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Brazil

Biofuels Annual

2019

Approved By:

Oliver Flake, Agricultural Counselor

Prepared By:

Sergio Barros, Agricultural Specialist

Report Highlights:

The National Biofuels Policy of Brazil, the RenovaBio program, is expected to be implemented in late December 2019. Over forty biofuel plants have requested the certification process. Brazil's total 2019 ethanol production is estimated at 34.45 billion liters, an increase of four percent compared to the revised figure for 2018. Total domestic demand for ethanol (fuel and other uses) for calendar year 2019 is estimated at 33.93 billion liters. Total Brazilian biodiesel production is estimated at 5.8 billion liters, an eight percent increase relative to 2018, based on the projected modest growth of the Brazilian economy and the increase of the biodiesel blend to eleven percent (B11) beginning in September 2019.

I. Executive Summary

The RenovaBio Program is designed to support Brazil's COP21 goals. RenovaBio was launched in December 2016 by the Ministry of Mines and Energy (MME) and was instituted as the "National Biofuels Policy". The program is expected to be effective by late December 2019. The RenovaBio operation is based on three main instruments:

1. annual carbon intensity reduction targets (gCO₂/MJ) for a minimum period of ten years,
2. certification of biofuels by efficiency in reducing GHG emissions, and
3. Decarbonization Credits (CBIO).

On June 28, the European Union and Mercosur reached a provisional agreement on a free trade agreement (FTA), concluding two decades of talks. The final text and market access schedules still need to be determined and have no set deadline. Mercosur will receive preferential tariffs under Tariff Rate Quotas (TRQ) for the several categories of products, including ethanol.

Ethanol

No changes have been made to the current ethanol mandate, which remains at 27 percent (E27) for Gasoline C (gasolina comum, more commonly referred to simply as "gasoline") since March 16, 2015. No changes have been made on CIDE and PIS/COFINS for ethanol or gasoline. The Brazilian government (GOB) instituted an annual TRQ of 600 million liters on ethanol imports from September 1, 2017 through August 31, 2019. Any volume above the quota is subject to the 20 percent Common External Tariff under the Mercosur agreement. The GOB has not released any official communication regarding the removal of the TRQ and/or the import tariff on ethanol.

Brazil's total ethanol production for 2019 is estimated at 34.45 billion liters, an increase of four percent compared to the revised figure for 2018. Total ethanol production from corn in 2019 is estimated at 1.4 billion liters, an increase of 609 million liters compared to 2018. Total cellulosic ethanol production is estimated at 45 million liters, and represents an insignificant share of total ethanol production in Brazil. No significant changes have been made to the current status of advanced biofuels research, development and production.

Total 2019 domestic demand for ethanol (fuel and other uses) is estimated at 33.93 billion liters, up 2.19 billion liters compared to revised figure for 2018. Ethanol is mainly used for fuel in Brazil. Brazil's total ethanol exports are estimated at 1.8 billion liters, an increase of eleven percent compared to total exports in 2018 (1.62 billion liters). Brazil's total ethanol imports for 2019 are projected at 1.2 billion liters, a decrease of 495 million liters relative to the previous year (1.695 billion liters). Ethanol imports are only for fuel use and originate almost entirely from the United States.

Biodiesel

Biodiesel production remains tightly regulated by the government. Biodiesel production in 2018 increased to 5.35 billion liters, up 25 percent compared to 2017, due to the increase in diesel consumption and the increase of the biodiesel blend to ten percent (B10) in March 2018. Total Brazilian biodiesel production for 2019 is estimated at 5.8 billion liters, an eight percent increase relative to 2018, based on the projected 0.8 percent growth of the Brazilian economy in 2019 and

the increase of the biodiesel blend to eleven percent (B11) as of September. Total biodiesel consumption is estimated at 5.79 billion liters, an increase of eight percent relative to 2018 (5.34 billion liters).

II. Policy and Programs

Renewable Energy and Greenhouse Gas Emissions

In December 2015, Brazil joined the 21st Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, where governments from 190 countries discussed potential agreements on preventing global climate change. Each country submitted their plan to reduce domestic emissions of greenhouse gases (GHGs), called an “Intended Nationally Determined Contribution (iNDC),” with the intention of limiting the rise of global temperatures to a maximum of 2°C by 2100.

As a result of COP21 commitments and several voluntary goals set internally, Brazil committed to reduce domestic emissions of GHGs by 37 percent by 2025 and by 43 percent by 2030, based upon 2005 levels (see [BR18017](#) for additional information). Note that, in June 2019, President Jair Bolsonaro announced that Brazil will uphold the commitments made in The Paris Agreement despite contrary statements during his political campaign.

RenovaBio Program

The RenovaBio Program is designed to support Brazil’s COP21 goals. RenovaBio was launched in December 2016 by the Ministry of Mines and Energy (MME) and was instituted as the “National Biofuels Policy” with the enactment of Bill #13,576 on December 26, 2017.

As stated in Bill #13,576, RenovaBio’s goals include:

1. contributing to meet the country's commitments under the COP21 Paris Agreement under the United Nations Framework Convention on Climate Change;
2. contributing to the adequate ratio between energy efficiency and reduction of GHG emissions in the production, commercialization, and use of biofuels, including mechanisms for lifecycle assessment;
3. promoting the adequate expansion of the production and use of biofuels in the national energy matrix, emphasizing the continuity of fuels supply; and
4. contributing to the predictability of various biofuels in the national fuel market.

The RenovaBio operation is based on three main instruments:

1. annual carbon intensity reduction targets (gCO₂/MJ) for a minimum period of ten years,
2. certification of biofuels by efficiency in reducing GHG emissions, and
3. Decarbonization Credits (CBIO).

The rationale behind RenovaBio is the recognition that the biofuels sector, in addition to offering a basket of goods in the fuel market (ethanol, biodiesel, biogas, bio-kerosene, etc.), provides a reduction of GHG emissions, which is not currently valued due to the absence of a specific market. By creating a market for carbon decarbonization credits (CBIO), RenovaBio aims to formalize recognition of the environmental benefits of biofuels and remuneration for the sector’s role in reducing GHG emissions.

This report updates [BR18017](#), illustrating the progress of Renovabio which is expected to be effective by late December 2019. In November 2018, the Petroleum, Natural Gas and Biofuels National Agency (ANP) adopted Resolution #758/2018 which:

1. defines the standards for the efficient production or importation of biofuels;
2. sets up the criteria to calculate the Energetic-Environment Efficiency Score/Rank for domestic biofuels producers and importers;
3. defines the requirements for accrediting certification companies (inspectors) and the certification of individual units (plants). Currently, five companies are accredited to inspect and certify the biofuels units. Over forty biofuels units have started the certification process;
4. sets Renovacalc, the analytical tool which measures the biofuels carbon intensity (in g CO₂ equivalent/MJ) comparing the carbon intensity to the equivalent fossil fuel, to double-check the environmental performance from biofuels production.

In April 2019, MME opened the new proposal for the compulsory targets for carbon intensity (CI) reduction (gCO₂/MJ) for the 2020-2029 cycle for public consultation. The annual targets will be deployed for fuel distributors. In June 2019, MME/National Council for Energy Policy (CNPE) Resolution #15 approved the compulsory targets for the 2020-2029 cycle.

The targets aim to reduce the CI of transportation fuels to 66.1 g CO₂/MJ (a reduction of 10.2 percent) by 2029, starting from a base in 2018 of CI of 73.6 gCO₂/MJ. In order to guarantee the proposed reduction, MME estimates that 95.5 million Decarbonization Credits (CBIOs) will need to be traded in 2029. Each CBIO corresponds to one metric ton of carbon saved through the utilization of biofuels versus fossil fuels. The table below shows the compulsory targets set by CPNE (in millions of CBIOs) as well as the tolerance interval.

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Annual Target (in millions of CBIOs)	16.8	28.7	41	49.8	59.6	66.9	73.3	79.5	85.1	90.1	95.5
Tolerance Interval	-	-	45.5	54.3	64.1	71.4	77.8	84	89.6	94.6	100
	-	-	36.5	45.3	55.1	62.4	68.8	75	80.6	85.6	91

In June 2019, ANP Resolution #791/2019 breaks down the annual compulsory target for carbon intensity reduction by individual distributor based on the fossil fuel (gasoline and diesel) trade by company in the previous year. Distributors who did not commercialize fossil fuels in the previous year are not required to meet any target.

The Brazilian Government has been working on the definition of all regulatory and market aspects related to the trading of CBIOs, which will be traded in the stock exchange and encompass the issuing, expiration, distribution, intermediation, and custody. The CBIO regulatory framework is still under construction and is expected to be effective by the end of 2019.

Government Support for Ethanol Programs

Anhydrous Ethanol Use Mandate

No changes have been made to the current ethanol mandate, which remains at 27 percent (E27) for Gasoline C (gasolina comum, more commonly referred to simply as “gasoline”) since March 16, 2015. There is no market for unblended fossil gasoline in Brazil (Gasoline A). The table below shows the ethanol use mandate since 2006.

Ethanol Use Mandate		
Year	Month	Mandate
2006	Jan-Feb	E25
	Mar-Oct	E20
	Nov-Dec	E23
2007	Jan-May	E23
	Jun-Dec	E25
2008	Jan-Dec	E25
2009	Jan-Dec	E25
2010	Jan	E25
	Feb-Apr	E20
	May-Dec	E25
2011	Jan-Sep	E25
	Oct-Dec	E20
2012	Jan-Dec	E20
2013	Jan-Apr	E20
	May-Dec	E25
2014	Jan-Dec	E25
2015	Jan-Mar 15th	E25
	Mar 16th-Dec	E27
2016	Jan-present	E27

Tax Incentives for Ethanol

No changes have been made to the tax incentives for ethanol-flex-fuel vehicles compared to gasoline vehicles. Please refer to [BR17006](#) for historical information.

Taxes Applied to Ethanol, Flex-Fuel and Gasoline Vehicles (Percentage)						
Year	Taxes	1000 cc	1001-2000 cc		Over 2000 cc	
		Gas 1/ /Eth/Flex	Gas 1/	Eth/Flex	Gas 1/	Eth/Flex

2013	IPI					
	ICMS	2	8	7	25	18
	PIS/COFINS	12	12	12	12	12
	% of Avg	11.6	11.6	11.6	11.6	11.6
	MSRP	23.6	27.4	26.8	36.4	33.1
2014	IPI	3	10	9	25	18
	ICMS	12	12	12	12	12
	PIS/COFINS	11.6	11.6	11.6	11.6	11.6
	% of Avg					
	MSRP	24.4	28.6	28	36.4	33.1
2015/2018	IPI	7	13	11	25	18
	ICMS	12	12	12	12	12
	PIS/COFINS	11.6	11.6	11.6	11.6	11.6
	% of Avg					
	MSRP	27.1	30.4	29.2	36.4	33.1

Source: National Association of Motor Vehicle Manufacturers (ANFAVEA)

* Gas 1 = Gasoline.

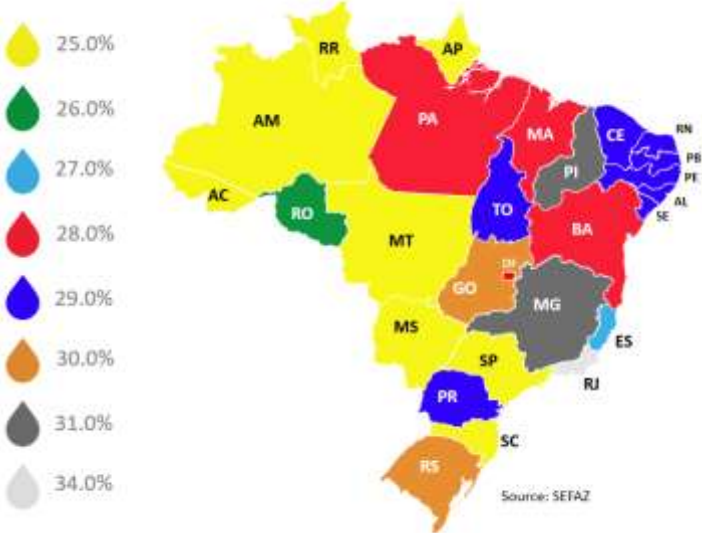
** The tax of 3% refers to flex fuel cars MSRP = Manufacturer Suggested Retail Price. The aggregation of the individual taxes does not necessarily add up to the percentage of the Average Retail Price (fourth row) because each individual tax applies to different steps of the production chain and not to the final retail price. During 2013, the Brazilian government offered temporary tax breaks to some categories.

The GOB has a complex tax system including several taxes at the federal, state, and municipal level. Depending on the economic and financial strategies pursued by policymakers, the GOB can provide incentives for gasoline and/or ethanol at the pump. Currently, the GOB provides preferential treatment for ethanol compared to gasoline under both the Contribution for Intervention in Economic Domain (CIDE) and the Contribution to the Social Integration Program/Contribution for Financing Social Security (PIS/COFINS) programs. No changes have been made on CIDE or PIS/COFINS for ethanol or gasoline. See [BR15006](#) and [BR17006](#) for the latest information on CIDE and PIS/COFINS, respectively.

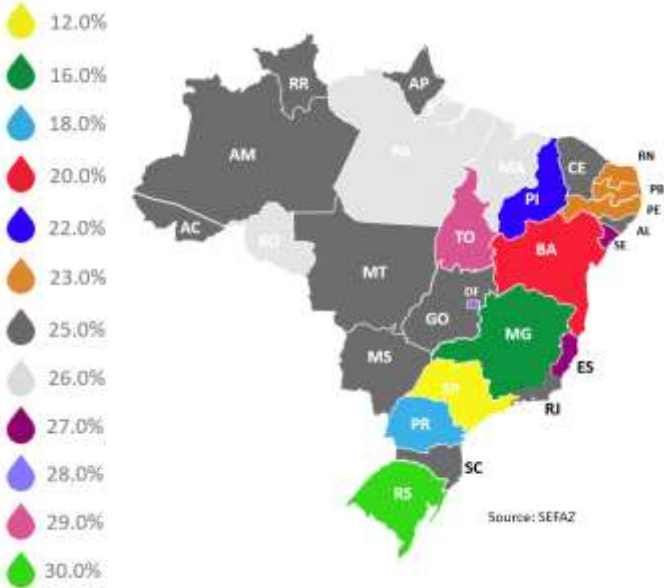
In addition, governments from several Brazilian states provide differential treatment for ethanol by using the state tax for circulation of goods and services (ICMS) for ethanol and gasoline. The ICMS tax charged on ethanol varies from 12 to 30 percent. ICMS for gasoline varies from 25 to 34 percent. The tax rate can vary based on a number of state-level factors and largely depends

on the state's overall tax revenue and budget for a given year. The figures below show the current ICMS set by each Brazilian state as reported by the Ministry of Finance.

ICMS Gasoline C



ICMS Hydrated Ethanol



Credit Lines

The Brazilian Agricultural Crop and Livestock Plan for 2019/20 was announced in June 2019 by the Ministry of Agriculture, Livestock and Supply (MAPA). A total of R\$225.59 billion will be released to fund agricultural and livestock programs. Within this amount, a total of R\$ 1.5 billion is allocated to the Prorenova program. Prorenova is the credit line from the National Bank for Social and Economic Development (BNDES) to finance new greenfields and sugarcane renewal in existing fields. The annual interest rate is comprised of the “long term interest rate” (TJLP) plus 3.7 percent. The payment is due within 72 months after contracting the loan.

Ethanol Import Tariff

In August 2017, the Ministry of Development, Industry and Commerce (MDIC) and the Chamber of Foreign Trade (CAMEX) imposed an annual TRQ of 600 million liters on ethanol imports effective September 1, 2017. Any volume above the quota is subject to the 20 percent Common External Tariff under the Mercosur agreement. The TRQ will be reassessed 24 months after implementation, September 1, 2019. At this point, the Brazilian Government has not released any official communication about removing the TRQ and/or the import tariff after the end of the two-year period.

The EU-MERCOSUR Free Trade Agreement (FTA)

On June 28, the European Union and Mercosur reached a provisional agreement on an FTA, concluding two decades of talks. The final text and market access schedules still need to be determined and have no set deadline. The EU will become the first major partner with which Mercosur has struck a trade agreement. The European Union is already Mercosur’s biggest trade and investment partner and it’s second largest for goods trade. The four Mercosur governments, the 28 national governments of the EU and the European Parliament will have to ratify the deal before it enters force. The deal includes:

- **Tariff reductions:** The EU would eventually abolish 82 percent of the taxes on Mercosur imports. Mercosur would gradually eliminate its duties on 91 percent of EU goods.
- **Market access:** Mercosur would receive preferential tariffs under Tariff Rate Quotas for the several categories of products, including ethanol. According to the released details of the FTA agreement, the EU will establish a duty-free TRQ of 562 million liters of ethanol for industrial use per year, and an additional TRQ of 250 million liters at reduced tariff rates.
- **Protection of standards:** The deal includes wording to protect food, environmental and working standards in both blocs. It explicitly commits all signatories to the emissions-reduction targets of The Paris Agreement and a "commitment to fighting deforestation".

The EU will also establish a duty free 180,000 mmt TRQ for sugar imports. The Brazilian Sugarcane Industry Association (UNICA) expects a sharp increase in sugar and ethanol exports to the European Union once the EU-Mercosur agreement is implemented. UNICA reported that, under the new agreement, the value of annual exports of sugar and ethanol from Brazil to the EU could reach R\$2 billion (US\$521 million) per year. This would more than triple the revenues from exports in 2018, when the total amount of sugar and ethanol exported was R\$600 million.

Government Support for Biodiesel Programs

Biodiesel Use Mandate

The biodiesel mandate that applies to all mineral diesel consumed has been set at ten percent since March 1, 2018. The National Energy Policy Council (CNPE) Resolution #16, from October 2018, recommends the annual increase of the biodiesel blend by one percent, from B11 in June 2019 up to B15 by March 2023, conditioned to the tests made in diesel engines. The increase to B11 was postponed because additional tests were necessary and on August 6, the Petroleum, Natural Gas and Biofuels National Agency (ANP) finally approved the increase of the blend to B11 beginning in September 2019.

Biodiesel Import Tariff

According to the Secretariat of Foreign Trade (SECEX), the import tariff applied to biodiesel blends above B30, including pure (B100) biodiesel (NCM 3826.00.00), is fixed at 14 percent and the import tariff for petroleum oils containing biodiesel up to and including B30 (NCM 2710.20) is zero. Both rates are unchanged.

III. Gasoline and Diesel Pools

The tables below show fuel use history for gasoline C (gasoline A + anhydrous ethanol), diesel (diesel A + biodiesel) and jet fuel.

Fuel Use (in millions of liters)										
Calendar Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019f
Gasoline Total	29,844	35,491	39,698	41,426	44,364	41,137	43,019	44,150	38,352	37,500
Diesel Total	49,239	52,264	55,900	58,572	60,032	57,211	54,279	54,772	55,629	56,074
On-road	n/a	n/a	n/a	n/a	43,283	41,813	39,402	39,761	40,383	40,704
Agriculture	n/a	n/a	n/a	n/a	n/a	720	687	n/a	n/a	n/a
Construction & Mining	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Shipping & Rail	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Industry	n/a	n/a	n/a	n/a	n/a	4,863	4,405	n/a	n/a	n/a
Heating	n/a	n/a	n/a	n/a	n/a	3,062	2,918	n/a	n/a	n/a
Jet Fuel Total	6,250	6,955	7,292	7,225	7,470	7,355	6,765	6,694	7,164	7,200
Total Fuel Markets	85,333	94,711	102,890	107,224	111,866	105,703	104,062	105,616	101,145	100,774

Shipping & Rail	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Industry	1,232	1,260	1,291	1,320	1,358	1,397	1,438	1,480	n/a	n/a
Heating	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Jet Fuel Total	7,183	7,400	7,623	7,860	8,113	8,373	8,641	8,828	n/a	n/a
Total Fuel Markets	102,156	102,911	103,831	105,123	107,349	110,138	113,422	116,959	n/a	n/a

EPE’s projections are based on the assumption that the national vehicle fleet will remain comprised mostly of Otto cycle internal combustion vehicles (powered by gasoline and/or ethanol) and that biofuels, more specifically hydrous ethanol, will remain the most important source of fuels to power light vehicles. Indeed, hydrous ethanol has steadily displaced gasoline A (pure gasoline) use in the total fuels pool and will continue to displace gasoline with the beginning of the Renovabio program in the end of 2019. EPE assumes that the ethanol blend remains unchanged at 27 percent through 2027.

Currently, the light vehicle fleet represents over 90 percent of the total vehicle fleet (trucks, buses and light vehicles). EPE projects that in the next decade, licensing of new light vehicles will still be driven by repressed demand for new vehicles; the aging of the fleet; high market potential for the automobile market given the low vehicle per capita rate; and steadily increasing competitiveness among automakers.

Diesel use forecasts are closely related to GDP forecasts. The biodiesel forecast is based on the current legislation for the biodiesel mandate which projects an incremental increase of the blend to 15 percent (B15) by 2023. EPE projects that the biodiesel blend will remain unchanged at B15 thereafter.

IV. Ethanol

Brazilian Ethanol Production, Supply and Demand (PS&D) Tables

Sugarcane is the main source of feedstock for ethanol production in Brazil, followed by corn. The table below shows the Brazilian ethanol production, supply and demand (PS&D) spreadsheet for Ethanol Used as Fuel and Other Uses (Industrial and Chemicals, excluding ethanol for beverages) for calendar years 2010 through 2019. For more information on these tables, see Notes on Statistical Data – Ethanol (Section VII).

No Brazilian government entity or trade source maintains production figures on use “for fuel” or “other uses”. All ethanol production figures are reported solely as hydrous and anhydrous volumes. According to ATO/Sao Paulo contacts, ethanol plants produce different specifications of hydrous and/or anhydrous, but make no distinction between fuel and other uses. The actual

use for fuels and other uses (industrial and chemical, refined, and/or neutral) are determined at end-use.

Ethanol Used as Fuel and Other Industrial Chemicals (in millions of liters)										
Calendar Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019 f
Beginning Stocks	4,048	5,916	6,891	7,094	8,195	9,367	7,452	7,266	8,306	9,795
Fuel Begin Stocks	3,683	5,549	6,488	6,690	7,790	8,913	6,985	6,774	7,809	9,293
Production	27,965	22,893	23,509	27,642	28,553	30,385	28,439	28,254	33,149	34,445
Fuel Production	24,516	20,212	20,739	24,377	25,585	27,268	25,580	25,282	30,334	31,387
<i>>of which is cellulosic</i>	0	0	0	0	0	2	6	17	25	45
Imports	76	1,136	554	132	452	513	835	1,750	1,695	1,200
Fuel Imports	74	1,100	553	131	403	500	810	1,745	1,690	1,195
Exports	1,906	1,964	3,055	2,917	1,398	1,867	1,789	1,367	1,615	1,800
Fuel Exports	562	1,083	2,500	1,952	780	900	400	430	800	900
Consumption	24,267	21,090	20,805	23,756	26,435	30,946	27,671	27,597	31,740	33,933
Fuel Consumption	22,162	19,290	18,590	21,456	24,085	28,796	26,201	25,562	29,740	31,775
Ending Stocks	5,916	6,891	7,094	8,195	9,367	7,452	7,266	8,306	9,795	9,707
Fuel Ending Stocks	5,549	6,488	6,690	7,790	8,913	6,985	6,774	7,809	9,293	9,200
Total Balance Check	0	0	0	0	0	0	0	0	0	0
Fuel Balance Check	0	0	0	0	0	0	0	0	0	0
Refineries Producing First Generation Fuel Ethanol (in millions of liters)										
Number of Refineries	430	418	408	399	382	382	383	384	369	370
Nameplate Capacity	41,360	42,800	41,600	40,700	37,930	38,050	39,677	40,012	43,105	43,105
Capacity Use (%)	59%	47%	50%	60%	67%	72%	64%	63%	70%	73%
Refineries Producing Cellulosic Fuel Ethanol (in millions of liters)										
Number of Refineries	0	0	0	0	1	3	3	3	3	3
Nameplate Capacity	0	0	0	0	82	127	127	127	127	127
Capacity Use (%)	0%	0%	0%	0%	0%	2%	5%	13%	20%	35%
Co-product Production (in 000's MT)										
Bagasse	116,519	95,388	97,954	115,175	118,971	126,008	117,492	115,467	134,721	137,500
DDGs	0	0	0	0	0	106	176	394	594	1,051
Corn Oil	0	0	0	0	0	6	10	23	34	60
Feedstock Use for Fuel Ethanol (in 000's MT)										

Sugarcane	349,5 57	286,1 63	293,8 63	345,5 25	356,9 13	378,0 25	352,4 75	346,4 00	404,1 63	412,5 00
Corn	0	0	0	0	0	338	564	1,259	1,897	3,357
Bagasse for Cellulosic Fuel	0	0	0	0	0	0.011 1	0.033 3	0.094 4	0.138 9	0.250 0
Market Penetration (in millions of liters)										
Fuel Ethanol Use	22,16 2	19,29 0	18,59 0	21,45 6	24,08 5	28,79 6	26,20 1	25,56 2	29,74 0	31,77 5
Hydrous for Fuel	15,07 4	10,89 9	10,65 0	11,75 5	12,99 4	17,86 2	14,58 6	13,64 2	19,38 5	21,65 0
Anhydrous in Gasoline C	7,088	8,391	7,940	9,701	11,09 1	10,93 4	11,61 5	11,92 0	10,35 5	10,12 5
Gasoline C (includes anhydrous)	29,84 4	35,49 1	39,69 8	41,42 6	44,36 4	41,13 7	43,01 9	44,15 0	38,35 2	37,50 0
Gasoline C Blend Rate	23.7%	23.6%	20.0%	23.4%	25.0%	26.6%	27.0%	27.0%	27.0%	27.0%
Blend Rate Overall	49.3%	41.6%	36.9%	40.3%	42.0%	48.8%	45.5%	44.2%	51.5%	53.7%

Production

Ethanol is an alcohol, nearly all of which is made by fermenting sugar components of plant materials such as corn and wheat starch, sugarcane, sugar beet, sorghum, and cassava. Total ethanol production for 2019 is estimated at 34.445 billion liters, an increase of four percent compared to the revised figure for 2018 (33.149 billion liters). Total ethanol production for fuel use is estimated at 31.387 billion liters, up three percent from the previous calendar year.

To be in accordance with the actual feedstock production cycle, the following narrative describes sugarcane and ethanol production in marketing years. Post currently projects Brazil's marketing year (MY April through March, unless otherwise stated) 2019/20 sugarcane crush at 627 mmt, up seven million metric tons from MY 2018/19 (620 mmt).

The center-south region is expected to harvest 580 mmt of sugarcane, an increase of seven million metric tons above the previous crop (573 mmt). In spite of the dry weather spell in December and January, steady rainfall during February and March has offset industry expectations for a drop in the current harvest season. Expectations for better agricultural yields due to late rainfall (March and April) have been frustrated by the freeze that occurred in some growing states in July. North-Northeastern production for MY 2019/20 is projected at 47 mmt, unchanged from the current MY 2018/19 estimate, assuming that regular weather conditions prevail until the beginning of the crop in the second semester of the year.

Total sucrose (total reducing sugar, TRS) content diverted to ethanol production for MY 2019/20 is estimated to be virtually unchanged at 64 percent as opposed to 64.1 percent for MY 2018/19. The domestic market for ethanol remains attractive. The projected increase in the deficit in the world sugar market to 6-7 million metric tons for 2019/20 did not send a strong enough price signal to divert more sugarcane towards sugar production.

Total ethanol production from corn in 2019 is estimated at 1.4 billion liters, an increase of 609 million liters compared to 2018. Ethanol from corn represents four percent of total ethanol production. There are currently ten plants producing ethanol from corn in Brazil in the states of

Mato Grosso and Goiás and four plants under construction which should start operations in 1-2 years. The majority of the units are full-plant type, e.g., dedicated corn-only plans. Some are flex-plants, producing ethanol from sugarcane and corn. There are two new projects recently launched and at least five projects either in the licensing or financing stage. According to the Corn Ethanol National Union (UNEM), Brazil is forecast to produce 2.6 billion liters of corn ethanol in 2020 and 8 billion by 2028.

Total cellulosic ethanol production for 2019 is estimated at 45 million liters, an increase of 20 million liters compared to 2018, assuming that the existing plants are able to overcome the on-going plant-level operational/mechanical challenges. This amount still represents an insignificant share of total ethanol production in Brazil.

Industrial Capacity

The total number of sugar-ethanol mills in 2019 is 370 units, one additional unit compared to the revised figure for 2018 (369 units). Hydrated ethanol production capacity for 2019 is reported unchanged from the revised figure for 2018 at 43.105 billion liters. This figure reflects the authorized hydrated ethanol production capacity of 233,000 m³ per day, as reported by ANP, and assumes an average of 185 crushing days.

Ethanol installed industrial capacity depends on annual decisions made by individual plants to produce sugar and/or ethanol. Post contacts report that the industry responds to the ratio of 40:60 to switch between sugar and ethanol production or vice versa from harvest to harvest. Once producing units adjust their plants to produce a set ratio of sugar/ethanol in a given year, there is much less flexibility to change it during the crushing season.

Sugarcane and Ethanol Prices Received by Producers

Sugarcane prices received by third party suppliers for major producing states are based on a formula that considers prices for sugar and ethanol in both the domestic and international markets. The State of Sao Paulo Sugarcane, Sugar and Ethanol Growers Council (CONSECANA) was the first to develop this formula for the state of São Paulo, the major producing state, which accounts for roughly 60 percent of center-south production. The cumulative CONSECANA price (March through June 2019) for the state of Sao Paulo for the 2019/20 crop was R\$0.6191 per kg of TRS or approximately R\$76,89 per ton of sugarcane. Note that CONSECANA's prices are based on both sugar and ethanol prices in domestic and international markets.

The tables below include the latest information publicly available for the Ethanol Indexes released by the University of Sao Paulo's College of Agriculture "Luiz de Queiroz" (ESALQ). The indexes track anhydrous and hydrous ethanol for fuel prices received by producers in the domestic spot market.

Price for Fuel Anhydrous Ethanol - State of São Paulo (R\$/000's of liters)					
Period	2015	2016	2017	2018	2019
January	1,458.20	1,996.70	2,047.10	2,015.70	1,798.80
February	1,552.50	2,083.00	1,916.90	2,050.90	1,811.80

March	1,420.40	2,113.70	1,697.60	2,076.10	2,010.10
April	1,401.50	1,602.40	1,635.30	1,807.40	
May	1,363.10	1,536.40	1,610.30	1,697.00	
June	1,352.40	1,678.10	1,509.90	1,817.90	
July	1,328.80	1,636.60	1,424.70	1,632.30	
August	1,300.70	1,726.30	1,552.30	1,557.20	
September	1,358.30	1,796.80	1,592.80	1,817.70	
October	1,658.30	2,018.30	1,669.70	1,957.90	
November	1,870.40	2,086.60	1,806.70	1,856.60	
December	1,888.10	2,075.70	1,928.80	1,829.60	
Source: USP/ESALQ/CEPEA					

Price for Fuel Hydrated Ethanol - State of São Paulo (R\$/000's of liters)					
Period	2015	2016	2017	2018	2019
January	1325.60	1824.40	1815.80	1836.20	1605.60
February	1384.70	1916.40	1686.10	1852.20	1667.10
March	1261.30	1906.60	1526.40	1868.20	1776.40
April	1261.60	1396.60	1471.80	1538.70	
May	1226.50	1391.00	1414.20	1568.00	
June	1216.20	1501.90	1327.70	1633.70	
July	1199.00	1501.50	1304.00	1457.90	
August	1175.50	1559.70	1406.40	1461.60	
September	1273.40	1665.90	1442.30	1678.00	
October	1528.80	1857.90	1533.90	1792.80	
November	1709.00	1869.30	1651.10	1648.70	
December	1704.60	1867.90	1748.00	1664.80	
Source: USP/ESALQ/CEPEA					

Consumption

Total domestic demand for ethanol (fuel and other uses) for calendar year 2019 is estimated at 33.93 billion liters, up 2.19 billion liters compared to the revised figure for 2018. Ethanol is mainly used for fuel in Brazil. No changes have been made to the current ethanol mandate which was set at 27 percent (E27) for Gasoline C as of March 16, 2015. Total ethanol consumption for use as fuel in 2019 is estimated at 31.78 billion liters, a sharp increase of almost seven percent compared to the previous year. The steady and strong demand for hydrated ethanol at the pump is pushed by continued high gasoline prices in the majority of the Brazilian states.

Note that consumer decisions to buy hydrous ethanol or gasoline at the pump are mainly driven by the ratio between hydrous ethanol and gasoline prices. The 70 percent ratio between hydrous ethanol and gasoline prices is the rule of thumb in determining whether flex car owners choose to fill up with hydrous ethanol (price ratio below 70 percent) or gasoline (price ratio above 70 percent). This decision is tied to the energy content of each fuel and the fact that ethanol's energy content is approximately 36 percent lower than pure fossil gasoline.

The tables below show ethanol and gasoline prices as well as the price ratio for selected states, cities, and months. Comparing the month of June 2019 with June 2018, the ethanol-gasoline price ratio has become more favorable for hydrous ethanol fueling in major states with large automobile fleets (Sao Paulo, Minas Gerais, and Goias as sampled by ATO/Sao Paulo), thus increasing overall demand for hydrous ethanol.

Gasoline and Ethanol Prices in Selected States (average price, R\$/liter)									
		Gasoline				Ethanol			
		2016	2017	2018	2019	2016	2017	2018	2019
Sao Paulo State	Jan	3.520	3.628	3.998	4.058	2.601	2.777	2.858	2.625
	Feb	3.544	3.615	4.004	3.974	2.682	2.740	2.884	2.607
	Jun	3.464	3.327	4.340	4.193	2.271	2.266	2.768	2.607
	Aug	3.446	3.560	4.214		2.284	2.415	2.434	
Sao Paulo City	Jan	3.486	3.588	3.944	3.944	2.588	2.757	2.834	2.611
	Feb	3.507	3.584	3.954	3.933	2.658	2.748	2.865	2.579
	Jun	3.414	3.237	4.294	4.174	2.245	2.220	2.760	2.590
	Aug	3.394	3.507	4.170		2.237	2.391	2.421	
Minas Gerais	Jan	3.707	3.850	4.393	4.555	2.781	2.947	3.123	2.960
	Feb	3.741	3.827	4.438	4.509	2.907	2.944	3.186	2.929
	Jun	3.683	3.618	4.860	4.744	2.522	2.577	3.087	2.953

	Aug	3.684	3.871	4.735		2.548	2.684	2.841	
Belo Horizonte (MG Capital)	Jan	3.571	3.731	4.263	4.459	2.704	2.888	3.095	2.920
	Feb	3.616	3.723	4.327	4.398	2.884	2.902	3.187	2.900
	Jun	3.555	3.521	4.839	4.658	2.457	2.534	3.057	2.889
	Aug	3.560	3.733	4.663		2.482	2.613	2.792	
Rio Janeiro State	Jan	3.869	4.042	4.647	4.780	3.242	3.546	3.624	3.595
	Feb	3.899	4.024	4.671	4.707	3.363	3.535	3.688	3.620
	Jun	3.907	3.921	4.974	4.946	3.071	3.163	3.592	3.810
	Aug	3.890	4.151	4.888		3.055	3.199	3.279	
Rio Janeiro Capital	Jan	3.849	4.033	4.648	4.853	3.233	3.566	3.631	3.644
	Feb	3.880	3.999	4.651	4.679	3.372	3.526	3.693	3.637
	Jun	3.898	3.896	4.942	4.916	3.060	3.137	3.582	3.804
	Aug	3.869	4.130	4.857		3.038	3.181	3.267	
Porto Alegre (RS Capital)	Jan	3.963	3.813	4.351	4.401	3.501	3.697	3.932	3.971
	Feb	3.959	3.797	4.357	4.155	3.586	3.714	3.996	3.872
	Jun	3.810	3.731	4.698	4.916	3.352	3.439	4.039	4.072
	Aug	3.886	3.946	4.576		3.352	3.438	3.736	
Goiania (GO Capital)	Jan	3.650	3.902	4.464	4.387	2.629	3.023	2.890	2.974
	Feb	3.384	3.742	4.427	4.435	2.837	2.810	2.880	2.939
	Jun	3.782	3.771	4.840	4.668	2.659	2.689	2.935	2.943
	Aug	3.795	3.970	4.755		2.693	2.779	2.847	
Fortaleza (CE Capital)	Jan	3.876	3.980	4.302	4.206	3.073	3.288	3.453	3.462
	Feb	3.867	3.974	4.066	4.184	3.091	3.276	3.420	3.477
	Jun	3.968	3.845	4.726	4.726	3.274	3.255	3.770	3.798
	Aug	3.941	3.883	4.370		3.244	3.200	3.637	
Source: Petroleum, Natural Gas and Biofuels National Agency (ANP)									

Ratio Ethanol/Gasoline Prices					
		2016	2017	2018	2019
Sao Paulo State	Jan	74%	77%	71%	65%
	Feb	76%	76%	72%	66%
	Jun	66%	68%	64%	62%
	Aug	66%	68%	58%	
Sao Paulo City	Jan	74%	77%	72%	66%
	Feb	76%	77%	72%	66%
	Jun	66%	69%	64%	62%
	Aug	66%	68%	58%	
Minas Gerais	Jan	75%	77%	71%	65%
	Feb	78%	77%	72%	65%
	Jun	68%	71%	64%	62%
	Aug	69%	69%	60%	
Belo Horizonte (MG Capital)	Jan	76%	77%	73%	65%
	Feb	80%	78%	74%	66%
	Jun	69%	72%	63%	62%
	Aug	70%	70%	60%	
Rio Janeiro State	Jan	84%	88%	78%	75%
	Feb	86%	88%	79%	77%
	Jun	79%	81%	72%	77%
	Aug	79%	77%	67%	
Rio Janeiro Capital	Jan	84%	88%	78%	75%
	Feb	87%	88%	79%	78%
	Jun	79%	81%	72%	77%
	Aug	79%	77%	67%	
Porto Alegre (RS)	Jan	88%	97%	90%	90%

Capital)	Feb	91%	98%	92%	93%
	Jun	88%	92%	86%	83%
	Aug	86%	87%	82%	
Goiania (GO Capital)	Jan	72%	77%	65%	68%
	Feb	84%	75%	65%	66%
	Jun	70%	71%	61%	63%
	Aug	71%	70%	60%	
Fortaleza (CE Capital)	Jan	79%	83%	80%	82%
	Feb	80%	82%	84%	83%
	Jun	83%	85%	80%	80%
	Aug	82%	82%	83%	
Source: Petroleum, Natural Gas and Biofuels National Agency (ANP)					
* The gray area indicates that gasoline prices are more attractive than ethanol.					

The size of the Brazilian light vehicle fleet plays a strong role in encouraging ethanol consumption. In fact, it is the primary factor considered by EPE when projecting fuel use for Brazil. The fleet was estimated at 36.6 million units in June 2019 and pure hydrous ethanol and flex fuel powered vehicles together represent 79 percent (29 million units) of the total fleet, an increase of 1 million units over last year.

The table below shows the licensing of flex fuel vehicles (FFV) and hydrous ethanol powered cars, as reported by the Brazilian Association of Vehicle Manufacturers (ANFAVEA). Sales of FFV represent over 90 percent of total monthly vehicle sales. Purchases of new flex-cars have continuously recovered from a record low in 2015, when the Brazilian economic recession began.

Licensing of Ethanol Powered Vehicles (pure ethanol & flex fuel units)							
2012	2013	2014	2015	2016	2017	2018	2019 /1
3,162,824	3,169,111	2,940,508	2,194,020	1,750,754	1,927,221	2,168,176	1,098,177
Source: National Association of Vehicle Manufacturers (ANFAVEA)							
* /1 indicates January through June							

Trade

Exports

Brazil's total ethanol exports for 2019 are estimated at 1.8 billion liters, higher than last year's 1.62 billion liters. In spite of the competition to supply domestic demand, exports have benefited from windows of opportunity opened by spikes in U.S. ethanol prices. The tables below show ethanol exports (NCM 2207.10 through 2207.20.19) for 2017, 2018 and 2019 (January through June), as reported by the Brazilian Secretariat of Foreign Trade (SECEX). Previously, SECEX reported ethanol exports by volume, weight, and value. However, due to a recent system change over the last year, SECEX no longer reports trade in ethanol by volume.

Brazilian Ethanol Exports (NCM 2207.10, 2207.20.11 & 2207.20.19, MT, in US\$000's FOB)						
	CY 2017		CY 2018		CY 2019 1/	
Country	Weight	Value	Weight	Value	Weight	Value
United States	782,053	578,079	737,241	511,703	324,211	219,930
South Korea	226,510	136,864	432,257	262,071	102,032	58,911
Japan	67,189	50,299	80,880	57,120	37,125	25,757
Netherlands	36,258	22,888	34,199	24,198	32,608	19,090
Colombia	8,073	6,348	18,565	12,790	5,759	3,974
Nigeria	486	420	947	763	4,305	3,389
Philippines	0	0	4,785	3,106	2,412	1,559
Cameroon	223	203	519	428	1,853	1,526
Liberia	1,306	1,135	128	112	1,880	1,473
United Kingdom	58	97	58	87	2,050	1,292
Others	12,985	10,523	31,943	21,864	6,596	5,607
Total	1,135,142	806,856	1,341,523	894,241	520,832	342,509
Source : Brazilian Foreign Trade Secretariat (SECEX)						
* Numbers may not add due to rounding						
** 1/ indicates Jan through Jun						

Imports

Brazil's total ethanol imports for 2019 are projected at 1.2 billion liters, a decrease of 495 million liters relative to the previous calendar year (1.695 billion liters). Ethanol imports are only for fuel use and originate almost entirely from the United States. The increased ethanol

supply in the domestic market will likely lead to decreased imports. Current price spikes in the United States have also limited trade, but not sufficiently to prevent imports from the U.S., even with the 20 percent import tariff paid on imported volumes above the quarterly 150 million liter TRQ.

The tables below show ethanol imports (NCM 2207.10 through 2207.20.19) for 2017, 2018 and 2019 (January through June), as reported by SECEX. SECEX no longer reports trade in ethanol by volume.

Brazilian Ethanol Imports (NCM 2207.10, 2207.20.11 & 2207.20.19, MT, US\$000's FOB)						
	CY 2017		CY 2018		CY 2019 /1	
Country	Weight	Value	Weight	Value	Weight	Value
United States	1,451,906	896,266	1,400,862	741,071	671,730	340,674
Paraguay	0	0	1,849	973	38,496	20,861
Germany	100	645	115	636	39	241
Poland	63	83	97	148	56	97
France	12	91	25	50	37	49
Argentina	0	0	0	0	19	22
Spain	2	15	2	15	1	10
Switzerland	0	0	0	0	0	0
United Kingdom	0	1	0	1	0	0
Japan	0	0	0	3	0	0
Others	520	692	99	382	0	0
Total	1,452,603	897,792	1,403,049	743,281	710,379	361,955
Source : Brazilian Foreign Trade Secretariat (SECEX)						
* Numbers may not add due to rounding						
** 1/ indicates Jan through Jun						

V. Biodiesel

Brazilian Biodiesel Production, Supply and Demand (PS&D) Table

The table below shows Brazil's biodiesel supply and demand (PS&D) table for calendar years 2010 through 2019.

Biodiesel (in millions of liters)										
Calendar Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019f
Beginning Stocks	135	60	132	54	42	52	46	47	88	98
Production	2,386	2,673	2,717	2,955	3,460	4,010	3,801	4,291	5,350	5,800
Imports	9	18	0	0	0	0	0	0	0	0
Exports	8	6	0	39	40	12	0	0	0	0
Consumption	2,462	2,613	2,795	2,928	3,410	4,004	3,800	4,250	5,340	5,794
Ending Stocks	60	132	54	42	52	46	47	88	98	104
Balance Check	0	0	0	0	0	0	0	0	0	0
Production Capacity (in millions of liters)										
Number of Biorefineries	66	65	65	64	58	57	51	51	51	51
Nameplate Capacity	5,837	6,742	7,400	7,900	7,722	7,860	7,191	8,140	8,500	8,500
Capacity Use (%)	40.9%	39.6%	36.7%	37.4%	44.8%	51.0%	52.9%	52.7%	62.9%	68.2%
Feedstock Use for Fuel (1,000 MT)										
Soyoil, crude	1,762	1,934	1,834	1,925	2,294	2,703	2,615	2,702	3,368	3,531
Animal fat	317	352	461	586	702	759	612	696	824	864
Market Penetration (in millions of liters)										
Biodiesel, on-road use	1,787	1,897	2,029	2,125	2,458	2,927	2,759	3,085	3,876	4,206
Diesel, on-road use	35,743	37,938	40,578	42,518	43,283	41,813	39,402	39,761	40,383	40,704
Blend Rate (%)	5.0%	5.0%	5.0%	5.0%	5.7%	7.0%	7.0%	7.8%	9.6%	10.3%
Diesel, total use	49,239	52,264	55,900	58,572	60,032	57,211	54,279	54,772	55,629	56,074

Production

Feedstock

Biodiesel is a transesterified vegetable oil, also known as fatty acid methyl ester (FAME), produced from plant and animal oils and fats. According to updated information reported by the Petroleum, Natural Gas and Biofuels National Agency (ANP), there are no significant changes in the raw material used to produce biodiesel. About 70 percent of biodiesel produced is made from soybean oil and 16 percent is made from animal fat (tallow). The remaining feedstocks are cooking oil (two percent), cottonseed oil (one percent) and other raw materials (12 percent).

Biodiesel production remains tightly regulated by the government. Biodiesel production in 2018 increased to 5.35 billion liters, up 25 percent compared to 2017, due to the increase in diesel consumption and the increase of the biodiesel blend to ten percent (B10) in March 2018. Total Brazilian biodiesel production for 2019 is estimated at 5.8 billion liters, an eight percent increase relative to 2018, based on the projected 0.8 percent growth of the Brazilian economy in 2019 and the increase of the biodiesel blend to eleven percent (B11) as of September (see Biodiesel Use Mandate section). According to ANP, cumulative January through June 2019 production is approximately 2.24 billion liters. Biodiesel production by month is reported below.

Brazilian Biodiesel Monthly Production/Deliveries (in 000's of liters)

Month	2015	2016	2017	2018	2019
January	319,546	271,388	255,361	337,824	446,508
February	303,594	300,065	259,812	338,420	415,249
March	322,692	323,158	335,069	452,310	462,134
April	324,526	348,485	347,603	446,137	464,902
May	338,851	328,814	369,316	383,291	448,352
June	322,185	292,772	359,236	467,077	
July	341,094	337,435	387,236	489,776	
August	344,038	327,183	399,997	486,156	
September	330,388	313,309	398,707	482,327	
October	359,166	341,024	409,344	500,209	
November	324,662	321,560	386,941	479,066	
December	306,526	296,145	382,671	487,444	
Total	3,937,269	3,801,339	4,291,294	5,352,054	2,237,144
Source: ANP					

According to industry contacts, Brazil has 51 plants authorized to produce biodiesel. According to ANP, the authorized industrial capacity for 2018 is estimated at 8.5 billion liters per year, based on a 360-day operational cycle. ATO/Sao Paulo estimates a total of 51 biodiesel plants for 2019 with an industrial capacity unchanged at 8.5 billion liters per year. This represents approximately 1.47 times the mandatory biodiesel production to be blended in mineral diesel in 2019.

Market Prices

The biodiesel market remains regulated by the government through a public auction system (for more information see GAIN Reports [BR10006](#) and [BR11013](#) – Brazilian Biofuels Annual Reports for 2010 and 2011, respectively) which gives preference to producers with the Social Fuel Stamp. The Social Fuel Stamp provides incentives for poorer farmers (family farmers) in disadvantaged areas. The tables below update the results of the 60th through the 67th auctions from April 2018 to June 2019, as published by ANP.

Biodiesel Auctions				
Auction	60th Auction	61th Auction	62th Auction	63th Auction

Date	Apr-18	Jun-18	Aug-18	Out-18
Number of Suppliers	38	38	38	38
Offered Quantity (m ³)	1,033,000	1,040,000	1,093,000	1,029,000
Purchased Quantity (m ³)	928,138	1,010,000	993,600	964,800
Opening/Reference Price (R\$/m ³)	2,910	3,070	2,984	3,162
Average Price (R\$/m ³) 1/	2,423.00	2,631.00	2,438.00	2,814.00
Delivery Date	May-Jun/18	Jul-Aug/18	Sep-Out/18	Nov-Dec/18
Source: ANP				
* 1/ Price FOB, including PIS/PASEP and COFINS, excluding ICMS, including Petrobras margin.				

Biodiesel Auctions				
Auction	64th Auction	65th Auction	66th Auction	67th Auction
Date	Dec-18	Feb-19	Apr-19	Jun-19
Number of Suppliers	39	40	39	39
Offered Quantity (m ³)	1,049,000	1,124,000	1,092,000	1,124,000
Purchased Quantity (m ³)	914,970	977,520	928,512	984,443
Opening/Reference Price (R\$/m ³)	3,225	2,940	3,037	3,050
Average Price (R\$/m ³) 1/	2,635.00	2,333.00	2,287.00	2,329
Delivery Date	Jan-Feb/19	Mar-Apr/19	May-Jun/19	Jul-Aug/19
Source: ANP				
* 1/ Price FOB, including PIS/PASEP and COFINS, excluding ICMS, including Petrobras margin.				

Biodiesel prices received by producers are determined by the public auction system (see Average Price in the tables above). The government sets the opening/reference price for different Brazilian regions and biodiesel producers bid for the lowest price. Producers are not allowed to change the sales price set at the auctions and consequently must search for low cost raw material and hedge their activities to offset risk.

Industry sources report that raw materials represent approximately 75-80 percent of the biodiesel production cost whereas other inputs such as methanol and additives represent 10 percent of the total cost. Given that over 70 percent of biodiesel production still uses soybean oil as the feedstock, the profitability of the sector is highly dependent on soybean oil prices. The tables below show the price for soybean oil in 2018 and 2019 (January through June). The average crude price in the state of Sao Paulo is US\$646 per ton for January through June 2019, a decrease of eleven percent compared to the same period in 2018 (US\$724 per ton), mostly due to a dip in world market prices.

Soybean Oil, Crude - Prices (2018)						
Location	Jan	Feb	Mar	Apr	May	Jun
Chicago (US\$/ton)	730	708	704	691	685	656
Premium (US\$/ton)	26	37	36	59	21	26
Port of Paranaguá - FOB (US\$/ton)	756	745	741	750	706	682
São Paulo - (US\$/ton with ICMS 12%)	767	748	736	733	692	666

Source: Elaborated by ABIOVE based on several sources

Soybean Oil, Crude - Prices (2018)						
Location	Jul	Aug	Sep	Oct	Nov	Dec
Chicago (US\$/ton)	629	624	616	640	618	632
Premium (US\$/ton)	41	31	34	40	36	4
Port of Paranaguá - FOB (US\$/ton)	671	655	650	680	654	636
São Paulo - (US\$/ton with ICMS 12%)	682	623	675	690	633	589

Source: Elaborated by ABIOVE based on several sources

Soybean Oil, Crude - Prices (2019)						
Location	Jan	Feb	Mar	Apr	May	Jun
Chicago (US\$/ton)	637	665	648	629	602	612
Premium (US\$/ton)	11	14	3	-1	28	17
Port of Paranaguá - FOB (US\$/ton)	648	679	651	629	630	629
São Paulo - (US\$/ton with ICMS 12%)	660	676	652	626	627	633

Source: Elaborated by ABIOVE based on several sources

Consumption

Biodiesel domestic consumption in Brazil remains regulated by the government and is a function of two variables – the mandatory blend rate and overall diesel consumption, which is closely correlated to GDP. The current biodiesel mandate is B10, e.g., mineral diesel is required to have a ten percent biodiesel blend (B10) and, as of September, it will be increased to B11. The Brazilian economy is expected to grow modestly at 0.8 percent in 2019 according to several financial institutions. Therefore, diesel consumption for 2019 is estimated at 56.07 billion liters, a weak increase of 445 million liters compared to 2018. Total biodiesel consumption for 2019 is estimated at 5.79 billion liters, an increase of eight percent relative to 2018 (5.34 billion liters).

Trade

Brazil does not export any significant amounts of biodiesel. In general, this is because it is not price competitive compared to diesel. Biodiesel imports are nearly zero. The National Biodiesel Production Program (PNPB) created in 2004 requires that only domestically produced biodiesel be eligible to participate in the auction system used to regulate the market.

Similarly, trade under NCM 2710.20 remains insignificant. In 2018, Brazil exported only 4.5 metric tons of biodiesel, up 2.18 mt from 2017 (2.32 mt). Imports for 2018 were 8.76 mt, down seven percent compared to 2017 (9.4 mt).

VI. Advanced Biofuels

No significant changes have been made to the current status of advanced biofuels research, development and production in Brazil (see [BR18017](#) for additional information). In March 2019, Granbio, one of the two Brazilian companies producing advanced biofuels, announced the acquisition of the U.S. company, American Process Inc., with a large intellectual property portfolio in biorefinery, biofuels, biochemicals and nanocellulose. This will allow the transfer of technology to the Granbio plant in Brazil. The acquisition will support Granbio's mission to make the production of large-scale biofuels, biochemicals and advanced renewable materials to replace fossil carbon use.

VII. Notes on Statistical Data

Ethanol

The beginning stocks for the Ethanol Used as Fuel and Other Industrial Chemicals table (excluding ethanol for beverages) are based on information from the Ministry of Agriculture, Livestock and Supply (MAPA) and reflect all stocks at the ethanol plants as of January 1. Beginning Stocks for the ethanol "For Fuel Only" table are estimated based on historical average use of bioethanol for fuel/other uses. On average, ethanol for fuel has represented 87 percent of the total ethanol disappearance (use).

ATO/Sao Paulo historically reported all figures related to the sugar-ethanol industry in marketing years and made necessary adjustments to convert from marketing to calendar years. The official Brazil marketing year for sugarcane, sugar and ethanol production as determined by the Brazilian government is April through March for the center-south producing states, although sugarcane crushing started as early as late March in past years. The official marketing year for the north-northeast is September through August.

Ethanol production estimates for Fuel and Other Industrial Chemicals were provided by MAPA. Given that all Brazilian official publications and industry sources report production in hydrous/anhydrous ethanol only, production estimates “For Fuel Only” are taken as the difference between “production for all uses” minus estimates for “disappearance for other uses” (domestic consumption and exports).

Trade figures were based on the Brazilian Secretariat of Foreign Trade (SECEX). SECEX breaks down trade numbers in four categories as described below:

- NCM 2207.10.10 – Undenatured ethylic alcohol with ethanol content equal to or over 80 percent with water content equal to or below 1 percent volume. Undenatured alcohol is defined as pure ethanol with no additives and is suitable for consumption.
- NCM 2207.10.90 - Undenatured ethylic alcohol with ethanol content equal to or over 80 percent. Others. Undenatured alcohol is defined as pure ethanol with no additives and suitable for consumption.
- NCM 2207.20.11 - Denatured ethylic alcohol with any ethanol content and water content equal to or below 1 percent volume. Denatured alcohol is defined as ethanol with additives which make it poisonous and/or unpalatable, thus not suitable for human consumption. Denatured alcohol is used as a solvent and as fuel for spirit burners and camping stoves. Different additives like methanol are used to make it difficult to use distillation or other simple processes to reverse the denaturation.
- NCM 2207.20.19 - Denatured ethylic alcohol with any ethanol content. Others. Denatured alcohol is defined as ethanol with additives which make it poisonous and/or unpalatable, thus not suitable for human consumption. Denatured alcohol is used as a solvent and as fuel for spirit burners and camping stoves. Different additives like methanol are used to make it difficult to use distillation or other simple processes to reverse the denaturation.

There are no figures for ethanol exports for fuel and/or other uses. Post estimated ethanol “for fuel” based on industry sources.

Domestic consumption figures were taken from information provided by Datagro, the Petroleum, Natural Gas and Biofuels National Agency (ANP), UNICA and other Post contact information.

The number of bio refineries is taken from MAPA and UNICA up to 2013. As of 2014, ANP started to report total number of units. Ethanol production capacity was based on production figures as reported by UNICA up to 2013. Using UNICA’s source material, Post took the highest ethanol production figure in a given 15-day period, as reported by the institution, and extrapolated it to the entire center-south crushing season. A similar procedure was performed

for northeast production based on MAPA reports. As of 2014, ANP became the source, with no adjustments needed. ANP provides the industrial daily capacity for hydrated ethanol production and ATO/Sao Paulo multiples it by 185 days (the average period for sugarcane crushing).

Sugarcane crushed for ethanol production was calculated based on the actual production breakdown for sugar/ethanol as described in previous GAIN reports. Feedstock use and co-product data are consistent with fuel ethanol production figures and based on the following conversion rates:

- 1 metric ton of sugarcane = 80 liters of ethanol
- 1 metric ton of corn = 417 liters of ethanol
- 1 metric ton of corn yields 313 kg of DDGs
- 1 metric ton of corn yields 18 liters of corn oil
- 1 metric ton of ethanol = 1,167 liters of ethanol

Biodiesel

Historical production numbers are based on figures reported by ANP and forecasts are based on projections for diesel consumption and the results from the public auctions. The biodiesel market continues to be regulated by the government through a public auction system which sets the volume of biodiesel that should be produced and delivered to fuel distributors in a period.

Consumption figures are based on mineral diesel consumption and the mandatory mixture of biodiesel in mineral diesel set by Brazilian legislation.

Trade figures are based on the Brazilian Secretariat of Foreign Trade (SECEX), as reported below:

- From 2006 through 2011 - NCM 3824.90.29 – Other industrial fatty acid derivatives, mixtures and preparations containing fatty alcohols or carboxylic acids or their derivatives
- As of 2012 – NCM 3826.00.00 – Pure biodiesel (B100) and their blends above B30
- As of 2012 – NCM 2710.20 – Petroleum oils containing biodiesel up to and including 30% by volume. The following assumption was made: 1 metric ton of petroleum oils and oils obtained from bituminous minerals which fall under NCM 2710.20 is equivalent to 0.15 metric tons of pure biodiesel (B100).

The number of bio refineries and production capacity are based on ANP reports. Feedstock use data are consistent with biodiesel production figures and based on the following conversion rates:

- 1 metric ton of soy oil, crude = 1,113 liters of biodiesel
- 1 metric ton of animal fat/grease = 1,043 liters of biodiesel
- 1 metric ton of biodiesel = 1,136 liters of biodiesel

APPENDIX

I. *Brazil's Geographic Division*

The map below shows Brazil's division by regions and states.



II. Exchange Rate

Exchange Rate (R\$/US\$1.00 - official rate, last day of period)							
Month	2013	2014	2015	2016	2017	2018	2019
January	1.99	2.43	2.66	4.04	3.13	3.16	3.65
February	1.98	2.33	2.88	3.98	3.10	3.24	3.74
March	2.01	2.26	3.21	3.56	3.17	3.32	3.90
April	2.00	2.24	2.98	3.45	3.20	3.48	3.94
May	2.13	2.24	3.18	3.60	3.26	3.74	3.94
June	2.22	2.20	3.10	3.21	3.30	3.86	3.83
July	2.29	2.27	3.39	3.24	3.13	3.75	3.76
August	2.37	2.24	3.65	3.24	3.15	4.14	
September	2.23	2.45	3.98	3.25	3.17	4.00	
October	2.20	2.44	3.86	3.18	3.27	3.72	
November	2.32	2.56	3.85	3.40	3.26	3.86	

December	2.34	2.66	3.90	3.47	3.31	3.87	
Source: Brazilian Central Bank (BACEN) - Last day of month							