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Report Highlights:

EU bioethanol consumption is projected to rise by 4.5 percent to 7.21 billion liters in 2025, driven by the expansion of the gasoline pool and the growing market for E10 fuel. This year, EU bioethanol production is expected to reach a record high, supported by ample supplies of cereals and sugar beets. However, the gap between EU demand and production will widen, leading to increased imports. EU biobased diesel (BBD) consumption is forecast to rebound by 3.1 percent to 16.75 billion liters in 2025, largely due to heightened demand for sustainable aviation fuels (SAF), spurred by the EU-wide two percent mandate. In response, BBD production is anticipated to grow by 1.90 percent to 16.07 billion liters in 2025, with a rising share derived from municipal, agricultural, and food waste streams. As part of the European Green Deal, the European Commission (EC) has introduced legislative proposals aimed at increasing the adoption of biofuels across road, aviation, and maritime transport sectors.

Table of Contents

I. Summary

The 2021 EU Biofuels Annual Report contained a biomass chapter, which now is a standalone report EU Wood Pellets Annual, published July 14, 2025.

Policy and Programs

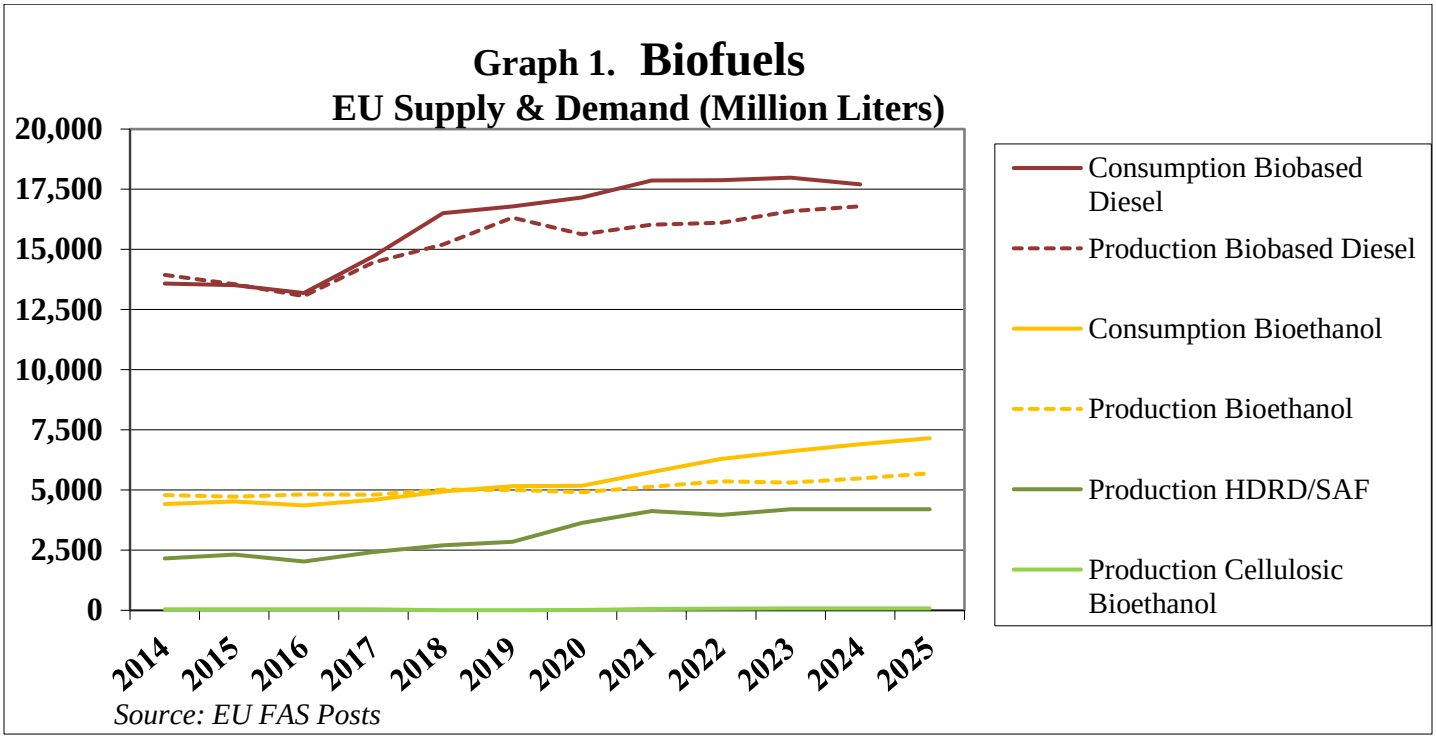
In 2018, the European Union (EU) adopted the Renewable Energy Directive II (REDII). Most of the provisions of the REDII entered into force on January 1, 2021. It sets a new overall renewable energy target of 32 percent by 2030 and a 14 percent target for the transport sector. The REDII capped the share of conventional/crop-based biofuels to one percent above Member States' 2020 consumption levels, up to the overall cap of seven percent for each Member State. The REDII also set ambitious binding targets for the use of advanced biofuels to 3.5 percent by 2030 and expanded sustainability criteria for biofuels. In October 2023, the REDII was aligned with the EU's Green Deal goals of a reduction of greenhouse gas (GHG) emissions of 55 percent by 2030 and carbon neutrality by 2050, and an overall renewable energy target of at least 42.5 percent by 2030. This revised REDII entered into force on November 20, 2023, with an 18-month period to transpose most of the Directive's provisions into national law.

As part of the Green Deal, the European Commission (EC) also adopted several legislative proposals that will affect the biofuels market in the medium to long term such as the Deforestation-free Supply Chain Regulation (EUDR). The EUDR targets products which are identified by the EC as the main drivers of deforestation including soy and palm derivatives. The requirements for economic operators will start on December 30, 2025.

Regulation 2023/851 sets a 100 percent reduction target for CO_2 emissions for new passenger cars and new light commercial vehicles by 2035. Recently, the EU also adopted a Regulation revising CO_2 emission standards for heavy-duty vehicles. The EU adopted Regulation (EU) 2023/1805 in September 2023 and Regulation 2023/2405 in October 2023 to promote the use of renewable and low-carbon fuels in the maritime and aviation transport sectors, respectively. As from January 1, 2025, the EC imposed a two percent mandate for the use of sustainable aviation fuels (SAF).

In 2025, the EC took measures to protect the domestic market. On February 10, the EC imposed antidumping duties on Chinese biodiesel imports, and on June 20, the EC suspended Pakistan's Generalized Scheme of Preferences Plus (GSP+) status for ethanol imports.

Conventional and Advanced Biofuels



Consumption

In 2024, while EU bioethanol consumption continued its expansion (4.4 percent), consumption of EU biomass-based diesel (BBD) fell significantly (9.7 percent). Bioethanol sales increased mainly due to gasoline fuel pool growth and continued market expansion of E10 in many countries. The only significant reduction of bioethanol consumption is anticipated to have taken place in Sweden, which lowered its blending mandate for ethanol. Based on the further growth of the gasoline pool and market expansion of E10, FAS European posts estimate an increase of bioethanol use by 4.5 percent to 7.21 billion liters in 2025.

In 2024, BBD consumption declined due to the increasing electrification of the transport sector, the substitution of diesel by gasoline cars, and the increased use of "advanced" BBD types. These have higher greenhouse gas (GHG) reduction values which reduces the physical volumes needed to fulfill national mandates. In 2025, BBD consumption is forecast to recover by 3.1 percent to 16.75 billion liters based on a sharp increase in the use of sustainable aviation fuels (SAF) supported by an EU-wide two percent mandate of jet fuel consumption.

Production

EU bioethanol production has increased since 2020, mainly driven by a growing domestic demand for this renewable fuel and the restriction of imports from third countries. A better overall EU 2023 beet crop supported EU bioethanol production in 2024. An even larger beet crop in 2024 is expected to serve as the foundation for further expansion of bioethanol production in 2025. French production, in particular, is anticipated to benefit from the increased availability of beet supplies, bolstering its output. In 2025, production is also forecast to increase in Central Europe, based on expanding capacity and an

abundance of cereals. Additionally, FAS EU Posts expect that facilities in Western Europe will have sufficient access to feedstocks to sustain their production levels. Overall, EU fuel bioethanol production is projected to increase by 3. 5 percent to 5.70 billion liters in 2025, a new record.

In 2024, EU production of BBD benefitted from the U.S. blenders' tax credit, which supported exports to the United States. Beginning in August 2024, provisional anti-dumping duties on imports from China created room for more EU domestic production. EU BBD production is forecast to further increase by 1.9 percent to 16.07 billion liters in 2025. This increase is mainly driven by SAF production because of the EU-wide mandate of two percent. Production of fatty acid methyl esters (FAME) is forecast to stagnate as exports of soybean methyl ester (SME) to the United States are expected to fall due to the end of the blenders' credit in January 2025. The diversification of feedstocks for BBD production continues and in 2024 the category "other" is anticipated to rank third in the feedstock mix after rapeseed oil and used cooking oil (UCO). In contrast, the use of palm oil is forecast to drop below one percent.

Trade

Since 2022, EU bioethanol imports surged and have remained at relatively high levels up to the publication of this report. During 2024, the United States remained the principal supplier with Canada and Brazil as the second and third suppliers. EU fuel bioethanol imports are estimated at 1.25 billion liters in 2024 and are projected to surge by 25 percent to 1.57 billion liters in 2025. This forecast is based on a further expansion of bioethanol consumption, while domestic production, despite a record, is not keeping up with consumption growth. During 2025, U.S. ethanol exports are forecast to remain competitive and supplies ample based on an anticipated good corn crop.

In 2024, EU BBD imports declined as sourcing from China was curtailed by provisional anti-dumping duties. With the definitive enforcement of these duties on February 18, 2025, EU biomass-based diesel (BBD) imports are expected to decrease further throughout the year. Following a surge in 2024, EU BBD exports are projected to decline in 2025, influenced by the United States' transition from a blenders' tax credit to a producers' tax credit.

Advanced Biofuels

Based on the minimum blending rates for "advanced" biofuels (as defined by the EC) produced with agricultural and forestry byproducts listed in Part A of Annex IX of the REDII, the consumption of these fuels must increase significantly by 2030. Currently, EU production of such "advanced" biofuels is limited to roughly five percent of BBD and ten percent of bioethanol. Most of these biofuels are HDRD produced from municipal and agricultural waste streams such as sewage sludge and fractions from palm oil mills, vegetable oil refineries, and pulp and paper plants, and bioethanol produced from food waste streams and fractions from celluloses production. With the introduction of catch and cover crops to Part A of Annex IX potentially a larger share of advanced biofuels (for aviation) will be produced with the use of these feedstocks.

A larger portion of biofuels is produced using waste oils and fats listed in Part B of Annex IX of the REDII. Nearly a third of the BBD (including HDRD) are produced from UCO and animal fats. The REDII sets a maximum consumption limit of 1.7 percent of all transport fuels for biofuels produced with these waste oils and fats, but EU Member States can modify this limit, if justified, considering the

limited availability of the feedstock. Sourcing feedstocks from third countries could support a production expansion to keep these renewable transport fuels competitive.

II Policy and Programs

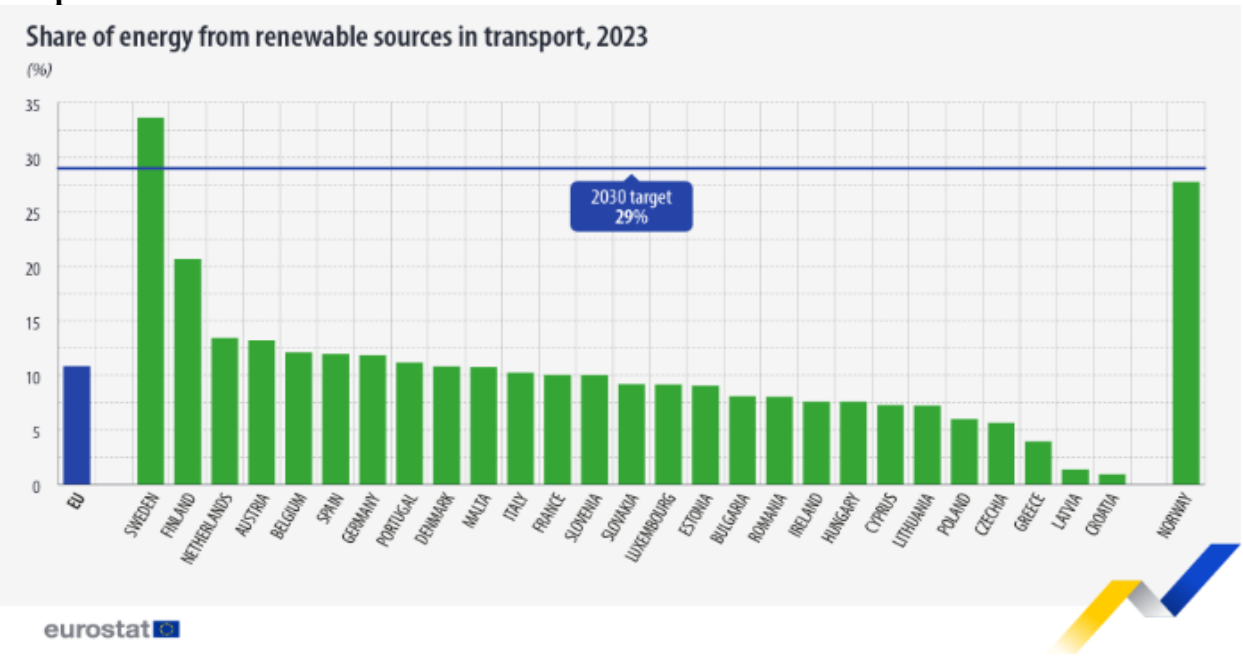
The EU's Renewable Energy Directive (RED)

The EU Energy and Climate Change Package (CCP) ran from 2010-2020. The RED, which was part of the CCP package, entered into force on June 25, 2009, and expired on December 31, 2020. The CCP required the EU to achieve a binding target whereby 20 percent of its overall energy use would be powered from renewable sources and 10 percent energy use in transportation for each Member State would come from renewables by 2020. For more information about the RED, please see the 2020 Biofuels Annual Report.

The Renewable Energy Directive II (REDII)

In 2018, the European Union (EU) adopted the new REDII for the period 2021-2030. Most of the provisions of Directive 2018/2001 entered into force on January 1, 2021. The Directive was amended in October 2023 by Directive 2023/2413 to align the REDII with the EU's Green Deal ambitions of a reduction of greenhouse gas (GHG) emissions of 55 percent by 2030 (compared to 1990) and carbon neutrality by 2050. The revised REDII entered into force on May 21, 2025. Some Member States must still transpose the Directive into national law.

Graph 2



Uptake of Renewables in the EU

In September 2024, the European Commission (EC) published a report on the State of the Energy Union 2024. In 2023, the EU reached a 24.5 percent share of its final energy use from renewable sources, up 1.5 percent from 2022. The average share of energy from renewable sources in transport was 10.8 percent in 2023 (see Graph 2), this includes double counting of advanced biofuels.

The REDII Renewables Targets

The revised REDII sets out an overall renewable energy target of at least 42.5 percent at the EU level by 2030. For transport, Member States can choose between a target of reducing GHG intensity by 14.5 percent up to 2030 (compared to 1990) or ensuring a share of at least 29 percent of renewables in final energy consumption by 2030. The Directive also sets out a binding target on non-crop based advanced biofuels of 1 percent in 2025 and 5.5 percent in 2030, of which a share of at least 1 percentage point is from renewable fuels of non-biological origin in 2030. The EU capped crop-based biofuels at the level consumed in each Member State in 2020, with an additional 1 percent point allowed over present consumption up to an overall cap of 7 percent. Member States can also set a lower limit for conventional biofuels than prescribed in the REDII.

For advanced biofuels, defined as biofuels made from feedstock listed in the Table 1, the REDII introduces two different sets of targets for biofuels made from feedstocks listed in Part A of Annex IX and feedstock listed in Part B. Biofuels from feedstocks listed in Part A must be supplied at a minimum 1 percent in 2025 and 5.5 percent in 2030, of which a share of at least 1 percentage point is from renewable fuels of non-biological origin in 2030. Biofuels produced from feedstock listed in Part B will be capped at 1.7 percent in 2030 except in Cyprus and Malta. Advanced biofuels can be double counted although not all Member States do this. In May 2024, the EC adopted Delegated Directive (EU) 2024/1405 which adds new feedstocks in Annex IX of the REDII. These feedstocks are in italics in the table below.

Table 1 Advanced Biofuel sources, Part A and Part B of Annex IX in the REDII

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	• Used cooking oil • Some categories of animal fats • *Damaged crops that are not fit for use in the food or feed chain, excluding substances that have been intentionally modified or contaminated in order to meet this definition* • *Municipal wastewater and derivatives other than sewage sludge* • *Crops grown on severely degraded land excluding food and feed crops and feedstocks listed in Part A of this Annex, where not used for the production of biofuel for the aviation sector* • *Intermediate crops, such as catch crops and cover crops, and excluding feedstocks listed in Part A of this Annex,*

• Biomass fraction of waste and residues from forestry and forest-based industries • Other non-food cellulosic material • Other ligno-cellulosic material except saw logs and veneer logs • *Fusel oils from alcoholic distillation* • *Raw methanol from kraft pulping stemming from the production of wood pulp* • *Intermediate crops, such as catch crops and cover crops that are grown in areas where due to a short vegetation period the production of food and feed crops is limited to one harvest and provided their use does not trigger demand for additional land, and provided the soil organic matter content is maintained, where used for the production of biofuel for the aviation sector* • *Crops grown on severely degraded land, except food and feed crops, where used for the production of biofuel for the aviation sector* • *Cyanobacteria*	*that are grown in areas where due to a short vegetation period the production of food and feed crops is limited to one harvest and provided their use does not trigger demand for additional land and provided the soil organic matter content is maintained, where not used for the production of biofuel for the aviation sector*

A non-exhaustive list of waste and residues covered by Annex IX of REDII can be found in Annex IV of Implementing Regulation 2022/996 on rules to verify sustainability and GHG saving criteria and low indirect land-use change (ILUC) risk criteria. The substances listed in that annex shall be considered as falling under a category of raw material set out in Annex IX without being explicitly mentioned.

Implementation of the REDII and Advanced Biofuels

Some EU Member States plan to achieve higher blending rates of advanced biofuels than required by the REDII. For more information about the mandates see our FAS GAIN report: Biofuel Mandates in the EU by Member State – 2025, published July 16, 2025.

The REDII Sustainability Criteria

To qualify for counting towards the REDII targets, biofuels, bioliquids, and biomass consumed in the EU must comply with strict sustainability criteria provided in article 29 of the REDII. This article sets requirements on the minimum level of GHG savings, safeguarding against the conversion of high-carbon content lands and protection of biodiversity.

High-Risk Indirect Land Use Change (ILUC) Biofuels: The REDII introduces specific criteria for high-risk ILUC biofuels through Delegated Act 2019/807, which determines 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 calculations of the EC, only palm oil falls under this definition. The use of high-risk ILUC biofuels were capped at the 2019 level through 2023 and are now being phased out until 2030. The Delegated Act also sets out criteria for certifying low-risk ILUC biofuels, which were already defined in article 2 of the REDII. The delegated act provides the possibility for producers to certify their

feedstock as low-risk ILUC. Palm oil producers can certify their feedstock as low risk if they comply with the general sustainability criteria of the REDII and produce through additional "measures" such as cultivation on unused or abandoned land or if fruit bunches are collected only from small holders (less than two hectares).

The REDII Greenhouse Gas (GHG) Savings

The REDII introduces new compliance measures for GHG emission criteria for biofuels used in transport and counted towards the 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 REDII or to calculate actual values for their pathway which must then be certified.

Table 2. GHG emissions savings thresholds in the REDII for the transport sector

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

Compliance With Sustainability and GHG Emission Saving Criteria – Voluntary schemes.

Voluntary schemes and national certification schemes of EU Member States help to ensure that biofuels, bioliquids and biomass fuels are sustainably produced by verifying that they comply with the EU sustainability criteria. Following the entry into force of the REDII, voluntary schemes recognized under the RED had to adjust the certification approaches to meet the new requirements. Those additional rules are enshrined in Implementing Regulation 2022/996 which lays down the rules to verify sustainability and GHG emissions saving criteria and low ILUC change-risk criteria. This Regulation lays down implementing rules to ensure economic operators comply with the sustainability criteria and provide accurate data on GHG emission savings of the REDII. The Regulation also lays down the rules to comply with the criteria for certification of low ILUC-risk biofuels as foreseen by Delegated Regulation 2019/807. More information about the recognition process can be found on the EC website.

Recognition by the EC is not a pre-requisite for certification. EU Member States may accept evidence from voluntary schemes or national certifications schemes set up by EU Member States not recognized by the EC if the competent authorities in those countries are confident about the quality of the certification services provided by these schemes.

Additional National Sustainability Requirements

The REDII allows Member States to establish additional sustainability criteria for biomass fuels. Before December 31, 2026, the EC will assess the impact of such additional criteria on the internal market, accompanied, if necessary, by a proposal to ensure harmonization at the EU-level. The REDII also allows Member States to set a limit lower than the 7 percent allowed for biofuels, bioliquids and biomass fuels produced from food and feed crops. Member States can also distinguish between different biofuels, bioliquids and biomass fuels produced from food and feed crops, considering the best available evidence on indirect land-use change impact. EU Member States may, for example, set a lower limit for

the share of biofuels, bioliquids and biomass fuels produced from certain oil crops or ban them entirely as France has done with palm oil.

EU Database for Biofuels

The REDII required the EC to set up a Union Database for Biofuels (UDB) to enable the traceability of liquid and gaseous biofuels in the EU. This database was established in part to respond to product mislabeling (fraud) concerns over imports of certain biofuels, in particular biomass-based diesel (BBD) certified made from used cooking oil (UCO). It went live on January 15, 2024, but it is not yet mandatory for economic operators to digitally report their transactions when selling biofuels into the European market. More information can be found on the EC website.

The Fuel Quality Directive (FQD)

The Fuel Quality Directive (FQD) required a reduction of the greenhouse gas (GHG) intensity of transport fuels by at least six percent by 2020 (from 1990). It was amended by the revised REDII. This amendment removed the GHG intensity reduction target from the FQD and into the REDII. In addition, the FQD limits ethanol blends to ten percent or less when ethanol is used as an oxygenate in standard gasoline burning internal combustion engines (not applicable for flex-fuel engines).

Sustainable Aviation Fuels (SAF)

In October 2023, the EU adopted Regulation 2023/2405 on SAF. The Regulation requires aviation fuel suppliers to ensure all aviation fuel made available to aircraft operators at each EU airport contains progressively an increasing minimum share of SAF, including a minimum share of synthetic aviation fuels (renewable fuels of non-biological origin), in accordance with the values and dates of application set below:

Table 3. Targets in the proposed SAF Regulation (volume based)

Date of application	Minimum share of SAF	Minimum share of synthetic fuels
January 1, 2025	2%	N/A
January 1, 2030	6%	1.2%
January 1, 2035	20%	5%
January 1, 2040	34%	10%
January 1, 2045	42%	15%
January 1, 2050	70%	35%

The EC defines SAF as aviation fuels that are either synthetic aviation fuels, recycled carbon aviation fuel, advanced biofuels as listed from feedstock listed in part A and B of Annex IX or biofuels produced from the feedstock other than food and feed crops which comply with the sustainability and GHG emissions criteria. The EU decided not to include first generation biofuels such as feed and food and crop-based biofuels for sustainability reasons. The EC defines synthetic aviation fuels as renewable fuels of non-biological origin.

Sustainable Maritime Fuels (SMF)

In September 2023, the EU adopted Regulation (EU) 2023/1805 on the use of renewable and low-carbon fuels in maritime transport. This Regulation aims to promote the use of renewable and low-carbon fuels and alternative energy sources in maritime transport throughout the EU. To achieve this, it sets a limit on the intensity of GHG emissions from the energy used on board, which becomes stricter over time. First generation biofuels such as feed and food and crop-based biofuels cannot be used to reach the targets set by the Regulation. However, advanced biofuels and renewable fuels of non-biological origin which comply with sustainability criteria and GHG emissions laid down in REDII can count towards the targets.

EU Climate Law

On July 9, 2021, Regulation 2021/1119, also known as the EU Climate Law, was published in the EU Official Journal. The Climate Law enshrines a legally binding target of net zero GHG emissions by 2050. EU Institutions and EU Member States are bound to take the necessary measures at the EU and national level to meet the target. The Climate Law includes measures to keep track of progress and adjust the EU's actions accordingly. The text also includes a reduction of net GHG emissions by at least 55 percent compared to 1990 levels by 2030. The Law also includes a process for setting a 2040 climate target.

New CO_2 emissions standards for vehicles

In April 2023, the EU adopted Regulation 2023/851 which requires a 100 percent reduction target for CO_2 tailpipe emissions from new passenger cars and new light commercial vehicles by 2035. This Regulation effectively bans the sale of new internal combustion engine passenger cars and vans by 2035. The agreed text sets intermediate 2030 targets of a 55 percent fleet-wide CO_2 emissions reduction (compared to 2021 levels) for new cars and a 50 percent reduction for vans.

In June 2024, the EU adopted Regulation 2024/1610 revising CO_2 emission standards for heavy-duty vehicles. Under the Regulation, CO_2 emissions must be reduced on average compared to 2019 levels by 45 percent by 2030, 65 percent by 2035 and 90 percent by 2040 onwards. The new Regulation also sets a 100 percent zero-emission target for urban buses by 2035 and an intermediate target of 90 percent by 2030.

Revision of the Energy Tax Directive

The EC also announced a revision of the Energy Tax Directive (ETD). The EC noted that biodiesel and especially ethanol are disadvantaged by the volume-based taxation (rates expressed per liter), because one liter of these fuels has a lower energy content than one liter of the fossil fuels they replace while the same tax rate applies. Therefore, the EC proposed to set different minimum levels of taxation applicable to fossil fuels and biofuels on an energy basis (euros/gigajoule). This would be accompanied by a transition period for food and feed crop biofuels and low-carbon fuels. The proposal continues through the legislative process and has not yet been adopted.

Table 4. Proposed minimum level of taxation applicable to motor fuels (in EUR/gigajoule)

	Start of transitional period (01/01/2023)	Final rate after completion of transitional period (01/01/2033)
Petrol	10.75	10.75
Gasoil	10.75	10.75
Sustainable food and feed crop biofuels	5.38	10.75
Sustainable biofuels	5.38	5.38
Low-carbon fuels	0.15	5.38
Advanced sustainable biofuels and biogas	0.15	0.15
Renewable fuels of non-biological origin	0.15	0.15

EU Deforestation-free Supply Chain Regulation (EUDR)

In 2023, the EU adopted the EUDR (Regulation 2023/1115) aimed to prevent products causing deforestation from entering the EU market. The Regulation targets products which are identified by the EC as the main drivers of deforestation including soybean, palm oil and related products. To sell any of the covered products in the EU, or export them from the EU, business operators will be required to provide extensive information about the product's origins, including the precise location(s) and general time of production. The Regulation establishes a country's benchmarking system through which the EC will assess the risk that countries, or parts thereof, produce relevant commodities and products that contribute to deforestation. Products sourced from standard- or high-risk origins must comply with additional risk assessment and mitigation procedures. For more information, please see GAIN Report: European Institutions Finalize Deforestation-Free Supply Chain Regulation.

On December 23, 2024, the EU published Regulation 2024/3234 amending the EUDR in the Official Journal. This amendment postpones the date of entry into application of the EUDR by one year to December 30, 2025, for most operators and June 30, 2026, for small and medium sized operators. The amendment also stipulates that the benchmarking of countries should be published by June 30, 2025. As part of the postponement, the EC also published an official statement in which it commits to analyzing, based on an impact assessment, additional measures to simplify and reduce the administrative burden in the context of the general review of the Regulation, expected no later than June 30, 2028.

On April 15, 2025, the EC also published an updated Guidance Document and Frequently Asked Questions document on the implementation of the EUDR. More information can be found in GAIN Report: European Commission Publishes New Guidance Document and Proposes Technical Changes to the EU Deforestation Regulation

The EU Taxonomy for Sustainable Activities

In order to meet the EU's climate targets for 2030 and reach the objectives of the European Green Deal, the EC adopted the Taxonomy Regulation in June 2020. This Regulation establishes the framework for an EU taxonomy for sustainable activities by setting out four overarching conditions that an economic activity must meet to qualify as 'environmentally sustainable'. The Taxonomy Regulation aims to act as a screening mechanism to define sustainable activities to steer private investment to activities the EC deems sustainable. It creates three different categories: "sustainable activities", "transitional activities and "enabling activities." The EC classifies crop-based biofuels as sustainable activities. More information can be found in GAIN Report: Commission Adopts Taxonomy for Green Investments.

Policy Response to the War in Ukraine

In February 2022, Russian forces invaded Ukraine. The war is putting pressure on global food security because both countries are larger producers of oilseeds and trade flows are being disrupted. For more information about the EU's policy response to the situation, please see the European Union: Oilseeds and Products 2025 Annual Report. Note that ongoing inflationary pressures in part due to the war have led several EU Member States to make 'temporary' changes in biofuel mandates or make them voluntary altogether, change the penalties for not fulfilling mandates, halt scheduled mandate increases, and lower tax rates. For more information about the mandates see our FAS GAIN report: Biofuel Mandates in the EU by Member State – 2025, published July 16, 2025.

Until June 5, 2025, the EU had granted Ukraine full trade liberalization, suspending import duties, quotas, and trade defense measures for imports from Ukraine on a temporary basis through the Autonomous Trade Measures (ATM) Regulation. Since June 6, 2025, the EU-Ukraine trade relationship reverted to the 2014 Deep and Comprehensive Free Trade Area (DCFTA). Transitional measures will apply through the end of 2025, reinstating quotas on sensitive agricultural products, including corn and wheat. Details on the quotas are laid down in Implementing Regulation 2025/1132.

Market Access

The EU is negotiating and has implemented several Free Trade Agreements (FTAs) with other countries and regions, which include concessions on biofuels. More information is available on the EC website.

Mercosur: On December 6, 2024, the EC announced that they reached a political agreement for an EU-Mercosur partnership agreement. The agreement includes a bilateral safeguard clause in case increased imports cause - or even threaten to cause - serious injury to relevant sectors, including agricultural sectors. This safeguard clause also covers imports under tariff rate quotas (TRQs) in the agreement. The text still needs to be formally approved by the European Parliament and the EU Member States. Under the agreement, there is a gradual phase out of duties on 91 percent of EU exports to Mercosur and 92 percent of Mercosur exports to the EU. Mercosur countries will be allocated new TRQs with a five-year phase in period:

- 450,000 metric tons of ethanol to be used by the chemical industry.
- 200,000 metric tons of ethanol for all other uses, including biofuels.

Mexico: On January 17, 2025, the EU and Mexico announced the conclusion of a new FTA. As with the agreement with Mercosur, the text still needs to be formally approved by the European Parliament and the EU Member States. The agreement abolishes customs duties for most goods. Additionally, Mexico will be allocated new TRQs with a five-year phase in period, including a TRQ for 5,500 MT for ethanol for energy use.

Duties

Regulation 2017/2321 lays down the EU's anti-dumping and anti-subsidy rule. Duty rates for fuels 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 5. Most-Favored Nation (MFN) Duty Rates for Biofuels

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	3.7%
220710	Undenatured ethanol	€19.2/hl
220720	Denatured ethanol	€10.2/hl
27101942	Petroleum oil having a bio-based carbon content of at least 80% by weight	0%

Antidumping (AD) and Countervailing (CV) Duties Against U.S. Biodiesel

In 2009, the EU initiated AD and CV duties of up to €409.2 (around $495) 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). On September 15, 2015, the EU extended the duties against both fuels an additional five years to September of 2020 with Commission Regulation 2015/1519. On September 14, 2020, two days before the expiration of the duties, the EC launched an investigation to extend the anti-dumping measures against both fuels. On August 3, 2021, the EU extended for an additional five years the anti-dumping duties levied on both fuels. Implementing Regulation (EU) 2021/1266 imposes an anti-dumping duty rate of up to €198 per MT for both fuels. For more information, please see GAIN Report: EU Extends Its Anti-Dumping Duty and Countervailing Duties on Imports of US Biodiesel.

Biodiesel AD and CV Duty Actions Against Argentina and Indonesia

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 said 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 proceedings for Argentina.

In February 2019, the EU 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 if volume limits are not exceeded. This is in line with article 18 of the WTO Agreement on subsidies and countervailing measures. On May 5, 2025, the EU published Implementing Regulation (EU) 2025/835 imposing a definitive CV duty on imports of biodiesel from Argentina for another five years. The rates of the definitive countervailing duty applicable range between 25 and 33.4 percent depending on the company. In December 2019, the EU imposed countervailing duty on imports of biodiesel from Indonesia with Implementing Regulation 2019/2092. The CV duty ranges from 8 to 18 percent depending on the company.

Biodiesel Antidumping Actions Against China

On February 10, 2025, the EC imposed antidumping duties on Chinese biodiesel imports (Implementing Regulation 2025/261), which had been applied provisionally since August 14, 2024. These measures are

imposed on biodiesel in pure form or as included in a blend but exclude aviation biofuels known as sustainable aviation fuel (SAF). The EU imposed AD duties on Chinese biodiesel range between 10.0 and 35.6 percent depending on the company.

Suspension of the GSP+ Tariff Preferences for Ethanol Originating in Pakistan

On June 20, 2025, the EC suspended Pakistan's Generalized Scheme of Preferences Plus (GSP+) status for ethanol imports, effective June 20, 2025, following the publication of Implementing Regulation 2025/1206 . The GSP+ status provides preferential access to the EU market for certain products by removing or reducing import duties. This suspension, which applies for two years, was initiated due to concerns about the impact of Pakistani ethanol exports on the EU market. Fuel-grade ethanol is not included in the measures.

Surveillance of Imports of Renewable Ethanol for Fuel

On September 15, 2023, the EC introduced retroactive surveillance measures on imports of bioethanol for fuel from several countries, including the United States. The measures were launched after imports of bioethanol into the EU increased by close to 80 percent between 2021 and 2022. The most important exporting countries in terms of volumes in 2022 were Brazil, the United States, the United Kingdom, and Peru. The introduction of these surveillance measures is the first step that can be taken before the introduction of possible antidumping or countervailing measures.

III. Ethanol

Bioethanol is produced by fermenting the carbohydrate components of plant materials. In the EU, the most used feedstocks are grains (e.g., corn, other coarse grains, and wheat kernels) and sugar beet. '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.

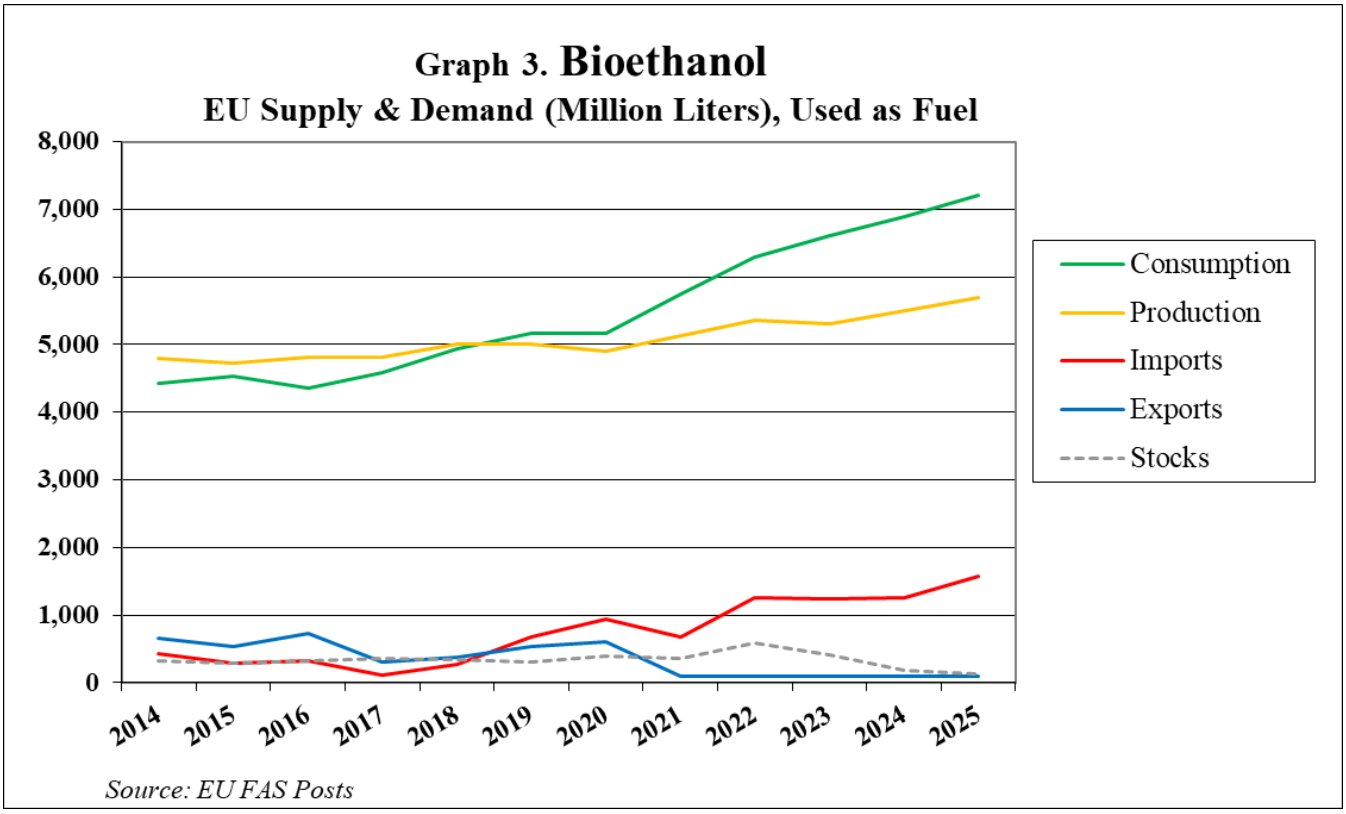
EU Production, Supply and Demand Table

Table 6. Ethanol Used as Fuel and Other Industrial Chemicals
(Million Liters)

Calendar Year	2016[r]	2017[r]	2018[r]	2019[r]	2020[r]	2021[r]	2022[r]	2023[r]	2024[e]	2025[f]
Beginning Stocks	359	359	387	363	337	439	391	607	440	200
Fuel Begin Stocks	286	325	357	335	310	392	362	582	420	178
Production	5,497	5,399	5,565	5,549	5,842	5,715	5,863	5,712	5,882	6,054
Fuel Production	4,818	4,806	5,015	5,000	4,909	5,141	5,363	5,310	5,506	5,700
>of which is cellulosic (a)	10	10	10	10	35	70	70	90	30	30
Imports	856	882	801	1,099	1,492	1,125	1,979	1,951	1,867	2,150
Fuel Imports	315	111	269	682	939	681	1,249	1,234	1,252	1,570

>of which is ETBE (b)	24	9	9	14	26	19	18	87	123	154
Exports	783	349	426	592	648	150	150	150	150	150
Fuel Exports	733	299	376	542	596	100	100	100	100	100
Consumption	5,570	5,904	5,964	6,082	6,584	6,738	7,476	7,680	7,839	8,095
Fuel Consumption	4,361	4,586	4,930	5,165	5,170	5,752	6,292	6,606	6,900	7,210
Ending Stocks	359	387	363	337	439	391	607	440	200	159
Fuel Ending Stocks	325	357	335	310	392	362	582	420	178	138
Refineries Producing First Generation Fuel Ethanol (Million Liters)										
Number of Refineries	55	57	56	52	54	58	53	55	53	53
Nameplate Capacity	7,620	7,418	7,284	7,271	7,459	8,051	8,089	8,249	8,241	8,500
Capacity Use (%)	63	65	69	69	66	64	66	64	67	67
Refineries Producing Cellulosic Fuel Ethanol (Million Liters)										
Number of Refineries	1	1	1	1	2	3	3	2	1	1
Nameplate Capacity	10	10	10	10	40	110	110	100	35	35
Capacity Use (%)	100	100	100	100	88	64	64	90	86	86
Co-product Production (1,000 MT)										
DDGs	3,258	3,307	3,518	3,441	3,618	3,674	3,993	4,042	4,231	4,385
Corn Oil	141	144	186	198	188	193	212	207	213	219
Feedstock Use for Fuel Ethanol (1,000 MT)										
Wheat Kernels	3,681	3,955	3,125	2,721	3,002	2,592	2,760	2,993	3,005	3,070
Corn Kernels	4,863	4,967	6,410	6,819	6,472	6,641	7,303	7,153	7,356	7,540
Barley Kernels	400	391	485	443	593	655	616	679	948	1,110
Rye Kernels	672	518	487	233	444	592	427	166	130	130
Triticale	794	736	733	778	1,048	1,258	1,651	1,922	2,078	2,160
Sugar Beets	8,838	7,768	7,025	7,352	4,788	6,872	4,660	3,339	3,640	3,890
Cellulosic Biomass	40	40	40	40	140	280	280	360	120	120
Market Penetration (Million Liters)										
Fuel Ethanol Use	4,361	4,586	4,930	5,165	5,170	5,752	6,292	6,606	6,900	7,210
Gasoline Pool 1/	90,208	91,145	96,158	98,291	86,029	93,429	98,966	102,488	106,647	111,233
Blend Rate (%)	4.83	5.03	5.13	5.25	6.01	6.16	6.36	6.45	6.47	6.48

Sources/Notes: r = revised / e = estimate / f = forecast of EU FAS Posts. Footnote :1/ Fuel pool defined as gasoline plus all biocomponents (ethanol, ETBE, methanol). Source: IEA, Oil Market Report, June 2025. Production capacity as of December 31 of year stated. Ethanol use: Eurostat statistics and FAS Posts projections. Trade and stocks data: See Notes section. Footnotes: (a) Production is an estimate. For more information see section Advanced Biofuels. (b) ETBE HS code 29091910, ETBE contains 45 percent ethanol which is the volume reported. (c) From 2021 to 2024, EU bioethanol and ethanol exports are anticipated to be minimal at estimated at respectively 100 million liters and 150 million per year. (d) Calculated co-product production (theoretical maximum) based on estimated feedstock use in fuel ethanol production.

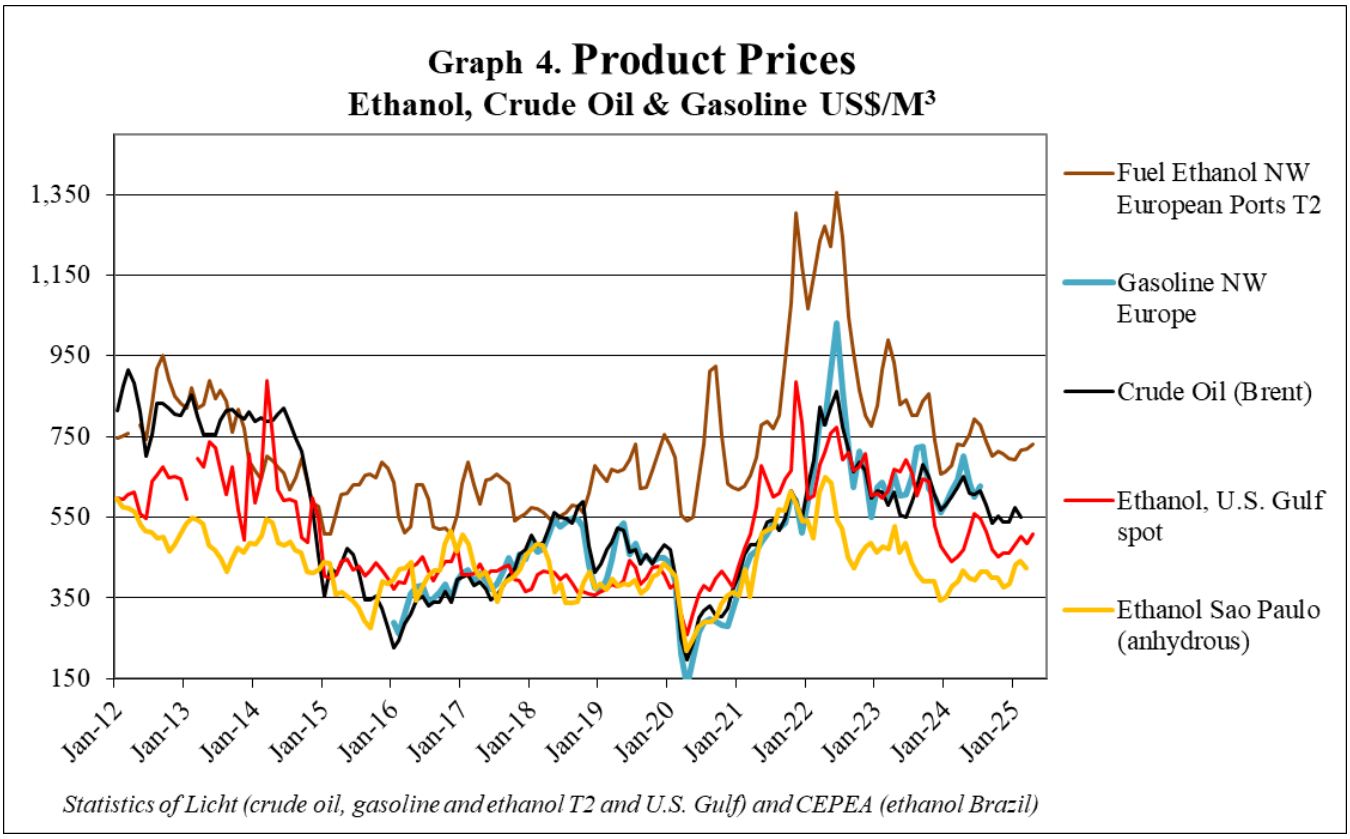


Consumption

Table 7. EU Fuel Ethanol Consumption By Member State (million liters)								
Calendar Year	**2018[r]**	**2019[r]**	**2020[r]**	**2021[r]**	**2022[r]**	**2023[r]**	**2024[e]**	**2025[f]**
France	1,084	1,239	1,087	1,378	1,648	1,625	1,723	1,735
Germany	1,491	1,435	1,378	1,467	1,508	1,581	1,622	1,645
Netherlands	335	366	430	444	477	505	525	545
Poland	299	372	359	409	456	478	506	520
Belgium	228	228	223	277	296	324	335	340
Sweden	224	178	187	229	297	371	304	335
Spain	319	257	195	248	224	306	310	315
Hungary	138	189	167	180	184	161	175	175
Other	812	901	1,144	1,120	1,202	1,255	1,400	1,600
Total	**4,930**	**5,165**	**5,170**	**5,752**	**6,292**	**6,606**	**6,900**	**7,210**

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

Following the United Kingdom's departure, the EU27 (hereafter referred to as the EU) transitioned from being a net exporter to a net importer of bioethanol. Between 2014 and 2018, the EU maintained its status as a net exporter of bioethanol. However, starting in 2019, consumption began to outpace production, resulting in the EU becoming a net importer of bioethanol (refer to Graph 3 above). For the impact of the COVID-19 and Russia's war in Ukraine refer to the EU Biofuels Annual of 2024.



EU fuel bioethanol consumption has been expanding since 2016, though only with a slight increase in 2020 due to the transport lockdowns during the COVID-19 pandemic (see graph 3 above). Based on an overall increase in the gasoline fuel pool across the EU (source: International Energy Agency) and continued market expansion of E10 in many countries, FAS EU posts estimate an overall EU growth in bioethanol fuel use of 4.5 percent in both 2024 and 2025. Three factors play a key role in the rising gasoline consumption; economic growth boosting road transportation, the substitution of diesel by gasoline cars, and the relatively low price of ethanol compared to gasoline (see graph 4).

Currently, E10 is available in the following nineteen EU Member States: Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Slovakia, and Sweden (source ePURE). EU Member States which have not introduced E10 are mainly located in the Mediterranean region (Spain, Portugal, Italy, Slovenia, Croatia, and Greece). In Spain, E10 non-labelled blend was introduced in 2020 however, E5 is the standard blend in petrol stations. In many EU Member States both E5 and E10 are available, and a gradual shift to the latter is taking place due to the increasing number of stations providing E10, further supported by the lower price of E10, growing acceptance by drivers, and a better adaptability of the car fleet engines to higher ethanol blends. Another factor for the further rise of bioethanol consumption is the lagging use of advanced bioethanol, which is often subject to multipliers. For more information about the introduction of high bioethanol blends, blending mandates, and multipliers see our FAS GAIN report: Biofuel Mandates in the EU by Member State – 2025, published July 16, 2025.

In France, bioethanol consumption passed 1.7 billion liters in 2024, buoyed by an increase of gasoline consumption and elevated sales of E10. In 2024, French sales of E10 accounted for sixty percent of gasoline sales. In recent years, French consumption of E85 has been supported by an increase in the number of flex-fuel cars and stations offering the fuel. Superethanol-E85 is a fuel composed of 65 to 85 percent bioethanol. However, in 2024, E85 consumption stagnated for the first time since record-keeping began in 2011 due to saturation of the market for flex-fuel cars.

Other countries where significant growth of bioethanol use occurred in 2024 are Germany, Poland, and the Netherlands. Currently, Germany has the largest bioethanol deficit of all EU Member States. Germany's introduction of E10 in 2010 was met with skepticism due to reports it could harm the engines. But the increasing price difference between E5 and E10 is shifting consumer choice to the higher blend. In 2024, E10 sales by volume increased by 6.1 percent in comparison to 2023. Currently the market share of E10 is about thirty percent of the gasoline octane 95 market. In 2025, the expansion of E10 sales is forecast to level off. However, it is anticipated that the gradually increasing greenhouse gas (GHG) reduction mandate in Germany will continue to drive demand for renewable fuels higher. In Poland, E10 was introduced on January 1, 2024, which combined with the higher gasoline use, boosted bioethanol consumption in 2024. In 2025, Polish bioethanol consumption is forecast to further rise mainly based on the favorable economic environment. In the Netherlands the growth of the gasoline pool is the main driver of bioethanol consumption as E10 was already introduced in 2019. The only significant reduction of bioethanol consumption is anticipated in Sweden. The Swedish blending mandate for ethanol was reduced beginning in 2024 from 7.8 percent in 2023 to 6 percent during 2024–2026, which lowered the use of bioethanol, somewhat tempered by the higher anticipated gasoline consumption.

Production and Capacity

Table 8. EU Fuel Ethanol Production
By Member State (million liters)

Calendar Year	2018[r]	2019[r]	2020[r]	2021[r]	2022[r]	2023[r]	2024[e]	2025[f]
France	1,139	1,103	975	962	1,111	1,124	1,139	1,200
Germany	799	676	700	738	759	727	797	795
Belgium	646	620	620	633	649	649	658	660
Hungary	638	642	629	662	632	590	595	635
Netherlands	519	519	481	519	519	570	570	570
Poland	259	286	276	338	404	429	543	560
Spain	522	547	501	553	497	547	542	540
Austria	251	254	222	246	259	246	247	245
Other	242	353	505	490	533	428	415	495
Total	**5,015**	**5,000**	**4,909**	**5,141**	**5,363**	**5,310**	**5,506**	**5,700**

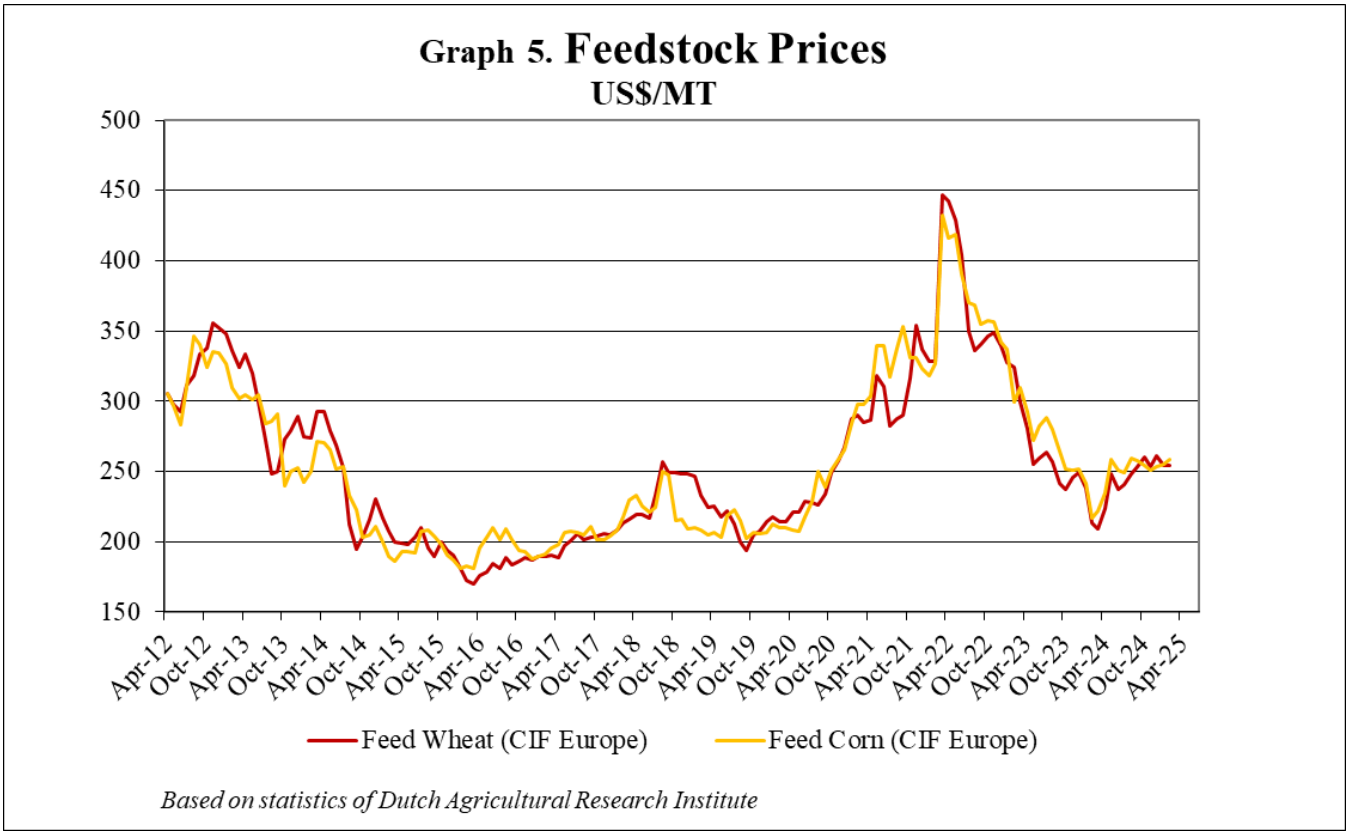
r = revised / e = estimate / f = forecast EU FAS Posts. Source: EU FAS Posts and Eurostat

Overall EU fuel bioethanol production has increased since 2020, mainly driven by the growing demand for bioethanol and the restriction of imports from third countries. A better overall EU 2023 beet crop supported EU bioethanol production in 2024, and an even larger beet crop in 2024, is forecast to be the basis for a further production expansion of bioethanol in 2025.

Production is also expected to increase in Hungary and Poland in 2025. In Hungary, capacity expanded by approximately 380 million liters of ethanol, with an estimated one-third dedicated to producing barley-based ethanol for use as road transport fuel. Hungary can increase its capacity for producing fuel bioethanol at the expense of producing for food and industrial uses if fuel bioethanol demand significantly increases. Polish bioethanol production increased in 2023 and 2024 driven by further fuel demand increase and high availability of corn in Central Europe. Polish production is forecast to further increase this year. In Central Europe, further capacity expansion is anticipated beyond 2025 in Romania and Bulgaria.

Production in Western Europe, mainly the Netherlands, Belgium, and Spain may also depend on the global availability of corn and potential restrictions on imports from the United States. As of the drafting this report, FAS Posts anticipate that these EU Member States will be able to source sufficient quantities of corn to maintain their production levels of 2024 (for more information see the next section).[1]

Feedstock Use and Production of Co-products



In the EU, nearly all bioethanol is produced from grains and sugar beet derivatives. Wheat is predominantly used in Germany and France. An abundance of corn in Central Europe, particularly in Hungary and Poland, supports corn-based ethanol production in that region. In Poland, the availability

[1] For additional information regarding the EU's Grain Market, consult the latest EU's Grain and Feed Report.

of Ukrainian corn was reportedly one of the factors which influenced the decision of introducing E10, which increased annual corn consumption by 500,000 MT. Corn is also the preferred grain in the Netherlands, Belgium, and Spain, where most ethanol plants are located at seaports, and corn is sourced from third countries (predominantly corn from Ukraine is used as feedstock). Since 2020, France shifted from wheat to corn as the main cereal for bioethanol production but sources predominantly domestically.

Even though corn and wheat prices are nearly at the same level (see graph 5), margins for producing corn ethanol are reportedly better than for producing wheat ethanol, which could further support the use of corn in Germany. But the conclusion of the EU tariff rate quota of Ukrainian corn on June 5, 2025, could increase corn prices and possibly end this price benefit. However, the global supply of corn is anticipated to be abundant and favors its use for bioethanol production in Western Europe. There is an incentive to use non-genetically engineered (non-GE) corn as ethanol producers in northwestern Europe prefer to market their distillers dried grains (DDG) as non-GE for the domestic feed market. The use of barley as feedstock for bioethanol production is forecast to further increase in 2025, mainly driven by the expanding use in Hungary. Barley is reportedly better adapted to severe droughts than corn.

In France, Germany, Czechia, Belgium, and Austria, sugar beets and their derivatives are also used to produce bioethanol. In France, sugar beets are only processed for bioethanol in sugar beet processing plants that have on-site ethanol distillation capacity. In some other EU Member States, like Austria and Belgium, beet pulp or concentrated juice may serve as a feedstock for ethanol production. Overall, the use of sugar beets for bioethanol was sharply lower in 2023. This was due in part to the ban on neonicotinoids, used to combat aphid attacks that damage yields, which negatively affected beet production in 2022, and beet ethanol production in 2023. The use of grains, in particular Ukrainian wheat, as feedstock for bioethanol production rose, compensating for reduced sugar beet availability. In 2024 and 2025, the use of sugar beets as bioethanol feedstock rebounded based on a higher EU beet supply. The spread of the reed glasswing cicada and the diseases it carries are anticipated to slightly reduce the use of sugar beets in ethanol production in Germany this year. For more information see the FAS GAIN EU Grain and Feed Annual, published on April 16, 2025, and the FAS GAIN EU Sugar Annual, published April 18, 2025.

In the EU, to reach the estimated 2025 production of 5.70 billion liters of fuel bioethanol, the required cereals volume needed is estimated at 14.0 MMT, an increase of about 490,000 MT compared to 2024. This is roughly 5.1 percent of total EU cereal production. Co-products from the bioethanol production process are distillers dried grains (DDG), wheat gluten, corn oil, and yeast concentrates. In 2025, the maximum theoretical production level (calculated, using the conversion factors listed at the end of this report) of co-products is forecast to reach 4.37 MMT, an increase of roughly 150,000 MT from 2024. This accounts for 2.7 percent of total EU feed grain consumption. The volume of sugar beets used to produce bioethanol is estimated at 3.64 MMT in 2024, and 3.89 MMT in 2025. This is roughly 3.7 percent of total EU sugar beet production.

Trade

U.S. bioethanol exports to the EU are subject to the Most Favored Nation (MFN) import tariff and sustainability requirements when fuel ethanol is shipped. For more information see the Policy and

Programs Chapter of this report and the EU Biofuels Annual of 2020. In November 2020, the EU started a surveillance program for fuel ethanol after complaints by the industry that imports had been rising disproportionately.

Since 2022, EU bioethanol imports surged and have remained at relatively high levels up to the publication of this report. In 2023, the United States, Brazil, and Peru were the main suppliers of bioethanol. In 2024, the United States remained the principal supplier with Canada and Brazil as the second and third largest suppliers. In 2024, the United Kingdom was the second largest supplier of ethanol (for all uses) to the EU, but the share of which is used as transport fuel is uncertain. Based on the methodology described in Chapter VIII – Notes on Statistical Data, 2024 EU fuel bioethanol imports are estimated at 1.25 billion liters. Since 2021, EU imports of bioethanol as ethyl-tert-butylether (ETBE) increased significantly from 18 million liters in 2022 to 123 million liters in 2024. Note that any "light (petroleum) oils" found under HS code 2710.12 (gasoline) that may contain ethanol are not included in the balance or trade estimates. This is because preblended gasoline volumes arriving in Europe are deemed to be small, and thus not appreciably affecting the balance.

During the first four months of 2025, EU ethanol imports (for all uses) were 23 percent higher than reported during the first quarter of 2024. This import expansion is mainly due to higher imports from the United States, which nearly tripled. During the remainder of 2025, U.S. ethanol exports are forecast to remain competitive in the EU due to ample supplies based on an anticipated good corn crop. EU imports from Brazil are projected to remain at a low level due to the strong domestic demand for bioethanol in Brazil. During the first four months of 2025, in addition to the United States, EU ethanol imports (for all uses) increased from Guatemala, Ukraine, and South Africa. Although EU imports from Pakistan declined during this period, because the European Commission (EC) implemented a safeguard measure against imports from the country (for more information see the Policy and Programs chapter of this report). FAS Posts projects EU fuel bioethanol imports to increase to 1.57 billion liters in 2025. This forecast is based on a further expansion of bioethanol consumption, while domestic production, despite a record, is not keeping up with this trend.

IV. Biobased Diesel

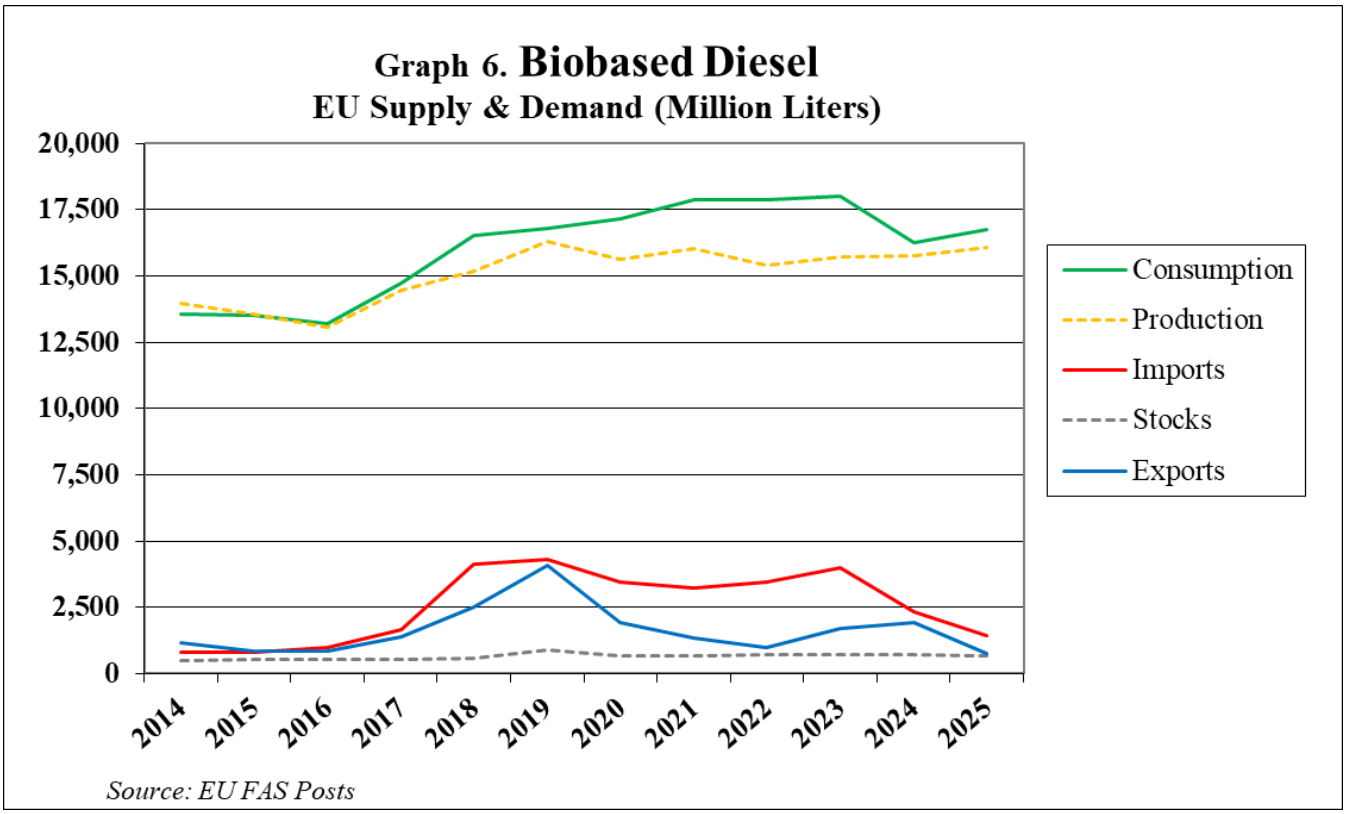
Bio-based diesel (BBD) includes biodiesel (fatty acid methyl esters, aka FAME) and renewable diesel. Renewable diesel, a full drop-in fuel replacement for fossil diesel, can be produced through various feedstock-technology platform pathways, but the renewable diesel commercialized at scale today is hydrogenation-derived renewable diesel (aka HDRD). HVO (hydrotreated vegetable oil) is an older yet still frequently used term for HDRD. HDRD plants are typically designed to also produce sustainable aviation fuel (SAF). Due to the lack of readily available and accurate supply/demand data on SAF, this report includes SAF (volumes remain very small) in HDRD statistics and therefore BBD statistics as well.

EU Production, Supply and Demand Table

Table 9. Biodiesel (FAME) & Renewable Diesel (HDRD) & SAF (Million Liters)										
Calendar Year	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024[e]**	**2025[f]**
Begin Stocks (excl. SAF)	540	530	590	900	670	680	715	715	720	650
Production	13,058	14,464	15,200	16,325	15,629	16,030	15,393	15,702	15,770	16,070
>HDRD + SAF	2,029	2,421	2,702	2,842	3,629	4,121	3,482	4,457	4,640	5,040
Imports (Biodiesel only)	958	1,669	4,148	4,286	3,449	3,224	3,465	3,994	2,315	1,450
Exports (Biodiesel only)	841	1,364	2,530	4,061	1,914	1,346	971	1,702	1,905	750
Consumption	13,185	14,709	16,508	16,780	17,154	17,873	17,887	17,989	16,250	16,750
End Stocks (excl. SAF)	530	590	900	670	680	715	715	720	650	670
Production Capacity, Biodiesel (Million Liters)										
Number of Biorefineries	187	180	179	173	174	171	162	161	161	162
Nameplate Capacity	20,733	20,109	20,514	19,869	19,824	20,019	20,128	20,370	20,381	20,425
Capacity Use (%)	53.2	59.9	60.9	67.9	60.5	59.5	59.2	55.2	54.6	54.0
Production Capacity, HDRD (includes SAF) (Million Liters)										
Number of Biorefineries	11	13	14	15	15	16	17	20	22	23
Nameplate Capacity	3,395	3,600	3,600	5,372	5,487	6,327	6,437	6,990	7,884	8,011
Capacity Use (%)	59.8	67.3	75.1	52.9	66.1	65.1	54.1	63.8	58.9	62.9
Feedstock Use for Biodiesel+HDRD+SAF (1,000 MT)										
Rapeseed oil	5,850	6,300	6,100	5,950	5,800	6,075	5,507	5,630	5,755	5,650
UCO	2,200	2,600	2,700	3,360	3,500	4,000	4,370	4,000	4,100	4,500
Palm oil	2,020	2,300	2,250	2,600	1,500	890	320	214	85	70
Soybean oil	550	700	1,200	1,070	900	780	950	1,200	840	700
Animal fats	1,000	860	1,000	1,190	1,250	1,300	900	880	885	1,230
Sunflower oil	250	230	250	270	240	225	310	310	290	280
Other	304	279	507	603	1,412	1,711	2,023	2,420	2,780	3,030
Biodiesel + HDRD Use in Distillate Pool 1/ (Million Liters)										
Biodiesel+HDRD, On-road	12,531	13,457	15,044	15,641	15,840	16,204	15,900	16,345	14,600	14,600
Biodiesel+HDRD+SAF, Total	13,185	14,709	16,508	16,780	17,154	17,873	17,887	17,989	16,250	16,750
Diesel Pool, On/Off-road /2	224,738	241,920	244,676	245,681	219,018	232,889	234,290	228,083	224,917	219,008
Diesel Pool, Total 3/	305,558	310,932	309,419	311,480	288,351	299,641	300,677	288,035	282,907	277,047
Jet Fuels/Other Kerosene 4/	53,845	57,384	60,189	61,357	28,407	34,239	51,804	57,989	60,622	61,255

Sources/Notes: r = revised / e = estimate / f = forecast EU FAS Posts. 1/ Fuel pools are defined as fossil fuels plus all "bio-components" (biofuels). 2/ All on/off-road transport incl. construction & agriculture; excludes rail, heavy marine diesels 3/ Covers all on/off-road uses as defined above plus rail & heavy marine diesels and stationary power. 4/ Covers all private-commercial-military kerosene-type jet fuels (both fossil and bio-based) + other

kerosene fuel applications. Sources: see chapter VII. Production capacity as of December 31 of year stated. HDRD and SAF trade cannot be accurately tracked under the existing eight-digit trade codes. The amount of HDRD and SAF included under previous trade codes is unclear. For more information see the Appendix of this report. The feedstock category "other" includes pine oil, tall oil, tall oil pitch, palm fatty acid distillates (PFAD), palm oil mill effluents (POME), empty palm fruit bunches, free fatty acids, and sewage sludge. Beginning/ending stocks: In the absence of reliable data and except for and 2018, data assumes that average stocks equal two weeks of consumption.



Consumption

The consumption of BBD[2] is mainly driven by Member States' GHG reduction as well as blending mandates and the size of the fuel pool. The latter decreased in 2024 and is further estimated to decrease in 2025, partly because of increasing electrification of the transport sector and the substitution from diesel to gasoline cars. In some cases, subsidies for electrical vehicles or lifting of tax incentives for diesel cars may play a role. Due to the GHG reduction mandates, FAME and HDRD with high GHG reduction values have a competitive advantage. Especially in countries that are close to the 7 percent volumetric blending limit for FAME (stipulated in the FQD[3]). Additionally, double counting of biofuels that meet criteria defined by the REDII limits the effect of increasing mandates on physical blending

[2] For some Member States (e.g. Bulgaria, Germany, Romania) the consumption number given in this report refers strictly to on-road transport while for other countries (e.g. Austria, Belgium, Italy) it includes on/off-road transport (including rail/agriculture/aviation.)

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

volumes as less biofuel is needed to fulfill the mandate. In 2024, BBD consumption decreased by almost 10 percent in comparison to the previous year. This decrease in consumption was caused by the sum of different factors across EU Member States. For instance, in Germany, the transferability of GHG reduction tickets is paused for 2025 through 2026, which led to a historically low demand for BBD at the end of 2024. In Sweden, mandates were cut significantly in 2024 to reduce fuel costs, which led to a lower consumption of BBD.

In 2025, BBD consumption is expected to recover slightly (3 percent). The projected increase in consumption is mainly attributed to the 2 percent SAF mandate imposed by the EU, which provides a strong incentive for SAF consumption. Overall, SAF and HDRD consumption are expected to increase by almost 30 percent, which is mainly driven by the demand for SAF. For more information about SAF see the Advanced Biofuels chapter of this report. Additionally, while most Member States increased their mandates from 2024 to 2025, this is not expected to affect physical consumption of FAME due to double counting of advanced biodiesel. Mandates were raised from 2024 to 2025 in Austria, Denmark, Finland, Germany, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Slovakia, Slovenia, and Spain. Sweden lowered its mandates substantially in 2024 and froze the lowered mandates for two years. In all other Member States, the mandates remain the same as in 2024. For more information about the mandates see our FAS GAIN report: Biofuel Mandates in the EU by Member State – 2025, published July 16, 2025.

Table 10. EU BBD[1] Consumption
By Member State (million Liters)

Calendar Year	2018	2019	2020[r]	2021[r]	2022[r]	2023[r]	2024[e]	2025[f]
France	3,542	3,553	2,997	3,142	3,169	3,124	3,124	3,120
Germany	2,669	2,621	3,583	2,974	2,952	3,038	2,404	2,580
Spain	1,979	2,045	1,810	1,774	1,676	2,307	2,175	2,450
Italy	1,343	1,662	1,654	1,851	1,812	1,904	1,912	1,920
Poland	951	1,025	1,076	1,076	1,200	1,259	1,234	1,280
Sweden	2,342	1,744	1,596	1,691	1,770	1,680	811	870
Belgium	625	625	454	738	650	796	810	750
Finland	354	424	381	692	532	532	532	530
Austria	529	578	444	498	472	515	515	530
Romania	254	386	384	453	521	506	501	500
Others	1,920	2,117	2,775	2,984	3,133	2,328	2,232	2,220
Total	**16,508**	**16,780**	**17,154**	**17,873**	**17,887**	**17,989**	**16,250**	**16,750**

1) Contains small amounts of SAF in most recent years. r = revised / e = estimate / f = forecast EU FAS Posts.
Source: FAS EU Posts based on information collected in MT using a conversion rate of 1 MT equals 1,136 liters for FAME and of 1 MT equals 1,282 liters for HDRD.

Production and Capacity

It is estimated that total production capacity for BBD increased marginally by about three percent in 2024 and is mainly driven by an increased demand for SAF. Due to the previously mentioned EU SAF mandate, it is expected that a larger emphasis will be placed on domestic SAF production to fulfill the

mandate in 2025. The increase in capacity can be attributed to new plants in Spain and Sweden. EU FAME production is estimated to have stagnated in 2024 and forecasted to continue to stagnate in 2025. Overall, EU production capacity remains underutilized for both BBD as well as HDRD and SAF.

The EU has a very diverse BBD production structure. Plant sizes range from an annual capacity of 12 million liters to 1,280 million liters. FAME production facilities exist in every EU Member State, except for Finland, Luxembourg, Croatia, and Malta. In contrast, HDRD production occurs in only eight countries (see table below), plant size is uniformly larger scale, and the plants are in many cases owned and operated by mineral oil companies. The majority of HDRD capacity consists of dedicated HDRD plants, some of which have been expanded over time to include SAF production. Additionally, co-processing of HDRD with conventional fuel at their oil refineries reportedly occurs in Spain (9 plants), Austria (1 plant), Portugal (1 plant), Hungary (1 plant), Germany (1 plant) and the Netherlands (1 plant).

Production

In 2024, BBD production marginally increased even though domestic consumption decreased. In 2024, this can be attributed to large amounts of BBD that were exported to the United States where importers benefitted from the blenders' tax credit, which was still active in 2024. The introduction of anti-dumping duties led to lower imports from China, which created opportunities for increased domestic production. Imports from China had previously put high pressure on EU BBD production as mostly biofuels with certificates for advanced biofuels (RED Annex IX-A feedstock) were imported by the EU. For more details, please see our previous Biofuels Annual.

BBD production for 2025 is forecast to increase by 2 percent to 16.07 billion liters compared to 2024. The increase is mainly driven by SAF production. FAME production is estimated and forecast to stay stagnant in both 2024 and 2025. Multiple factors have led to stagnating FAME production although consumption is forecast to decline. First, import data from January through March 2025 suggests a 34 percent decrease in imports of BBD to the EU. This is mostly driven by lower imports of BBD from China due to anti-dumping duties imposed by the EU. These lower imports create opportunities for domestic production in the EU. Secondly, fewer exports of soybean methyl ester (SME) to the United States are expected due to the end of the blenders' credit in January 2025 (see Policy Chapter).

Table 11. EU FAME Production
By Member State (Million Liters)

Calendar Year	2018	2019	2020[r]	2021[r]	2022[r]	2023[r]	2024[e]	2025[f]
Germany	3,799	4,070	3,875	3,837	3,790	4,003	4,020	4,040
Poland	1,001	1,091	1,081	1,138	1,110	1,108	1,130	1,150
The Netherlands	1,010	1,136	1,136	1,136	1,136	1,136	1,136	1,140
France	2,512	2,353	1,851	1,203	1,074	1,031	1,050	1,050
Spain	2,008	1,853	1,698	1,429	1,529	907	900	900
Belgium	511	568	568	568	568	704	704	700
Italy	508	616	618	560	551	642	648	650
Austria	326	340	333	335	361	366	365	360
Other	823	1,456	840	1,703	1,792	1,348	1,177	1,040
Total	**12,498**	**13,483**	**12,000**	**11,909**	**11,911**	**11,245**	**11,130**	**11,030**

Ranked by production in 2025, r = revised / e = estimate / f = forecast. Source: FAS EU Posts based on information in MT using a conversion rate of 1 MT equals 1,136 liters.

Table 12. EU HDRD[1] Producers
By Member State (Million Liters)

Calendar Year	2018	2019	2020	2021	2022[r]	2023[r]	2024[e]	2025[f]
The Netherlands	1,218	1,156	1,203	1,247	1,099	1,327	1,346	1,346
Spain	482	545	535	409	300	667	850	950
Italy	281	328	797	750	549	814	820	833
France	128	150	476	641	641	641	641	641
Finland	354	424	381	753	610	605	603	603
Sweden	160	208	208	312	278	369	321	577
Other	79	31	29	9	5	34	59	90
Total	**2,702**	**2,842**	**3,629**	**4,121**	**3,482**	**4,457**	**4,640**	**5,040**

1) Contains small amounts of SAF in more recent years. Ranked by production in 2025; e = estimate / f = forecast. Source: FAS EU Posts based on information in MT, converted to liters using a conversion rate of 1 MT equals 1,282 liters.

Feedstock Use and Co-products Production

Most Member States do not provide official data on feedstock use for the production of FAME, SAF, and HDRD. The figures and analysis below are based on FAS EU Post estimates. In recent years there has been a noticeable shift away from crop-based vegetable oils as feedstocks. For further information on the vegetable oil market in the EU, please see the latest FAS GAIN Oilseeds and Products Annual, published April 9, 2025. Waste and residue-based biofuels are attractive due to their eligibility for double counting in some EU Member States.

Rapeseed oil is historically the main feedstock for biodiesel in the EU. It accounted for almost 40 percent of total feedstock in 2024 and is forecast to account for about 37 percent of feedstock in 2025. This slight decline may be attributed to the new EU SAF mandate, which is forecast to make waste and residues increasingly attractive, as SAF may only be produced from waste and residue feedstock.

Used Cooking Oil (UCO) as a feedstock is very attractive due to its eligibility for double counting. It remained the second most important feedstock after rapeseed oil in 2024 and is forecasted to remain in second place in 2025 as well. Between January and April 2025, almost 27 percent more UCO was imported to the EU than during the same timeframe in 2024. In addition to its established eligibility for double counting, the EU's new SAF mandate as of 2025 (see Policy and Programs chapter), makes waste and residue feedstock increasingly attractive. Tariffs imposed on Chinese imports by the United States as well as the end of the U.S. blenders' tax credit may redirect UCO to the EU in 2025, which explains the increase in UCO imports in the first four months of 2025. In the future, EU companies may compete for waste and residue feedstocks. UCO is a scarce resource and with higher demand from SAF production, FAME producing companies may have difficulties sourcing this feedstock.

Table 13. Import of Used Cooking Oil (UCO) (HS Code 1518 0095 in 1000 MT)								
	2019	2020	2021	2022	2023	2024	2024 Jan - April	2025 Jan - April
China	481	273	619	935	345	474	155	283
Malaysia	101	285	201	204	244	232	111	58
United Kingdom	99	153	150	235	202	141	68	49
Russia	60	99	87	80	84	81	30	20
Saudi Arabia	70	65	67	81	85	97	27	44
Argentina	20	33	24	3	38	51	15	19
Other	449	717	461	244	455	524	152	233
Total	**1,280**	**1,625**	**1,609**	**1,780**	**1,453**	**1,600**	**558**	**706**

Source: Trade Data Monitor (TDM), LLC

The EU biodiesel standard DIN EN 14214 limits the volume of inputs mid-to-high free fatty acid (FFA) content fats and oils like **soybean oil**, palm oil and tallow that may be employed as sole feedstock in FAME as there are concerns regarding their performance in cold weather. On its own, soybean oil methyl ester (SME) does not comply with the iodine value prescribed by this standard (the iodine value functions as a measure for oxidation stability) In prior years, the amount of soybean oil used as feedstock was significantly higher than in 2024 and 2025 due to high demand for FAME from the United States in response to stacked policy support (blenders' tax credit, RINs, and California's Low Carbon Fuel Standard (LCFS)). Due to the end of the blenders' tax credit in January 2025, U.S. demand for imported SME has decreased. As a result, 17 percent less soybean oil is forecasted as feedstock used for EU FAME production in 2025 in comparison to 2024.

The amount of **animal fat** employed as feedstock is difficult to estimate and post estimate should be viewed as an indication rather than reliable data. The situation varies heavily between different Member States. In Germany, tallow methyl ester cannot be counted against the biofuel mandate. Due to issues with the availability of palm oil mill effluent (POME), Spain is forecast to substantially increase the use of animal fat as feedstock in 2025.

Sunflower Oil made up 2 percent of total EU feedstock in 2024. Mainly Greece and Bulgaria employ sunflower oil as feedstock in biodiesel. In 2024, these two Member States alone employed 52 percent of total sunflower oil, followed by smaller amounts used in Hungary, France, Poland, Romania, and Lithuania. The amount of sunflower oil used as feedstock is forecasted to remain at the same level in 2025.

Palm oil is being phased out as a feedstock for biodiesel by 2030 and has, thus, steadily declined since 2020. From 2024 to 2025 an almost 40 percent decrease in the use of palm oil as a feedstock is expected, as the phase out progresses.

The category "**other**" includes tall oil; free fatty acids; sewage sludge; residues from palm oil production including palm oil mill effluent (POME), palm fatty acid distillates (PFAD), and fresh and empty fruit bunches (FFB and EFB respectively); and cottonseed oil. In 2024, this category of feedstock increased by 15 percent year-on-year. This is mainly due to increased employment of PFAD as a

feedstock in the Netherlands, as well as tall oil in Scandinavian Member States. In 2025, a further increase of 9 percent is expected. This increase is mainly attributed to tall oil and brown grease.

Origin of feedstocks and volume of generated byproducts

A large share of EU soybean oil is made from imported soybeans. In contrast, most of the rapeseed oil is of domestic origin. The 2025 projection of 5.7 MMT of rapeseed oil used in RME is equivalent to about 14 MMT of rapeseed. This also generates roughly 8.5 MMT of rapeseed meal as a byproduct, most of which is used for animal feed. Similarly, 3.5 MMT of soybeans are crushed to generate the 0.7 MMT of soybean oil with about 2.8 MMT soybean meal as a byproduct (see also the latest FAS GAIN Oilseeds and Products Annual, published April 9, 2025).

Trade

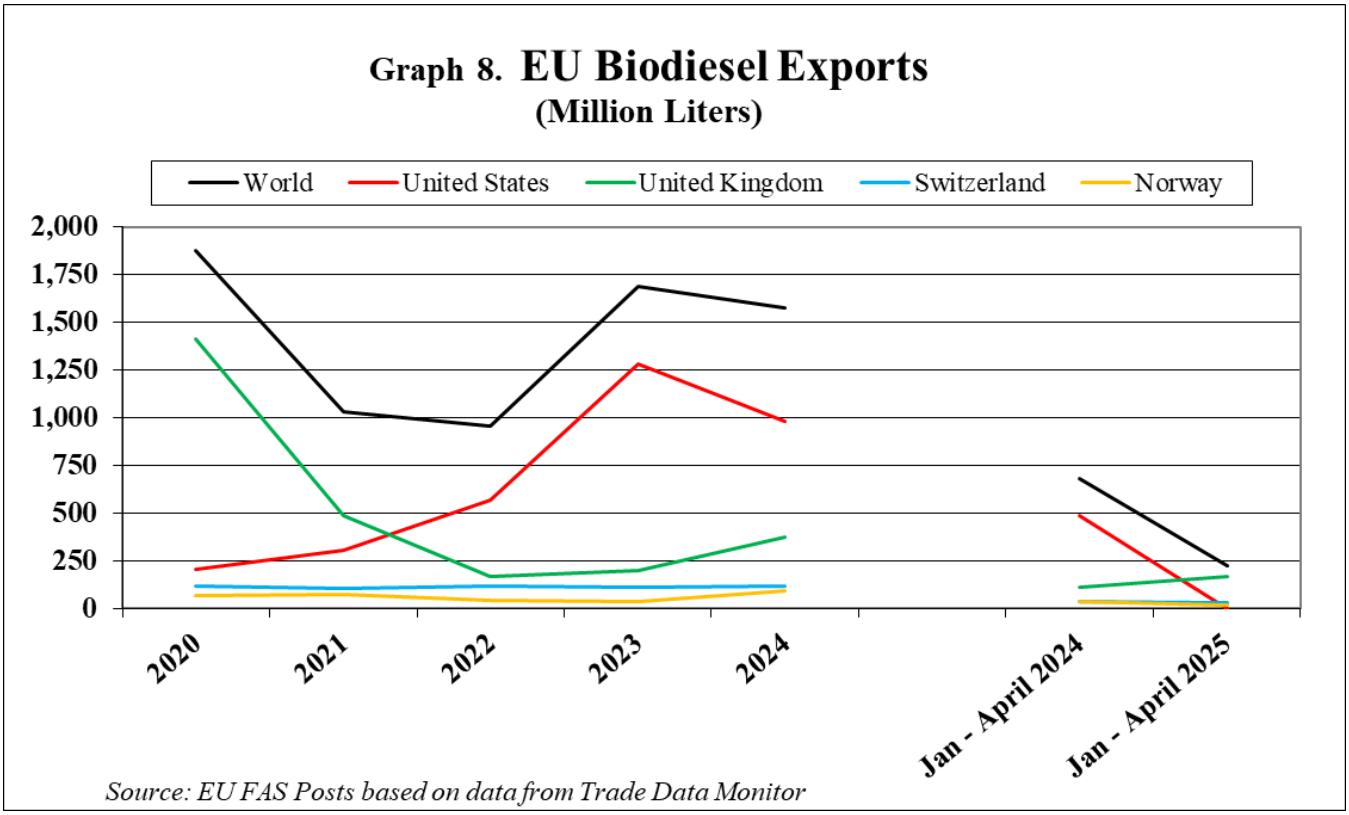
The trade flows included in this report are limited to biodiesel and petroleum oil containing biodiesel codes CN 38.26.00 and CN 27.10.20 converted to a B100 equivalent and should not include HDRD which should be classified elsewhere because it is chemically different from biodiesel. Until the end of 2024, EU Customs combined HDRD with other products under a single 10-digit code that falls under CN 2710.19, and countries known to export HDRD to the EU and elsewhere also had no HDRD-specific code yet. Since January 2025, 10-digit EU Customs Tariff Codes (TARIC) for SAF and HDRD exist. However, this data is only publicly available on the 8-digit level. Until this data becomes available, it is unclear if and how much SAF and HDRD are included in the trade data employed in this report.

In 2024, the dominant suppliers of FAME to the EU were China, Malaysia, Argentina and the United Kingdom. However, imports from China decreased by almost 42 percent in 2024 in comparison to 2023. High volumes of imported advanced biodiesel, especially from China, led to anti-dumping duties being imposed by the EU in February 2025, following provisional duties from 2024 (see Policy and Programs chapter). This has led to overall lower imports of biodiesel from China. This decline was partially compensated by Malaysian imports, which increased by almost 21 percent year-on-year. Although the United Kingdom is still a main supplier of biodiesel to the EU, imported quantities also decreased by almost 25 percent, making Malaysia the second largest importer to the EU after China in 2024. As explained in the production section, these decreases in imports opened market opportunities for domestically produced biodiesel in the EU.

Mainly due to anti-dumping duties as well as China's focus on the domestic market since December 2024, imports of biodiesel from China have decreased by almost 100 percent between January and April 2025 in comparison to the same months in the prior year. The strongest suppliers to the EU in the first four months of 2025 are Malaysia, UK, Argentina, and South Korea.

In the past five years, the United States, United Kingdom, Norway, and Switzerland have been the top export destinations for biodiesel produced in the EU. In 2023 and 2024 especially, most biodiesel exports from the EU went to the United States. The exports to the United States are very likely mostly SME made from U.S. soybeans. Exports to the United States declined by about 23 percent in 2024 in preparation for the switch from the blenders' tax credit to the producers' tax credit in January 2025. This trend continued during the first four months of 2025 and exports to the United States from the EU

declined by almost 100 percent. United Kingdom used to be the largest export market for EU biodiesel in 2020 and 2021, before the United States became the number one export market for the EU. EU exports to the UK increased by about 50 percent in the first four months of 2025. For more information on the UK biofuels market, please visit the UK Biofuels Report.



Stocks

In the absence of reliable data, estimates and forecasts assume that average stocks are equivalent to two weeks' supply of consumption. However, after the lifting of anti-dumping (AD) duties on biodiesel from Argentina, and in anticipation of the outcome of EU anti-subsidy proceedings against Argentina, European traders and petroleum companies reportedly accumulated large stocks at the end of 2018. These are assumed to have been reduced throughout 2019.

V. Advanced Biofuels

The EU's Renewable Energy Directive (RED), extended under REDII and revised on November 20, 2023, establishes an overall policy for the production and promotion of energy using "advanced" (as defined by the EC) biofuels in the EU. Lower-carbon emission biofuels are replacing higher-carbon emission fossil fuels and biofuels (based on full life-cycle analysis) in transportation. EU and national Member State policy is structured to limit further expansion of fossil fuels as well as "conventional" biofuels and incentivize expanded use of "advanced" biofuels. Advanced biofuels (defined as non-food

and feed-based biofuels) are less likely to result in land use change because they are made from waste-stream feedstocks or feedstocks that don't require arable 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 hydrogenated vegetable oil (HVO), is a drop-in fuel that can fully replace fossil diesel, and, with some modification in the production process at the plant, some level of sustainable aviation fuel (SAF) can be substituted for HDRD. All HDRD and SAF are treated as an advanced biofuel in this report but would only be considered "advanced" under EU policy when made with qualifying feedstocks including waste-stream feedstocks.

To date the large-scale commercialization of advanced biofuels has remained limited to HDRD and non-cellulosic bioethanol produced from waste streams. The race to electrify transport has already narrowed the role biofuels can play and will continue to account for an increasing share of EU and Member State energy use in transportation in the ongoing transition to renewable energy. Hydrogen and so called eFuels (Electrofuels) made with renewable electricity are longer term decarbonization solutions poised to shrink market opportunity for biofuels further, but large market impacts from these fuels are not expected within the coming decade.

Hydrogenation-Derived Renewable Diesel (HDRD)

EU production of HDRD began with Neste Oil in Finland in 2007, then a large expansion followed in 2011 as its Rotterdam plant came online. The feedstocks for HDRD are lipids (plant oils and animals fats, both virgin and waste stream products) and hydrogen. It is fully substitutable for diesel fuel. Pressured to lower the Carbon Intensity (CI) score of HDRD further, European plants continue efforts to substitute waste-stream feedstock for virgin vegetable oils and are investing in renewable hydrogen production to replace existing fossil-derived hydrogen.

In 2024, HDRD (including SAF) production increased 4.1 percent to 4.64 billion liters. In 2025, HDRD production is forecast to increase by 8.6 percent to 5.04 billion liters based on anticipated expansion of production in Sweden and Spain (for more information see Chapter IV Biomass-based Diesel). As a result of projected capacity expansion in Sweden, the Netherlands, France, Poland, Spain, and Italy production is forecast to further increase in 2026 and 2027. A major but unknown share of the capacity will be used to produce SAF.

The forecast production expansion will cause an increase in the demand for feedstocks, in particular the feedstocks listed in Part A and B of Annex IX of the RED (for more information see the Policy and Programs chapter of this report). Food and feed are not permitted in SAF used to comply with targets. The EU increasingly imports feedstocks for advanced biofuel production. In 2024, the EU imported about 2.4 MMT of palm fatty acid distillate (PFAD), 2.0 MMT of waste fats and oils under HS1518, 2.75 MMT of palm oil mill effluent (POME), and 0.2 MMT of tall oil.

Advanced Bioethanol

The commercialization of cellulosic ethanol has lagged far behind the development of HDRD and is essentially not progressing. The main factors that prevent operators from investing in cellulosic ethanol are high plant construction costs and operational challenges, insufficient regulatory support (financial incentives), and the challenges of delivering large volumes of bulky, low-energy-content feedstock. Production of bioethanol applying waste streams is however expanding. An increasing number of ethanol plants reprocess byproducts, in many cases from their own process, such as starch sludge, which can be counted as advanced biofuels. Production of advanced ethanol from waste materials listed in Part A of Annex IX of the REDII, such as food waste, is estimated at 9.9 percent of the total ethanol production (for all uses in 2024 estimated by ePURE).

Sustainable Aviation Fuels (SAF) and Marine Biofuels (SMF)

In October 2023, the EU adopted Regulation 2023/2405 on sustainable aviation fuels. The Regulation requires aviation fuel suppliers to ensure all aviation fuel made available to aircraft operators at each EU airport contains progressively an increasing minimum share of SAF. The minimum share of SAF is set at 2 percent of the total aviation fuel beginning on January 1, 2025. The total EU jet fuel consumption in 2025 is estimated at 61.3 billion liters by the International Energy Agency, which sets the mandated volume at about 1.2 billion liters of SAF. Please refer to the Policy and Programs chapter of this report for more information.

In 2023, the EU production of SAF totaled 281 million liters (source: Eurostat), with Finland (272 million liters), France (9 million liters), and the Netherlands (90,000 liters) as the only producers. Based on private sector plans, expansion of SAF production will take place in Sweden (started in 2024), Spain (started in 2024), the Netherlands (2025), Italy (2025), France (2025), Poland (2025), and Portugal (2026). The plant capacities are reportedly sufficient to cover the estimated demand of 1.2 billion liters this year. For more information see the HDRD section below.

Another opportunity for biofuels is the marine fuel market. In September 2023, the EU adopted Regulation (EU) 2023/1805 on the use of renewable and low-carbon fuels in maritime transport (for more information see chapter Policy and Programs). At this juncture it seems clear the space will become crowded with different renewable fuel solutions for the maritime sector as time passes. According to the European Maritime Safety Agency, biofuels offer medium and long-term marine fuel alternatives that can enter the market relatively quickly. HDRD has the potential to replace conventional fossil maritime fuels without substantial modifications to ship engines and related infrastructure such as storage tanks and fuel pumps. The Dutch biofuel distributor, GoodFuels, has partnered with several ship owners to supply marine biofuels to ships in the Port of Rotterdam and other European ports.

Commercial Production of Advanced Biofuels

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

Table 14. Advanced Biofuels Plants in the EU				
Country	**Biofuel**	**Feedstock**	***Annual Capacity* (million liters)**	**Year of opening**
Finland	HDRD	Oils and fats	430 (2 lines)	2007
The Netherlands	Methanol	Biogas	75	2010
Spain	HDRD	Palm oil products and UCO	945 (7 plants)	2011
The Netherlands	HDRD	Oils and fats	1,280 (of which 640 SAF in 2025)	2011
Italy (Venice)	HDRD	UCO, animal fats, and residues from the agri-food industry	513[a]	2014
Finland	HDRD	Tall oil	115	2015
Sweden	HDRD	Tall oil	335	2015
Portugal	HDRD	UCO and animal fats	50	2017
Finland	Ethanol	Saw dust	10[b]	2018
Germany	Bio-CNG	Straw	-	2018
France	HDRD	Oils and fats	640	2019
Italy (Gela)	HDRD	UCO, animal fats, and residues from the agri-food industry	945 (of which 510 SAF in 2025)	2019
Sweden	Methanol	Pulp mill side-streams	6	2020
Austria	Ethanol	Wood sugar	30	2020
Romania	Ethanol	Wheat Straw	65[c]	2021
Sweden (Lysekil)	HDRD	Pyrolysis Oil	950[d]	2021
Italy (Taranto)	SAF	Biocomponents	12	2022
Austria	HDRD	Oils and fats	200	2024
Spain (Cartagena)	HDRD	UCO or ag waste	315	2024
Sweden (Gothenburg)	HDRD	UCO and tall oil	250	2024
Poland	HDRD	Virgin and waste oils	385	2024
France	HDRD	Agricultural and food industry waste	510	2025

Source: EU FAS Posts. a. Capacity will be increased to 770 million liters in 2027. b. Stopped production in 2023. c. Stopped production in December 2023. d. Capacity increased to 950 million liters in 2025.

HDRD, SAF, SMF, and Pyrolysis Oil

The Netherlands: In 2011, Neste opened an HDRD plant with an annual capacity of roughly 1 billion liters in Rotterdam. In addition to HDRD, the Neste plant produces renewable feedstock (naphtha, propane, and alkanes) to produce polymers and other chemicals. Current annual production capacity at the plant in Rotterdam is a maximum of 1.28 billion liters. In 2024, roughly 90 percent of the feedstock used by Neste to produce HDRD consisted of waste and residue feedstocks. The waste and residues consist of used cooking oil (UCO), by-products of vegetable oil refining such as palm fatty acid distillate (PFAD), tall oil, and oils and fats removed from wastewater. Neste is expanding its refinery in Rotterdam, increasing capacity to roughly 3.45 billion liters (biofuels and intermediate feedstocks), of which roughly 1.5 billion liters is SAF. The company's target is to start up the new production unit in 2027. In addition to Neste, UPM and Shell are reportedly planning to build HDRD/SAF plants in

Rotterdam of about 640 million liters and 1 billion liters, respectively. Shell temporarily halted the construction of its biofuel plant in Rotterdam.

In 2028 or 2029, SkyNRG is planning to produce SAF for Schiphol Airport in Delfzijl, a seaport in the Northern part of the Netherlands. With the technical expertise of Shell Aviation, the plant will convert waste fats and oils into SAF with a production capacity of 125 million liters. The company reportedly has an off-take agreement to deliver the SAF to KLM for 10 years.

Finland: Neste operates a plant with 2 lines each producing roughly 200,000 MT of biofuels and intermediate feedstocks per year (of which about 215 million liters is HDRD). For more information about Neste see under the Netherlands. In 2015, UPM opened an HDRD plant in Lappeenranta. The capacity of the plant is 115 million liters of advanced biofuels per year. Biocrude oil as feedstock for HDRD production is produced by 2 refineries in Finland. Green Fuel Nordic Oy partnered with a Dutch company, BTG, to produce 25 million liters of pyrolysis oil at its plant in Lieksa. Fintoil is building a crude tall oil refinery with a capacity of 200,000 MT (as feedstock for roughly 100 million liters of HDRD), which became operational in the fall of 2022.

Spain: Spanish HDRD production is mainly from co-processing by petroleum refineries (crude oil refineries co-fed with biogenic lipids). CEPSA (since July 2011), Repsol, (since 2013) and BP (2016) are producing HDRD. During the second quarter of 2024, Repsol started to produce HDRD in Cartagena in an HDRD stand-alone facility. The annual production capacity is estimated at about 315 million liters. Repsol is reportedly planning to open other plants in Puertollano (2026), Coruna (2027), and Tarragona (2027). Cepsa is reportedly planning to open a new plant in Huelva in 2026. In March of 2024, Repsol and Bunge announced a partnership agreement to develop new opportunities to meet the growing demand for lower carbon intensity feedstocks in renewable fuel production.

Italy: In 2014, Enilive (Eni's company focused on mobility products and services) opened an HDRD plant in Venice, Italy. In 2027, the capacity is forecast to increase from 510 to 770 million liters per year. Following the model adopted for Venice, Enilive converted their petroleum refinery in Gela, Sicily, into a renewable diesel production facility, with an annual capacity of 945 million liters. In October 2022, Enilive stopped importing palm oil for its Gela and Venice biorefineries ahead of the deadline set by EU regulations for 2023. Instead of palm oil, the plant processes waste and residue feedstocks (e.g. UCO, animal fats, and residues from the agri-food industry). Enilive plans to increase its biorefining annual capacity to over 3.8 billion liters by 2028 and over 6.4 billion liters by 2030 and enhance its optionality for SAF production to about 1.3 billion liters by 2026, with further potential to double production by 2030. These targets will be supported by ongoing projects at the Venice biorefinery and the construction of new biorefineries in Malaysia and South Korea.

Sweden: Preem sources a diverse range of raw materials, including raw tall oil diesel from SunPine, the world's largest producer of raw tall oil, and food waste such as used cooking oil. The company is planning to further expand its HDRD/SAF production to 5 million liters in 2035. To achieve this, a plant of 950 million liters became operational in 2024 in Lysekil. The Swedish government lowered the greenhouse gas (GHG) reduction target in biofuels beginning January 1, 2024. This policy change will significantly affect the domestic demand for HDRD (for more information see Chapter IV Biomass-based Diesel).

In April 2024, the Finnish company, St1 and SCA opened a plant to produce up to 250 million liters of HDRD/SAF in Gothenburg, Sweden. St1 is also investigating the construction of another plant with a capacity of 500 million liters to begin operations in roughly 5 years. One of the raw materials which will be used by Preem and St1 for their expanded production is biocrude oil made from tall oil. To increase the supply of biocrude oil, SunPine increased its capacity from about 100 million liters to 150 million liters in 2021. Pyrocell, owned by Preem and Setra, constructed a plant to produce nearly 30 million liters of biocrude oil from saw dust. In September 2021, production of the non-fossil oil started. The pyrolysis oil is refined into renewable diesel and gasoline at Preem's refinery in Lysekil. Both Sweden and Finland increasingly use tall oil as feedstock for HDRD production. For more information see the FAS GAIN Report - United States Tall Oil Exports to the Nordics Surge, published November 6, 2024.

France: Total Energies' HDRD plant located in La Mede (Southern France) began producing HDRD in July 2019. This plant has a maximum capacity of 640 million liters per year. Another project in France is the BioTFuel project, a cooperation of Avril, Axens, CEA, IFPEN, ThyssenKrupp, and Total Energies. This project aims to produce 230 million liters of HDRD/SAF per year from one MMT of biomass. The demonstration-scale plant is located at Total Energies' former Flandres petroleum refinery in Dunkerque.

On March 21, 2025, the major French oil company TotalEnergies announced the conversion of the Grandpuits oil refinery near Paris into a zero-crude oil facility, set to be operational by mid-2025. The biorefinery, with a processing capacity of 510 million liters per year, will produce HDRD, SAF, and renewable naphtha, from over 75 percent waste and residues. Partnerships with the German owned SARIA (a specialist in agricultural and food industry organic waste management) and Air Liquide will secure feedstock supply and develop a renewable hydrogen unit, respectively. The Grandpuits plant will be the first major SAF production unit in France. SAF produced in Grandpuits will be shipped to the two large Paris airports (Charles de Gaulle Airport and Orly Airport) nearby.

Portugal: Portuguese HDRD production is mainly produced through co-processing of vegetable oils by petroleum refineries. Since 2017, GALP has been producing HDRD in their facilities in Sines. Production capacity is estimated at 35 million liters per year. GALP has announced the installation of a second HDRD unit in Sines, which could have an annual production capacity of over 270 million liters per year in a joint venture with Japan's Mitsui. This project is expected to be operational in 2026. This plant will be capable of switching between HDRD and SAF production using vegetable oils and residual fats.

Austria: In June 2024, OMV has announced it started HDRD production. In the final production phase, the plant should have a capacity of about 200 million liters per year.

Poland: PKN ORLEN confirmed the construction of an installation for the production of 385 million liters of HDRD per year in Plock. It will be adapted to process a wide range of lipid raw materials, including rapeseed oil and UCO. The plant will produce both biocomponents for HDRD and SAF. Production of HDRD began in 2024, while the production SAF, will start in the second half of 2025.

Advanced Bioethanol

Finland: St1's Cellunolix® biorefining concept is a method for producing biofuels or biochemicals by processing waste materials from sawmills, specifically, sawdust and wood chips from softwood trees. The plant in Kajaani had an annual production capacity of 10 million liters and started production in 2017. This plant closed production in 2023. St1's Etanolix® concept refines waste and residues rich in starch and sugar into advanced ethanol. An Etanolix® plant can be set up as stand-alone plant or it can be integrated at a food processing plant such as a bakery or brewery. There are three Etanolix® biorefineries in production in Finland (in Lahti, Vantaa and Hamina). The annual production capacity varies between 1 to 9 million liters. In October 2023, St1 announced it will end production at the site in Vantaa, Lahti, and Kajaani. The dismantling started in 2024.

Austria: The company Austrocel, a cellulose producer, began construction of an advanced bioethanol plant in early 2020, using residues from its cellulose production as feedstock. The plant became operational by the end of 2020 and delivered its first shipment of advanced biofuels (1.3 million liters) in January 2021. The Austrocel plant has a capacity of 30 million liters per year. The Austrian sugar, starch, and ethanol producer Agrana, uses residuals of its own starch production as feedstock. Currently, about 30 percent of the feedstock is used to produce about 250 million liters of bioethanol is starch sludge.

In *Bulgaria*, ADM opened an advanced ethanol plant with a capacity of 60 million liters in 2022. The plant has the technical ability to produce conventional, advanced, and industrial chemical bioethanol making use of byproducts from starch production. However, as of the drafting of this report the plant is not yet categorized as producing advanced biofuels by the EC.

Poland: On March 1, 2022, the Polish oil company, ORLEN Group, announced that they will build an installation to produce advanced bioethanol from non-food products, mainly straw. Its planned annual capacity is 32 million liters. The plant is anticipated to be operational by the end of 2025. The bioethanol plant will be built together with a biomass (mainly lignin as a byproduct of ethanol production) fueled combined heat and power (CHP) plant.

Biomethanol

Biomethanol can be used as a platform chemical to produce other biochemicals such as lactic acid and formaldehyde. It can also be used as a transport fuel and blended with biofuels, diesel, and gasoline, or used to produce bio-methyl tertiary butyl ether (bio-MTBE) or bio-dimethyl ether (bio-DME). In the Netherlands, the advanced biofuel plant of OCI Methanol Europe produces biomethanol from biogas. The plant produces about 75 million liters of biomethanol annually. 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 which is extracted from pulp mill side-streams. Other companies active in the biomethanol sector are Gidera Energy and Blue Circle Olefins.

Biomethane

A wide range of plants produce biogas and bio-liquified natural gas (bio-LNG), some of which are used in transport across much of Europe. An example is the bio-LNG plant of Renewi in the Netherlands. In

Germany, Verbio is producing biomethane from straw at its plant at the Schwedt/Oder site. The plant has the capacity to produce approximately 140 GWh of biomethane per year. This is equivalent to 14 million liters of diesel on an energy basis– using approximately 40,000 MT of straw. The biomethane is destined for use in the transport sector as bio-CNG/LNG and will qualify to count against the THG-reduction sub-mandate for advanced biofuels under the national implementation of REDII in Germany.

VI. Notes on Statistical Data

Bioethanol

Production
Historical fuel ethanol production capacity, production, and consumption figures are based on statistics of Eurostat and the European Renewable Ethanol Association (ePURE). Production of fuel ethanol: Eurostat statistics cover indigenous "bioethanol" production (ethanol produced from biomass and/or the biodegradable fraction of waste, to be used as biofuel). Missing MS production figures of Eurostat are estimated by FAS Posts. EU current forecasts are FAS Post estimates. FAS Posts based their estimates on market information from private sector, national industry organizations, and government sources.

Consumption
Eurostat statistics of final consumption (energy use by transport sector) of blended "biogasoline," which includes bio-Ethyl tert-butyl ether (bio-ETBE), and negligible volumes of bio-Methyl tert-butyl ether (bio-MTBE), and biomethanol (in total with a maximum of about 6 percent). Bio-ETBE is not included in the reported ethanol production but is included in the consumption and trade figures. The volume of bio-ETBE is converted to bioethanol, which contains 45 percent bioethanol by volume. EU current forecasts are FAS Post estimates. FAS Posts based their estimates on market information from private sector, national industry organizations, and government sources.

Trade
Fuel ethanol import figures are based on Trade Data Monitor (TDM) data (sourced from Eurostat). As the EU has no Harmonized System (HS) code for ethanol used as fuel, actual trade in ethanol used as fuel vs other industrial chemical applications are difficult to assess. From 2016 to 2024, the estimation of the EU fuel ethanol import figures is based on EU imports through preferential trade under HS 2207 (Bolivia, Costa Rica, Guatemala, and Peru), and the imports from Brazil, Canada, and the United States. The monthly shipments larger than 1 million liters plus a unit value of less than $1.20 per liter are counted as fuel ethanol, the remainder is treated as non-beverage, non-fuel ethanol. HS code 29091910 covers ETBE which contains 45 percent ethanol by volume. From 2016 to 2020, EU bioethanol exports are the residual of the production, supply, and demand (PSD) balance. From 2021 to 2024, EU fuel bioethanol exports are anticipated to be minimal at estimated at 100 million liters per year. Stocks are the residual of the production, supply, and demand balance.

Bioethanol trade numbers include ethanol imports under HS code 2207, HS code 29091910 (ETBE, 45 percent ethanol) and HS code 38249097 (solely import from Brazil). Part of the bioethanol is possibly also imported under other HS codes; 220890, 38249091, 38249098 and 38249099, blended with petrol

or other products. Either exports or imports are used as a residual to balance the table and may not exactly match totals calculated using the above methodology.

Feedstock and Co-products
Official data for feedstock use is scarce and generally unavailable from industry and government sources. The figures in this report represent FAS Posts estimates supported by staff assessments of grain and sugar markets which are published by FAS GAIN reports, official EU Member State feedstock use figures of consumed biofuels (not produced), and official trade figures of feedstocks. Feedstock and co-product figures are cross-checked with fuel ethanol production figures as published in the ethanol balance table using known feedstock yield rates (listed in the Appendix II) to ensure accuracy.

Biodiesel/HDRD

Production and Consumption
Original biodiesel/HDRD data is collected in MT, then converted to liters using a conversion rate of 1 MT = 1,136 liters for biodiesel; 1,282 liters for HDRD. 2014-2022 figures are based on Eurostat and MS official statistics and adjusted by EU FAS Posts using additional market information obtained from national industry organizations and government sources. 2023 and 2024 figures are FAS post estimates/forecasts.

Trade
Figures are based on Trade Data Monitor (TDM) data (sourced from Eurostat) 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.
Either exports or imports are used as a residual to balance the table and may not exactly match totals calculated using the above methodology.

Feedstock
Official data for feedstock use is scarce and generally unavailable from industry and government sources. The figures in this report represent FAS Posts estimates supported by staff assessments of oilseed markets which are published. Feedstock figures are cross-checked with biodiesel/HDRD production figures as published in the biodiesel/HDRD balance table using known feedstock: biofuel yield rates (listed in the Appendix II) to ensure accuracy.

Fuel Pools
Source for all fuel pools: IEA, Oil Market Report, June 2025.

Appendix I – Abbreviations

BBD = Biomass-based diesel (BBD) includes biodiesel (fatty acid methyl esters, aka FAME) and renewable diesel. Renewable diesel, a full drop-in fuel replacement for fossil diesel, can be produced through various feedstock-technology platform pathways, but the renewable diesel commercialized at scale today is hydrogenation-derived renewable diesel (aka HDRD).

Biodiesel = Fatty acid methyl ester (FAME) produced from agricultural feedstock (plant 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 = European Union. "EU" in this report refers to EU27.

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

FFA = Free fatty acids

FQD = Fuel Quality Directive

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

PFAD = Palm fatty acid distillate

PME = Palm oil-based methyl ester biodiesel

POME = Palm Oil Mill Effluent

RED = EU Renewable Energy Directive 2009/28

REDII = EU Renewable Energy Directive 2018/2001

Revised REDII = RED II as revised by EU Directive 2023/2413

RME = Rapeseed oil methyl ester
SAF = Sustainable aviation fuel
SME = Soybean oil 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
UDB = Union Database for Biofuels
US$ = U.S. Dollar

Appendix II - Energy Content and Conversion Rates

1 MT ETBE = 0.45 MT of bioethanol
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

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

Feedstock: Biodiesel Conversion Rates
Rapeseed oil: 1 MT = 1,136 liters
Soybean oil, crude: 1 MT = 1,113 liters
Soybean oil, 1x refined: 1 MT = 1,128 liters
Sunflower oil: 1 MT = 1,136 liters
Other: 1 MT = 1,136 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

Ethanol: Co-product Yield Rates (maximum theoretical yield)
Corn kernels: 1 MT = 313 kg of DDG + up to 29 kg of corn oil
Other grain kernels: 1 MT = 313 kg of DDG (negligible vegetable oil)

Appendix III - Related Reports from USEU and MS Posts

Country	Title	Date
EU	Biofuel Mandates in the EU by Member State - 2025	07/16/25
EU	Wood Pellets Annual 2025	07/14/25
EU	Sugar Annual 2025	04/18/25
EU	Grain and Feed Annual 2025	04/16/25
EU	Oilseeds and Products Annual 2025	04/09/25
Netherlands	Overview of the Market of Industrial Hemp in the Netherlands and Its Potential as Bio-based Material	02/03/25
UK	Sustainable Aviation Fuel in the UK	01/14/25
Finland	United States Tall Oil Exports to the Nordics Surge	11/06/24
UK	Wood Pellets Annual 2024	11/04/24
EU	Biofuels Annual 2024	08/13/24
EU	Wood Pellets Annual 2024	07/05/24
Denmark	Markets for Wood Chips in Northwestern Europe	04/23/24

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https://gain.fas.usda.gov/#/

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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