

International Biofuels Baseline Briefing Book

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Summary

- Domestic ethanol and biodiesel use is mainly driven by policy.
- Brazilian production and use of ethanol continue to grow, with net exports remaining a small share of domestic production.
- U.S. and Brazilian ethanol prices remain well below the levels of 2010-2013.
- EU biodiesel net imports small relative to the levels of 2010-2012.
- Argentina will lead the biodiesel export market.
- Rest of world (RoW) ethanol and biodiesel use and imports are projected to increase with the increase in the crude oil price.

Macroeconomic assumptions

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Crude Oil Price												
	(U.S. \$ /Barrel)											
West Texas Intermediate oil*	92.97	47.79	47.57	60.67	66.27	73.63	80.53	82.28	84.08	85.85	87.61	89.4
Refiners acquisition oil*	92.23	46.25	44.91	55.56	60.47	67.08	73.25	74.84	76.48	78.09	79.69	81.3
Real GDP growth												
	(Percent change from previous year)											
World	2.60	2.41	2.68	3.05	3.17	3.23	3.26	3.20	3.21	3.18	3.13	3.01
Argentina	0.45	1.62	0.95	1.78	2.26	2.43	2.76	3.12	3.24	3.02	2.84	2.79
Brazil	0.10	-3.60	-2.38	1.18	2.34	2.59	2.70	2.76	2.83	2.87	2.91	2.92
Canada	2.47	1.24	1.70	2.10	2.30	2.35	2.25	2.17	2.11	2.18	2.11	2.06
European Union	1.36	1.84	1.92	2.02	1.90	1.73	1.78	1.77	1.74	1.70	1.69	1.65
Indonesia	5.02	4.72	4.41	4.72	5.06	5.41	5.26	5.27	5.38	5.64	5.47	5.16
Malaysia	5.99	4.80	4.41	4.50	5.07	5.16	5.04	4.89	4.90	5.04	4.98	4.85
Rest of World	3.52	3.17	3.43	3.78	4.10	4.33	4.36	4.37	4.38	4.30	4.17	3.97
Population growth												
World	1.19	1.18	1.16	1.14	1.11	1.08	1.05	1.03	1.00	0.98	0.96	0.94
Argentina	1.04	1.02	0.99	0.97	0.95	0.93	0.91	0.89	0.87	0.86	0.84	0.82
Brazil	0.89	0.86	0.83	0.80	0.77	0.74	0.72	0.69	0.66	0.64	0.61	0.58
Canada	1.12	0.93	1.12	1.07	1.06	1.06	1.05	1.05	1.04	1.03	1.02	1.01
European Union	0.19	0.26	0.35	0.29	0.25	0.20	0.16	0.13	0.11	0.10	0.07	0.07
Indonesia	1.27	1.22	1.17	1.12	1.08	1.04	1.01	0.98	0.95	0.91	0.88	0.85
Malaysia	1.48	1.43	1.39	1.34	1.30	1.28	1.25	1.23	1.21	1.19	1.16	1.12
Rest of World	1.31	1.29	1.26	1.24	1.21	1.18	1.15	1.13	1.10	1.07	1.05	1.03
Exchange rates												
	(Currency per U.S. \$)											
Argentina Peso	8.12	9.40	14.99	16.88	18.01	18.87	19.86	20.98	21.96	23.14	24.40	25.70
Brazil Real	2.36	3.39	4.19	4.16	4.27	4.37	4.45	4.51	4.56	4.62	4.69	4.75
Canada Dollar	1.10	1.28	1.33	1.25	1.19	1.15	1.11	1.10	1.09	1.09	1.10	1.10
European Union Euro	0.75	0.90	0.96	0.88	0.82	0.79	0.78	0.76	0.75	0.74	0.73	0.73
Indonesia Rupiah	254.45	257.56	260.58	263.51	266.36	269.14	271.86	274.52	277.12	279.65	282.11	284.50
Malaysia Dollar	3.27	3.91	4.39	4.26	3.94	3.81	3.78	3.76	3.73	3.72	3.70	3.68
Inflation rates												
	(Percent change from previous year)											
Argentina Peso	29.30	28.50	34.60	23.30	19.50	17.60	15.40	13.90	12.30	11.00	9.50	8.80
Brazil Real	6.90	7.70	7.20	5.00	5.10	4.90	4.30	3.80	3.90	3.80	3.80	3.70
Canada Dollar	1.60	1.00	1.80	2.10	2.00	2.00	2.10	2.20	2.20	2.10	2.10	2.00
European Union Euro	1.00	1.20	1.30	1.70	1.80	1.80	1.80	1.70	1.70	1.70	1.70	1.70
Indonesia Rupiah	5.40	4.20	4.60	5.00	5.10	5.40	4.80	5.00	5.40	5.70	6.00	5.90
Malaysia Dollar	2.50	-0.10	1.80	2.50	2.40	2.90	3.00	3.10	3.40	3.70	3.80	3.70

Source: Except as noted below, IHS Global Insight, Dec. 2015 (world) and Jan. 2016 (U.S.).

*For 2015-2020, IHS Global Insight, Jan. 2016. Beginning in 2021, energy prices are assumed to increase at the same rate as GDP deflator inflation.

World Ethanol Policy Summary

- In November 2015, the U.S. Environmental Protection Agency (EPA) published the 2014, 2105, and 2016 renewable fuel standard rule and 2017 biomass-based biodiesel mandate.¹
- U.S. will continue importing ethanol mostly derived from sugarcane to meet California's low carbon fuel standard (LCFS) requirement.
- As of March 2015, the government of Brazil increased the domestic ethanol mandates from 25 to 27%.
- In Brazil, the state run fuel supplier *Petrobras* controls the gasoline C (ethanol blended fossil fuel) retail price.
- Officially Argentina has an ethanol blending mandate of 10%.
- Canadian federal government mandated 5% renewable fuel in gasoline. Canada has provincial ethanol blending mandates too. British Columbia, Alberta, and Ontario have an ethanol blending mandate rate of 5%, while Saskatchewan has a 7.5% rate and Manitoba has an 8.5% ethanol blending mandate rate.
- British Columbia has a low carbon fuel standard that targets a 10% decrease in carbon intensity between 2010 and 2020.
- The European Union implemented the EU Energy and Climate Change Package (CCP) in April 2009 and Renewable Energy Directive (RED) in June of 2009. According to RED by 2020, there needs to be a 20% reduction in greenhouse gas (GHG) emissions compared to 1990. 20% of the total EU energy mix would come from renewable energy and there is a 10% renewable energy blending target in transport fuel. Further, in April 2015 EU amended the original RED to include the 7% cap on crop based biofuels.
- EU's antidumping duties on bioethanol has restricted U.S. from exporting ethanol to EU for fuel use.
- This baseline assumes EU food crop-based ethanol blending mandates at the current penetration rate of 3.3% until 2025. Trade policies are implicitly incorporated in the baseline projections.
- The government of India created an ethanol blending program that originally mandated ethanol blending at the 5% level. In 2014, the government increased the blending rate to 10%.
- In China, an E10 blend mandate has been adopted by six provinces (Heilongjiang, Jilin, Liaoning, Henan, Anhui, and Guangxi). However, Chinese government has phased out the policies encouraging the use of food-grain based feedstock for ethanol production creating uncertainty regarding the ability to meet those mandates.
- China has an import tariff of 5% on fuel ethanol, along with 17% VAT and 5% consumption import tax.
- Chinese authorities are currently implementing a host of measures to fight air pollution in the country's major cities and ethanol blending is considered to be one option.
- Others countries, including Japan, Indonesia, and Australia have implemented domestic ethanol blending mandates.

¹ See U.S. Baseline Briefing Book, FAPRI-MU Report # 02-16.
<http://www.fapri.missouri.edu/wp-content/uploads/2016/03/FAPRI-MU-Report-02-16.pdf>

World Biodiesel Policy Summary

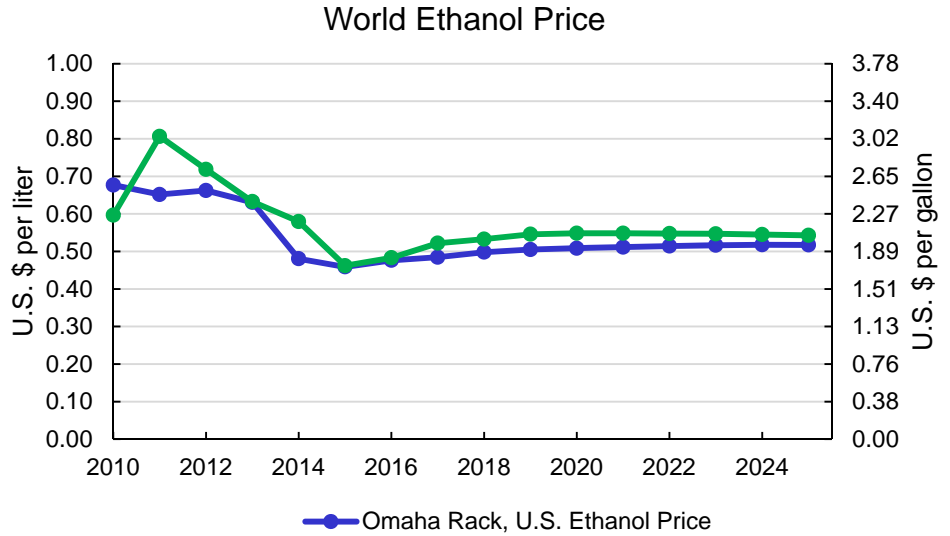
- In 2010, Argentina's government mandated biodiesel blending at a 10% blending rate and it remains at this level throughout the projection period.
- Soybean oil-based biodiesel in Argentina has a lower export tax compared to soybeans and soybean oil. However, Argentina's newly elected president has reduced the export tax on crops including soybeans.²
- Brazil imposes a 7% biodiesel blend mandate.
- In the EU, in order to be considered sustainable, biofuels must achieve GHG savings of at least 35% in comparison to fossil fuels. In 2017 this savings requirement rises to 50% and in 2018, it further rises to 60% but only for new production plants. The EU commission is setting out the 2030 Framework and Climate Energy that will continue with the GHG saving policy beyond 2020.
- In May of 2013, the EU imposed an anti-dumping duty on biodiesel imported from Indonesia and Argentina and this policy is assumed to continue.
- This baseline assumes EU food crop-based biodiesel blending mandates at the current penetration rate of 4.3% until 2025. Trade policies are implicitly incorporated in the baseline projection.
- In 2015, the Energy Ministry of Indonesia increased the biodiesel mandate to 15%. The government introduced a new export tax of \$50 per metric ton of crude palm oil and \$30 per metric ton of biodiesel made from palm oil.
- Malaysia has implemented a 5% biodiesel blending mandate.
- The U.S. increased the biodiesel use mandates for 2014, 2015, 2016 and 2017 in the revised RFS published by EPA in November 2015. U.S. production is projected to increase and domestic consumption is projected to exceed the RFS mandate.³
- Biodiesel use for fuel use in China is only approved in selected cities. There continues to be no national or provincial mandate for biodiesel usage.
- China has an import tariff of 6.5% on biodiesel and mixtures, along with a 17% VAT.
- The government of India restricts the use of edible oil for biodiesel production. There is an import tax of 26.42% on biodiesel.
- Other countries including Canada, Philippines, and Japan have their own domestic biodiesel blending mandates.

² See International Crops Baseline Briefing Book, University Center for Economic Development, University of Nevada.
<http://www.unr.edu/Documents/business/uced/FAPRI/2016/Briefing%20Book.pdf>

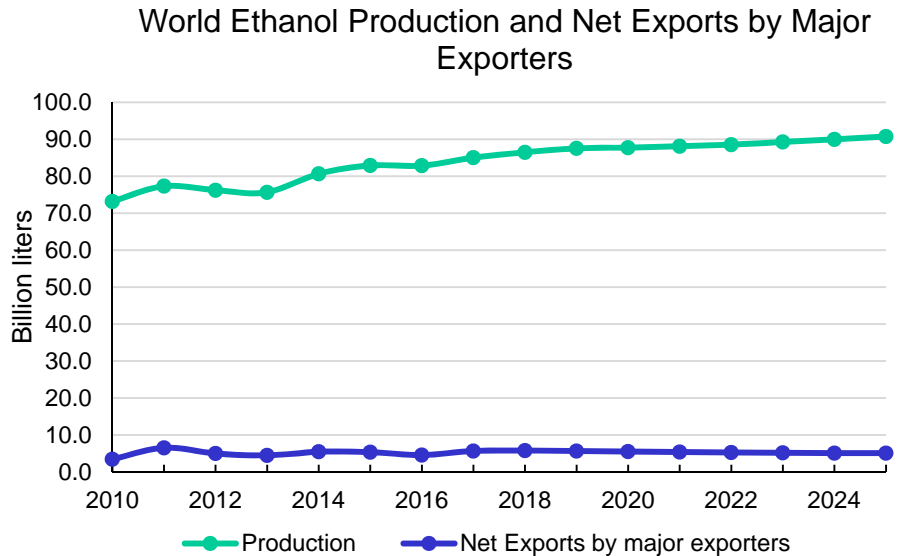
³ See U.S. Baseline Briefing Book, FAPRI-MU Report # 02-16.
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World Ethanol Price, Production, Use, and Trade

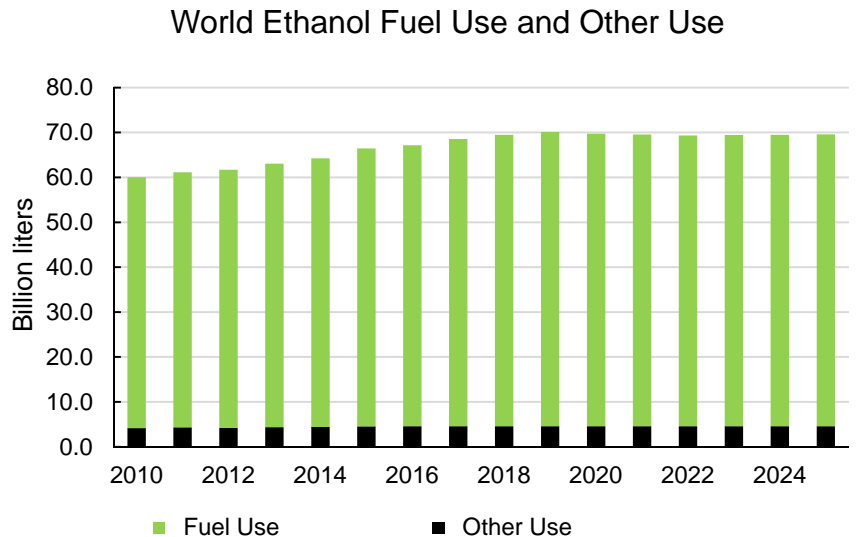
- Following the dip in the international crude oil price, the anhydrous ethanol (Brazil, Santos F.O.B.) price fell to \$1.75 per gallon in 2015 from \$2.19 per gallon in 2014.
- After recovering from this fall the Brazilian anhydrous ethanol price is projected to be stable at around \$2.00 per gallon by 2025 based on the higher crude oil price assumptions.
- By 2025, the U.S. Omaha rack ethanol is projected to be \$1.95 per gallon.⁴ That will give U.S. ethanol exporters a price advantage over their Brazilian counterparts.



- World ethanol production is projected to increase as country specific government policy pushes biofuel use.
- In later years, ethanol production is projected to increase at a higher rate.
- World ethanol trade remains flat over the projection period as government policy encourages domestic demand to be met via domestic production.



- World fuel ethanol use is projected to increase because of the country specific domestic blending mandates and higher petroleum price during the later years.
- Increasing fuel ethanol use is derived mainly from the rest of world (RoW), where increasing crude oil price results in increasing ethanol fuel use.
- Other ethanol use which includes chemical and beverage uses remains flat across the projection period.



⁴ See U.S. Baseline Briefing Book, FAPRI-MU Report # 02-16. <http://www.fapri.missouri.edu/wp-content/uploads/2016/03/FAPRI-MU-Report-02-16.pdf>

Ethanol Price

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Bioethanol Price												
						(U.S. \$ per liter)						
Anhydrous Santos F.O.B. (Brazil)	0.58	0.46	0.48	0.52	0.53	0.54	0.55	0.55	0.55	0.55	0.54	0.54
Omaha Rack (U.S.)*	0.48	0.46	0.48	0.48	0.50	0.51	0.51	0.51	0.51	0.52	0.52	0.52
Bioethanol Price												
						(U.S. \$ per gallon)						
Anhydrous Santos F.O.B. (Brazil)	2.19	1.75	1.83	1.97	2.01	2.06	2.07	2.07	2.07	2.07	2.06	2.05
Omaha Rack (U.S.)*	1.82	1.74	1.80	1.83	1.88	1.91	1.92	1.94	1.95	1.95	1.96	1.96

World Ethanol Trade

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net Exports												
						(Million liters)						
Argentina	13	13	33	72	79	76	71	69	73	67	61	53
Brazil**	1,040	1,145	2,087	2,087	2,241	2,584	2,668	2,700	2,695	2,672	2,630	2,601
Canada	-1,142	-1,190	-1,013	-964	-957	-937	-928	-927	-927	-936	-946	-956
European Union	-447	-303	-420	-440	-412	-402	-407	-412	-416	-420	-424	-427
United States*	2,920	2,833	1,820	1,974	1,953	1,839	1,855	1,869	1,913	1,998	2,107	2,222
Rest of World	-912	-1,025	-1,034	-1,257	-1,431	-1,688	-1,785	-1,826	-1,865	-1,910	-1,956	-2,021
Historical Discrepancies	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472	-1,472

*For details see 2016 U.S. Baseline Briefing Book, FAPRI-MU Report #02-16.

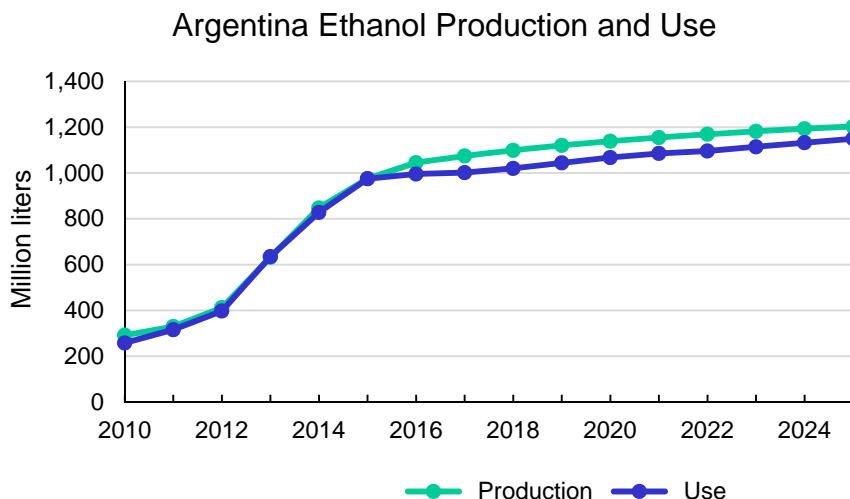
Note: The U.S. baseline briefing book reports the mean of stochastic results for the U.S. markets.

Figures reported here are from a deterministic solution, and will therefore differ slightly.

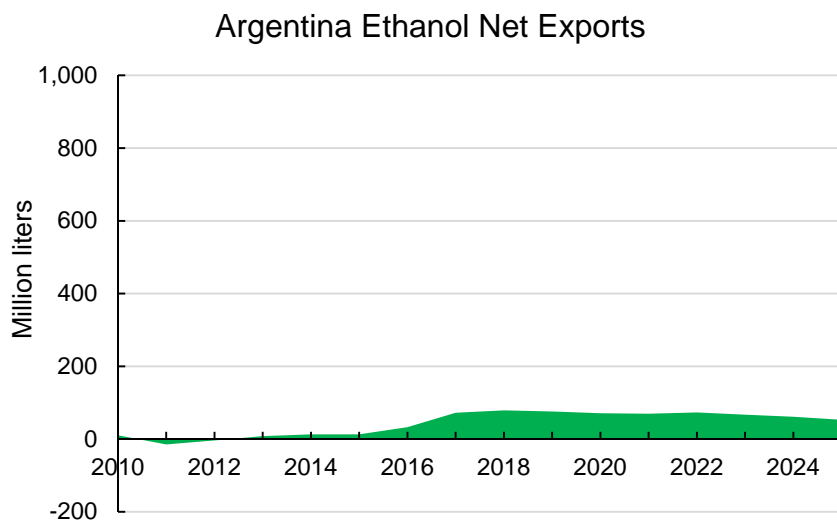
**Brazil projection starts from 2015.

Argentina Ethanol Production, Use, and Trade

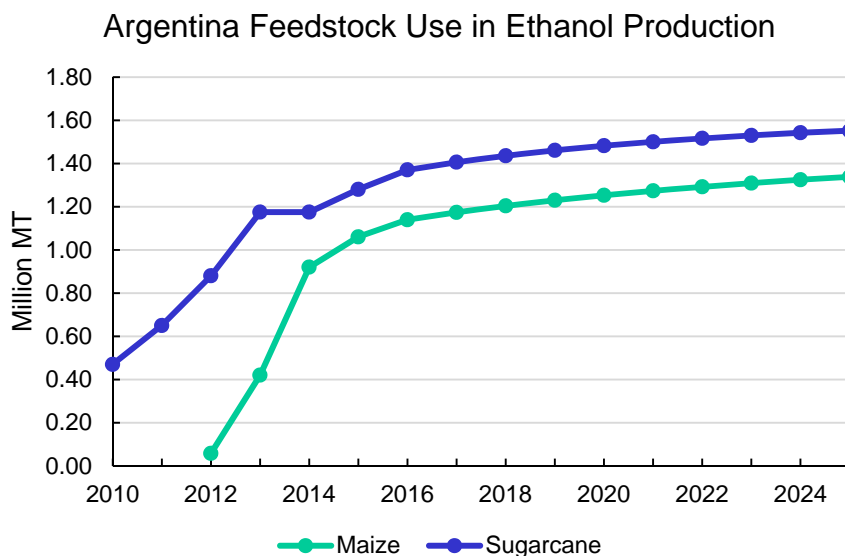
- Argentina produces ethanol mainly to meet the domestic demand.
- Increasing domestic motor fuel use leads to the increase in domestic ethanol use, which is blended in gasoline at a 10% rate.
- By the end of the projection period production surpasses consumption as there is export demand.



- Argentina was essentially self sufficient in ethanol production from 2010 to 2015.
- Argentina's net exports are projected to be 33 million liters in 2016 as the local ethanol market is more profitable than the world market.
- By 2025, Argentina's ethanol exports are projected to be 53 million liters.

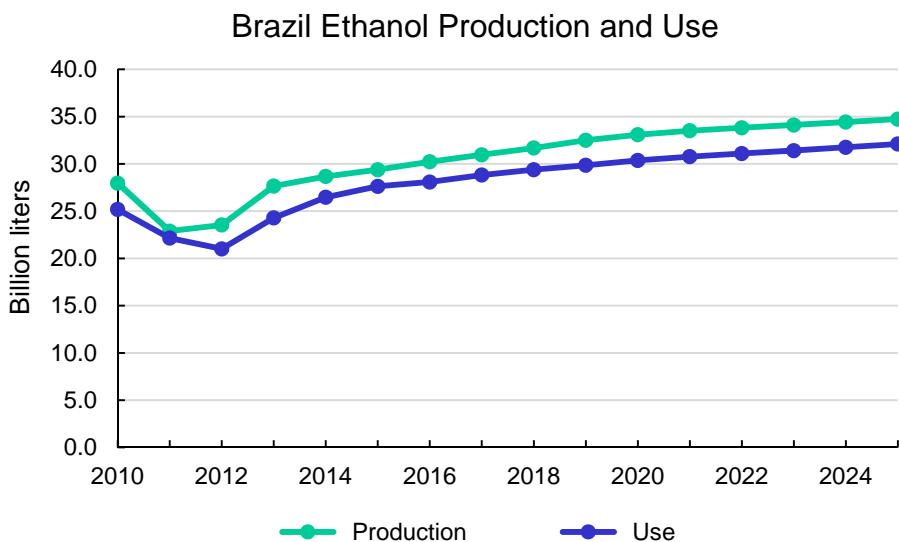


- Ethanol producers in Argentina use two kinds of feedstock; sugarcane juice /molasses, and grains. Maize is the major grain used for ethanol production.
- Use of both the feedstocks is projected to increase as the production of ethanol increases.
- By 2025, 1.3 million MT of sugarcane and 1.6 million MT of maize are projected to be used for ethanol production.

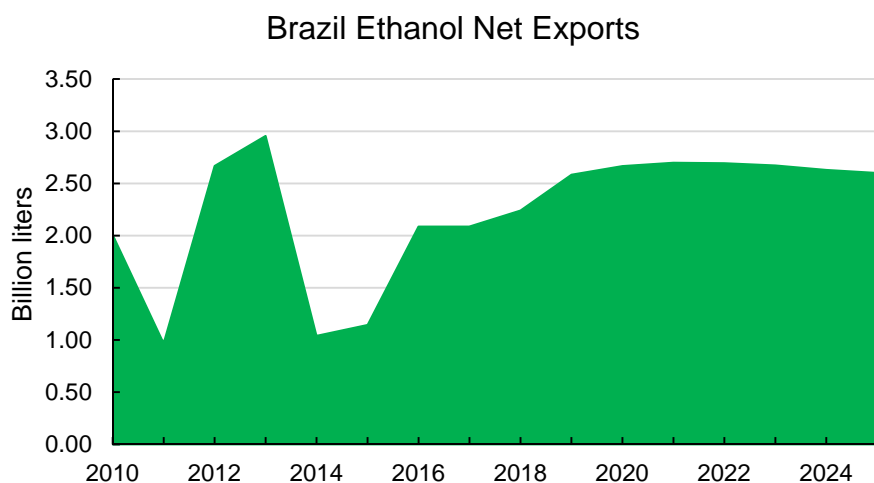


Brazil Ethanol Production, Use, and Trade

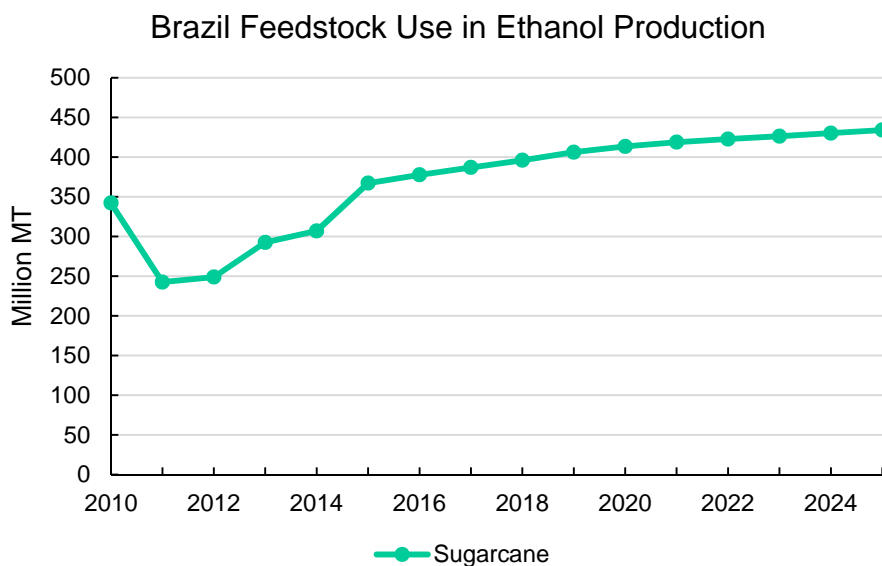
- During the projection period 2016-2025, production increases from 30.2 billion liters to 34.4 billion liters, which is around 1.8% annually.
- Consumption of both the ethanol used for blending with fossil fuel and hydrous ethanol (E100) is projected to increase.
- Anhydrous ethanol (blend ethanol) use increases as government increases domestic use mandate from 25% to 27%.
- Hydrous ethanol (E100) use is also projected to increase as it's price remain competitive with government controlled gasoline C price.



- Brazilian ethanol exports are projected to remain flat as Brazilian ethanol loses price competitiveness in the world bioethanol market.
- By 2025, Brazilian ethanol net exports are projected to be 2.6 billion liters.
- The U.S. remains the major importer of the ethanol over the projection period.

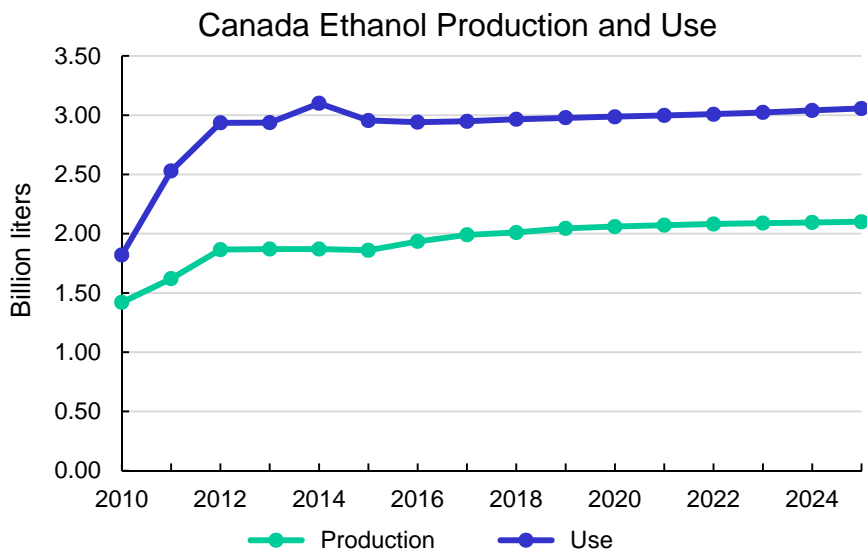


- Sugarcane use for feedstock in ethanol production is projected to increase as sugar prices remain flat.
- Brazilian government is encouraging an expansion of the domestic ethanol production to maintain the sugarcane demand.
- By 2025, 434 million MT of sugarcane is projected to be used for ethanol production.

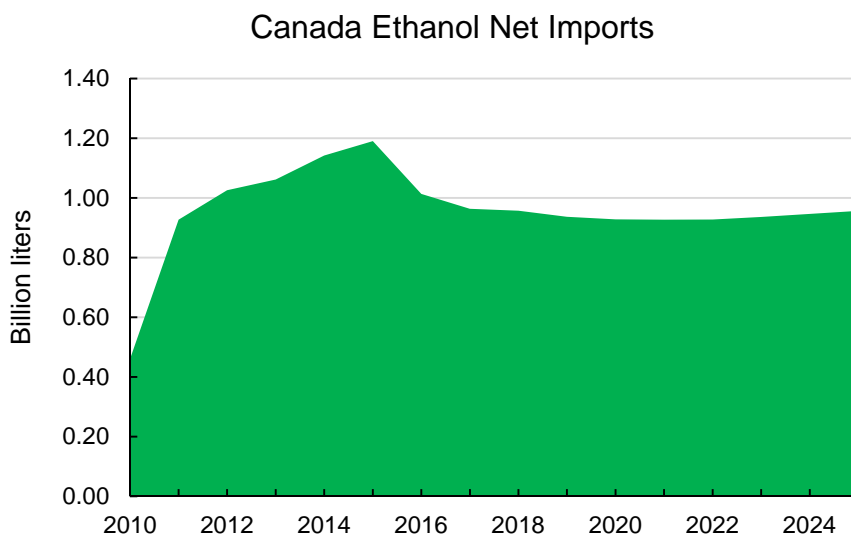


Canada Ethanol Production, Use, and Trade

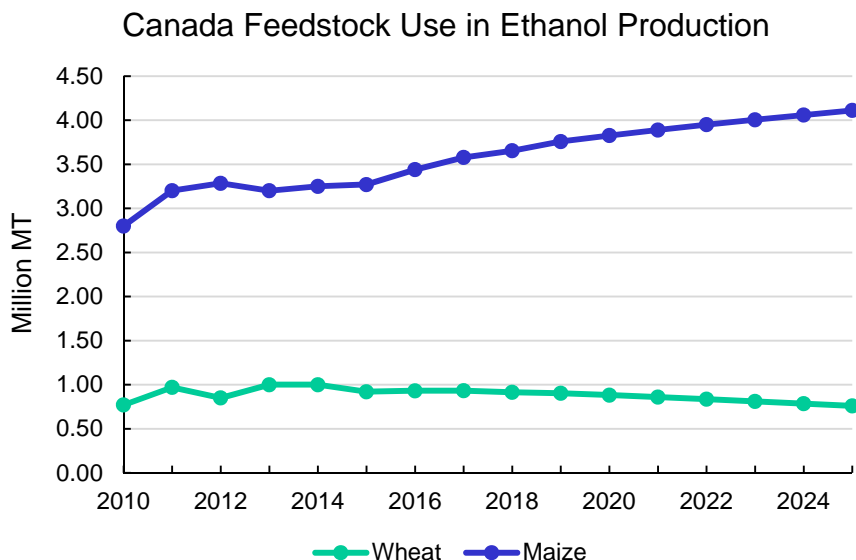
- Domestic ethanol consumption in Canada is driven by 5% ethanol blend mandates over the projection period.
- Ethanol consumption and production are projected to be flat as higher levels of consumption are not plausible until significant infrastructural development happens.
- Canadian ethanol production in 2016 is projected to be 1.9 billion liters and in 2025 ethanol production is projected to increase by 240 million liters to 2.1 billion liters.



- In order to meet the domestic mandates Canada imports ethanol and is projected to follow a similar trend.
- Almost all of Canada's ethanol imports come from U.S.
- In 2016, Canadian ethanol imports are projected to be around 1 billion liters.
- By 2025, the ethanol imports are projected to decrease to 956 million liters.



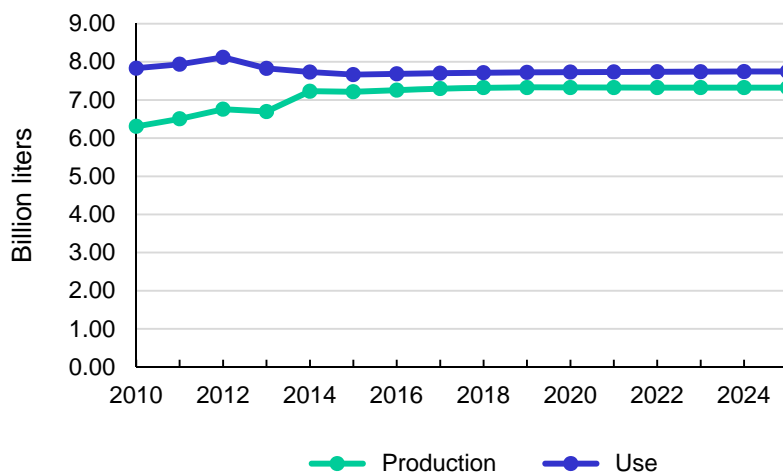
- In 2016, 3.4 million MT of maize and 0.9 million MT of wheat are projected to be used as feedstock in ethanol production.
- It is projected that the wheat share will decrease and maize share will increase by the end of the projection period as the livestock and bioethanol industry compete for wheat.
- By 2025, 4.1 million MT of maize and 0.76 million MT of wheat are projected to be used for ethanol production.



European Union Ethanol Production, Use, and Trade

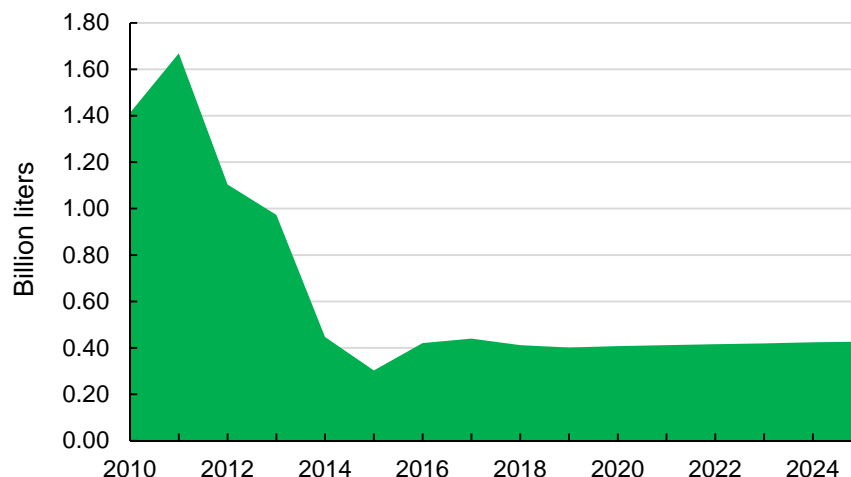
- With lower gasoline use in EU, both the consumption and production of ethanol by the member states of EU are projected to be flat over the period of 2016-2025.
- In 2016, the EU's total ethanol production is projected to be 7.2 billion liters and production is projected to remain flat.
- Ethanol consumption in 2016 is projected to be 7.7 billion liters. It is essentially stable over the projection period as many member countries adjust their blending mandates and reduce overall motor fuel use.

European Union Ethanol Production and Use



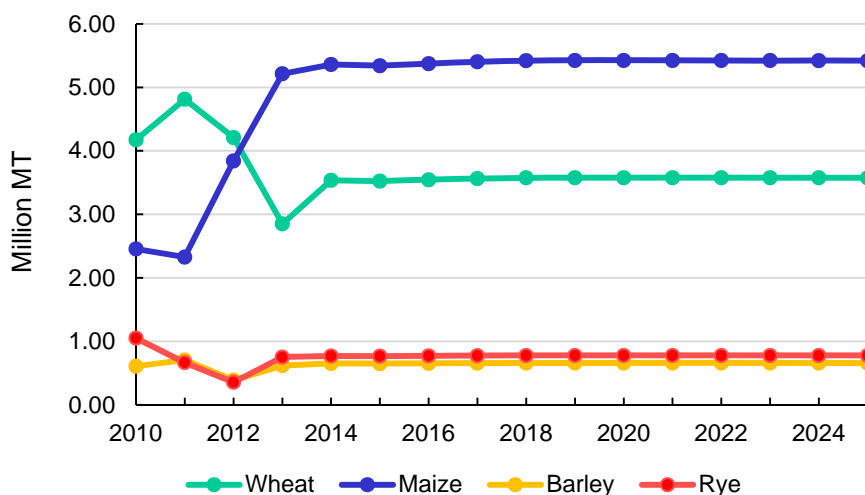
- Since 2011, rising production and declining domestic ethanol consumption have reduced EU ethanol imports.
- In 2016, the EU net ethanol imports are projected to be 420 million liters and they remain steady in later years.

European Union Ethanol Net Imports



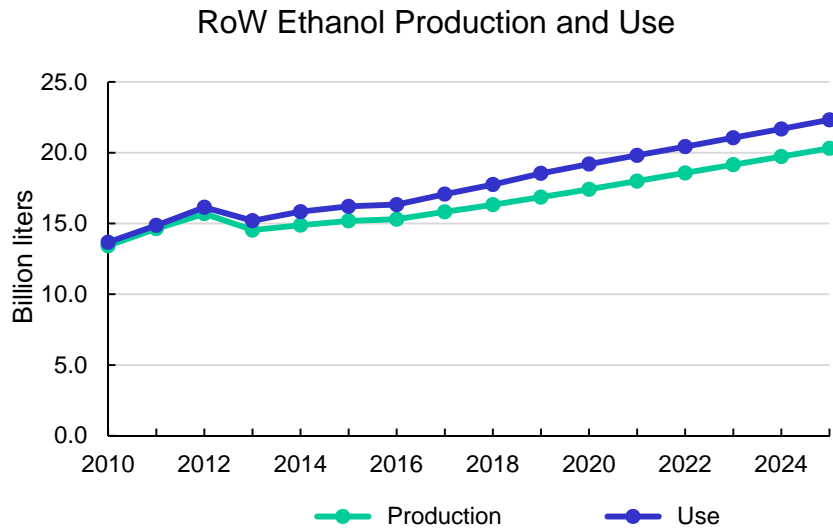
- The use of both maize and wheat for ethanol production in EU is projected to increase slightly because of abundant supply.
- In 2016, maize continues to be cheap in the world market resulting in 5.8 million MT of maize used as feedstock.
- By 2025, maize based feedstock use in European Union is projected to increase to 6.7 million MT and wheat based feedstock use increases to 4.4 million MT.

EU Selected Feedstock Use in Ethanol Production

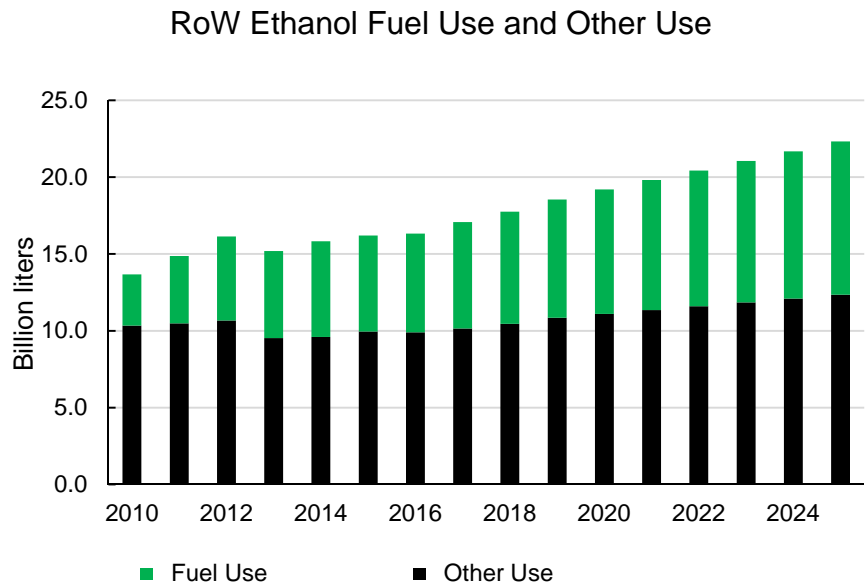


Rest of World Ethanol Production, Use, and Trade

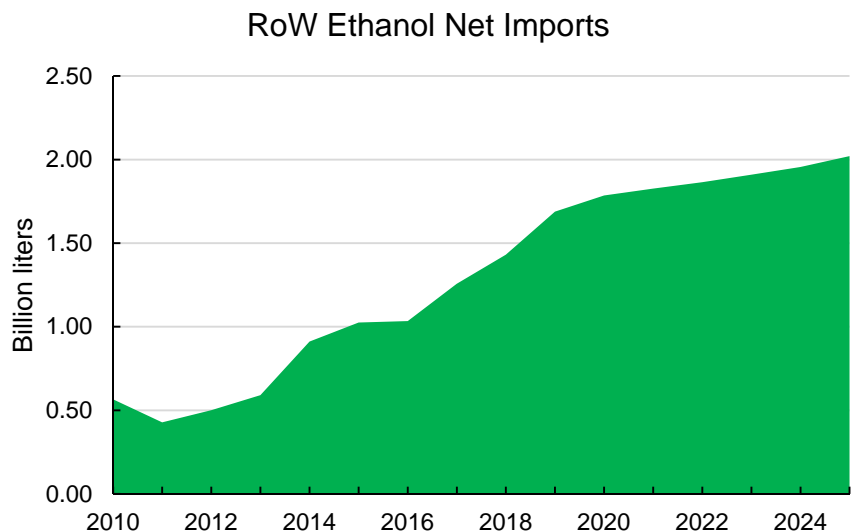
- Rest of world (RoW) consists of many countries including India, and China with ambitious ethanol blending mandate policies.
- As the petroleum price increases, both production and consumption in RoW is projected to increase.
- By 2025, the consumption and production of ethanol by the RoW is projected to increase to 22 billion liters and 20 billion liters respectively.



- RoW total ethanol use is dominated by ethanol use for chemicals and beverages.
- The total ethanol use in 2016 is projected to be 16 billion liters with an average annual increase rate of 3.5%.
- Fuel ethanol use is projected at 6 billion liters with an average annual increase rate of 5.9%.
- Other ethanol use is projected to increase at a flatter rate of 2.4% per year.



- With the implementation of ethanol blending mandates and switching to ethanol in case of higher crude oil price, RoW is projected to be a net importer of ethanol.
- In 2016, RoW net ethanol import is projected to be 1.03 billion liters.
- Net projected ethanol imports almost double between 2016 and 2025.

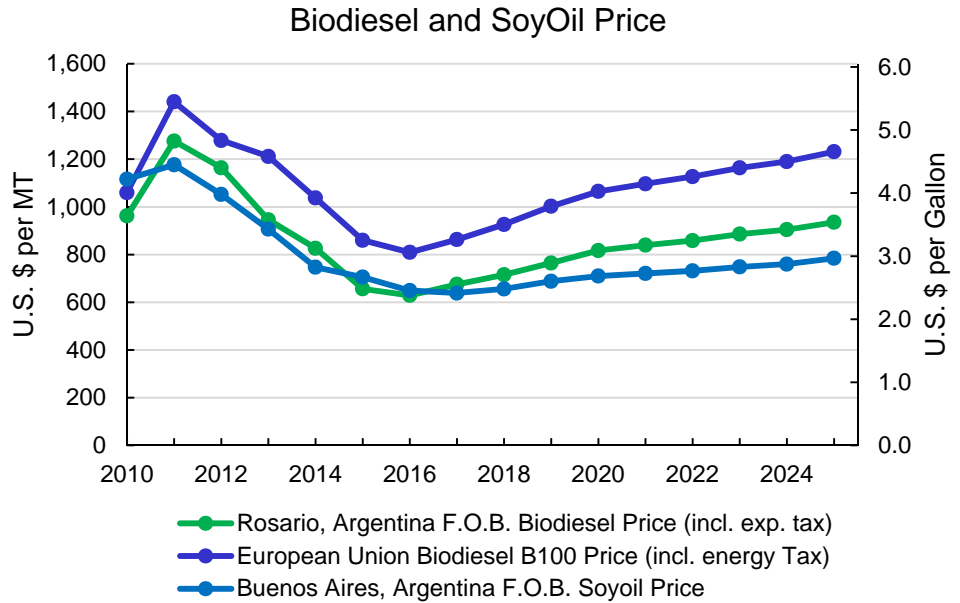


Ethanol Production, Use and Trade and Feedstock Use by Country

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Argentina	(Million liters)											
Production	848	975	1,045	1,074	1,099	1,120	1,139	1,155	1,169	1,182	1,193	1,203
Fuel Use	663	815	836	842	860	884	908	925	936	954	972	990
Other Use	165	160	160	160	160	160	160	160	160	160	160	160
Net Trade	13	13	33	72	79	76	71	69	73	67	61	53
Stocks	104	91	107	107	108	108	108	108	108	108	108	108
Feedstock Use	(Thousand MT)											
Maize	920	1,061	1,140	1,174	1,204	1,230	1,253	1,274	1,292	1,309	1,325	1,338
Sugarcane	1,175	1,281	1,370	1,406	1,436	1,461	1,483	1,501	1,517	1,530	1,543	1,552
Brazil	(Million liters)											
Production	28,665	29,381	30,219	30,957	31,681	32,497	33,082	33,507	33,822	34,103	34,420	34,734
Fuel Use	24,627	25,985	26,437	27,160	27,715	28,171	28,675	29,068	29,387	29,683	30,029	30,363
Other Use	1,838	1,638	1,648	1,658	1,668	1,678	1,688	1,698	1,708	1,718	1,728	1,738
Net Trade	1,040	1,145	2,087	2,087	2,241	2,584	2,668	2,700	2,695	2,672	2,630	2,601
Stocks	7,982	8,596	8,643	8,694	8,752	8,815	8,866	8,907	8,940	8,969	9,002	9,034
Feedstock Use	(Thousand MT)											
Sugarcane	307,020	367,266	377,735	386,962	396,012	406,214	413,521	418,835	422,775	426,289	430,247	434,178
Canada	(Million liters)											
Production	1,870	1,860	1,935	1,990	2,010	2,045	2,059	2,071	2,081	2,088	2,094	2,100
Fuel Use	2,900	2,750	2,736	2,743	2,759	2,771	2,779	2,789	2,798	2,814	2,829	2,843
Other Use	200	205	204	205	206	207	207	208	209	210	211	212
Net Trade	-1,142	-1,190	-1,013	-964	-957	-937	-928	-927	-927	-936	-946	-956
Stocks	111	206	213	219	221	224	226	227	228	229	229	230
Feedstock Use	(Thousand MT)											
Maize	3,250	3,270	3,440	3,578	3,654	3,758	3,826	3,889	3,950	4,005	4,058	4,112
Wheat	1,000	920	931	931	914	902	881	859	835	810	785	759
European Union	(Million liters)											
Production	7,230	7,214	7,256	7,300	7,323	7,326	7,326	7,326	7,326	7,325	7,322	7,320
Fuel Use	5,333	5,180	5,184	5,203	5,214	5,222	5,229	5,234	5,238	5,242	5,245	5,247
Other Use	2,400	2,485	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Net Trade	-447	-303	-420	-440	-412	-402	-407	-412	-416	-420	-424	-427
Stocks	1,756	1,608	1,600	1,637	1,658	1,663	1,667	1,671	1,674	1,677	1,679	1,679
Feedstock Use	(Thousand MT)											
Wheat	3,535	3,296	3,798	4,067	4,105	4,196	4,245	4,288	4,311	4,333	4,373	4,436
Maize	5,360	4,998	5,759	6,167	6,225	6,362	6,437	6,501	6,537	6,570	6,631	6,726
Barley	651	607	699	749	756	773	782	790	794	798	805	817
Rye	769	717	826	885	893	913	924	933	938	943	951	965
Rest of the World	(Million liters)											
Production	14,878	15,183	15,298	15,821	16,323	16,859	17,416	17,991	18,571	19,150	19,727	20,307
Fuel Use	6,232	6,255	6,431	6,923	7,299	7,692	8,097	8,462	8,830	9,204	9,577	9,972
Other Use	9,600	9,950	9,900	10,150	10,450	10,850	11,100	11,350	11,600	11,850	12,100	12,350
Net Trade	-912	-1,025	-1,034	-1,257	-1,431	-1,688	-1,785	-1,826	-1,865	-1,910	-1,956	-2,021
Stocks	1,983	1,986	1,987	1,992	1,997	2,002	2,008	2,014	2,019	2,025	2,031	2,037

World Biodiesel Price, Production, Use, and Trade

- The vegetable oil price⁵ generally acts as the floor to the world biodiesel price.
- Argentinean F.O.B. biodiesel price is projected to remain low at \$2.38 per gallon in 2016.
- By 2025, the Argentinean biodiesel price is projected to increase to \$3.54 per gallon as world crude oil prices are assumed to recover.



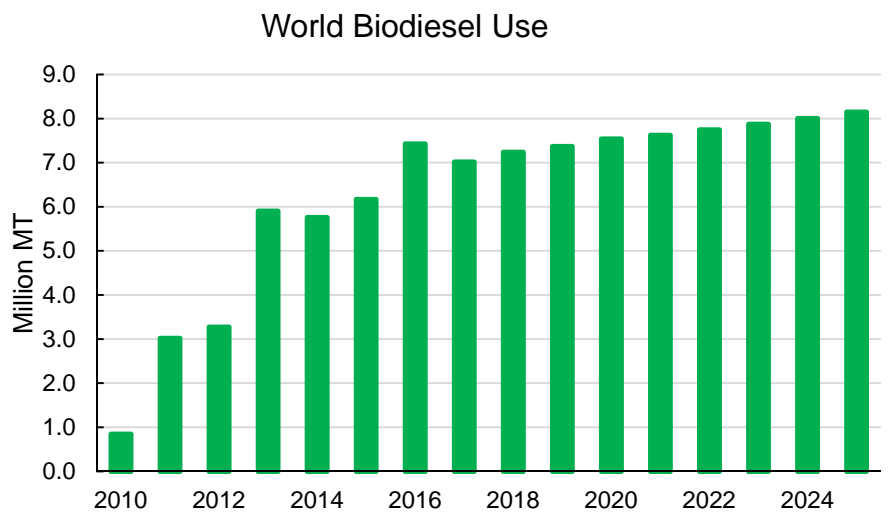
- Environmental & energy independence policies around the world result in an upward trend in biodiesel consumption.

- EU policies were responsible for most of the early growth in biodiesel production and consumption.

- In 2014, the biodiesel price premium over crude oil encouraged biodiesel use.

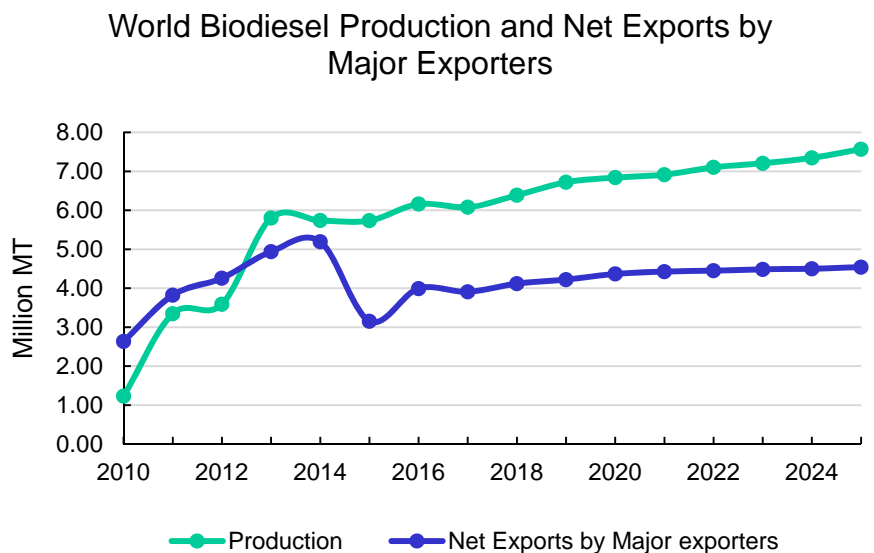
- After the 2015 dip in biodiesel demand due to the plunging crude oil price, it is projected to increase as crude oil prices rise.

- World biodiesel consumption is projected to increase by 6.3 million MT over the next 10 years at average of 2.4% per year.



- World biodiesel production is projected to increase from 28 million MT in 2016 to 32.8 million MT in 2025 following the increase in biodiesel price.

- The world net biodiesel trade is projected to increase from 3 million MT to 4.5 million MT as RoW biodiesel use increases.



⁵ See International Crops Baseline Briefing Book, University Center for Economic Development, University of Nevada. <http://www.unr.edu/Documents/business/uced/FAPRI/2016/Briefing%20Book.pdf>

Biodiesel and Soyoil Price

Calender Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Biodiesel Price						(U.S. \$ per MT)						
Rosario, Argentina F.O.B. (incl. exp. tax)	826	656	629	675	716	765	817	840	859	886	905	936
European Union (incl. energy Tax)	1,038	860	809	863	926	1,003	1,065	1,097	1,127	1,164	1,190	1,231
Soyoil Price*						(U.S. \$ per MT)						
Buenos Aires, Argentina F.O.B.	746	705	649	638	656	688	709	720	731	748	759	784
Biodiesel Price						(U.S. \$ per gallon)						
Rosario, Argentina F.O.B. (incl. exp. tax)	3.13	2.48	2.38	2.56	2.71	2.89	3.09	3.18	3.25	3.35	3.42	3.54
European Union (incl. energy Tax)	3.93	3.25	3.06	3.27	3.51	3.79	4.03	4.15	4.27	4.40	4.50	4.66
Soyoil Price*						(U.S. \$ per gallon)						
Buenos Aires, Argentina F.O.B.	2.82	2.67	2.45	2.42	2.48	2.60	2.68	2.73	2.77	2.83	2.87	2.97

*For details see International Crops baseline briefing book, University of Nevada.

World Biodiesel Trade

Calender Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net Exports						(Thousand MT)						
Argentina	1,598	700	855	1,045	1,148	1,215	1,289	1,324	1,337	1,357	1,371	1,377
Brazil	-3	0	94	69	81	68	72	45	6	-26	-69	-106
European Union	-427	-300	-172	-85	-176	-335	-375	-417	-476	-517	-553	-618
Indonesia	1,217	350	744	650	663	615	600	583	577	557	503	481
Malayasia	428	299	274	310	331	342	352	355	352	349	350	340
United States*	-344	-749	-1,394	-1,167	-1,131	-951	-1,016	-1,026	-956	-968	-958	-861
Rest of World	-2,604	-489	-590	-1,011	-1,103	-1,143	-1,111	-1,053	-1,029	-942	-832	-801
Historical Discrepancies	135	189	189	189	189	189	189	189	189	189	189	189

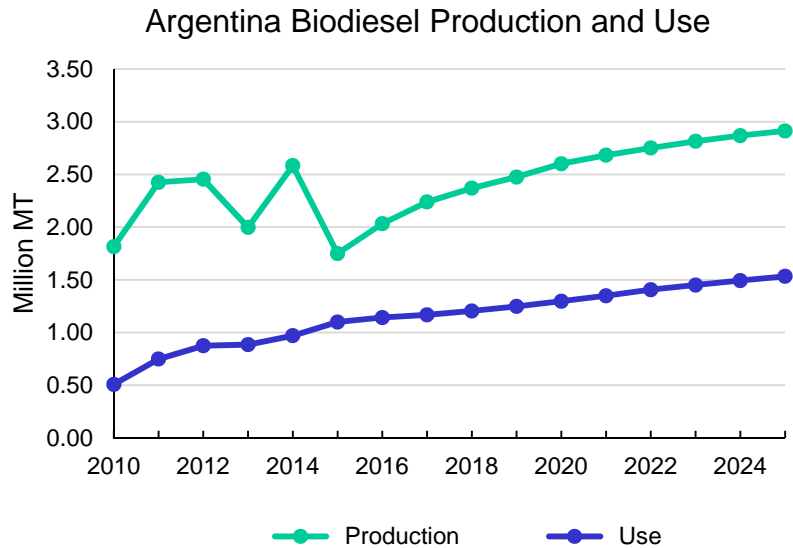
*For details see 2016 U.S. Baseline Briefing Book, FAPRI-MU Report #02-16.

Note: The U.S. baseline briefing book reports the mean of stochastic results for the U.S. markets.

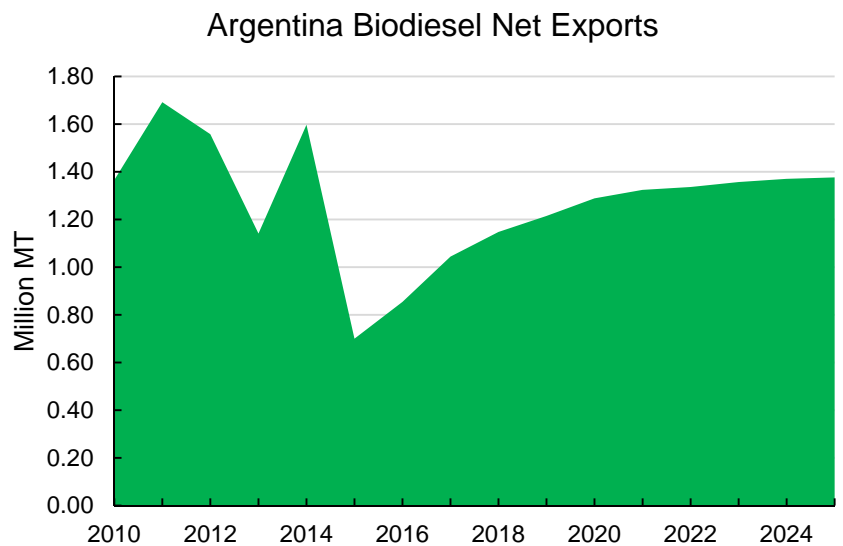
Figures reported here are from a deterministic solution, and will therefore differ slightly.

Argentina Biodiesel Production, Use, and Trade

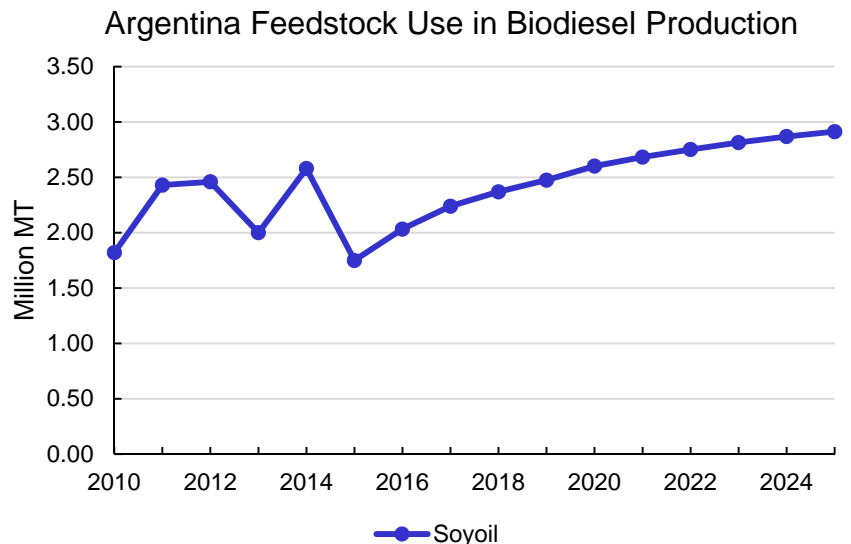
- In 2015, Argentina's biodiesel production dropped by 30% as export demand declined.
- Biodiesel production is projected to grow rapidly in the future years to capture more of the international biodiesel market.
- The increase in domestic consumption is driven by the biodiesel blend mandate of 10%.



- Argentinean export taxes favor soyoil based biodiesel over soyoil.
- Net biodiesel exports dropped significantly in 2015 as soybean oil lost its price advantage over free falling crude oil price and EU continued its antidumping policy on Argentinean biodiesel.
- In 2016, biodiesel exports are projected to bounce back to 855 thousand MT.
- As the U.S. EPA considers Argentinean soyoil based biodiesel as an advanced biofuel, the 2025 biodiesel exports are projected to be 1.4 million MT.



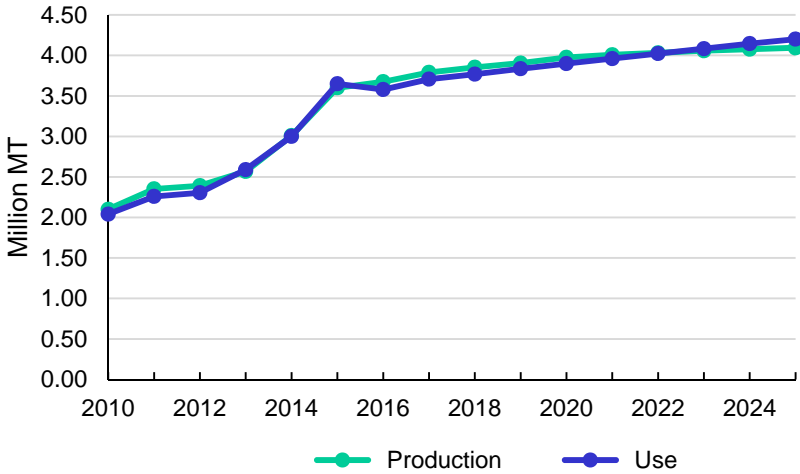
- Even after the new Argentinean government reduces the export tax on soybeans and its byproduct by 5%, the biodiesel export tax are still lower which encourages biodiesel production from soyoil.
- Soyoil demand for biodiesel production in Argentina is projected to grow as the production of biodiesel continues.



Brazil Biodiesel Production, Use, and Trade

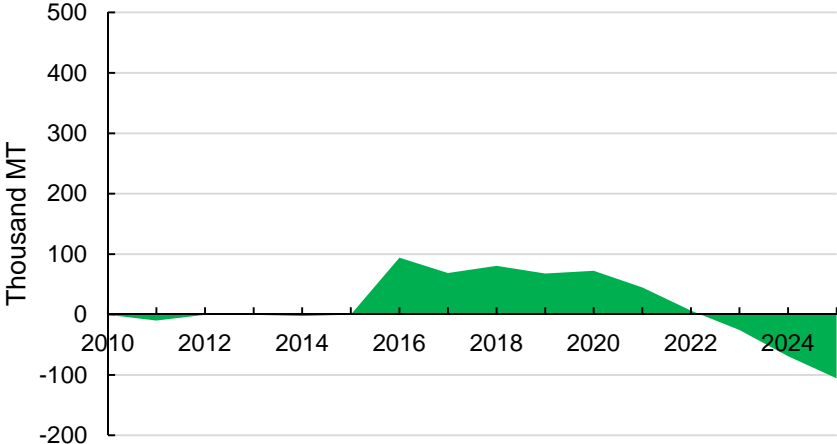
- Brazil is self-sufficient with regard to biodiesel.
- Brazilian consumption is projected to increase as the domestic fuel use continues to grow and the domestic biodiesel mandate is at 7%.
- From 2016 to 2025, Brazilian biodiesel production is projected to increase from 3.7 million MT to 4 million MT.

Brazil Biodiesel Production and Use



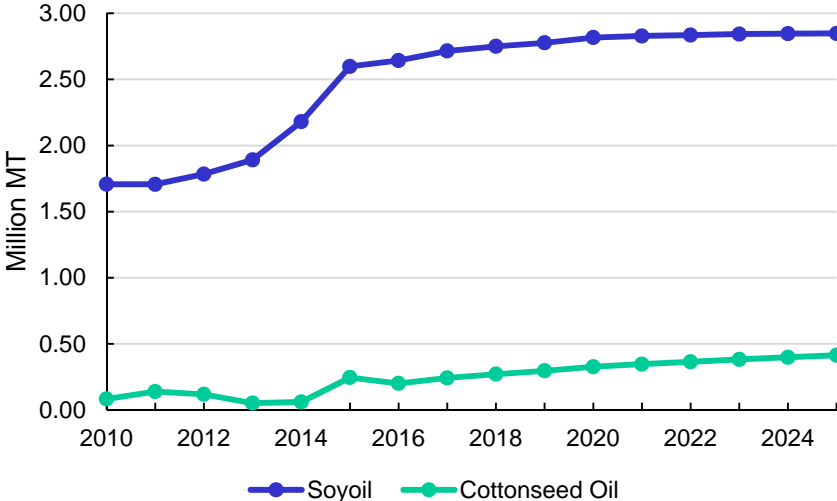
- Brazilian participation in biodiesel trade is insignificant as the government controls both the production and consumption of biodiesel.
- Small net exports are projected for 2016-2021 and small net imports are projected for later years.

Brazil Biodiesel Net Exports



- With the increase in biodiesel production in Brazil, the demand for soyoil and cottonseed oil is projected to be increase.
- In 2016, 2.6 million MT of soyoil and 200 thousand MT of cottonseed oil are projected to be used for biodiesel production in Brazil.

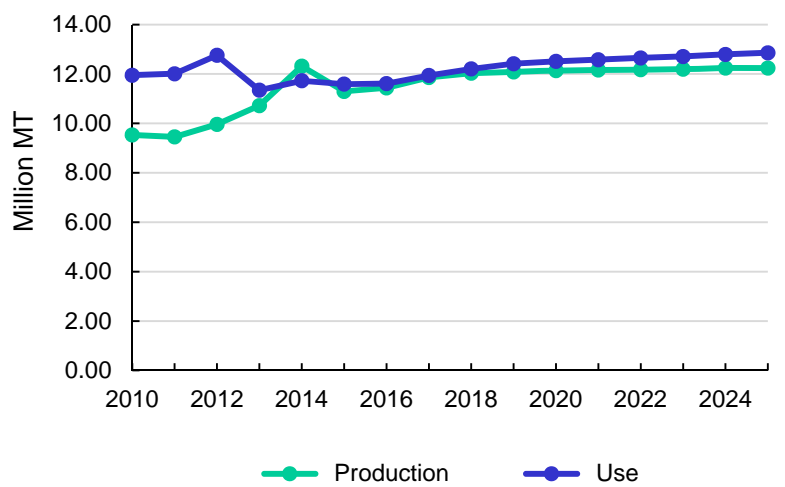
Brazil Feedstock Use in Biodiesel Production



European Union Biodiesel Production, Use, and Trade

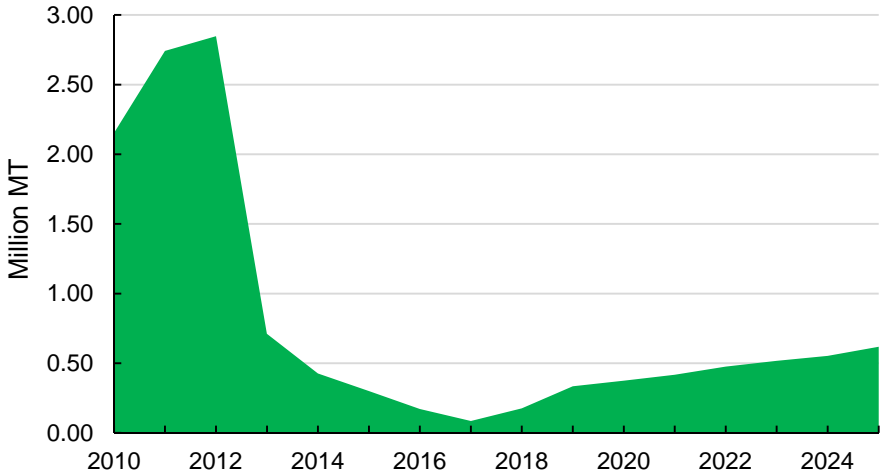
- Domestic biodiesel consumption in EU is projected to increase as minimum GHG reduction mandate will continue.
- The production of biodiesel is projected to be 11.4 million MT in 2016 and is projected to increase to 12.2 million MT by 2025 mainly driven by the consumption and imports restriction.

European Union Biodiesel Production and Use



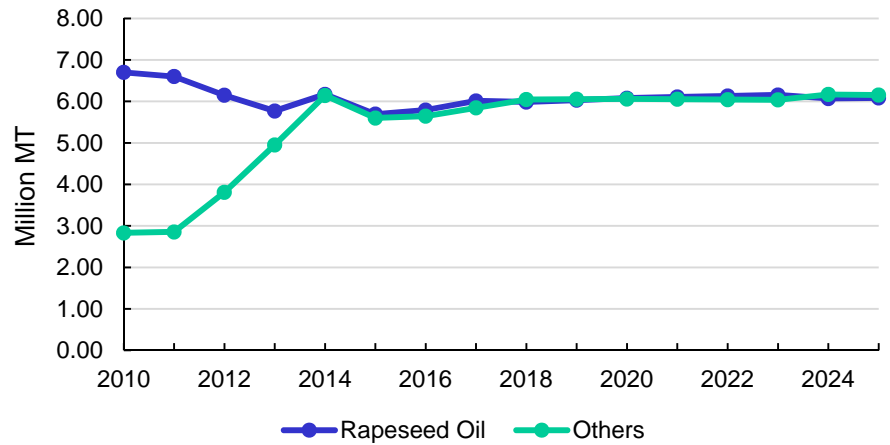
- EU biodiesel imports fell sharply in 2013 when anti-dumping duties were imposed.
- Assuming a continuation of current policies, EU net imports of biodiesel remain small relative to domestic production and use.

European Union Biodiesel Net Imports



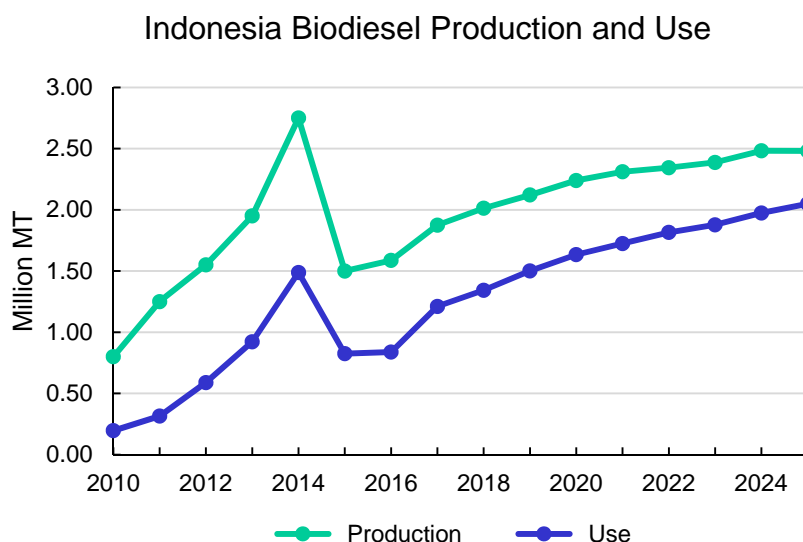
- The EU uses rapeseed and other oil including soyoil, palm oil, sunflower oil, recycle vegetable oil, used cooking oil and animal fat to produce biodiesel.
- Use of rapeseed and other oil mainly driven by used cooking oil is projected to be used as feedstock at a 1:1 ratio as some of the feedstocks under other oil category are double counted toward achieving the biodiesel mandates in EU.

European Union Feedstock Use in Biodiesel Production

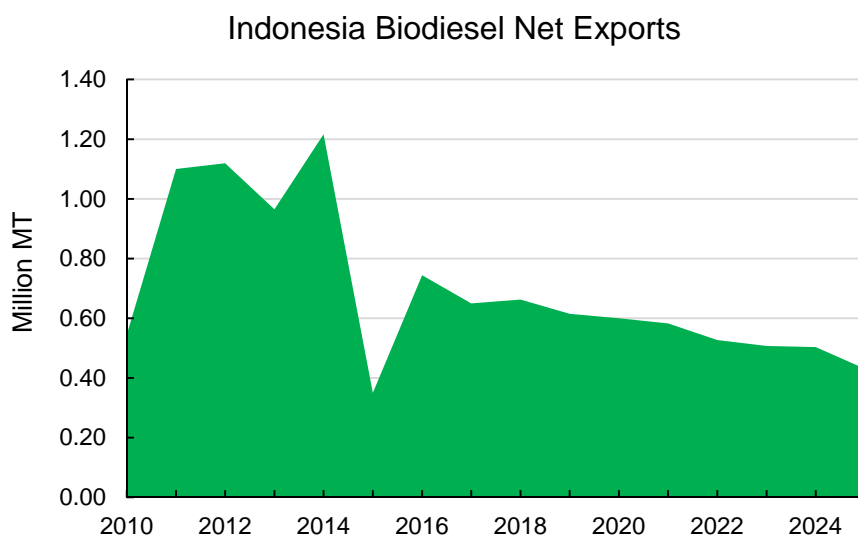


Indonesia Biodiesel Production, Use, and Trade

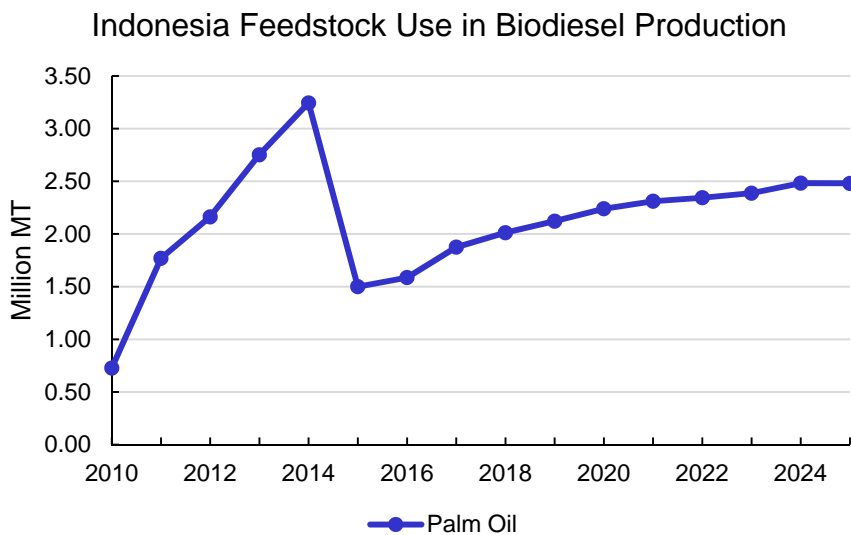
- Indonesian biodiesel production is projected to continue to rise as there is abundant supply of crude palm oil.
- Indonesian biodiesel consumption is projected to grow at a faster rate due to the implementation of the 15% biodiesel blending mandate.
- In 2016, consumption of biodiesel is projected to be 838 thousand MT.



- In 2015, there was a sharp drop in Indonesian biodiesel exports because of the plunge in the crude oil price.
- Biodiesel net exports in 2016 are projected to recover as the U.S. is importing Indonesian palm oil based biodiesel to meet the advanced biofuel mandate.
- With increase in domestic demand, the Indonesian biodiesel net exports is projected to decrease by 2025 as the government is setting up a robust domestic biodiesel market.

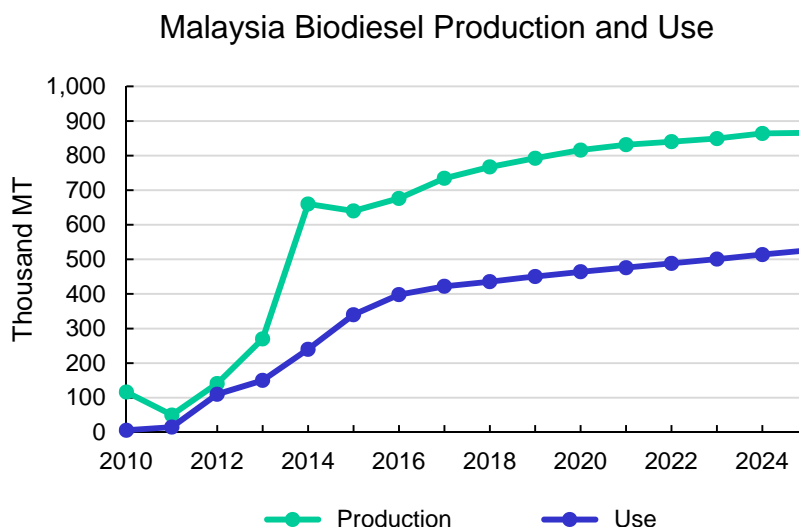


- The recently imposed levy on the export of crude palm oil by the Indonesian government will continue to encourage the use of palm oil for domestic biodiesel production.
- In 2016, 1.6 million MT of palm oil are projected to be used for biodiesel production.
- By 2025, the palm oil use in biodiesel production in Indonesia is projected to increase to 2.5 million MT.

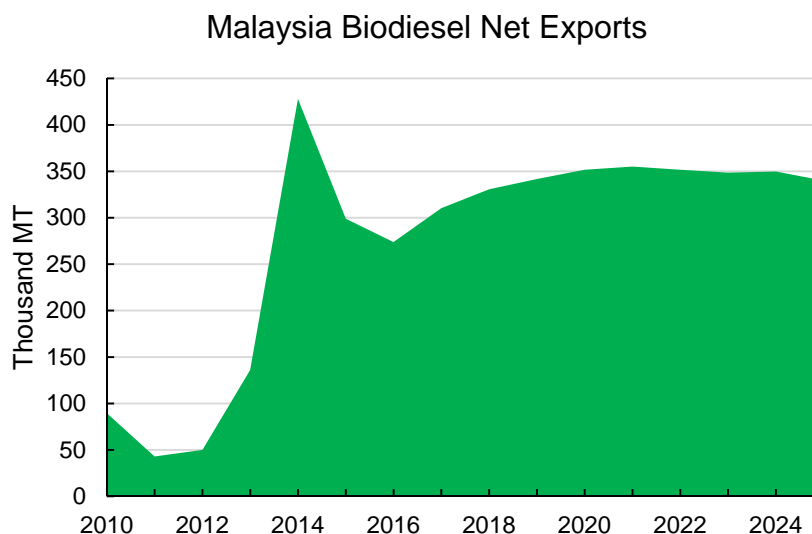


Malaysia Biodiesel Production, Use, and Trade

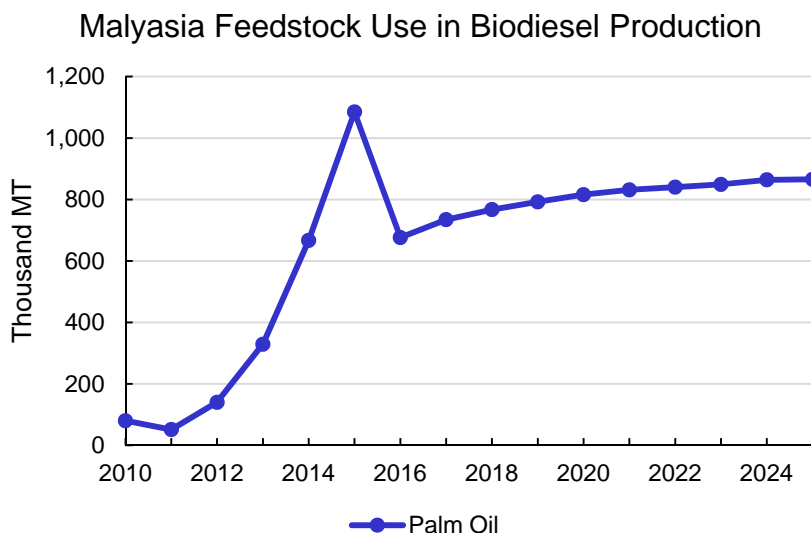
- Malaysian biodiesel production in 2016 is projected to be 676 thousand MT and by 2025, it is projected to increase to 866 thousand MT.
- The spike in 2014 biodiesel production is the result of a sharp increase in biodiesel export demand in the same year.
- Domestic biodiesel consumption in 2016 is projected to be 398 thousand MT and it increases to 526 thousand MT in 2025 as the blending mandates increase from 5% to 7%.



- Malaysia is a major biodiesel exporter. Unlike Indonesia and Argentina, European Union did not impose anti-dumping duties on Malaysian biodiesel which helps to explain the sharp increase in exports in 2014.
- In 2016, Malaysia is projected to export 274 thousand MT of biodiesel to the international biofuels market.
- By 2025, Malaysian biodiesel exports are projected to increase to 340 thousand MT.



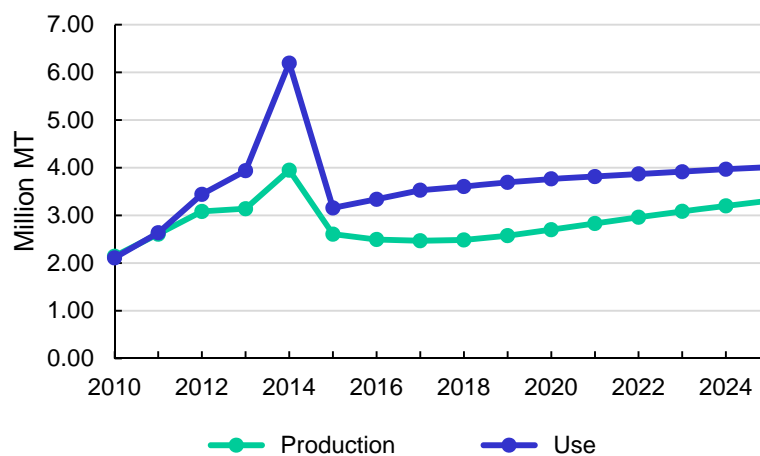
- Crude palm oil is the major feedstock used in biodiesel production in Malaysia. With the fall in the world palm oil price, the Malaysian government is promoting the use of palm oil in biodiesel production.
- In 2016, after an initial dip in the palm oil use for biodiesel production, palm oil based feedstock use is projected to be 676 thousand MT.
- By 2025, 866 thousand MT of palm oil are projected to be used for biodiesel production.



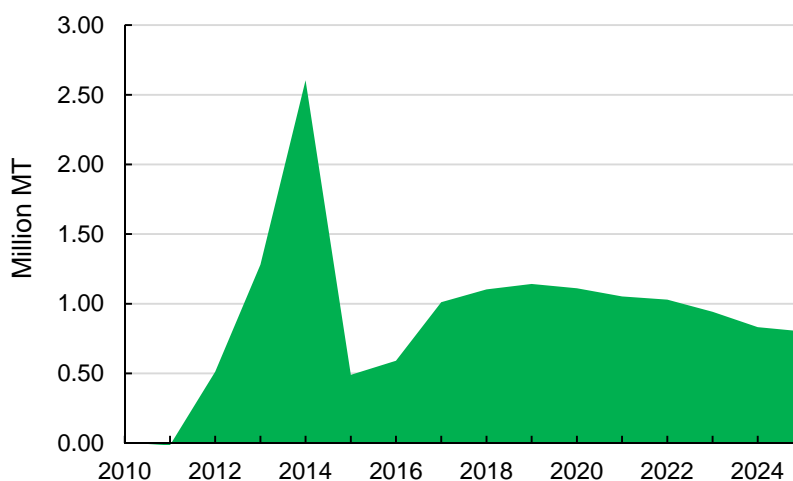
Rest of World Biodiesel Production, Use, and Trade

- With the reduction in the price premium between biodiesel and vegetable oil, the production of biodiesel in the Rest of World (RoW) falls dramatically in 2015.
- After a fall in production and consumption in 2015, both are projected to increase at a modest rate.
- In the latter part of the projection period, both the RoW production and consumption of biodiesel are projected to increase as crude oil price increases.
- Import demand for biodiesel in the RoW countries is projected to increase in 2016 and continue increasing until 2019.
- As the RoW starts building biodiesel production infrastructure, the biodiesel imports are projected to decline beyond 2019.

RoW Biodiesel Production and Use



RoW Biodiesel Net Imports



Biodiesel Production, Use and Trade and Feedstock Use by Country

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	(Thousand MT)											
Argentina												
Production	2,584	1,750	2,033	2,240	2,370	2,475	2,601	2,683	2,751	2,815	2,869	2,913
Use	970	1,100	1,142	1,168	1,205	1,248	1,297	1,349	1,407	1,451	1,493	1,533
Net Trade	1,598	700	855	1,045	1,148	1,215	1,289	1,324	1,337	1,357	1,371	1,377
Stocks	226	176	211	238	255	268	283	292	300	306	311	314
Feedstock Use												
Soyoil	2,580	1,750	2,033	2,240	2,370	2,475	2,601	2,683	2,751	2,815	2,869	2,913
Brazil												
Production	3,010	3,600	3,676	3,790	3,853	3,905	3,976	4,007	4,031	4,057	4,076	4,093
Use	3,001	3,650	3,578	3,707	3,768	3,835	3,899	3,960	4,024	4,082	4,145	4,201
Net Trade	-3	0	94	69	81	68	72	45	6	-26	-69	-106
Stocks	881	832	835	848	853	855	860	861	862	863	863	861
Feedstock Use												
Soyoil	2,180	2,598	2,643	2,715	2,750	2,777	2,817	2,828	2,835	2,843	2,846	2,847
Cottonseed oil	61	245	200	243	271	296	327	347	364	382	398	414
European Union												
Production	12,314	11,294	11,438	11,859	12,031	12,083	12,135	12,159	12,174	12,192	12,240	12,237
Use	11,726	11,589	11,608	11,939	12,206	12,417	12,509	12,576	12,649	12,708	12,793	12,856
Net Trade	-427	-300	-172	-85	-176	-335	-375	-417	-476	-517	-553	-618
Stocks	2,078	2,083	2,085	2,089	2,091	2,091	2,091	2,092	2,092	2,092	2,092	2,092
Feedstock Use												
Rapeseed oil	6,170	5,694	5,793	6,013	5,986	6,029	6,077	6,107	6,131	6,155	6,071	6,084
Others	6,144	5,600	5,645	5,846	6,045	6,053	6,058	6,052	6,043	6,037	6,169	6,153
Indonesia												
Production	2,750	1,500	1,586	1,875	2,013	2,121	2,240	2,311	2,394	2,437	2,482	2,530
Use	1,488	825	838	1,211	1,343	1,501	1,634	1,725	1,815	1,878	1,974	2,049
Net Trade	1,217	350	744	650	663	615	600	583	577	557	503	481
Stocks	203	528	532	546	553	558	564	567	569	571	576	575
Feedstock Use												
Palm oil	3,244	1,500	1,586	1,875	2,013	2,121	2,240	2,311	2,394	2,437	2,482	2,530
Malaysia												
Production	660	640	676	734	767	792	816	831	840	849	864	866
Use	240	340	398	422	436	450	464	476	488	501	514	526
Net Trade	428	299	274	310	331	342	352	355	352	349	350	340
Stocks	6	7	11	13	14	14	14	15	15	15	15	15
Feedstock Use												
Palm oil	667	649	676	734	767	792	816	831	840	849	864	866
Rest of World												
Production	3,950	2,607	2,495	2,468	2,484	2,575	2,701	2,833	2,962	3,086	3,200	3,310
Use	6,194	3,158	3,339	3,529	3,606	3,693	3,767	3,816	3,870	3,916	3,971	4,012
Net Trade	-2,604	-489	-590	-1,011	-1,103	-1,143	-1,111	-1,053	-979	-892	-832	-751
Stocks	1,967	1,905	1,651	1,602	1,584	1,608	1,654	1,723	1,794	1,855	1,917	1,966