, to 217,000 MT in 2019. In 2019, Poland mainly imported wood pellets from Ukraine, the Baltics, and Germany. According to the National Energy Regulatory Office (Urzad Regulacji Energetyki), imported wood pellets used by the industry should be certificated, confirming the origin of the biomass used during production. To be eligible for such a certificate, wood pellet plants in the country of origin must be audited by an independent auditor. For more information see the GAIN Report – Polish Wood Pellets Market Brief, published on June 16, 2020.
- In Hungary, many previously coal-fired power and heating plants began to use renewable energy sources instead of fossil fuels. The feedstocks include a wide variety of agricultural and forestry biomass types, mostly sourced locally. This is supported by subsidies for electricity production with biomass utilization. At the same time, Hungary's National Renewable Energy Action Plan prefers more efficient and smaller heating centers that are close to biomass sources and can meet the local energy or heating demand.

Production

Table 12. Main Pellet Producers (1,000 MT)

Calendar Year	2013	2014	2015	2016	2017	2018	2019[e]
Germany	2,250	2,100	2,000	1,950	2,250	2,415	2,820
Sweden	1,310	1,490	1,550	1,665	1,680	1,835	1,625
Latvia	1,100	1,380	1,500	1,570	1,465	1,575	1,600
France	750	1,040	950	1,150	1,250	1,350	1,400
Austria	960	945	1,000	1,070	1,225	1,345	1,350
Estonia	590	1,000	900	1,195	1,175	1,290	1,300
Poland	600	610	850	900	1,000	1,200	1,250

Portugal	800	700	700	500	700	780	800
Spain	300	410	475	550	530	595	715
Total	**12,200**	**13,100**	**14,100**	**14,400**	**15,400**	**16,900**	**17,700**

Source: IEA, AEBIOM and Member State sector organisations, e = estimate EU FAS Posts.

With a production of roughly 17.7 MMT in 2019, nearly thirty percent of global production, the EU is the world's second largest producer of wood pellets, just recently outpaced by China which produces over 20 MMT of pellets (source Bioenergy Europe). Compared to production plants in North America, plants in the EU are predominantly small or medium-sized. Most of the leading pellet producing countries have a sizeable domestic market for residential heating pellets. Recent increases in demand for pellets has supported a further increase in domestic production. Exceptions in Table 17 are Latvia, Estonia and Portugal, which are predominantly producing for export for use in large scale power plants abroad. The COVID-19 crisis may affect the production of pellets as the supply of by-products from the wood processing sector could fall. In the EU, secondary feedstocks, such as sawdust, wood industry residues, and shavings, comprise about 85 percent of the raw materials used for pellet production (Source: EPC survey 2019).

- Germany currently has 39 companies with 50 production facilities for wood pellets, with a total annual production capacity of 4 million MT. In 2019, production amounted to 2.8 million MT, 95 percent of which were produced from residues of the timber industry. Germany is a net-exporter of wood pellets. In 2019, exports totaled 720,000 MT, of which the vast majority was exported to neighboring EU Member States (Italy, France, and Austria) and Switzerland. In 2020, the number of wood pellet based heating system units in Germany is estimated at 500,000. The majority consists of small units below a capacity of 50 kW.
- The second largest producer in the EU is Sweden. Due to expanding production, Sweden reached self-sufficiency in 2016. However, in 2019, production was cut by more than ten percent due to forest fires and unfavorable harvest conditions. As a result, a larger share of domestic consumption, which fell by only three percent, was supplied by imports. Only a small portion of production is exported, about 115,000 MT in 2019. The production numbers are based on statistics of the Swedish Pellet Association PelletsForbundet.
- Wood pellet production has expanded rapidly in the Baltic Region (Latvia, Estonia and Lithuania) over the past five years. In 2017 and 2018, Baltic production was hampered due to warm weather conditions. This is reflected in the exports which stagnated at 3.3 MMT in 2018. In 2019, exports recovered to 3.9 MMT. The Baltics are producing both for the residential and industrial markets. The main markets are Denmark, the United Kingdom, Italy, Belgium, the Netherlands and Sweden.
- There are almost 60 pellet producers in France. They produce between 200 MT and 120,000 MT of pellets per year. Production has increased steadily in the past years due to expanding domestic demand. A new plant with a capacity of 120,000 MT of black pellets is expected to be put into operation in 2020 in Pomacle-Bazancourt.
- In 2018, Austria produced 1.3 MMT of wood pellets in 42 plants-- ten percent more than in the previous year. With the exception of 2012 and 2014, pellet production is steadily rising. Austria is a net-exporter of wood pellets but domestic demand is also increasing. Exports are mainly directed to Italy and Germany. In 2019, Austria exported 820,000 MT of wood pellets of which 710,000 MT went to Italy.

- In 2019, Polish production of wood pellets recovered because the government launched a program subsidizing the exchange of old home furnaces to new, higher quality units. The program was announced on July 2017, but officially began in mid-2018. In 2020, Polish production is forecast to increase to 1.3 MMT. In 2018, Poland also amended the law on biofuels, which set stricter standards for biofuels and in effect eliminated the use of straw pellets. Poland is a net exporter of wood pellets. Over the past eight years, exports (mainly to Italy, Germany and Denmark) rose steadily to 477,000 MT in 2019.
- In 2019, Spanish pellet production reached 714,000 MT, an all times record. According to Avebiom there were 83 pellet plants in Spain, estimated to have an annual installed production capacity of 1.8 MMT in 2019. Nearly 60 pellet plants are located in shared facilities with sawmills or carpenter's workshops and 25 plants process olive kernel. Spain has traditionally been a net exporter of wood pellets. In 2019, exports reached 88,000 MT, down from the 110,000 MT exported in 2018. The large domestic demand reduced Spain´s exportable supply. Main destinations for Spain wood pellets include Italy, France and the United Kingdom.
- Portugal has 3.3 million hectares of forest land covering over 35 percent of the country's territory. The large majority of Portugal's forest land is in private hands.
  There are 25 pellet production units in Portugal. Reportedly, average annual production is 850,000 MT of pellets with a capacity of roughly one million MT. Portugal is a net exporter of wood pellets. In 2019, exports reached 721,000 MT. Denmark, the United Kingdom and Spain are Portugal's main pellet export markets.
- In the Czech Republic, there are more than 30 large and middle sized pellet producers, as well as dozens of small ones. Czech production increased from roughly 150,000 MT in 2010 to about 400,000 MT in 2019, with one company accounting for 70 percent of total Czech production. Approximately 70 percent of the domestic production is exported, mainly to Austria and Italy. The Slovak Republic produces about 150,000 MT.
- Croatia has potential to become an important supplier of pellets due to large forests that occupy 2.6 million ha, roughly 47 percent of the land area in Croatia. Currently, annual pellet production is estimated at 280,000 MT of which almost 90 percent is exported to other EU Member States, mostly to Italy.

The major raw material for pellets has traditionally been sawdust and byproducts from sawmills. With increasing competition for sawdust resources, a broader sustainable raw material is becoming necessary. There is increased interest in forest residues, wood waste, and agricultural residues, but even the volume of these additional feedstocks will not be sufficient to satisfy the full demand in Western Europe. Overall, EU wood pellet production is not expected to be able to keep up with the increasing demand from both the residential heating market and for power generation.

Trade

Table 13. Main EU Importers of Wood Pellets (1,000 MT)				
	Total Imports[a]		Imports from U.S.	
Calendar Year	**2018**	**2019**	**2018**	**2019**
United Kingdom	7,837	8,697	4,880	5,484
Denmark	3,827	3,124	623	506
Italy	2,186	1,851	88	67
Netherlands	598	1,229	7	130
Belgium	1,175	1,222	538	592
Sweden	380	436	0	0
France	276	405	0	0
Austria	360	337	0	0
Slovenia	294	301	0	0
Germany	375	278	2	0
Total EU28	**-**	**-**	**6,139**	**6,779**

Source: Trade Data Monitor (HS Code: 440131) (a) Includes EU intra-trade.

Due to their location at seaports and limited domestic production, the large power utilities in the United Kingdom and Belgium are sourcing the majority of their pellets from non-EU suppliers, mainly the United States and Canada. In the Netherlands, the co-firing plants sourced mainly from the Baltics and Russia. Complex sustainability requirements are a hurdle for pellets shipped from North America to the Dutch market.

The port restrictions in Scandinavia are favoring supplies from the Baltic Sea, which generally ship with smaller vessels than those used in Atlantic trade. In Denmark, one plant is located at a deep seaport and is supplied from North America. Improved flexibility in the infrastructure is expected to further increase the sourcing from North America. Over the past five years, an increasing portion of the Danish imports were transshipped to other EU Member States, mainly to the United Kingdom and Belgium. Based on trade statistics and Danish consumption, it is estimated that about a quarter of Danish imports were re-exported in 2018 and 2019, by which Denmark has become a hub for global pellet trade. The markets for pellets in Germany, Austria, and to a lesser extent France and Italy are more isolated and depend mostly on the production in the region itself.

Table 14. Main Suppliers of Wood Pellets to EU (1,000 MT)						
Calendar Year	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
United States	3,890	4,278	4,902	5,205	6,139	6,779
Russia	826	786	834	1,269	1,365	1,689
Canada	1,259	1,475	1,685	1,478	1,762	1,624

Ukraine	136	149	165	214	380	431
Belarus	122	158	145	212	262	375
Brazil	4	23	33	103	177	263
Others	310	294	331	211	270	319
Total	**6,547**	**7,163**	**8,095**	**8,692**	**10,355**	**11,480**

Source: Trade Data Monitor (HS Code: 44013020 and 440131 as from 2012)

EU demand for pellets has significantly outpaced domestic production for the past ten years. This has resulted in increased imports from the United States. In 2019, U.S. exports to the EU totaled 6.8 MMT, representing a value of $1.3 billion. If EU demand and trade flows remain consistent with current patterns, the United States has the potential to supply 65 percent of the import demand, which would represent a trade value of potentially US$1.6 billion in 2020. Other significant exporters of pellets to the EU are Russia and Canada. In response to the EU demand for industrial pellets, capacity has expanded in the supplying regions. These third country imports could, however, be affected by the implementation of sustainability requirements by individual EU Member State governments.

Pellet Sustainability Criteria

A key factor to being able to capture the demand in the EU market and benefit from its growth potential is the sustainability of the supply. European traders and end-users of industrial wood pellets are calling for clear, consistent, harmonized, and long-term government regulations. In the absence of EU-wide binding criteria for solid biomass, several EU Member States including Belgium, Denmark, and the Netherlands, developed their own rules in response to the growing use of imported wood pellets.

In the RED II, sustainability of biomass production will be assessed at the sourcing level, and not at the forest-holding level, as originally proposed by the EC. EU Member States may place additional sustainability requirements for biomass fuels. By December 31, 2026, the EC shall assess the impact that such additional criteria may have on the internal market to ensure harmonization of sustainability criteria for biomass fuels (for more information see the Policy and Programs chapter of this report).

Meanwhile, the industry is actively formulating its own criteria. For *non-industrial wood pellets*, the European Pellet Council (EPC) developed sustainability criteria called ENplus, based on EN 14961-2. It includes sustainability requirements for the entire supply chain. For *industrial pellets*, the Sustainable Biomass Partnership (SBP) developed a sustainability scheme based on existing programs, such as the Forest Stewardship Council (FSC) or Program for the Endorsement of Forest Certification (PEFC). The SBP made their program compliant with the current requirements in the United Kingdom, Denmark, Belgium and the Netherlands.

In the Netherlands, the Dutch Energy Accord of September 2013 adopted strict sustainability criteria for biomass, such as forest level certification, information on greenhouse gas (GHG) emissions, carbon debt, and indirect land use changes (ILUC). These strict conditions may make it difficult for Dutch buyers to implement long term contracts with pellet producers. For more information see GAIN Report – Current Opportunities for Wood Pellets in The Netherlands, dated May 14, 2018.

VIII. Notes on Statistical Data

Bioethanol

Production capacity, production and consumption figures are based on statistics of the European Commission, Eurostat, the European Renewable Ethanol Association (ePURE) and FAS Posts. FAS Posts based their estimates on figures of national industry organizations and government sources. Ethyl tert-butyl ether (ETBE) is not included in ethanol production, but is included in the consumption figures. ETBE is predominantly consumed in France, Spain, the Netherlands and Poland.

Bioethanol import figures are based on Trade Data Monitor (TDM) data, which are sourced from EU Member State customs data, and the U.S. Bureau of Census. As the EU has no Harmonized System (HS) code for bioethanol, trade numbers are difficult to assess. The estimation of the EU import figures is based on EU imports through preferential trade under HS 2207, EU imports from Brazil under HS code 3824.90.97, U.S. fuel ethanol exports to the EU under HS 2207, and EU imports of HS code 29091910 (ETBE, 45 percent ethanol).

Feedstock and co-product figures: Official data for feedstock use is scarcely made available by industry and government sources. The figures in this report represent FAS Posts estimates and are based on the conversion and yield rates listed in Appendix II.

Biodiesel

Production and consumption figures are based on statistics of Eurostat and Member State official statistics and adjusted by EU FAS Posts using additional information obtained from national industry organizations and government sources.

Trade figures are based on Trade Data Monitor (TDM) data, which are sourced from EU Member State customs data, and the U.S. Bureau of Census, and adjusted for U.S. exports of biodiesel blends. A specific customs code for pure biodiesel (B100) and biodiesel blends down to B96.5 (HS 3824.90.91) was first introduced in the EU in January 2008. In January 2012 the code was changed to HS 3826.00.10 for blends containing at least 96.5 percent biodiesel, HS code 3826.00.90 (containing between 30 and 96 percent of biodiesel), and HS 2710.20.11 for blends containing at most 30 percent biodiesel. In this report it is assumed that these codes represent a blend of 99, 95, and 5 percent, respectively.

The U.S. Bureau of the Census introduced HTS export code 3824.90.40.30 in January 2011 which exclusively covers pure biodiesel (B100) and biodiesel blends above B30.

Feedstock and co-product figures: Data for feedstock use is not available. The figures in this report represent estimates by EU FAS posts and based on the conversion and yield rates listed in Appendix II.

Appendix I – Abbreviations

Biodiesel = Fatty acid methyl ester produced from agricultural feedstock (vegetable oils, animal fat, recycled cooking oils) used as transport fuel to substitute for petroleum diesel
Bioethanol = Ethanol produced from agricultural feedstock used as transport fuel

BtL = Biomass to Liquid
Bxxx = Blend of mineral diesel and biodiesel with the number indicating the percentage of biodiesel in the blend, e.g. B100 equals 100% biodiesel, while B5 equals 5% biodiesel and 95% conventional diesel.
CEN = European Committee for Standardization (Comité Européen de Normalisation)
DDG = distillers dried grains
EBB = European Biodiesel Board
EC = European Commission
EU = 'EU' in this report refers to EU27+UK, the current EU Customs Union.
Exxx = Blend of mineral gasoline and bioethanol with the number indicating the percentage of bioethanol in the blend, e.g. E10 equals 10% bioethanol and 90% conventional gasoline.
FAME = fatty acid methyl ester
GHG = greenhouse gas
GJ = Gigajoule = 1,000,000,000 Joule or 1 million KJ
Ha = Hectares, 1 hectare = 2.471 acres
HDRD = hydrogenation derived renewable diesel (also known originally as hydrotreated or hydrogenated vegetable oil or HVO
HS = Harmonized System of tariff codes
KTOE = 1000 MT of oil equivalent = 41,868 GJ = 11.63 GWh
MJ = Megajoule
MMT = Million metric tons
MS = Member State(s) of the EU
MT = Metric ton (1,000 kg)
Mtoe = Million tons of oil equivalent
MW = Mega Watt = 1,000 Kilo Watt (KW)
MWh = Mega Watt hours= 1,000 Kilo Watt hours (KWh)
MY = Marketing Year
Nordics = Denmark, Sweden, Finland, Norway and Iceland
PME = palm oil based methyl ester biodiesel
PVO = Pure vegetable oil used as transport fuel
RED = EU Renewable Energy Directive 2009/28
RME = Rapeseed Methyl Ester
SME = Soybean Methyl Ester
TME = Tallow Methyl Ester, biodiesel made from animal fat
Toe = Tons of oil equivalent = 41,868 MJ = 11.63 MWh
UCO = Used cooking oil/recycled vegetable oil
UCOME = UCO-based methyl ester biodiesel
US$ = U.S. Dollar

Appendix II - Energy Content and Conversion Rates

1 MT Gasoline = 1,342 Liters = 1.03 toe
1 MT BtL = 1,316 Liters = 0.80 toe
1 MT of HDRD = 1,282 Liters = 1.00 toe
1 MT Ethanol = 1,267 Liters = 0.64 toe
1 MT Diesel = 1,195 Liters = 1.02 toe
1 MT Biodiesel = 1,136 Liters = 0.90 toe

1 MT Pure veg Oil = 1,087 Liters = 0.83 toe

Yields Ethanol
Corn kernels: 1 MT = 402 to 417 liters (has risen since 2006)
Wheat kernels: 1 MT = 393 liters
Rye/Barley kernels: 1 MT = 241 liters
Sugar beets: 1 MT = 95 liters

Yields Biodiesel
Soybean oil, crude: 1 MT = 1,113 liters
Soybean oil, 1x refined: 1 MT = 1,128 liters
Crude palm oil (CPO): 1 MT = 1,087 liters
Animal fats/grease: 1 MT = 1,043 liters
Used cooking oil (UCO): 1 MT = 1,043 liters

Yields Ethanol Co-products (maximum theoretical yield)
Corn kernels: 1 MT = 313 kg of DDGs + up to 29 kg of corn oil
Other grain kernels: 1 MT = 313 kg of DDGs (negligible vegetable oil)

Appendix III - Related Reports from USEU and MS Posts in the EU

Country	Title	Date
Poland	Wood Pellets Market Brief	06/16/20
Spain	Perfect Weather Secures a Record Winter Grains Crop	06/01/20
EU	Biofuel Mandates in the EU by Member State in 2020	05/28/20
Netherlands	Dutch Wood Pellet Imports Surge to a New Record in 2019	05/26/20
Romania	Romania Approves New Biofuels Blending Exemptions	04/30/20
EU	Sugar Annual	04/29/20
EU	Grain and Feed Annual	04/21/20
Austria	Agricultural Processor AGRANA Starts Disinfectants Production	04/17/20
EU	Oilseeds and Products Annual	04/16/20
Portugal	Portugal Biofuels Policy and Market	03/16/20
EU	Biofuels Annual	07/16/19
EU	Biofuel Mandates in the EU by Member State in 2019	06/27/19
EU	EU Sugar Annual	04/23/19
EU	EU Grain and Feed Annual	04/15/19
EU	EU Oilseeds and Products Annual	03/28/19
Netherlands	The Dutch Industrial Market for Biomass	02/05/19
EU	EU Recognizes U.S. Soybean Industry Sustainability Scheme	02/11/19
EU	European Union Unveils Its Protein Plan	12/18/19
EU	EU Sugar Semi-Annual	09/28/18
EU	Oilseeds and Products Update	09/12/18
EU	Weather Woes Mount for EU28 Grain Crop	07/27/18
EU	EU Biofuels Annual 2018	07/03/18
EU	Biofuel Mandates in the EU by Member State in 2018	06/22/18

EU	EU Reaches a Political Agreement on Renewable Energy	06/22/18
Netherlands	Current Market Opportunities for Wood Pellets	05/17/18
Netherlands	Case Studies for a Biorefinery	05/14/18

The GAIN Reports can be downloaded from the following FAS website:

http://gain.fas.usda.gov/Pages/Default.aspx

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Disclaimer: This report presents the situation and outlook for biofuels in the EU. This report presents the views of the authors and does not reflect the official views of the U.S. Department of Agriculture (USDA). The data are not official USDA data. Official government statistics on biofuels are not available in many instances. This report is based on analytical assessments, not official data.

Attachments:

No Attachments