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Brazil

Biofuels Annual

2017

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Report Highlights:
As part of the ambitious goals Brazil committed to at the 21st Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change, the Ministry of Mines and Energy announced the RenovaBio program in December 2016. The program proposes to create a regulatory framework to revitalize the biofuels sector, encouraging energy efficiency gains in biofuels production and use, and will recognize that different biofuels have different capacities to contribute to the de-carbonization goals set at COP21. In August 2017, the Brazilian Government put a tariff rate quota in place for ethanol imports, allowing 600 million liters to enter duty free, with any volume above being subject to a 20% tariff. This followed a March 2017 request by Brazilian ethanol producers to place a tariff on ethanol imports. Producers claim the pace of imports jeopardizes domestic ethanol production; especially in northeastern Brazil, where import volumes have risen significantly due to competitive prices from imported corn ethanol. The United States remains the top supplier of ethanol to Brazil. The Brazilian ethanol-use mandate remains unchanged at 27 percent (E27), whereas the biodiesel mandate increased to eight percent (B8) in March 2017.

1. Executive Summary

The report includes the following sections: (1) Executive Summary; (2) Policy and Programs; (3) Fuel Use; (4) Ethanol; (5) Biodiesel; (6) Advanced Biofuels; (7) Notes on Statistical Data; (8) Exchange Rate.

1.1. Brazil's Geographic Division

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

2. Policy and Programs

2.1.1 RenovaBio Program

Brazilian Commitment to Control Climate Change

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 agreement to prevent global climate change. Each country submitted a plan to reduce domestic emissions of greenhouse gases (GHG), called an Intended Nationally Determined Contribution (iNDC), with the intention to limit the overall rise in global temperatures to a maximum of 2ºC by 2100.

As a result of COP21 commitments and several voluntary goals set by Brazil, the country committed to reduce its domestic emissions of GHG 37 percent by 2025 and 43 percent by 2030, both based on 2005 levels. With regard to energy production and use, the Brazilian iNDC makes the following commitments:

• Increase the share of sustainable bioenergy in the Brazilian energy matrix to approximately 18 percent by 2030, by expanding biofuel consumption, increasing ethanol

supply - including the proportion of advanced biofuels (second generation) and the share of biodiesel in the diesel mix;

• Achieve an estimated 45 percent share of renewables in the energy matrix by 2030;

• Obtain at least a 66 percent share of hydropower in electricity generation by 2030, not considering self-produced electricity;

• Expand the use of renewable energy sources other than hydropower in the total energy mix to between 28 and 33 percent by 2030;

• Expand the domestic use of non-fossil energy sources domestically, increasing the share of renewables (other than hydropower) in the power supply to at least 23 percent by 2030, including by increasing the share of wind, biomass, and solar energy;

• Achieve 10 percent efficiency gains in the electricity sector by 2030.

RenovaBio Program

As part of the ambitious goals set at COP21, in December 2016, the Minister of Mines and Energy (MME) announced the creation of the RenovaBio Program, which aims to create a regulatory framework to revitalize the biofuels sector. The stated goals of the program are:

1. Encourage energy efficiency gains in biofuels production and use; and,
2. Recognize that different biofuels have different capacities to contribute to the de-carbonization goals set at COP21.

As of the date of this report, the RenovaBio regulatory framework remains under development and is expected to be announced by the President in a Provisional Measure ("Medida Provisoria"). It is expected to set goals for carbon emission reduction for the fuels market in accordance with the commitments of COP21, creating more market predictability; which the sector currently lacks. The program is not expected to include the creation of carbon taxes or any kind of subsidy to biofuels. According to industry sources, RenovaBio is based on California's Low Carbon Fuel Standard (LCFS) Program and the U.S. Renewable Fuels Standard (RFS).

The program should include the creation of Certificates of Emission Reduction (Certificados de Reducao de Emissoes – CREs) issued by biofuel producers, which will be transferred to fuel distributors at the time of purchase. Fuel distributors will likely have mandates to acquire a certain volume of CREs. A secondary market for the CREs is likely to be created, since fuel distributors that do not have enough certificates would have to buy them to fulfill annual mandates.

2.1.2 (The Old) Proalcool Program

For a historical perspective of the Brazilian Ethanol Program (Proalcool), please refer to the Brazil Biofuels Annual Report from 2010 GAIN Report BR10006

2.2. Government Support Programs for Ethanol

2.2.1. Regional Producer Subsidy

The "Regional Producer Subsidy" is the only direct subsidy paid by the government of Brazil (GOB). The program was created decades ago to provide sugarcane producers from the north-

northeastern states support to balance their cost of production with that of the more developed growing areas in center-south Brazil. Throughout the years the GOB has tailored this subvention program to the evolving reality of the sugarcane industry. No subsidy has been paid to producers since July 2015, however, due to the current economic recession in Brazil.

2.2.2. Ethanol Use Mandate

No changes have been made to the current ethanol mandate, which remains at 27 percent (E27) since March 16, 2015. The ethanol-use mandate has been mandatory since 1977, when legislation required a 4.5 percent blend of ethanol to gasoline. According to the legislation, the ethanol blend can vary from 18 to 27.5 percent, and is currently set at 27 percent. The table below shows the historical 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

2.2.3. Tax Incentives for Ethanol

A. Tax Incentives for Ethanol-flex Fuel Vehicles

No changes have been made to the tax incentives for ethanol-flex-fuel vehicles compared to gasoline vehicles from 2015 to 2016. Tax incentives have played an important role in supporting ethanol consumption since the introduction of flex-fuel cars. The table below shows the value of the Tax on Industrialized Products (IPI), Contribution to the Social Integration Program/Contribution for Financing Social Security (PIS/COFINS), and state tax for circulation of goods and services (ICMS) for different categories of vehicles as reported by the National Association of Motor Vehicle Manufacturers (ANFAVEA). Note that IPI on flex cars has been lower

compared to gasoline only powered vehicles. ANFAVEA reports that regardless of the engine power, the tax burden as a share of the suggested retail price is usually lower for flex-fuel than gasoline only powered vehicles.

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**
2009	IPI	5/3*	11	7.5	25	18
	ICMS	12	12	12	12	12
	PIS/COFINS	11.6	11.6	11.6	11.6	11.6
	% of Avg MSRP	25.7/24.4*	29.2	27.1	36.4	33.1
January thru March 2010	IPI	7/3*	13	7.5	25	18
	ICMS	12	12	12	12	12
	PIS/COFINS	11.6	11.6	11.6	11.6	11.6
	% of Avg MSRP	27.1/24.4*	30	27.1	36.4	33.1
As of April 2010 and 2011	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
2012 (May thru Dec)	IPI	0	6.5	5.5	25	18
	ICMS	12	12	12	12	12
	PIS/COFINS	11.6	11.6	11.6	11.6	11.6
	% of Avg MSRP	22.2	26.4	25.8	36.4	33.1
2013	IPI	2	8	7	25	18
	ICMS	12	12	12	12	12
	PIS/COFINS	11.6	11.6	11.6	11.6	11.6
	% of Avg 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
2015/2016	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)
1/ Gas = 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. In 2013, the Brazilian government offered temporary tax breaks in some categories.

B. Tax Incentives for Ethanol Fuel

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 its Contribution for Intervention in Economic Domain (CIDE) and Contribution to the Social Integration Program/Contribution for Financing Social Security (PIS/COFINS) programs. In addition, governments from several Brazilian states provide differential treatment for ethanol by using different state taxes for circulation of goods and services (ICMS) percentages for ethanol and gasoline.

1. *Contribution for Intervention in Economic Domain (CIDE):* No changes have been made on the CIDE for ethanol and gasoline since 2015 – see BR15006 - for latest information on CIDE.

2. *Contribution to the Social Integration Program (PIS) and Contribution for Financing Social Security (COFINS*): In order to increase government revenue, President Temer increased taxes on fuels in late July, 2017. The goal is to cover an expected higher deficit and avoid revising the current target for the federal deficit set at R$139 billion for 2017. The PIS/COFINS tax for gasoline rose from R$0.38 cents/liter to R$0.79 cents/liter. The increase for ethanol producers rose from R$0.12 cents/liter to R$0.13 cents/liter, while for ethanol distributors, it increased from zero to R$0.11 cents/liter. The lower increase for ethanol compared to gasoline tends to favor the competitiveness of hydrous ethanol, given that the difference in PIS/COFINS for gasoline and ethanol is now R$0.55 cents/liter. According to the current Brazilian legislation, the PIS/COFINS applied to ethanol is restricted to a maximum tax of 9.25 percent of the average retail price.

3. *Tax for Circulation of Goods and Services (ICMS)*: ICMS is a state tax which varies from state to state. The payment of ICMS is also related to different tax regimes depending on the state. ICMS charged on ethanol varies from 12 to 30 percent. ICMS for gasoline varies from 17 to 34 percent. The figures below show the current ICMS set by each Brazilian state as of July 2017, according to the Ministry of Planning. Note that many states increased the ICMS tax from previous years as a way to increase state revenue given that the Brazilian economic recession has slowed economic activity, thus reducing tax collection.

ICMS Tax - All Brazilian States

State		Gasoline	Hydrated Ethanol	Diesel
Acre	AC	25%	25%	17%
Alagoas	AL	29%	25%	18%
Amazonas	AM	27%	27%	20%
Amapa	AP	25%	25%	25%
Bahia	BA	28%	20%	18%
Ceara	CE	29%	25%	18%
Distrito Federal	DF	28%	28%	15%
Espirito Santo	ES	27%	27%	12%
Goias	GO	30%	22%	15%
Maranhao	MA	28%	26%	18%
Minas Gerais	MG	29%	14%	15%
Mato Grosso Sul	MS	25%	25%	17%

Mato Grosso	MT	25%	25%	17%
Para	PA	28%	25%	17%
Paraiba	PB	29%	23%	18%
Pernambuco	PE	29%	23%	18%
Piaui	PI	27%	19%	18%
Parana	PR	29%	18%	12%
Rio de Janeiro	RJ	34%	25%	16%
Rio Grande Norte	RN	29%	23%	18%
Rondonia	RO	26%	26%	17%
Roraima	RR	17%	25%	17%
Rio Grande do Sul	RS	30%	30%	12%
Santa Catarina	SC	25%	25%	12%
Sergipe	SE	29%	27%	18%
Sao Paulo	SP	25%	12%	12%
Tocantins	TO	29%	29%	14.5%
Source: Ministry of Planning, July 2017				

2.2.4. Credit Lines

The National Bank for Social and Economic Development (BNDES) provides specific credit lines for the sugar, ethanol, and bioenergy industries to fund investments on sugarcane production, expansion of industrial capacity for sugar and ethanol, cogeneration, logistics, and multimodal transportation. BNDES reports that a total of R$ 2.02 billion was released in 2016 to finance the sugarcane/sugar/ethanol/energy cogeneration industry, down R$743 million compared to 2015, due to the financial difficulties faced by the sector.

In June 2017, the Ministry of Agriculture, Livestock and Supply announced the Brazilian Agricultural Crop and Livestock Plan for 2017/18. A total of R$190.25 billion will be released to fund agricultural and livestock programs, including Prorenova for sugar and PASS for ethanol. This represents a three-percent reduction over the previous crop plan. A total of R$1.5 billion should be available to finance the Prorenova program for 2017/18. Prorenova is a credit line to finance the renewal and/or expansion of sugarcane fields, which is intended to prioritize the use of new sugarcane varieties. The annual interest rate is comprised of the "long term interest rate" (TJLP) plus 3.7 percent. The payment is due within 96 months after contracting the finance.

2.2.5. Ethanol Import Tariff/Quota

According to the Mercosul (Common Southern Market) agreement, the import tariff for ethanol is 20 percent, however, since April 2010 ethanol has been included in Brazil's "list of exceptions" and the import tariff has been cut to zero.

Resolution # 92 (September 24, 2015), (www.camex.gov.br/legislacao/interna/id/1455) of the Ministry of Development, Industry and Commerce (MDIC)/Chamber of Foreign Trade (CAMEX) extended the zero import tariff for ethanol through December 31, 2021.

However, in March 2017, the Brazilian Sugarcane Industry Association (UNICA), whose member associations are responsible for the majority of ethanol produced in Brazil, requested that the Brazilian Government subject Brazil's ethanol imports to a 16 percent tariff. This request followed a

similar mid-March proposal from Brazil's northeast sugar and ethanol producers, who represent 8-10 percent of ethanol produced in Brazil, to reinstate the 20 percent Mercosul common external tariff on ethanol and remove ethanol from Brazil's list of exceptions. Ethanol producers claim that ethanol imports jeopardize domestic ethanol production, especially in northeastern Brazil where import volumes have risen significantly in the last months of 2016 and early 2017, due to competitive prices of imported corn ethanol, virtually all from the United States.

After several CAMEX committee meetings at the technical and political levels where no agreement could be reached, on July 25, Brazil's Minister level CAMEX committee (Conselho) was also unable to reach a consensus, instead delaying the decision by 30 days to August 23, 2017. At the meeting, the Ministry of Agriculture (MAPA) presented a new proposal for consideration to impose a tariff rate quota of 600 million liters on ethanol imports, with any volume above the quota being subject to the 20 percent Common External Tariff under the Mercosul agreement. Under the proposal, the TRQ would be administered by the Ministry of Industry, Foreign Trade and Services (MDIC) on a quarterly basis, with 150 million liters entering duty free each quarter. The TRQ proposal was unanimously approved, and will be reevaluated by CAMEX after 24 months.

On September 4, the Secretariat of Foreign Trade (SECEX) published Ministerial Order #32, which outlines the criteria on how the import quota will be allocated. According to the Order:

- 50 percent of the quarterly quota (75 million liters) will be distributed among companies that:
  - imported at least 5 percent of the total volume of Brazil's ethanol imports between January 2014 and December 2016, and
  - imported at least one shipment of any volume in the first half of 2017.
- The remaining 50 percent of the quarterly quota will be distributed among companies:
  - not included in the first group (above), and
  - companies from the first group who already exhausted their initial allocated volume.
- Import licenses (LI) will be evaluated on a first-come-first-serve basis in the Foreign Trade System (SISCOMEX).
- Unfilled volumes will not roll over into the next quarter.

For the original text in Portuguese, please visit the Diario Oficial here:
http://portal.imprensanacional.gov.br/

2.2.6. Ethanol Supply Contracts

The National Agency of Petroleum, Natural Gas and Biofuels (ANP) has regulated the ethanol sector since April 2011 with the enactment of Provisional Measure #532. Through Resolution # 67 of 2011, ANP began to monitor the trade of anhydrous ethanol between producers and distributors as of April 2012. Resolution # 67 was later modified by ANP Resolution # 05, from January 2013.

Fuel distributors are required to adopt a yearly supply contract to meet purchasing targets. The target is equivalent to 90 percent of total gasoline C (gasoline blended with ethanol) sales from the previous year and will be enforced in the beginning of every crop year (April 1). If distributors choose not to set a supply contract and buy the product on a monthly basis (direct purchase), they are required to have stocks on the last day of the month equivalent to the volume of gasoline C marketed in the subsequent month of the previous year.

On May 15, 2017, Resolution # 11 from the Minister of Mines and Energy (MME)/National Energy Policy Council (CNPE) announced that agents who import biofuels must meet the same obligations to maintain minimum stocks and proof of capacity to meet market demands that are required of Brazilian producers. This measure is intended to level the playing field between imports and

domestic production. On July 19, 2017, ANP opened public consultation #19/2017 to collect additional information on CNPE's Resolution #11/2017 to promote the necessary changes to current Resolution #67/2011. Comments were due on August 23, 2017.

2.3. Government Support Programs for Biodiesel

2.3.1. Biodiesel Use Mandate

As of March 1, 2017, the biodiesel mandate is set at eight percent, following Law #13.263/2016 from March 2016. The National Biodiesel Production Program (PNPB) was created in 2004 to promote domestic biodiesel production, to reduce petroleum import dependency, and to lower pollutant emissions and health related costs. In addition, PNPB was established to generate jobs and income and alleviate regional economic disparities by passing on benefits to family farmers, especially those in north and northeast Brazil.

Federal Law #11.097/2005 (http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2005/Lei/L11097.htm) defined and established a legal mandate for use of biodiesel as a fuel. The biodiesel-use mandate was initially set at two percent in 2008 and later raised to higher percentages to accommodate the growing biodiesel production.

Resolution #3 of September 21, 2015, from the National Energy Policy Council (CNPE) came into effect in January 2016 and authorizes voluntary biodiesel blends above the B7 mandate for several heavy duty fleets like long haul trucks, buses, rail transportation and agricultural machinery. However, if requested by the end users, the Ministry of Mines and Energy has the authority not only to authorize but also set the actual voluntary blend to be used by the fleet. For more information on Resolution #3 visit http://www.mme.gov.br/documents/10584/2431527/Resolu%C3%A7%C3%A3o_3_CNPE_Biodiesel.pdf/d7480b33-c6b4-45fe-a20b-19b0e23f3293).

On March 23, 2016, President Dilma Rousseff sanctioned Law #13.263/2016 (http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2016/Lei/L13263.htm) previously approved by both houses of Congress. The bill increased the biodiesel-use mandate gradually from seven percent (B7) to ten percent (B10) by 2019, as follows:

- Eight percent (B8) in March 2017;
- Nine percent (B9) in March 2018;
- Ten percent (B10) in March 2019.

Bill #3.834/2015 also instructs the National Council for Energy Policy to conduct tests over the next 36 months in diesel engines to check the feasibility for a fifteen percent blend (B15). If results are positive, a fifteen percent (B15) biodiesel-use mandate could be an option for the sector in the near future.

2.3.2. Biodiesel Import Tariff

According to the Secretariat of Foreign Trade, the import tariff applied to 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.

2.3.3 Tax Incentives

The GOB sets federal tax exemptions and incentives, according to the nature of the raw material, size of producer and region of production, in order to encourage the production of biodiesel and to promote social inclusion. The current federal tax framework for biodiesel follows:

Federal Taxes for Biodiesel and Mineral Diesel (R$/m3)					
Fuel	Biodiesel B100				Diesel
Producer Type	Family Agriculture (PRONAF)		All Others		
Region	North, Northeast & Semi-Arid Zones	All Others	North, Northeast & Semi-Arid Zones	All Others	
Feedstock	Any	Palm Oil or Castor Oil	Palm Oil or Castor Oil		
PIS/PASEP/ COFINS	0.00	10.39	22.48	148.00	82.20-379.30
Source: Brazilian Government, July 2017.					

3. *Fuel Use*

The tables below show fuel use history and projections for gasoline C (gasoline A + anhydrous ethanol), diesel (diesel A + biodiesel), and jet fuels. ATO/Sao Paulo based projections on data set provided by the Minister of Mines and Energy/Energy Research enterprise (MME/EPE) and MME's Petroleum, Natural Gas and Biofuels National Agency (MME/ANP) and a projection for virtually zero growth in the Brazilian Gross Domestic Product (GDP) for 2017, affecting diesel and gasoline consumption.

Diesel use breakdown is reported by the Fuels Industry Syndicate (SINDICOM), based on figures provided by ANP. However, diesel use breakdown was only released for 2014 and 2015. No data is available before 2014, and no data was released for 2016. Therefore, ATO/Sao Paulo used average share for diesel use on-road transport for 2014 and 2015 reported by SINDICOM to estimate figures for 2016 and 2017.

Fuel use growth rates for the 10-year projections were taken from EPE's projected growth rates for the period.

Fuel Use History (Million Liters)										
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017 1/**
Gasoline C	25,175	25,409	29,844	35,491	39,698	41,426	44,364	41,137	43,019	43,565
Diesel Total	44,764	44,298	49,239	52,264	55,900	58,572	60,032	57,211	54,279	54,269
On-road	n/a	n/a	n/a	n/a	n/a	n/a	43,283	41,813	39,403	39,396
Agriculture	n/a	n/a	n/a	n/a	n/a	n/a	720	687	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	n/a	4,863	4,405	n/a	n/a
Heating	n/a	n/a	n/a	n/a	n/a	n/a	3,062	2,918	n/a	n/a

Jet Fuel	5,227	5,428	6,250	6,955	7,292	7,225	7,470	7,355	6,765	6,768
Total Fuel Markets	75,166	75,136	85,333	94,711	102,890	107,224	111,866	105,703	104,062	104,602

Fuel Use Projections (Million Liters)

	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027 2/**
Gasoline C	41,850	39,890	38,011	36,771	36,216	35,884	36,327	37,209	38,438	39,331
Diesel Total	54,767	55,597	57,662	58,982	60,623	62,360	64,474	66,304	68,133	70,174
On-road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Agriculture	n/a	n/a	n/a	n/a	n/a	n/a	n/a	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	n/a	n/a	n/a	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	6,876	7,056	7,236	7,452	7,704	7,920	8,172	8,460	8,712	8,993
Total Fuel Markets	103,492	102,543	102,909	103,205	104,544	106,164	108,974	111,973	115,283	118,498

Source: ATO Sao Paulo based projections on a data set provided by the Minister of Mines and Energy/Energy Research enterprise (MME/EPE) and MME's Petroleum, Natural Gas and Biofuels National Agency (MME/ANP). 1/ 2017 is forecast. 2/ 2027 is projected by ATO/Sao Paulo using average growth forecast from 2024 through 2026 by EPE. Outlook projection for diesel series adapted from EPE dataset to be consistent with actual volumes estimated by ANP for 2016 and for Jan-May 2017.

Historical Fuel consumption in Brazil, as reported by the Petroleum, Natural Gas and Biofuels National Agency (ANP), follows. As reported by ANP, gasoline consumption for January-May 2017 is 18.65 billion liters, an increase of six percent compared to the same period in 2016 (17.52 billion liters). Hydrated ethanol prices have become less competitive vis-a-vis gasoline, resulting in additional gasoline consumption. Diesel consumption from January-May 2017 is 21.6 billion liters, down two percent compared to the same period in 2016 (22.05 billion liters) as a consequence of the continued economic turbulence faced by the country.

Brazilian Fuel Consumption Matrix (000 m3)

	2012	**2013**	**2014**	**2015**	**2016**	**2017 1/**
Diesel *	55,900	58,572	60,032	57,211	54,279	21,605
Gasoline C**	39,698	41,426	44,364	41,137	43,019	18,650
Hydrated Ethanol	9,850	11,755	12,994	17,863	14,586	4,791

Source: ANP. * Diesel includes Bx Biodiesel as of 2008. ** Gasoline C includes 18-27.5% of anhydrous ethanol. 2017 1/ refers to January-May.

Fuels demand projections from 2017 through 2026 by EPE were based on the "Ten-Year Plan for Energy Expansion – PDE2026" (http://www.epe.gov.br/pde/Paginas/default.aspx). PDE2026 was open for public consultation until August 6, 2017. EPE reports that the light vehicle fleet represents approximately 95 percent of the total vehicle fleet (trucks, buses and light vehicles). In the next decade, licensing of new light vehicles will be driven by repressed demand for new vehicles due to the economic crisis; the replacement of the aging fleet; vehicle sales potential given the low per capita vehicle ownership; and increasing competitiveness among automakers. The Brazilian light vehicle fleet is currently estimated at 36 million units, and is projected to reach 52 million units in 2026, equivalent to 0.23 vehicles per capita.

EPE projects that the national vehicle fleet will remain 100 percent comprised of Otto cycle internal combustion vehicles, e.g., powered by gasoline and/or ethanol, mostly flex fuels. Hydrous ethanol will remain an important source of fuel to power light vehicles, displacing gasoline use in the total fuel pools. EPE also assumes that the ethanol blend in gasoline remains unchanged at 27 percent through 2026.

Diesel use forecasts are closely related to GDP forecasts. EPE assumes that the biodiesel mandate will increase from 8 to 10 percent, according to the current legislation, remaining unchanged at 10 percent up to 2025 when it increases to 11 percent.

Brazilian Fuels Use Projection (million liters)											
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Gasoline A 1/	31,413	31,684	30,436	29,011	27,645	26,743	26,339	26,098	26,420	27,061	27,955
Anhydrous Ethanol	11,615	11,881	11,414	10,879	10,367	10,029	9,877	9,787	9,907	10,148	10,483
Hydrous Ethanol	15,482	13,823	15,921	18,274	20,798	22,490	24,142	25,715	26,786	27,803	28,922
Gasoline C 2/	43,028	43,565	41,850	39,890	38,011	36,771	36,216	35,884	36,327	37,209	38,438
Diesel A	53,606	53,127	53,049	53,279	55,234	56,502	58,076	59,741	61,767	63,522	64,580
Biodiesel	3,956	4,424	5,030	5,680	5,915	6,047	6,214	6,391	6,607	6,792	7,673
Diesel B 3/	57,561	57,551	58,079	58,959	61,149	62,549	64,290	66,131	68,374	70,314	72,253
Jet Fuels	6,732	6,768	6,876	7,056	7,236	7,452	7,704	7,920	8,172	8,460	8,712
Source: Minister of Mines and Energy/Energy Research Enterprise (MME/EPE), 2017 1/ Gasoline A is pure gasoline; 2/Gasoline C includes 27 % of anhydrous ethanol; 3/ Diesel B includes 7 thru 10 % of biodiesel following set legislation.											

4. Ethanol

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

Ethanol is an alcohol made by fermenting sugar components of plant materials such as corn and wheat starch, sugarcane, sugar beet, sorghum, and cassava. Sugarcane is virtually the sole source of feedstock for ethanol production in Brazil. The table below shows the Brazilian ethanol supply and demand (PS&D) spreadsheet for Ethanol Used as Fuel and Other Industrial Chemicals (excluding ethanol for beverages) for calendar years 2009 through 2018. For more information on these tables, see Notes on Statistical Data – Ethanol (Section 7.1.).

ATO/Sao Paulo historically reported all figures related to the sugar-ethanol industry in marketing years (MY) 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-March for the center-south producing states, although sugarcane crushing has started as early as late March in past years. The official marketing year for the north-northeast is September-August.

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, refined, or neutral) are determined at end-use.

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

Calendar Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Beginning Stocks	5,783	4,048	5,916	6,891	7,094	8,195	9,367	7,452	7,266	6,349
Fuel Begin Stocks	5,422	3,683	5,549	6,488	6,690	7,790	8,913	6,985	6,774	5,831
Production	26,105	27,965	22,893	23,509	27,642	28,553	30,385	28,439	26,208	28,708
Fuel Production	22,201	24,516	20,212	20,739	24,377	25,585	27,552	26,119	24,088	26,558
>of which is cellulosic (a)	0	0	0	0	0	0	2	6	8	8
Imports	4	76	1,136	554	132	452	513	835	1,725	1,325
Fuel Imports	0	74	1,100	553	131	403	500	810	1,700	1,300
Exports	3,296	1,906	1,964	3,055	2,917	1,398	1,867	1,789	1,400	1,400
Fuel Exports	1,118	562	1,083	2,500	1,952	780	1,184	939	750	750
Consumption	24,548	24,267	21,090	20,805	23,756	26,435	30,946	27,671	27,451	28,600
Fuel Consumption	22,823	22,162	19,290	18,590	21,456	24,085	28,796	26,201	25,981	27,100
Ending Stocks	4,048	5,916	6,891	7,094	8,195	9,367	7,452	7,266	6,349	6,382
Fuel Ending Stocks	3,683	5,549	6,488	6,690	7,790	8,913	6,985	6,774	5,831	5,840
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
Production Capacity, First Generation Ethanol, Sugar/Ethanol Plants (Million Liters)										
Number of Refineries	426	430	418	408	399	382	382	383	384	385
Nameplate Capacity	35600	41360	42800	41600	40700	37930	38050	39677	40012	40500
Capacity Use (%) - Total Ethanol Production (Fuel + Others)	73%	68%	53%	57%	68%	75%	80%	72%	66%	71%
Production Capacity, Cellulosic Ethanol (Million Liters)										
Number of Refineries	0	0	0	0	0	1	3	3	3	3
Nameplate Capacity	0	0	0	0	0	82	127	127	127	127
Capacity Use (%)						0%	2%	5%	6%	6%
Co-product Production (1,000 MT)										
Bagasse	108,771	116,519	95,388	97,954	115,175	118,971	126,008	117,492	107,167	115,833
DDGs							108	179	366	687
Corn Oil							10	17	34	64
Feedstock Use for Fuel (1,000 MT)										
Sugarcane	326,314	349,557	286,163	293,863	345,525	356,913	378,025	352,475	321,500	347,500
Corn	0	0	0	0	0	0	344	573	1,171	2,195
Bagasse from Sugarcane for Cellulosic Ethanol for Fuel Only	0	0	0	0	0	0	0.0111	0.0333	0.0444	0.0444
Market Penetration (Million Liters)										

Fuel Ethanol	22,823	22,162	19,290	18,590	21,456	24,085	28,796	26,201	25,981	27,100
Hydrous for Fuel	16,471	15,074	10,899	10,650	11,755	12,994	17,862	14,586	14,218	15,800
Anhydrous in Gasoline C	6,352	7,088	8,391	7,940	9,701	11,091	10,934	11,615	11,763	11,300
Gasoline C (includes ethanol)	25,409	29,844	35,491	39,698	41,426	44,364	41,137	43,019	43,565	41,850
Blend Rate Anhydrous /Gasoline C	25.00 %	23.75 %	23.64 %	20.00 %	23.42 %	25.00 %	26.58 %	27.00 %	27.00 %	27.00 %
Blend Rate Overall	54.5 %	49.3 %	41.6 %	36.9 %	40.3 %	42.0 %	48.8 %	45.5 %	45.0 %	47.0 %

4.2. Production

A. Production Estimates

ATO/Sao Paulo projections are based on industry sources. To be in accordance with the actual feedstock production cycle, the following narrative describes sugarcane and ethanol production in marketing years.

ATO/Sao Paulo estimates Brazil's marketing year (MY April-March, unless otherwise stated) 2017/18 sugarcane crush unchanged at 645 million metric tons (mmt), down one percent relative to the revised figure for MY 2016/17 (651.5 mmt). The center-south (CS) region is expected to harvest 605 mmt of sugarcane, stable compared to the previous crop (607 mmt). Rainfall patterns have showed regular volumes for a large part of growing areas, however production in states such as Goias and Minas Gerais were damaged by below average rainfall volumes. Specific growing regions in the state of São Paulo, like Bauru, were also adversely affected by below average rainfall volumes. Aging of sugarcane fields is also affecting production. Very limited damage to sugarcane fields is expected from the frost that occurred in mid-July in the states of Mato Grosso do Sul and Parana. The state of Mato Grosso do Sul was the most affected, but still with limited damage. The North-Northeastern (NNE) production for MY 2017/18 is projected at 40 mmt, down 10 percent relative to MY 2016/17 (44.5 mmt) due to drought affecting growing regions. See Gain Repot BR17001 for further information about the sugarcane crop.

In June 2017, the Ministry of Science, Technology and Innovation (MCTI)/National Technical Commission for Biosecurity (CTNBio) approved the commercial use of genetically modified (GM) sugarcane, intended for sugar production rather than ethanol production. The new variety, CTC 20Bt, was developed by Centro de Tecnologia Canavieira (CTC), uses the gene Bt (*Bacillus thuringiensis*), and is resistant to *Diatraea saccharalis* (cane borer) one of the major Brazilian sugarcane pests. The variety still needs to be multiplied and it will take a few years before full commercialization.

Total ethanol production for 2017 is estimated at 26.208 billion liters, down eight percent compared to the revised figure for 2016 (28.439 billion liters). Total ethanol production for fuel use is estimated at 24.088 billion liters, also down eight percent from the previous calendar year. Sugar-ethanol mills are diverting less sugarcane to ethanol production in the current crop – approximately 52 percent of the sugarcane volume as opposed to 53 percent in 2016/17, due to favorable sugar prices in the international and domestic markets bolstered by the world deficit in sugar supply.

It is early to predict MY 2017/18 production. More accurate numbers should be available in the first quarter of 2018 with the development of feedstock from new sugarcane plantings and recovery from current harvested areas. In other words, sugarcane from second, third, fourth, fifth and older cuts; as well as projections for sugar and ethanol demand in both the domestic and

international markets. The current production forecast is based on the assumption that regular weather conditions will prevail throughout the sugarcane production cycle in all producing regions, an average pace of sugarcane field renewals, the forecast for sugar surplus in the world market during the 2017/18 cycle - thus reverting the strong deficit in the previous two cycles - and increased demand for fuel ethanol.

ATO/Sao Paulo projects 2018 total ethanol production at 28.708 billion liters, an increase of nine percent vis-a-vis 2017. Ethanol for fuel production is forecast at 26.558 billion liters for 2018, up 10 percent from 2017. Total cellulosic ethanol production for 2017 is forecast at eight million liters from sugarcane bagasse, which represents an insignificant fraction of total ethanol production in Brazil.

A.1. Corn Ethanol Production

Corn ethanol production is steadily growing, but its potential for future expansion remains limited by local fuel demand, profitability and logistic challenges. Demand is currently limited to corn producing areas in the center-west, but it could potentially reach other north-northern states in Brazil.

Total ethanol production from corn for 2017 is projected at 480 million liters, or 1.8 percent of total projected ethanol production, and twice 2016 production (235 million liters). Post contacts report that currently there are four plants producing ethanol from corn in Brazil, in the states of Mato Grosso and Goias. Two are flex-plants, producing ethanol from both sugarcane and corn, and the remaining two are dedicated only to corn.

Corn ethanol plants are feasible in corn producing areas, especially if close to livestock operations because distiller's dried grain solubles (DDGs), a co-product from ethanol production, can be marketed as animal feed, thus increasing the profitability of the business. However, center-west and northern corn producing areas are larger states with a lower population density and limited ethanol demand.

Moving the grain to other more populated producing states to produce ethanol where demand is higher also represents an issue because of the complex Brazilian tax system and lack of sufficient infrastructure. Different states charge different value added tax also known as Goods and Services Circulation Tax (ICMS – "Imposto de Circulacao de Mercadorias e Servicos") for the same product, which, coupled with transportation challenges, makes transporting grain for ethanol production financially unfeasible.

B. Industrial Capacity

The total number of sugar-ethanol mills in 2017 is estimated at 384 units, according to updated information from ANP.

Hydrated ethanol production capacity for 2017 is estimated at 40.012 billion liters, slightly up from 2016 (39.67 billion liters). This figure reflects the authorized hydrated ethanol production capacity of 216,883 m3/day, as reported by ANP, and an average of 185 crushing days.

Anhydrous ethanol production capacity for 2017 is estimated at 21.65 billion liters based on 117,036 m3/day authorized capacity by ANP and an average of 185 crushing days. Anhydrous production capacity increased roughly one percent compared to 2016.

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 theoretical 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.

C. Sugarcane and Ethanol Cost of Production and Prices Received by Producers

According to industry sources, sugarcane represents between 60 to 70 percent of the cost of producing ethanol. Sugarcane prices received by third party suppliers for major producing states are based on a formula that takes into account 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, accounting for roughly 60 percent of the center-south production.

The cumulative CONSECANA price (April-June 2017) for the state of Sao Paulo for the 2017/18 crop was R$0.6233 per kg of TRS or approximately R$78.21 per ton of sugarcane. Note that CONSECANA's prices are based on both sugar and ethanol prices in domestic and international markets.

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

Price for Fuel Hydrated Ethanol - State of São Paulo (R$/000 liters).					
Period	**2013**	**2014**	**2015**	**2016**	**2017**
January	1144.60	1284.80	1325.60	1824.40	1815.80
February	1232.00	1368.60	1384.70	1916.40	1686.10
March	1226.40	1419.50	1261.30	1906.60	1526.40
April	1244.30	1338.50	1261.60	1396.60	1471.80
May	1110.20	1200.90	1226.50	1391.00	
June	1140.20	1214.90	1216.20	1501.90	
July	1114.50	1229.10	1199.00	1501.50	
August	1088.60	1207.00	1175.50	1559.70	
September	1148.50	1200.60	1273.40	1665.90	
October	1164.00	1138.30	1528.80	1857.90	
November	1204.70	1218.20	1709.00	1869.30	
December	1281.10	1265.50	1704.60	1867.90	
Source: USP/ESALQ/CEPEA.					

Price for Fuel Anhydrous Ethanol - State of São Paulo (R$/000 liters).					
Period	**2013**	**2014**	**2015**	**2016**	**2017**
January	1302.50	1456.10	1458.20	1996.70	2047.10
February	1352.70	1520.50	1552.50	2083.00	1916.90
March	1374.50	1610.20	1420.40	2113.70	1697.60
April	1394.80	1522.00	1401.50	1602.40	1635.30
May	1329.10	1366.40	1363.10	1536.40	
June	1285.20	1359.20	1352.40	1678.10	

July	1271.20	1373.90	1328.80	1636.60	
August	1227.30	1346.00	1300.70	1726.30	
September	1277.10	1362.40	1358.30	1796.80	
October	1315.40	1290.00	1658.30	2018.30	
November	1342.80	1329.90	1870.40	2086.60	
December	1440.00	1407.10	1888.10	2075.70	
Source: USP/ESALQ/CEPEA.					

Price for Hydrated Ethanol - Other Uses: State of São Paulo (R$/000 liters).					
Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	1,160.40	1,333.40	1,338.80	1,847.80	1,874.10
February	1,203.20	1,378.80	1,411.60	1,917.40	1,733.20
March	1,234.00	1,483.50	1,309.90	1,918.30	1,592.20
April	1,277.40	1,409.70	1,296.30	1,484.00	
May	1,168.00	1,246.00	1,259.70	1,420.30	
June	1,170.00	1,247.10	1,233.50	1,546.00	
July	1,158.80	1,257.60	1,235.60	1,506.50	
August	1,106.90	1,233.90	1,209.90	1,576.30	
September	1,160.10	1,250.00	1,284.70	1,669.50	
October	1,188.10	1,176.80	1,558.00	1,906.20	
November	1,212.00	1,267.80	1,710.80	1,896.00	
December	1,311.90	1,304.80	1,734.70	1,915.00	
Source: USP/ESALQ/CEPEA.					

Price for Anhydrous Ethanol - Other Uses: State of São Paulo (R$/000 liters).					
Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	1,371.20	1,477.60	1,482.60	2,072.20	2,110.10
February	1,368.10	1,523.40	1,508.00	2,084.50	1,930.80
March	1,363.70	1,596.50	1,417.60	2,125.70	1,761.00
April	1,401.30	1,535.80	1,415.10	1,729.50	1,676.40
May	1,376.20	1,387.20	1,406.70	1,633.50	
June	1,320.40	1,372.70	1,403.30	1,746.20	
July	1,335.10	1,390.70	1,402.80	1,668.70	
August	1,284.50	1,354.50	1,377.80	1,745.50	
September	1,289.20	1,381.30	1,434.10	1,820.50	
October	1,340.90	1,356.90	1,695.60	2,036.80	
November	1,387.70	1,377.40	1,854.30	2,171.30	
December	1,477.80	1,445.90	2,003.50	2,019.50	
Source: USP/ESALQ/CEPEA.					

4.3. Consumption

Total domestic demand for ethanol (fuel and other uses) for calendar year 2017 is forecast at 27.451 billion liters. Brazil is an important consumer of ethanol for fuel use. Total ethanol consumption for use as fuel is estimated at 25.981 billion liters for 2017, down 220 million liters compared to the previous year due to the current recession in the economy and expected zero growth of Brazilian GDP for 2017. Ethanol for ”other uses” demand is expected to remain

unchanged at 1.47 billion liters. Domestic demand for fuel ethanol in 2018 is forecast to increase to 27.1 billion liters, based on expected higher consumption of hydrous ethanol.

Consumer decisions to buy ethanol or gasoline are driven by the ratio between ethanol and gasoline prices. A 70 percent ratio between ethanol and gasoline prices is the rule of thumb in determining whether flex car owners will choose to fill up with ethanol (price ratio below 70 percent) or gasoline (price ratio above 70 percent).

The tables below show ethanol and gasoline prices and the price ratio for selected states, cities, and months. Note that in 2017, the ethanol-gasoline price ratio has not encouraged ethanol consumption in the majority of states and cities sampled by ATO/Sao Paulo. The one exception is the city and of Sao Paulo, where the bulk of Brazil's ethanol production is concentrated.

Gasoline and Ethanol Prices in Selected States (average price, R$/liter)

		Gasoline				Ethanol			
		2014	**2015**	**2016**	**2017**	**2014**	**2015**	**2016**	**2017**
Sao Paulo State	**Jan**	2.835	2.918	3.520	3.628	1.909	1.935	2.601	2.777
	Feb	2.837	3.150	3.544	3.615	1.946	2.101	2.682	2.740
	Jun	2.868	3.128	3.464	3.327	1.902	1.969	2.271	2.266
	Aug	2.856	3.095	3.446		1.874	1.897	2.284	
Sao Paulo City	**Jan**	2.803	2.878	3.486	3.588	1.903	1.914	2.588	2.757
	Feb	2.800	3.100	3.507	3.584	1.935	2.069	2.658	2.748
	Jun	2.835	3.074	3.414	3.237	1.869	1.935	2.245	2.220
	Aug	2.674	3.042	3.394		1.841	1.862	2.237	
Minas Gerais	**Jan**	2.976	3.025	3.707	3.850	2.134	2.198	2.781	2.947
	Feb	2.963	3.304	3.741	3.827	2.149	2.363	2.907	2.944
	Jun	2.952	3.366	3.683	3.618	2.210	2.232	2.522	2.577
	Aug	2.969	3.340	3.684		2.173	2.152	2.548	
Belo Horizonte (MG Capital)	**Jan**	2.859	2.902	3.571	3.731	2.098	2.135	2.704	2.888
	Feb	2.847	3.225	3.616	3.723	2.110	2.312	2.884	2.902
	Jun	2.851	3.296	3.555	3.521	2.155	2.244	2.457	2.534
	Aug	2.846	3.245	3.560		2.115	2.098	2.482	
Rio Janeiro State	**Jan**	3.082	3.214	3.869	4.042	2.352	2.500	3.242	3.546
	Feb	3.085	3.453	3.899	4.024	2.378	2.662	3.363	3.535
	Jun	3.132	3.516	3.907	3.921	2.468	2.649	3.071	3.163
	Aug	3.128	3.516	3.890		2.454	2.635	3.055	
Rio Janeiro Capital	**Jan**	3.052	3.187	3.849	4.033	2.340	2.485	3.233	3.566
	Feb	3.056	3.433	3.880	3.999	2.372	2.661	3.372	3.526
	Jun	3.109	3.490	3.898	3.896	2.451	2.624	3.060	3.137
	Aug	3.098	3.497	3.869		2.430	2.618	3.038	
Porto Alegre (RS Capital)	**Jan**	2.897	2.967	3.963	3.813	2.387	2.389	3.501	3.697
	Feb	2.882	3.297	3.959	3.797	2.396	2.586	3.586	3.714
	Jun	2.884	3.289	3.810	3.731	2.384	2.491	3.352	3.439
	Aug	2.872	3.316	3.886		2.337	2.487	3.352	
Goiania (GO Capital)	**Jan**	3.136	3.220	3.650	3.902	2.225	2.181	2.629	3.023
	Feb	3.111	3.431	3.384	3.742	2.175	2.339	2.837	2.810
	Jun	3.085	3.170	3.782	3.771	2.100	1.974	2.659	2.689
	Aug	3.134	3.224	3.795		2.166	2.043	2.693	
Fortaleza	**Jan**	2.891	3.151	3.876	3.980	2.335	2.572	3.073	3.288

(CE Capital)	**Feb**	2.879	3.347	3.867	3.974	2.342	2.601	3.091	3.276
	Jun	2.952	3.370	3.968	3.845	2.471	2.609	3.274	3.255
	Aug	2.984	3.369	3.941		2.491	2.608	3.244	
Source: Petroleum, Natural Gas and Biofuels National Agency (ANP).									

Ratio Ethanol/Gasoline Prices					
		2014	**2015**	**2016**	**2017**
Sao Paulo State	**Jan**	67%	66%	74%	77%
	Feb	69%	67%	76%	76%
	Jun	66%	63%	66%	68%
	Aug	66%	61%	66%	
Sao Paulo City	**Jan**	68%	67%	74%	77%
	Feb	69%	67%	76%	77%
	Jun	66%	63%	66%	69%
	Aug	69%	61%	66%	
Minas Gerais	**Jan**	72%	73%	75%	77%
	Feb	73%	72%	78%	77%
	Jun	75%	66%	68%	71%
	Aug	73%	64%	69%	
Belo Horizonte (MG Capital)	**Jan**	73%	74%	76%	77%
	Feb	74%	72%	80%	78%
	Jun	76%	68%	69%	72%
	Aug	74%	65%	70%	
Rio Janeiro State	**Jan**	76%	78%	84%	88%
	Feb	77%	77%	86%	88%
	Jun	79%	75%	79%	81%
	Aug	78%	75%	79%	
Rio Janeiro Capital	**Jan**	77%	78%	84%	88%
	Feb	78%	78%	87%	88%
	Jun	79%	75%	79%	81%
	Aug	78%	75%	79%	
Porto Alegre (RS Capital)	**Jan**	82%	81%	88%	97%
	Feb	83%	78%	91%	98%
	Jun	83%	76%	88%	92%
	Aug	81%	75%	86%	
Goiania (GO Capital)	**Jan**	71%	68%	72%	77%
	Feb	70%	68%	84%	75%
	Jun	68%	62%	70%	71%
	Aug	69%	63%	71%	
Fortaleza (CE Capital)	**Jan**	81%	82%	79%	83%
	Feb	81%	78%	80%	82%
	Jun	84%	77%	83%	85%
	Aug	83%	77%	82%	
Source: Petroleum, Natural Gas and Biofuels National Agency (ANP).					
Gray Area means gasoline prices more attractive than ethanol					

The size of the Brazilian light vehicle fleet also plays a role in encouraging ethanol consumption. The fleet is estimated at 35.46 million units in June 2017, and pure hydrous ethanol and flex fuel powered vehicles together represent approximately 76 percent (27 million units) of the total fleet. 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 currently represent over 90 percent of total monthly vehicle sales. The slowdown of the Brazilian economy in 2016 has sharply affected the purchasing of new flex-fuel cars.

Licensing of Ethanol Powered Vehicles (pure ethanol & flex fuel units)						
2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017/1**
2,848,071	3,162,824	3,169,111	2,940,508	2,194,020	1,750,754	881,559
Source: National Association of Vehicle Manufacturers (ANFAVEA) 1/ January-June						

4.4. Trade

A. Exports

Brazil's total ethanol exports for 2018 are forecast at 1.4 million liters, unchanged from the current estimate for 2017. Fuel ethanol exports for 2016 are estimated at 939 million liters, mostly to the United States. The tables below show ethanol exports (NCM 2207.10 through 2207.20.19) for 2016 and 2017 (January-June), as reported by the Brazilian Secretariat of Foreign Trade (SECEX).

Brazilian Ethanol Exports (NCM 2207.10, 2207.20.11 & 2207.20.19, MT, 000 Liters, US$ 1,000 FOB)						
	CY 2016			**CY 2017 1/**		
Country	**Volume**	**Weight**	**Value**	**Volume**	**Weight**	**Value**
United States	795,207	629,311	421,649	440,605	348,349	272,043
South Korea	630,890	514,418	300,267	88,289	71,277	45,376
Japan	82,200	64,972	44,619	55,955	44,168	34,735
Colombia	15,308	12,339	8,377	5,873	4,788	3,803
Uruguay	2,749	2,238	1,592	856	694	522
Liberia	1,457	1,174	943	476	384	335
Cote D'Ivore	245	197	169	340	274	237
France	0	0	0	168	135	223
Chile	1,188	1,036	769	327	264	190
Paraguay	123	110	115	124	119	150
Others	259,668	208,998	117,844	599	486	517
Total	1,789,034	1,434,793	896,343	593,612	470,938	358,131
Source: Brazilian Foreign Trade Secretariat (SECEX)						
Note: Numbers may not add due to rounding 1/Jan-Jun.						

B. Imports

Brazil's total ethanol imports for 2018 are projected at 1.3 billion liters, a decrease of 400 million liters compared to 2017, due to expected increase in domestic production. Ethanol imports are only for fuel use and originate almost entirely from the United States. Steady imports from the United States, particularly since the second semester of 2016 and early 2017, have concerned domestic ethanol producers, who requested the Brazilian government impose an import tariff (see section 2.2.5. *Ethanol Import Tariff / Quota*). However, post contacts report that even if the tariff

is increased, at certain times in the year imports will continue because the price arbitrage still favors U.S. ethanol.

The tables below show ethanol imports (NCM 2207.10 through 2207.20.19) for 2016 and 2017 (January-June), as reported by the Brazilian Secretariat of Foreign Trade (SECEX).

Brazilian Ethanol Imports (NCM 2207.10, 2207.20.11 & 2207.20.19, 000 Liters, MT, US$ 1,000 FOB)						
	CY 2016			**CY 2017 1/**		
Country	**Volume**	**Weight**	**Value**	**Volume**	**Weight**	**Value**
United States	829,819	655,378	392,779	1,279,773	1,021,486	640,613
Paraguay	0	0	0	572	452	420
Jamaica	41	48	354	40	32	221
Germany	99	80	105	73	63	83
France	10	9	65	6	5	35
Sweden	7	6	47	2	4	30
Mexico	1	3	14	2	2	10
Spain	0	0	0	0	0	1
Japan	0	0	7	0	0	0
Switzerland	0	0	0	0	0	0
Others	2,166	1,741	1,314	0	0	0
Total	832,144	657,264	394,684	1,280,469	1,022,042	641,414
Source : Brazilian Foreign Trade Secretariat (SECEX)						
Numbers may not add due to rounding 1/Jan-Jun.						

4.5. Ending Stocks

Beginning stocks for ethanol used as fuel and other industrial chemicals, excluding ethanol for beverages are based on information from MAPA and reflect all stocks at ethanol plants as of January 1, 2006. Beginning stocks for ethanol "for fuel only" are estimated based on historical average use of bioethanol for fuel/other uses. On average, ethanol for fuel has represented 87 percent of total ethanol disappearance (consumption and exports), therefore Post assumed this percentage to calculate the theoretical beginning stocks for fuel in January 1, 2006. All other stock figures were calculated based on the difference between total supply and disappearance.

ATO/Sao Paulo projects ending stocks for fuel ethanol at 5.84 billion liters for 2018, similar to 2017 (5.831 billion liters). Ending stocks measured on December 31 of each year do not actually reflect the supply and demand balance. In general, ethanol plants in the center-south are nearing the end of the crushing season, while ethanol plants in the northeast are fully operating. As a result, stock levels are expected to be high. Stock figures measured on April 1, after subtracting the disappearance (consumption and exports) during the first quarter of the year, will likely show a more realistic picture about product availability in the beginning of the new crop season (April).

5. Biodiesel

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

Biodiesel is a trans-esterified vegetable oil also known as fatty acid methyl ester produced from soy oil, cottonseed oil, rapeseed, oil, other vegetable oils, animal fats, and recycled cooking oils.

The table below shows Brazil's biodiesel supply and demand (PS&D) table for calendar years (CY) 2009 through 2018.

Biodiesel (Million Liters)										
Calendar Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Beginning Stocks	90	135	60	132	54	42	52	46	47	85
Production	1,608	2,386	2,673	2,717	2,955	3,460	4,010	3,801	4,300	4,850
Imports	4	9	18	0	0	0	0	0	0	0
Exports	3	8	6	0	39	40	12	0	0	0
Consumption	1,565	2,462	2,613	2,795	2,928	3,410	4,004	3,800	4,262	4,838
Ending Stocks	135	60	132	54	42	52	46	47	85	97
Production Capacity (Million Liters)										
Number of Biorefineries	63	66	65	65	64	58	57	51	50	54
Nameplate Capacity	4,350	5,837	6,742	7,400	7,900	7,722	7,860	7,191	7,769	8,595
Capacity Use (%)	37.0 %	40.9 %	39.6 %	36.7 %	37.4 %	44.8 %	51.0 %	52.9 %	55.3 %	56.4 %
Feedstock Use for Fuel (1,000 MT)										
Soy Oil, Crude	1,124	1,762	1,934	1,834	1,925	2,293	2,730	2,622	2,743	3,094
Animal Fat	247	317	352	461	586	702	724	614	660	744
Market Penetration (Million Liters)										
Biodiesel, on-road use	n/a	n/a	n/a	n/a	n/a	2,458	2,927	2,759	3,094	3,512
Diesel, on-road use	n/a	n/a	n/a	n/a	n/a	43,283	41,813	39,403	39,396	39,757
Blend Rate (%)	n/a	n/a	n/a	n/a	n/a	5.7%	7.0%	7.0%	7.9%	8.8%
Diesel, total use	44,298	49,239	52,264	55,900	58,572	60,032	57,211	54,279	54,269	54,767

5.2. Production

A. Feedstock

Biodiesel can be produced from several raw materials such as soybeans, cottonseed, animal fat, castor seed (*Ricinus communis*), African palm oil ("dendê"), "pinhao manso" (*Jatropha curcas*), sunflower, peanut, fried oil or others.

According to updated information reported by the Petroleum, Natural Gas and Biofuels National Agency (ANP), 70 percent of Brazil's biodiesel ïs produced from soybean oil, followed by animal tallow, representing 16 percent. The remaining feedstocks used are cottonseed oil and "others." The table below shows biodiesel production by raw material according to ANP and the Brazilian Association of Vegetable Oil Industry (ABIOVE).

Biodiesel Production by Raw Material (m3)					
Raw Material	**2013**	**2014**	**2015**	**2016**	**2017 1/**
Soybean Oil	2,142,990	2,551,813	3,038,835	2,918,031	847,562
Animal Tallow	611,215	731,935	755,075	640,127	193,114
Cottonseed Oil	65,960	81,666	78,786	40,822	1,973
Others	97,331	54,424	57,807	211,972	152,640
Total	2,917,495	3,419,838	3,930,503	3,810,952	1,195,289
Source: ANP/ABIOVE. 2017 1/ data refers to January to April.					

B. Production

Biodiesel production remains regulated by the government. Biodiesel production in 2016 was 3.8 billion liters, a drop of three percent compared to 2015, due to a drop in total diesel consumption, please see section on Fuel Use, above. Total Brazilian biodiesel production for 2017 is projected at 4.3 billion liters, up 13 percent relative to 2016 (3.8 billion liters). According to ANP, cumulative January-May 2017 production is approximately 1.56 billion liters, slightly down from cumulative production for the same period in 2016 (1.57 billion liters). The projection takes into account:

(1) the increase of the biodiesel mandate to eight percent (B8) in March 2017;

(2) the current economic downturn of the Brazilian economy, assuming virtually zero growth for the Brazilian economy in 2017 and the resulting stagnant consumption of diesel. ANP reports a total 21.6 billion liters of diesel consumed between January and May 2017, a decrease of two percent compared to the same period in 2016.

Biodiesel production for 2018 is forecast at 4.85 billion liters, an increase of 13 percent relative to 2017, based on modest recovery of the Brazilian economy (GDP projected to growth roughly one percent) and the an increase of in the biodiesel use mandate to nine percent as of March 2018. Biodiesel production is reported below.

Brazilian Biodiesel Monthly Production/Deliveries (000 liters)						
Month	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
January	193,006	226,505	245,215	319,546	271,388	255,361
February	214,607	205,738	240,529	303,594	300,065	258,823
March	220,872	230,752	271,839	322,692	323,158	335,069
April	182,372	253,591	253,224	324,526	348,485	346,599
May	213,021	245,934	242,526	338,851	328,814	369,316
June	214,898	236,441	251,517	322,185	292,772	
July	230,340	260,671	302,971	341,094	337,435	
August	254,426	247,610	314,532	344,038	327,183	

September	252,243	252,714	312,665	330,388	313,309	
October	251,416	277,992	321,603	359,166	341,024	
November	245,321	265,176	316,627	324,662	321,560	
December	244,962	214,364	348,962	306,526	296,145	
Total	2,717,483	2,917,488	3,422,210	3,937,269	3,801,339	1,565,168
Source: ANP.						

ANP reports that as of June 2017, Brazil has 50 plants authorized to produce biodiesel. According to ANP, the authorized industrial capacity for 2017 is estimated at 21,581 liters/day, or approximately 7.77 billion liters/year, based on a 360-day operational cycle. This represents approximately 1.80 times the mandatory biodiesel production to be blended in mineral diesel in 2017; and an increase of 7 percent compared to the authorized industrial capacity for the same period in 2016 (19,976 liters/day).

ATO/Sao Paulo projects a total of 54 biodiesel plants for 2018 with an industrial capacity of 8.6 billion liters per year (23,877 million liters/day), up 11 percent from the current industrial capacity. Projections are based on information for authorized plants and requests for authorization provided by ANP and industry sources.

C. Cost of Production and Market Prices

The biodiesel market remains regulated by the government through a public auction system (see GAIN Reports BR10006 and BR11013 – Brazilian Biofuels Annual Reports for 2010 and 2011, respectively, for more information) 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 44th through the 51st auctions from August 2015 July 2017, as published by ANP.

Biodiesel Auctions				
Auction	44th Auction	45th Auction	46th Auction	47th Auction
Date	Ago-15	Out-15	Dec-15	Fev-16
Number of Suppliers	32	33	34	32
Offered Quantity (m3)	850,727	827,787	729,777	956,970
Purchased Quantity (m3)	696,852	657,752	580,597	639,567
Opening/Reference Price (R$/m3)	2545.00-2840.00	2605.00-2890.00	2810.00-3140.00	3,070.00-3,385.00
Average Price (R$/m3) 1/	2,162.46	2,406.20	2,696.39	2,564.75
Delivery Date	Set-Out/15	Nov-Dec/15	Jan-Feb/16	Mar-Apr/16
Source: ANP 1/ Price FOB, including PIS/PASEP and COFINS, excluding ICMS, including Petrobras margin.				

Biodiesel Auctions				
Auction	48th Auction	49th Auction	50th Auction	51th Auction

Date	Apr-16	Jun-16	Ago-16	Out-2016
Number of Suppliers	32	30	31	27
Offered Quantity (m3)	902,023	848,454	777,002	706,427
Purchased Quantity (m3)	643,216	646,647	674,406	636,267
Opening/Reference Price (R$/m3)	2,880.00-3,220.00	2.950.00-3,330.00	2,675.00-3,080.00	2,935.00-3,290.00
Average Price (R$/m3) 1/	2,440.50	2,406.61	2,398.87	2,855.10
Delivery Date	May-Jun/16	Jul-Ago/16	Sep-Oct/16	Nov-Dec/16
Source: ANP 1/ Price FOB, including PIS/PASEP and COFINS, excluding ICMS, including Petrobras margin.				

Biodiesel Auctions				
Auction	52th Auction	53th Auction	54th Auction	55th Auction
Date	Dec-16	Feb-17	Apr-17	Jun-17
Number of Suppliers	32	35	34	34
Offered Quantity (m3)	765,927	875,007	872,380	856,897
Purchased Quantity (m3)	545,700	622,100	733,900	760,300
Average Price (R$/m3) 1/	2,810.00	2,302.00	2,108.00	2,255.00
Delivery Date	Jan-Feb/17	Mar-Apr/17	May-Jun/17	Jul-Aug/17
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 or hedge their activities to offset risk.

Industry sources report that raw materials represent approximately 75-80 percent of biodiesel production cost whereas other inputs such as methanol, additives, and catalyzers represent 10 percent of the total cost. Given that the feedstock soybean oil represents 70 percent of biodiesel production, the profitability of the sector is highly dependent on the price of soybeans.

The tables below show the price for soybean oil in 2016 and 2017 (January-May). The average crude price in the state of Sao Paulo is R$ 2,694,40/ton for January-May 2017, a decrease of 9 percent compared to the same period in 2016 (R$2,946.50/ton).

Soybean Oil, Crude - Prices (2016)						
Location	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Chicago (US$/ton)	661	688	713	753	714	702
Premium (US$/ton)	-14	-9	-26	-7	8	6
Port of Paranaguá - Fob (US$/ton)	648	680	687	746	722	708
Sao Paulo - (US$/ton com ICMS 12%)	764	735	815	855	797	853
Elaborated by ABIOVE based on several sources.						

Soybean Oil, Crude - Prices (2016)						
Location	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chicago (US$/ton)	669	714	719	760	781	789

Premium (US$/ton)	20	38	38	42	25	10
Port of Paranaguá - Fob (US$/ton)	689	752	757	802	806	799
Sao Paulo - (US$/ton com ICMS 12%)	845	908	946	993	961	937
Elaborated by ABIOVE based on several sources.						

Soybean Oil, Crude - Prices (2017)						
Location	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Chicago (US$/ton)	783	748	731	698	713	n/a
Premium (US$/ton)	10	18	-2	13	19	n/a
Port of Paranaguá - Fob (US$/ton)	793	765	730	710	732	n/a
Sao Paulo - (US$/ton com ICMS 12%)	938	891	840	793	789	n/a

Elaborated by ABIOVE based on several sources.

5.3. Consumption

Biodiesel domestic consumption remains regulated by GOB, thus the sector must comply with the biodiesel mandate which requires all mineral diesel to have an eight percent biodiesel blend (B8) as of March 2017. Based on industry estimates for mineral diesel domestic demand, ATO/Sao Paulo estimates total biodiesel domestic consumption for 2016 at 3.8 billion liters, respectively.

Biodiesel consumption for 2017 is forecast at 4.26 billion liters based on stagnant economic recovery and the increase of the biodiesel mandate from seven (B7) to eight (B8) percent in March 2017. Biodiesel consumption for 2018 is projected at 4.83 billion liters, based on minor recovery of the Brazilian economy, GDP growth close to one percent, and the increase of the biodiesel blend to 9 percent (B9) as of March 2018.

5.4. Trade

SECEX export figures by country of destination for biodiesel (NCM 3826.00.00) for the years 2015, 2016 and 2017 (January-June) are shown below. Exports are virtually zero. No imports have been registered under tariff code NCM 3826.00.00. There is virtually no trade in petroleum oils containing biodiesel up to 30 percent (NCM 2710.20). In 2016, Brazil exported only one metric ton biodiesel equivalent basis, an increase of 0.5 metric tons over 2015. Imports for 2016 were 2.3 metric tons, an increase 0.8 metric tons from the previous year.

Brazil imports almost no biodiesel, given that the country's National Biodiesel Production Program (PNPB), created in 2004 and regulated by ANP through an auction system, requires that only domestically produced biodiesel is eligible for the auction. Businesses including heavy duty fleets like long haul trucks, buses, rail transportation and agricultural machinery, which are allowed to use higher blends than those set by the current legislation (*see 2.3. Government Support Programs for Biodiesel; 2.3.1. Biodiesel Use Mandate*), could potentially import biodiesel, however in practice they do not because price of the imported product is not competitive with the domestically produced biodiesel.

Brazilian Biodiesel Exports by Country of Destination (kg, US$ FOB)						
	CY 2015		**CY 2016**		**CY 2017 1/**	
Country	**Quantity**	**Value**	**Quantity**	**Value**	**Quantity**	**Value**
United States	21,986	69,782	0	0	0	0

Japan	0	0	130	8,000	0	0
Malaysia	0	0	4	20	0	0
Netherlands	10,337,666	7,613,381	0	0	0	0
Total	10,359,652	7,683,163	134	8,020	0	0
Source : Brazilian Secretariat of Foreign Trade SECEX - Note: NCM 3826.00.00 - 1/ Jan-June						

Brazilian Biodiesel Imports by Country of Destination (kg, US$ FOB)						
	CY 2015		**CY 2016**		**CY 2017 1/**	
Country	**Quantity**	**Value**	**Quantity**	**Value**	**Quantity**	**Value**
France	0	0	360	133	0	0
Source : Brazilian Secretariat of Foreign Trade SECEX - Note: NCM 3826.00.00 - 1/ Jan-June						

5.5. Stocks

ATO/Sao Paulo forecasts biodiesel ending stocks for 2018 at 97 million liters, an increase of 12 million liters compared to 2017 (85 million liters), based on the difference between total supply and disappearance (consumption and exports).

6. Advanced Biofuels

No significant changes have been made to the current status of advanced biofuels research, development and production in Brazil. Please refer to BR16009 for additional information

7. Notes on Statistical Data

7.1. Ethanol

The beginning stocks for the Ethanol Used as Fuel and Other Industrial Chemicals table (excluding ethanol for beverages) is based on information from the Ministry of Agriculture, Livestock and Supply (MAPA) and reflects all stocks at the ethanol plants as of January 1, 2006. The beginning stocks for the ethanol "For Fuel Only" table is 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). Therefore, Post assumed this percentage to calculate the theoretical beginning stocks for fuel in January 1, 2006. All other stock figures were calculated based on the difference between total supply and disappearance (consumption and exports).

Ethanol production estimates for Fuel and Other Industrial Chemicals were provided by MAPA and are consistent with previous ATO/Sao Paulo GAIN reports submitted by marketing year. 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). All Brazilian official publications and industry sources report production in hydrous/anhydrous ethanol only.

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 or over 80 percent. With water content equal or below 1 percent volume. Undenatured alcohol is defined as pure ethanol with no additives and suitable for consumption.

- NCM 2207.10.90 - undenatured ethylic alcohol with ethanol content equal 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. With water content equal or below 1 percent vol. Denatured alcohol is defined as ethanol with additives which make it poisonous and/or unpalatable, thus, no 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, no 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 the type of ethanol that is usually imported by the final destination, as reported by UNICA. Thus, the United States, the Caribbean countries and Sweden usually import ethanol for fuel; whereas Japan, Korea and several other importing countries, including the European Union import ethanol for industrial and other uses.

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. Post took the highest ethanol production figure in a given 15-day period, as reported by the institution, and extrapolated 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. ANP provides the industrial daily capacity for hydrated ethanol production and ATO/Sao Paulo multiples by 185 days (average day for the 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:

Note that on average, one 1 metric ton of sugarcane produces = 80 liters of ethanol
1 metric ton of corn = 410 liters of ethanol
1 metric ton of corn yields 313 kg of DDGs

7.2. Biodiesel

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 particular period.

Consumption figures are based on mineral diesel consumption and the mandatory mixture of biodiesel (B2 through B8) 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 – biodiesel and their blends
- As of 2012 – NCM 2710.20 – petroleum oils containing biodiesel up to and including 30% by volume.

The number of bio refineries and production capacity are based on ANP reports. Feedstock use for biodiesel consumption is 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
- 0.875 metric ton of biodiesel = 1,000 liters of biodiesel

8. Exchange Rate

Exchange Rate (R$/US$1.00 - official rate, last day of period)							
Month	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
January	1.67	1.74	1.99	2.43	2.66	4.04	3.13
February	1.66	1.71	1.98	2.33	2.88	3.98	3.10
March	1.62	1.82	2.01	2.26	3.21	3.56	3.17
April	1.57	1.89	2.00	2.24	2.98	3.45	3.20
May	1.57	2.02	2.13	2.24	3.18	3.60	3.26
June	1.57	2.02	2.22	2.20	3.10	3.21	3.30
July	1.56	2.05	2.29	2.27	3.39	3.24	3.13
August	1.59	2.04	2.37	2.24	3.65	3.24	
September	1.85	2.03	2.23	2.45	3.98	3.25	
October	1.69	2.03	2.20	2.44	3.86	3.18	
November	1.81	2.10	2.32	2.56	3.85	3.40	
December 1/	1.88	2.04	2.34	2.66	3.90	3.47	
Source : Brazilian Central Bank (BACEN)							