

Liquid

biofuels

atlas

2020-2021

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1. Introduction

From 2000–2019, both the production and consumption of liquid biofuels increased 11-fold. In 2020 they dropped simultaneously, however, due to restrictions on mobility and the decline in economic activity, which negatively affected consumption. Nonetheless, data from the first semester of 2021 shows a recovery of both activities.

The rising consumption of biofuels is driven by public policies that authorize and, in many cases, advocate for their use. One of the most commonly used instruments by the countries is biofuel use mandates. In 2020 65 States had established mandates with differing degrees of severity and compliance. Similarly, subnational states also apply these instruments based on their degree of decentralization.

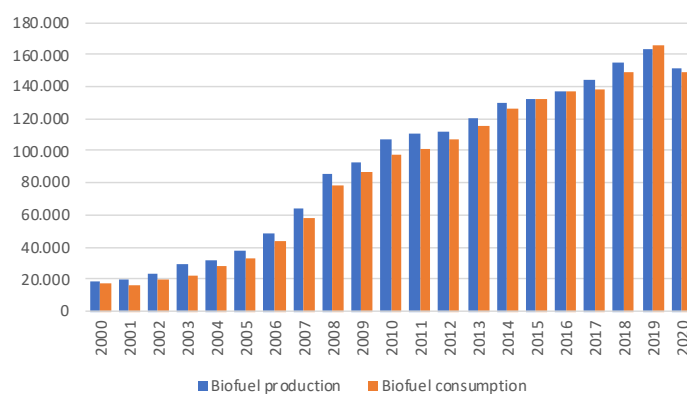
Of the different liquid biofuels, the most widely produced is bioethanol. Over the last 15 years, the use of corn as a raw material for production has been on the rise, in addition to the long-standing tradition of sugarcane-based bioethanol, which Brazil spearheaded led for decades.

On the other hand, over the last two decades, the production and consumption of biodiesel—a biofuel made through the process of transesterification using primarily palm, soybean and rapeseed oil with alcohol—is growing more rapidly than bioethanol, despite starting from a much lower baseline. This production is known as FAME or fatty acid methyl ester. Another more recent development is the production of biodiesel from hydrotreated vegetable oil, commonly known as HVO. Over the last decade, HVO consumption has grown by 687% to replace diesel and today represents 15% of all biodiesel produced.

Similarly, liquid biofuels for navigation and aviation are on the rise, albeit still incipient in the case of the former. In 2007, biojet recorded its first regular level of consumption (AIE 2021a) and, as of 2020, has risen significantly due to a new installed capacity. Moreover, a number of countries began to analyze and implement biofuel use mandates for the aviation sector. Specifically, the governments of Norway and Sweden enacted legislation in support of sustainable biofuels in aviation, while France is discussing a similar mandate for short-term implementation. Other member states of the European Union (EU), such as Germany, the Netherlands and Spain, have organized debates on the topic, while in the United States, several industry-specific initiatives are already underway (Torroba 2021).

Today, liquid biofuels are being refined as part of a cleaner transition in the framework of a mobility paradigm based on internal combustion. As new mobility paradigms are being developed (electromobility, hydrogen propulsion, etc.) that require considerable massification time, biofuels

Figure 1. Evolution of liquid biofuel production and consumption (in thousands of m³).



Source: Adapted from Torroba 2020a and EIA 2021.

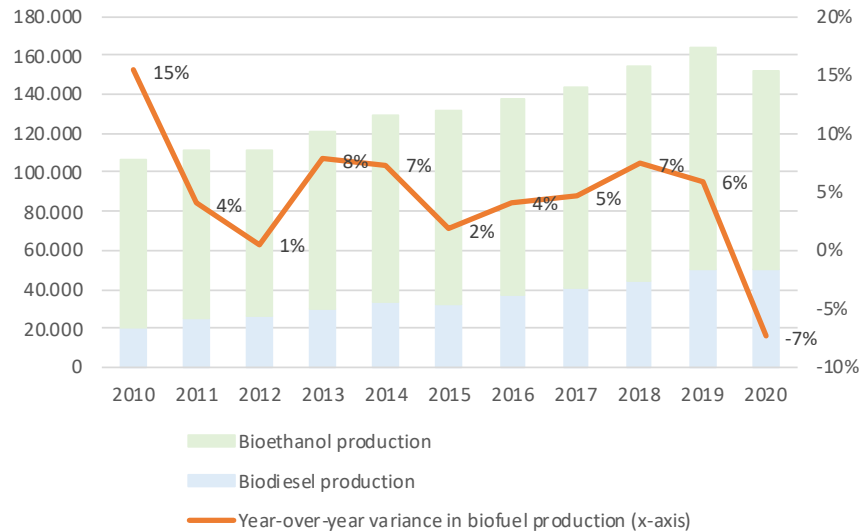
afford a more environmentally sustainable alternative to fossil fuels, without major technical changes.

This document provides information and statistics on the main variables (consumption, production, foreign trade and raw materials) and the current status of public policies regarding liquid biofuel mandates.

2. Production

Over the last decade (2011-2020), global liquid biofuel production increased by 36%. For the same period, the year-over-year variance ranged from -7% to 8%, with a clear upward trend in production, maxing out at 163,000,000 m³ in 2019. In 2020, production showed a year-over-year decline of -7%, closing at 151,000,000 m³.

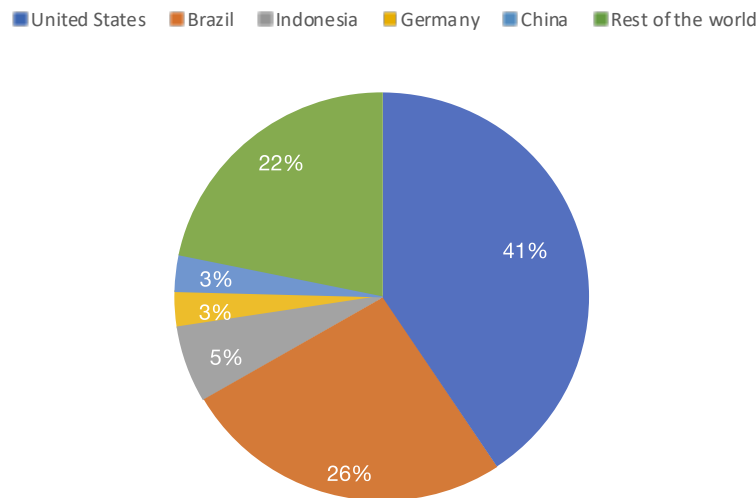
Figure 2. Year-over-year variance, trend and total global liquid biofuel production (in thousands of m³).



Source: Adapted from Torroba 2020a.

The five leading liquid biofuel producers are: the United States (41%), Brazil (26%), Indonesia (5%), China (3%) and Germany (3%). The remaining 22% of production is distributed among the rest of the countries in the world, with Thailand, France, India, Canada and Argentina also holding a notable share of the market.

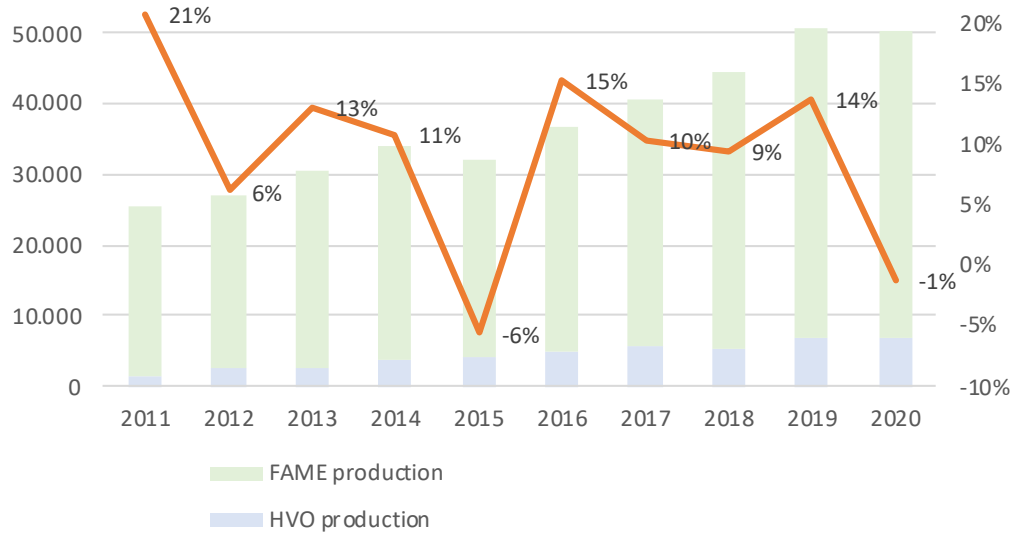
Figure 3. Distribution of global liquid biofuel production in 2020.



Over the last decade (2011-2020), global biodiesel production increased by 97%. For the same period, the year-over-year variance ranged from -6% to 21%, with a clear upward trend in production, maxing out at 50,000,000 m³ in 2019. In 2020, production showed a year-over-year decline of -1%.

Specifically, over the last 10 years, HVO production grew by 450%. The year-over-year variance for last year was 1.2%, maxing out at 7,000,000 m³. In the case of FAME, growth over the last decade reached 78%, with a production in 2020 of close to 43,000,000 m³.

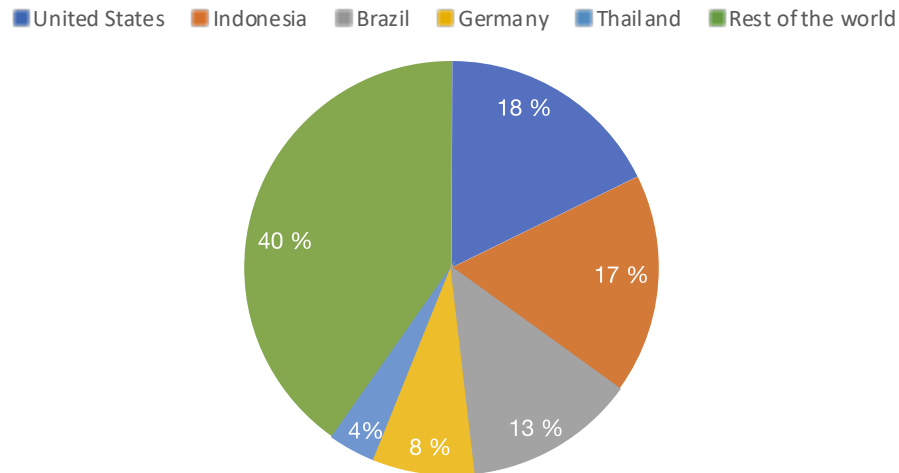
Figure 4. Year-over-year variance, trend and total global biodiesel (FAME and HVO) production (in thousands of m³).



Source: Adapted from Torroba 2020a.

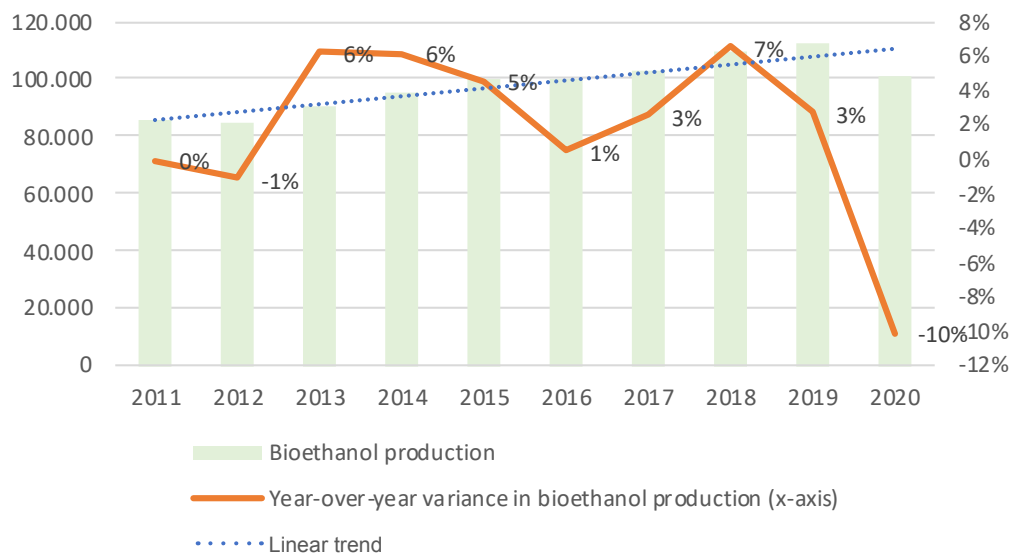
The five leading biodiesel producers are: the United States (18%), Indonesia (17%), Brazil (13%), Germany (8%) and Thailand (4%). The remaining 40% of production is distributed among the rest of the countries in the world, with France, China, Spain, Malaysia and Argentina also holding a notable share of the market.

Figure 5. Distribution of global biodiesel production in 2020.



Globally, bioethanol production grew by 18% over the last decade (2011-2020). The year-over-year variance ranged from -10% to 7%, with a clear upward trend in production, maxing out at 112,000,000 m³ in 2019. In 2020, production showed a year-over-year decline of -10%, closing at 101,000,000 m³.

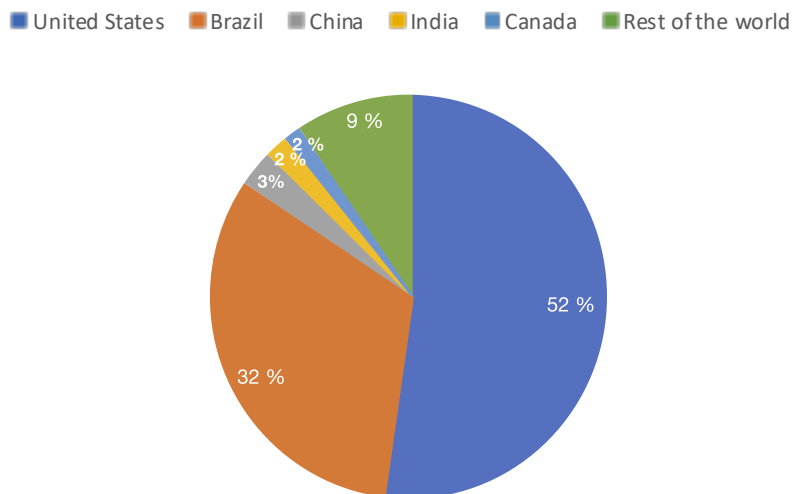
Figure 6. Year-over-year variance, trend and total global bioethanol production (in thousands of m³).



Source: Adapted from Torroba 2020a.

The five leading bioethanol producers are: the United States (52%), Brazil (32%), China (3%), India (2%) and Canada (2%). The remaining 9% of production is distributed among the rest of the countries in the world, with Thailand, France and Argentina also holding a notable share of the market.

Figure 7: Distribution of bioethanol production in the world in 2020.

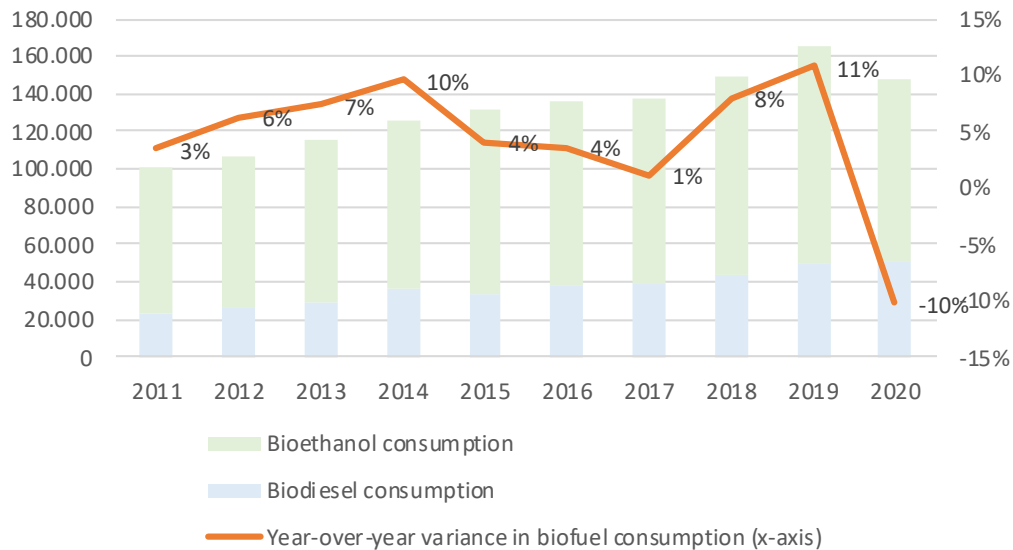


Source: Adapted from Torroba 2020a.

3. Consumption

Over the last decade (2011-2020) global liquid biofuel consumption increased by 47%. In 2019, with a year-over-year variance ranging from -10% to 11%, consumption showed a clear upward trend, exceeding 163,000,000 m³. In 2020, however, it showed a year-over-year decline of -10%, dropping to 148,000,000 m³.

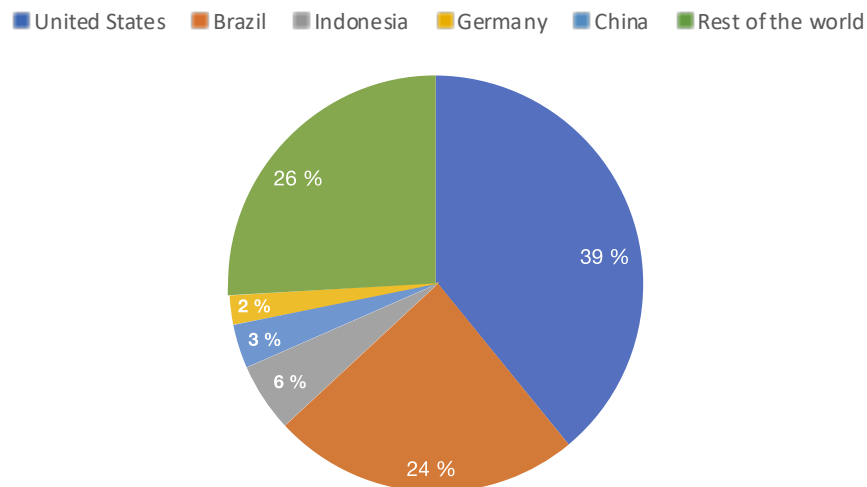
Figure 8. Year-over-year variance, trend and total global liquid biofuel consumption (in thousands of m³).



Source: Adapted from on Torroba 2020a.

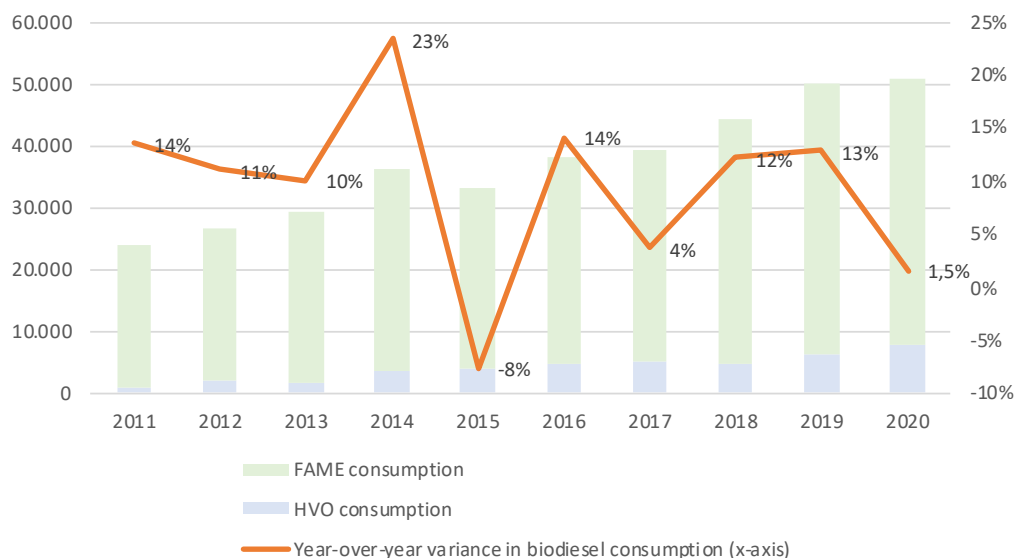
Liquid biofuel consumption is largely concentrated in two countries: the United States and Brazil, with 39% and 24% of total consumption, respectively. They are followed by Indonesia (6%), Germany (3%) and China (2%). The remaining 26% is distributed among the rest of the countries in the world, with Canada, Thailand, the United Kingdom, India, Argentina and Colombia also holding a notable share of the market.

Figure 9. Distribution of global liquid biofuel consumption in 2020.



In terms of biodiesel, over the last decade (2011-2020), global consumption increased by 112%. In 2019, with a year-over-year variance ranging from -8% to 23%, consumption showed a clear upward trend, exceeding 48,000,000 m³. In 2020, it showed year-over-year growth of 1.5%, maxing out at 50,000,000 m³. Specifically, over the last 10 years, the consumption of HVO increased by 687%; however, in 2020 it dropped by almost 20%.

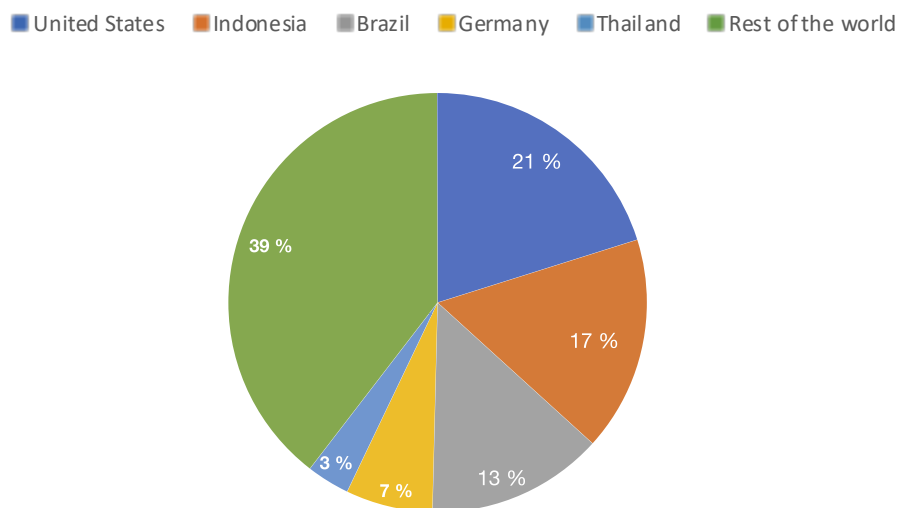
Figure 10. Year-over-year variance, trend and total global biodiesel consumption (in thousands of m³).



Source: Adapted from Torroba 2020a.

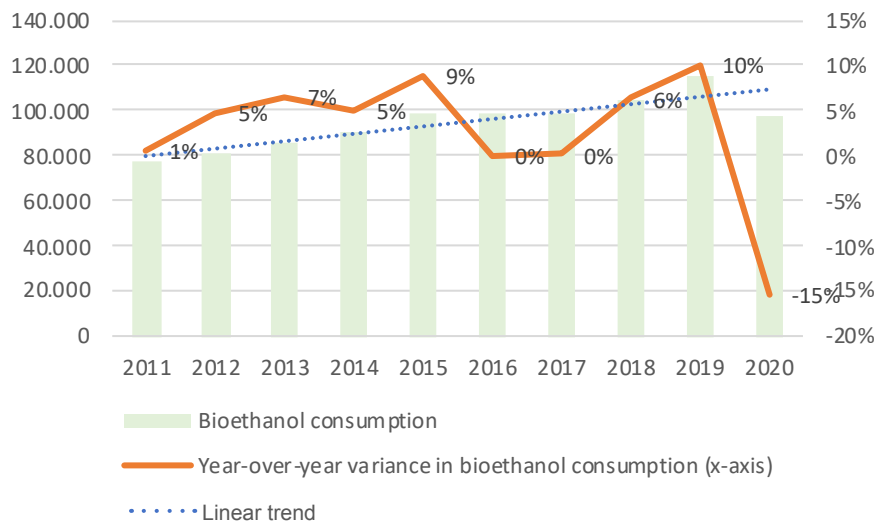
Global consumption of biodiesel is relatively deconcentrated in comparison to bioethanol. The United States, Indonesia, Brazil, Germany and Thailand hold shares of 21%, 17%, 13%, 7% and 3%, respectively. The remaining 39% is distributed among the rest of the countries in the world, with the United Kingdom, Malaysia, Colombia, China and Argentina also holding a notable share.

Figure 11. Distribution of global biodiesel consumption in 2020.



Over the last decade (2011-2020), global consumption of bioethanol increased by 27%. In 2019, with a year-over-year variance ranging -15% to 10%, it showed a clear upward trend, maxing out at 115,000,000 m³. In 2020, however, it showed a year-over-year decline of -15 %, rounding out at 98,000,000 m³.

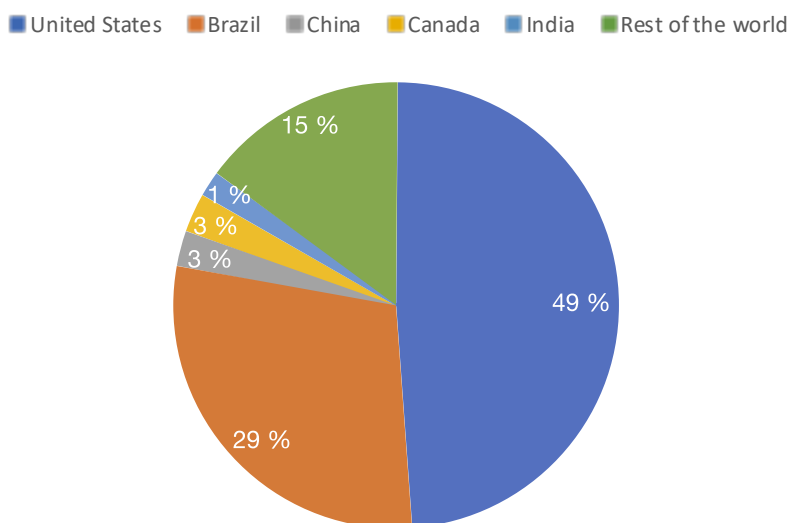
Figure 12. Year-over-year variance, trend and total global bioethanol consumption (in thousands of m³).



Source: Adapted from Torroba 2020a.

Bioethanol consumption is largely concentrated in the United States and Brazil, with 49% and 29% of total consumption, respectively. They are followed by China (3%), Canada (3%) and India (1%). The remaining 15% is distributed among the rest of the countries in the world, with Thailand, Germany, France, Japan, Argentina and Colombia also holding notable shares.

Figure 13. Distribution of global bioethanol consumption in 2020.



4. Biofuel mandates

According to Torroba (2020a), biofuel and fossil fuel blending requirements are put into practice through a variety of mechanisms, the most widespread of which, at the national and subnational levels (states, departments, provinces, etc.), is the “required blend mandate” of bioethanol and gasoline or biodiesel and diesel fuel. These blends are usually expressed as a percentage by volume (volume/volume blends) or by energy (energy/energy blends).

Biofuel use requirements are also established through “overall mandates” of biofuel/fossil fuel blends. These requirements are met in aggregated form, regardless of which is biofuel used.

An additional mechanism is to establish greenhouse gas (GHG) emission reduction targets, while promoting the use of biofuels to achieve them.

60 countries have established bioethanol use requirements¹ through one of the three aforementioned mechanisms. Brazil is a frontrunner in terms of “required blend mandates” with a gasoline-bioethanol blend range of 18% to 27.5%². In second place is Paraguay, with a mandate of 25%. Argentina comes in third with 12%, followed by a long list of countries with a 10% requirement, the most common in the world.

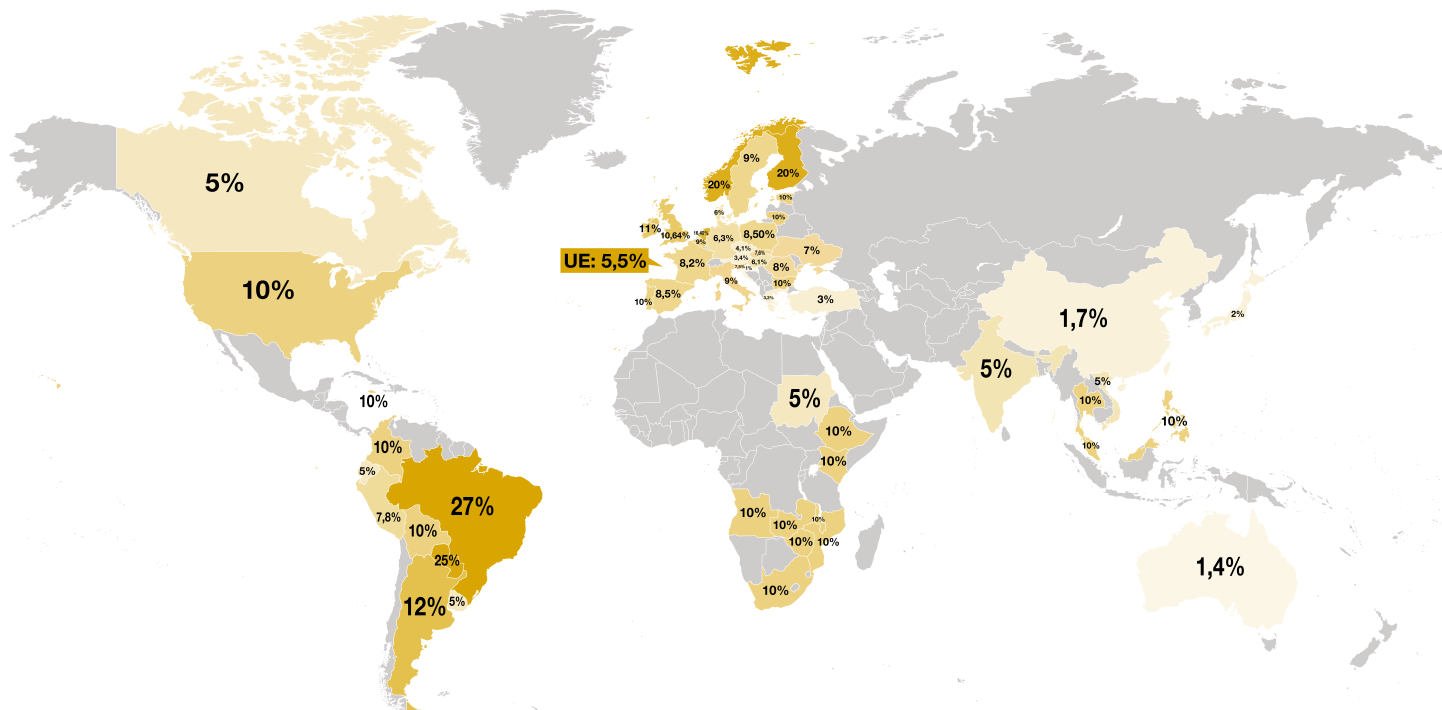
On the other hand, Finland³, Norway and the Netherlands have “overall mandates” of 20%, 20% and 16.4%, respectively; however, in practice, these are not always met.

¹ Excludes countries with ranges starting at 0% or that do not use bioethanol.

² In 2020, the effective requirement was 27%.

³ Expressed as an overall percentage of energy content.

Figure 14. Direct and indirect bioethanol in gasoline use mandates⁴ in 2020.



Note: Required and overall mandates and average biofuel use in countries with GHG reduction targets. For countries with subnational mandates, the national effective gasoline-bioethanol (v/v) blend is used as a reference. Excludes voluntary blends, mandated ranges starting at 0% and countries with zero bioethanol consumption. See Annex III for more detailed information.

Source: Adapted from USDA 2020a, Torroba 2021 and REN 21 2021.

In terms of biodiesel, in 2020 49 countries had biodiesel use requirements using one of the three aforementioned mechanisms.

Topping the list of countries with “required blend mandates” is Indonesia, with 20% in 2020, 30% in 2021 and a planned increase to 40%; second is Brazil with a required mandate of 12%⁶, which will increase by 1% each year until it reaches 15%. Finally, tied for third are Argentina, Colombia⁷ and Malaysia with 10% mandates.

Countries with biodiesel “overall blend” mandates include Finland (20%), Norway (20%) and the Netherlands (16.4%). Another noteworthy case is Sweden, which has proposed significant GHG emission reduction targets, consequently achieving a 33% biodiesel and renewable diesel penetration rate.

⁴ See Annex III for more information.

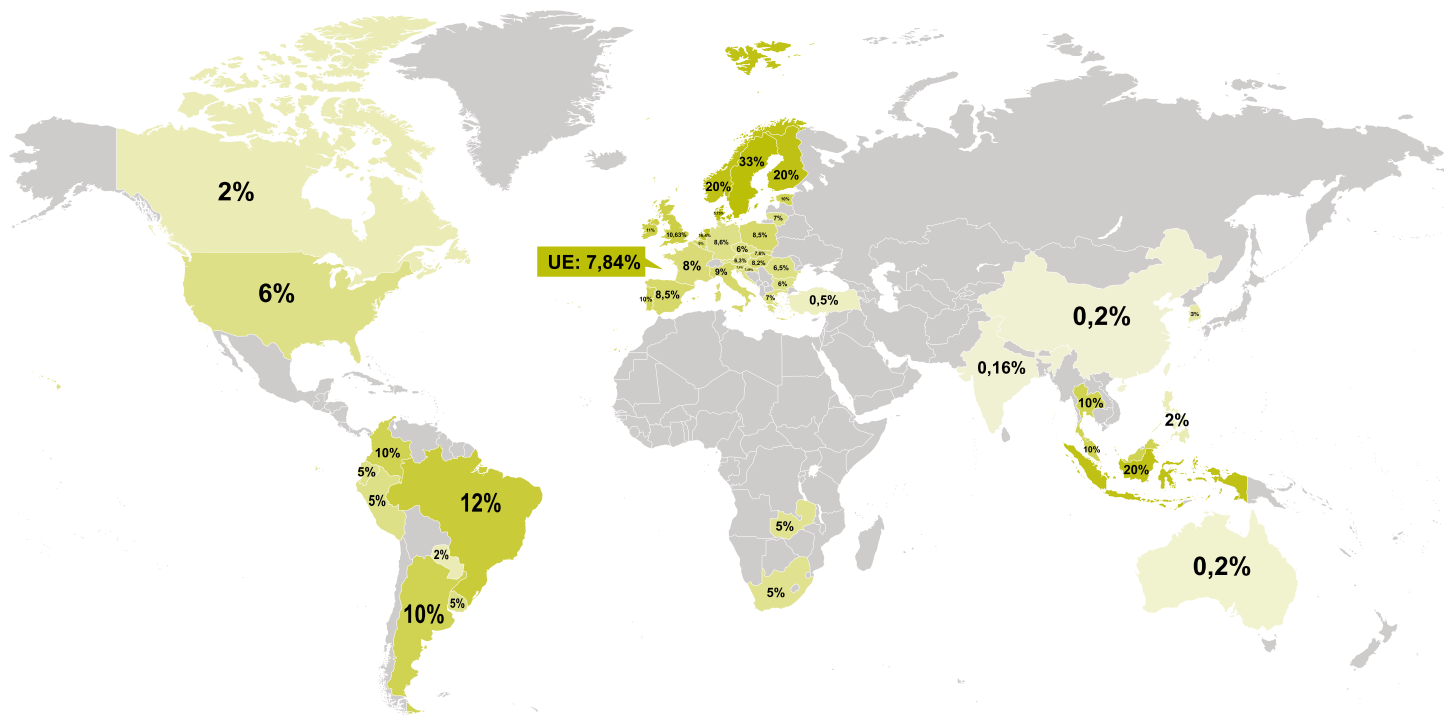
⁵ Excludes countries with ranges starting at 0% or that do not use bioethanol.

⁶ The 12% mandate became effective in March of 2020.

⁷ The mandate was increased to 12% in April of 2021 across most of the country.

⁸ Expressed as an overall percentage of energy content.

Figure 15. Direct and indirect biodiesel in diesel fuel use mandates⁹ in 2020.



Note: Required and overall mandates and average biofuel use in countries with GHG reduction targets. For countries with subnational mandates, the national effective gasoline-bioethanol (v/v) blend is used as a reference. Excludes voluntary blends, mandated ranges starting at 0% and countries with zero bioethanol consumption. See Annex III for more detailed information.

Source: Adapted from USDA 2020a, Torroba 2021 and REN 21 2021.

⁹ See Annex III for more information.

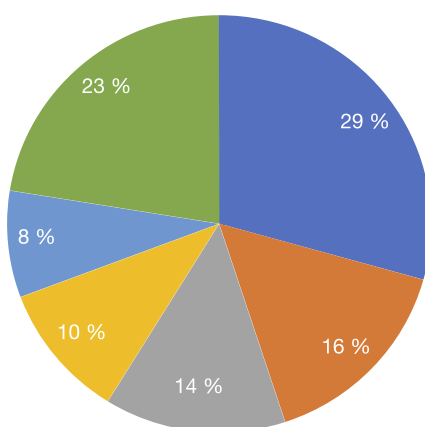
5. Foreign trade

Foreign trade of biodiesel represents 17% of global consumption, with a volume exceeding 8,000,000 m³.

In terms of biodiesel exports, a large percentage (29%) is concentrated in the EU, with a strong participation of intra-EU trade. It is followed by Singapore (16%), China (14%), Malaysia (10%) and Argentina (8%). The remaining 23% is distributed among the rest of the countries in the world, with the United States and Canada also holding a notable share.

Figure 16. Market share of global biodiesel exports in 2020.

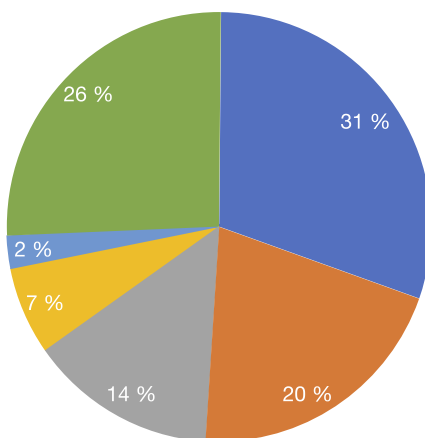
■ European Union (EU) ■ Singapore ■ China ■ Malaysia ■ Argentina ■ Rest of the world



In terms of biodiesel imports, the UE is the top net importer (31%), followed by the United States (20%), the United Kingdom (14%), Canada (7%) and Malaysia (2%). The remaining 26% is distributed among the rest of the countries in the world, with Peru, Singapore and China also holding a notable share.

Figure 17. Market share of global biodiesel imports in 2020.

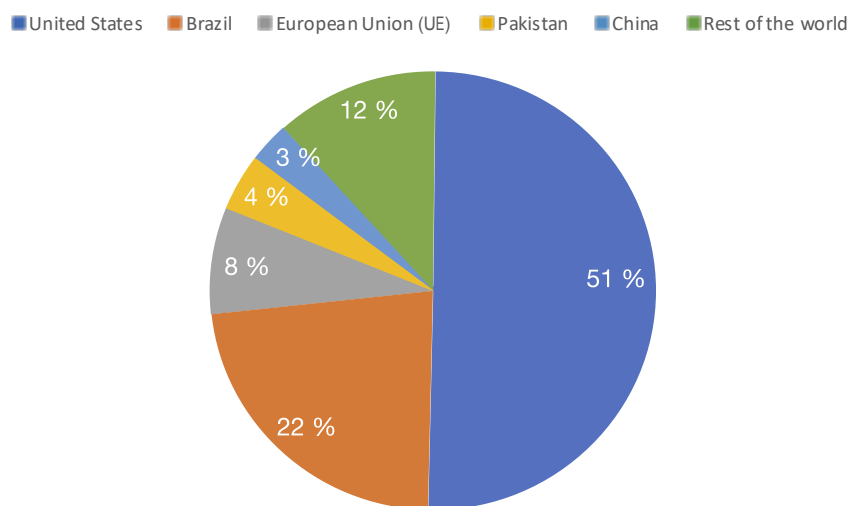
■ European Union (UE) ■ United States ■ United Kingdom ■ Canada ■ Malaysia ■ Rest of the world



Foreign trade of bioethanol represents 10% of global consumption, with a volume of approximately 10,000,000 m³.

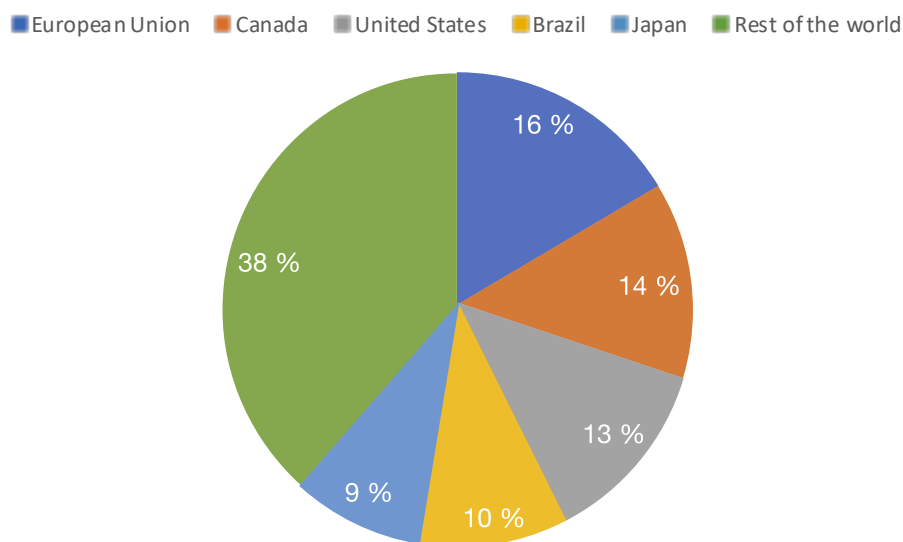
In terms of exports, the United States was responsible for 51%, followed by Brazil (22%), the EU (8%), Pakistan (4%) and China (3%). The remaining 12% is distributed among the rest of the countries in the world, with Paraguay, the United Kingdom, Guatemala and Peru also holding a notable share.

Figure 18. Market share of global bioethanol exports in 2020.



With respect to bioethanol imports, the EU represents 16%, followed by Canada (14%), the United States (13%), Brazil (10%) and Japan (9%). The remaining 38% of imports are distributed among the rest of the countries in the world, with South Korea, India and the United Kingdom also holding a notable share.

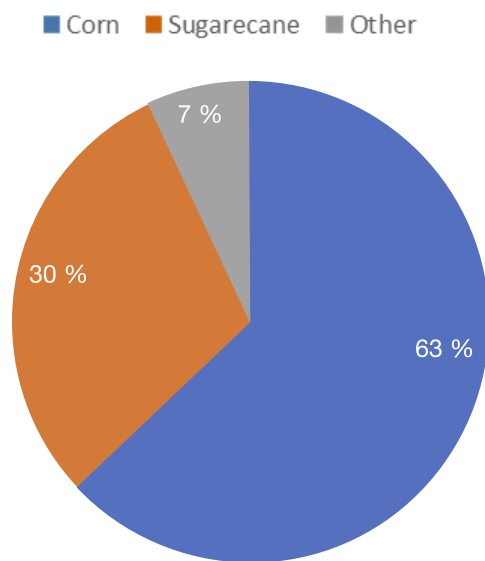
Figure 19. Market share of global bioethanol imports in 2020.



6. Raw materials

In 2020, corn and sugarcane were the most utilized raw materials for bioethanol production, representing 63% and 30%, respectively. In the case of maize, over 155,000,000 tons were used, yielding a production of 62,000,000 m³. In the United States, Canada, Argentina and several EU nations, corn is used in mass quantities, whereas in Brazil, where sugarcane is the traditional input, the use of maize is just starting to gain ground. In terms of sugarcane, 315,000,000 tons were allocated to bioethanol production¹⁰ yielding close to 30,000,000 m³ primarily in Brazil, Paraguay, Colombia, Argentina and India. The remaining 7% is produced from other raw materials, such as sugar beet and manioc.

Figure 20. Bioethanol production by type of raw material used in 2020.



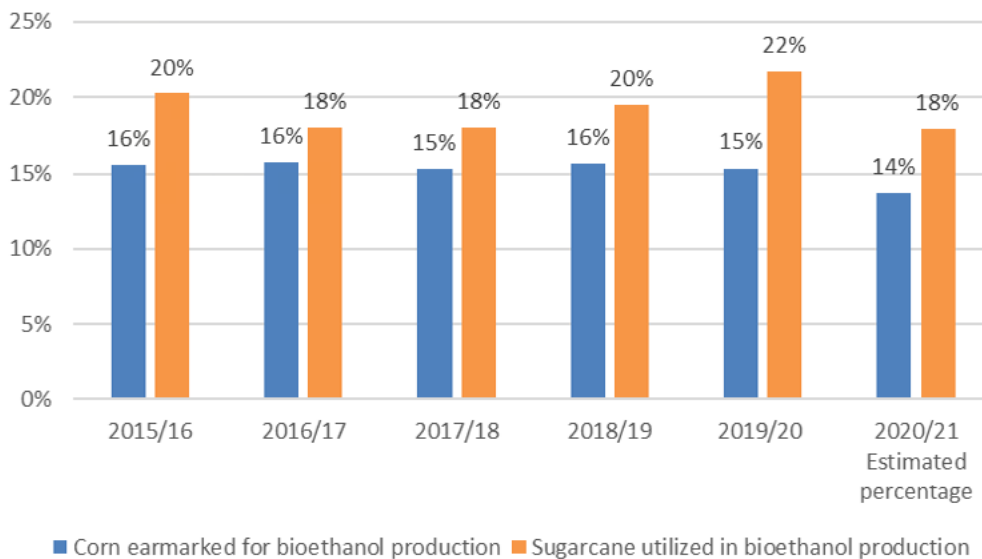
Note: Sugarcane-based bioethanol production includes the use of sugarcane juice, sugarcane waste, and the melting of sugars.

Source: Adapted from Torroba 2020a and 2020b.

¹⁰ In this case, bioethanol is produced through a process of juice extraction. While sugarcane waste and the melting of sugars are included in total sugarcane-based bioethanol production, these are not included in the amount of “primary” raw materials utilized.

During the 2020-2021 harvest, 14% of harvested corn¹¹ and 18% of sugarcane were earmarked for bioethanol production. Both of these percentages represent a decline, however, as compared to the previous harvest, due primarily to a drop in production.

Figure 21. Percentage of global corn and sugarcane production earmarked for bioethanol production.



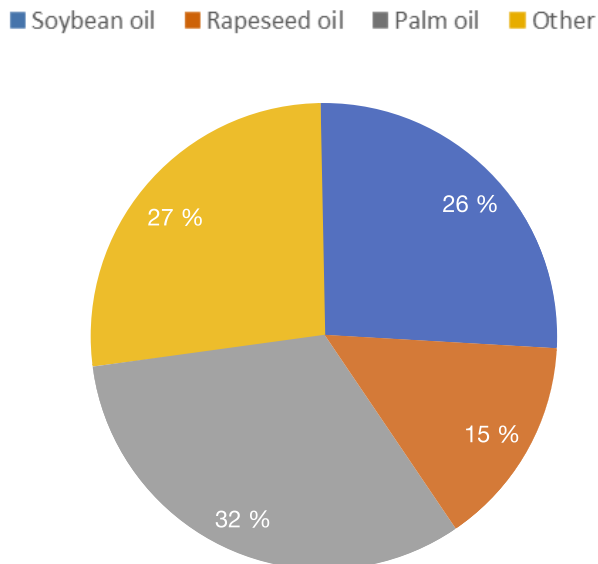
Note: The full amount of corn utilized in the bioethanol production process is attributed to bioethanol, without consideration for the byproducts.

Source: Adapted from Torroba 2020a and AMIS 2020.

In 2020, the most used raw materials in biodiesel production were vegetable oils, the most notable of which are palm (32%), soybean (26%) and rapeseed (15%). The remaining 27% is attributed to other raw materials, such as recycled vegetable oils, animal fats and other virgin vegetable oils, including sunflower. Based on the foregoing, in 2020, 16,500,000 m³ of biodiesel was produced from palm oil, 13,000,000 m³ from soybean oil and 7,500,000 m³ from rapeseed oil.

¹¹ For every 1,000 kg of corn processed to produce bioethanol, the following approximate amounts of byproducts are also obtained: a) 900 kg of wet distillers grains or 320 kg of dry distillers grains, also known as DDGS/WDGS8; b) 0.3 tons of vinasse (water included); and c) 300 kg of CO₂. That is why a large part of the corn allocated for bioethanol production produces a multiplicity of food products. In terms of volume, less than half of the corn produced generates bioethanol.

Figure 22. Biodiesel production by type of raw material in 2020.

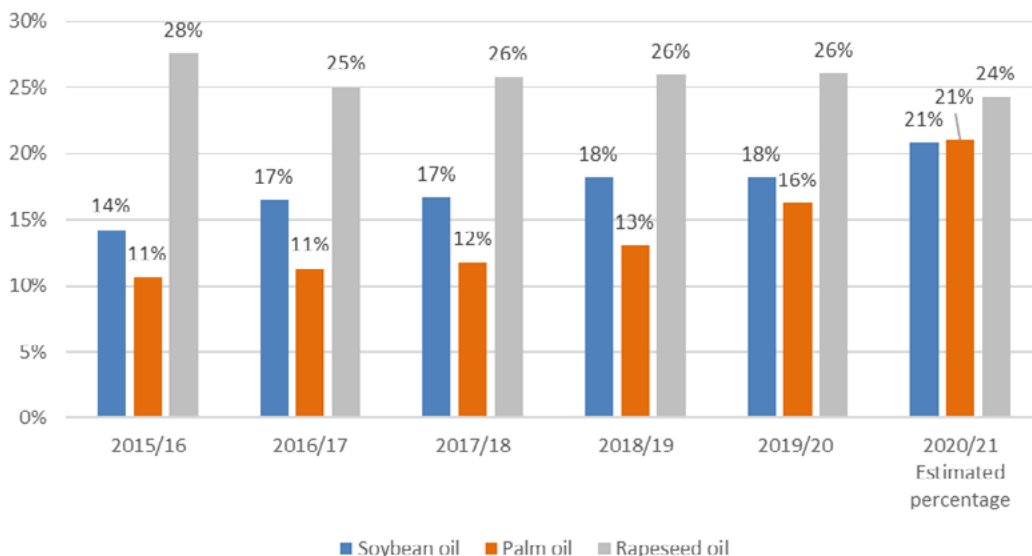


Source: Adapted from Torroba 2020a and 2020b.

The United States, Argentina, Brazil and Paraguay produce biodiesel mainly from soybean oil. The use of rapeseed oil as an input for production is widespread in the European Union, while palm oil is the most used in Colombia, Indonesia and the rest of southeast Asia.

In 2020, 24% of global rapeseed oil production, 21% of soybean oil production and 21% of palm oil production were earmarked for biodiesel production.

Figure 23. Percentage of global palm, soybean and rapeseed oil production earmarked for biodiesel production.



Source: Adapted from USDA 2020b.

Annex I. Biofuel production (in thousands of m³).

Year	Biodiesel production	Bioethanol production	Biofuel production
2010	21.125	85.834	106.959
2011	25.503	85.731	111.235
2012	27.083	84.770	111.852
2013	30.623	90.019	120.641
2014	33.927	95.558	129.485
2015	32.020	99.896	131.916
2016	36.920	100.404	137.324
2017	40.764	102.954	143.718
2018	44.617	109.677	154.294
2019	50.751	112.619	163.371
2020	50.128	101.249	151.377

Annex II. Biofuel consumption (in thousands of m³).

Year	Biodiesel consumption	Bioethanol consumption	Biofuel consumption
2010	21.067	76.722	97.789
2011	23.912	77.220	101.133
2012	26.556	80.915	107.470
2013	29.220	86.204	115.424
2014	36.055	90.489	126.544
2015	33.296	98.478	131.773
2016	37.987	98.520	136.507
2017	39.396	98.646	138.042
2018	44.182	104.886	149.067
2019	49.855	115.391	165.245
2020	50.615	97.753	148.368

Annex III. Biodiesel and bioethanol mandates by country, volume by volume (except clarifications) in 2020.

State	Bioethanol mandate	Biodiesel mandate	Observations
Angola	10%	0%	
Argentina	12%	10%	
Australia	1.4%	0.2%	There is no national mandate; however, two states have mandates for both biofuels, which were used to estimate the national blend.
Australia (New South Wales)	6%	5%	There are a number of exceptions and so the effective blend is less. In 2019, it was 2.5% for both biofuels.
Australia (Queensland)	4%	0.5%	In 2019 the effective blend was 1.8 % for bioethanol and 0.2 % for biodiesel.
Austria	3.4%	6.3%	Expressed as a percentage of energy content, with an overall target of 5.75% plus 0.5% advanced biofuels and a 6% reduction in fuel greenhouse gas (GHG) emission intensity.
Belgium	8.5%-9.9%	8.5%-9.9%	From 1 January to 31 March 2020, the mandate was 8.5%, but it was increased to 9.9% between 1 April and 31 December 2020. Expressed as a percentage of energy content. The country has a 0.1% advanced biofuels target and a 6% reduction in fuel GHG emission intensity. Double counting is subject to approval.
Bolivia	10%	0%	

State	Bioethanol mandate	Biodiesel mandate	Observations
Brazil	27%	12%	In terms of biodiesel, between September 2019 and February 2020, the mandate was 11%. As of March 2020, it rose to 12%.
Bulgaria	10%	6%	Expressed as a percent by volume. For biodiesel, the 6% mandate is defined as 5% first-generation biodiesel and 1% ad-vanced biodiesel. There is a 7% limit on conventional biofuels with a 0.05% ad-vanced biofuels mandate and a 6% reduc-tion in fuel GHG emission intensity.
Canada	5%	2%	Five provinces have biofuel mandates ranging from 5% to 10% for bioethanol and 2% to 4% for biodiesel.
Canada (Alberta)	5%	2%	
Canada (British Columbia)	5%	4%	
Canada (Manitoba)	8.5%	2%	
Canada (Ontario)	10%	4%	
Canada (Saskatchewan)	7.5%	2%	
China	1.7%	0.2%	The national E10 implementation goal has been suspended. In 2019, seven provinces and cities had fully implemented the E10 blend, with partial implementation in five others to varying degrees. Three other provinces launched pilot programs in some cities, but they were reduced or suspended. In the case of biodiesel, only Shanghai implements a B5 program. The estimated national blend for 2020 is shown.

State	Bioethanol mandate	Biodiesel mandate	Observations
Colombia	10%	10%	The biodiesel mandate increased to 12% as of April 2021.
Costa Rica	8%	5%	Bioethanol ranges from 0% to 8% and bio-diesel from 0% to 5%. In 2020, consumption of both biofuels was 0% in fossil fuels.
Croatia	1%	7.49%	Expressed as a percentage of energy content. The country has an overall biofuel percentage of 8.81%, a 0.1% advanced biofuels target and a 6% target reduction in fuel GHG emission intensity. Advanced and trash-based biofuels are double counted.
Cyprus	7.3%	7.3%	These are overall percentages, expressed in energy content. The country has a 6% target reduction in fuel GHG emission intensity.
Czech Republic	4.1%	6%	Expressed as percent by volume. 6% required reduction in GHG emissions. Double counting system of biofuels made from the recycled cooking oils and animal fats classified in Categories 1 and 2, in accordance with Regulation (EC) No. 1069/2009, and considered low risk in terms of land use change.
Denmark	7.6%	7.6%	Expressed as a percentage of energy content. The country has a 0.9% advanced fuels target, which excludes used vegetable oils and animal fats, and a 6% target reduction in fuel GHG emission intensity.
Ecuador	5%	5%	In terms of bioethanol, E5 is applied to Ecopaís gasoline.
Estonia	10%	10%	Overall percentages. Exempt from blending obligations. 98 RON gasoline is used. 0.5% advanced fuels target and 6% reduction in fuel GHG emission intensity.

State	Bioethanol mandate	Biodiesel mandate	Observations
Ethiopia	10%	0%	
EU	5.5%	7.84%	Final estimated blend for 2020 is shown. The target for 2020 was 10% of the final energy demand of the transport sector, with a 7% limit on conventional biofuels.
Finland	20%	20%	Overall percentages of energy content. 0.5% advanced fuels target.
France	8.2%	8%	Expressed as percentages of energy content. Double counting for cellulosic and waste-based biofuels, as well as others listed in Annex IX of Directive 2009/28/EC, except for pine oil and pine tar. 0.7% advanced biofuels target and 10% reduction in fuel GHG emission intensity.
Germany	6.3%	8.6%	The country set a 6% target reduction in GHG emissions and a 6.5% limit on the use of conventional fuels with 0.05% advanced biofuels. The final blend achieved in 2019 is shown.
Greece	3.3%	7%	Expressed as a percentage of bioethanol in gasoline (percentage of energy content). In the case of biodiesel, it is expressed as a percent by volume. 0.2% advanced biofuels target and 6% reduction in fuel GHG emission intensity.
Guatemala	5%	0%	Not mandatory.
Hungary	6.1%	8.2%	In terms of bioethanol, it is applied in 95 RON gasoline. Expressed as a percentage of energy content. Double counting of biofuels from recycled trash, cooking oil or animal fat. 6% target reduction in fuel GHG emission intensity.

State	Bioethanol mandate	Biodiesel mandate	Observations
India	5.2%	0.16%	The Biofuels Policy sets an E20 target in the Ethanol Blended Petrol Program for 2030. About 50% of all gas sold is E10, while the rest is not blended and so the estimated blend level for 2020 was 5.2%. The 2021-2022 target is E10. In the case of biodiesel, there is a 5% target for 2030; however, the final blend in 2020 was close to 0.16%.
Indonesia	0%	20%	In terms of biodiesel, in 2021 the blend percentage increased to 30%. The country has both a 5% (subsidized fuel for road vehicles, sold only through the state-owned company PERTAMINA) and 10% mandate (unsubsidized fuel sold through the private sector), but they have yet to be implemented.
Ireland	11%	11%	Overall percentages expressed as a per-cent by volume of total fuel used. Double counting of biofuels made from recycled vegetable oil and animal fat. 0.25% ad-vanced biofuels target and 6% reduction in fuel GHG emission intensity.
Italy	9%	9%	Overall percentages expressed in energy content, of which 1% is advanced biofuels. Double counting of advanced fuels. 6% target reduction in fuel GHG emission intensity.
Jamaica	10%	0%	
Japan	2%	0%	A minimum of 824 million liters of bio-ethanol are used to produce the 1.944 billion liters of ethyl tertiary-butyl ether (ETBE) consumed. The final estimated blend for 2020 is shown.
Kenya	10%	0%	Kisumu has implemented an E10 mandate.
Lithuania	10%	7%	0.5% advanced fuels target and 6% reduc-tion in fuel GHG emission intensity.
Luxembourg	7.7%	7.7%	Overall percentages expressed in energy content. 7.7% before double counting and 9.7% after. 6% target reduction in fuel GHG emission intensity.

State	Bioethanol mandate	Biodiesel mandate	Observations
Malaysia	10%	10%	The country had planned to extend the biodiesel mandate to achieve a 20% blend in the first quarter of 2020; however, the plan was delayed due to the pandemic. The Government modified the implementation date to mid-2021 but, according to several analysts, this objective will not be achieved until 2022.
Malawi	10%	0%	Implementation of the mandate depends on availability.
Malta	10%	10%	Overall percentages expressed in energy content. 6% target reduction in fuel GHG emission intensity.
Mexico	5.8%	0%	Not mandatory.
Mozambique	10%	0%	
Norway	20%	20%	The country has a 35% to 40% target reduction in emissions from the transport sector by 2030 as compared to 2005. The 20% quota requirement includes double counting of advanced biofuels. Of the quota, 4% must be advanced biofuels (the raw materials listed in Annex IX, Parts A and B of the iLUC Directive (Directive (EU) 2015/1513).
New Zealand	10%	7%	Not mandatory. Biodiesel ranges from 5% to 7%.
The Netherlands	16.4%	16.4%	Overall percentages in terms of energy, of which 1% is advanced biofuels. 5% limit on conventional biofuels. 1% target for advanced fuels. Double counting system. 6% target reduction in fuel GHG emission intensity.
Paraguay	25%	2%	
Peru	7.8%	5%	
Philippines	10%	2%	
Poland	8.5%	8.5%	Overall percentages in energy content. Double counting system. 0.1% advanced biofuels target and 6% reduction in fuel GHG emission intensity.

State	Bioethanol mandate	Biodiesel mandate	Observations
Portugal	10%	10%	Overall percentages of energy content. 0.5% advanced biofuels target with double counting and 10% reduction in fuel GHG emission intensity.
Romania	8%	6.5%	10% overall percentage. Expressed as percentage of energy content. Double counting system. 6% target reduction in fuel GHG emission intensity.
Slovakia	9%	6.9%	Established as minimum blends for both biofuels, with an overall percentage of 7.6%. Expressed as percentages of energy content. The percentage of second-generation biofuels is 0.5% with double counting. 6% target reduction in fuel GHG emission intensity.
Slovenia	10%	10%	Expressed as percentages of energy content. The advanced biofuels target is 0.5% with double counting. 7% limit on conventional fuels with a 6% target reduction in fuel GHG emission intensity.
Spain	8.5%	8.5%	Overall percentages expressed in energy content. Double-counting system.
South Africa	10%	5%	Bioethanol ranges from 2% to 10%.
South Korea	0%	3%	
Sudan	5%	0%	
Sweden	9%	33%	4.2% minimum required reduction of GHG emissions for gas and 21% for diesel. The final blend for 2019 is shown.
Thailand	10%	10%	There is no mandatory blend for bioethanol, but rather a consumption target of 2.7 billion liters by 2037. Three blend rates are used: E10, E20 and E85. In the case of biodiesel, diesel used in industry and agriculture is excluded from the mandate. B7 and B20 voluntary blends are included. In 2020 the estimated bioethanol blend was 13.7% and biodiesel was 9.6%.

State	Bioethanol mandate	Biodiesel mandate	Observations
Turkey	3%	0.5%	
Ukraine	7%	0%	The Alternative Fuel Types Act of 2000, amended in 2014, sets targets for the transport sector (mandatory bioethanol blend of 7% as of 2016). These provisions do not currently apply. Ukraine has start-ed to use the Euro-5 fuel standard, which provides for the addition of 5% biofuel. This standard includes a range from 0% to 5%. At present, this fuel is sold almost without bio-additives.
United Kingdom	10.637%	10.637%	Overall percentages of energy content. Double counting of biofuels made from certain waste, energy crops and renewa-ble fuels of non-biological origin. 6% tar-get reduction in fuel GHG emission inten-sity.
United States	10%	6%	Based on individual state blends and E85.
USA (Hawaii)	10%	0%	
USA (Louisiana)	2%	2%	
USA (Massachusetts)	0%	15%	The 15% biodiesel minimum will apply once the Registry of Motor Vehicles and other specialized agencies determine that the blend is appropriate. Agencies may request exemptions in certain cases, such as when the alternative fuel is not located within an appropriate distance, is price prohibitive, etc.
USA (Minnesota)	10%	20%	The biodiesel mandate ranges from 5% to 20%, depending on the season of the year.
USA (Missouri)	10%	0%	
USA (Oregon)	10%	5%	
USA (Washington)	2%	2%	
Uruguay	5%	5%	Minimum blends. In terms of bioethanol, in 2020 the final blend was 9.8%.

State	Bioethanol mandate	Biodiesel mandate	Observations
Vietnam	5%	0%	
Zambia	10%	5%	
Zimbabwe	10%	0%	Ranges from 5% to 20%.

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