

USDA Foreign Agricultural Service

# GAIN Report

Global Agricultural Information Network

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## Paraguay

## Biofuels Annual

**2011**

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**Report Highlights:**

Paraguayan ethanol production for 2012 is projected up at 180 million liters. The sector is enjoying very good returns and support through government policies. Contacts report that biodiesel does not receive the same level of support and has costs of production that are higher than the cost of imported diesel. Production is expected to reach only 12 million liters in 2012. Currently there is no local commercial plant producing biodiesel and production for 2011 is estimated at 1 million liters.

**Post:**

Buenos Aires

**Executive Summary:**

Paraguay's ethanol industry continues to grow every year as a result of larger demand promoted by official policies, including the biofuels Law. Local ethanol producers enjoy good returns, and continue to invest in expanding output and becoming more efficient. Contacts indicate that today's bottleneck is the limited acreage with sugarcane. The largest ethanol producer currently utilizes corn as its main feedstock. A couple of new refineries are expected to come in line in 2012. Small volumes of ethanol could be exported starting in 2013.

The local biodiesel sector is going through a difficult situation as its cost of production is higher than the cost of imported diesel. Local biodiesel commercial producers want the government to pass on this higher cost on to the consumer, but the government so far has yet not taken a decision. Production is negligible as most plants are not operating. Despite this situation, Paraguay has great potential to increase its biodiesel production, as it is one of the world's top soybean producer and exporter. There are some other alternative feedstocks which could also be used. A few public and private entities have research and extension programs focusing on jatropha, castor oil, and Coco Mbokaya.

**Author Defined:****Policy and Programs:**

In October 2005, Paraguay passed Law 2748 for Biofuels Promotion. The main objectives include to diversify the supply of renewable energy, diminish the dependence on imported fossil fuel, substitute fossil fuel with renewable fuels, improve environmental quality, develop the farm sector (focused primarily on small producers), and to export ethanol and biodiesel. The law sets mandated mixes for gasoline and diesel.

Government policy does not specify the type of feedstock to be used. However, ethanol production is mainly focused on sugarcane and grains, while biodiesel is primarily focused on tallow and vegetable oil. There are a few projects researching and expanding the potential use of other feedstocks such as Coco Mbokaya, Jatropha, spurge, and castor oil.

Paraguay's main energy source is hydroelectricity, with significant exports to Argentina and Brazil. However, biomass, mostly wood and charcoal, is the largest source of energy consumed in homes and the industry. Then follow petroleum products which are imported (Paraguay does not produce oil or gas), hydroelectricity, and finally biofuels with a very small share of the total.

Following are the main points of the Biofuels Promotion Law (and its following decrees):

- Declares production of biofuels to be of "national interest".
- Recognizes biodiesel, anhydrous ethanol and hydrated ethanol as fuels.
- Establishes minimum mix mandates for biodiesel at 1 percent in diesel for 2007, 3 percent in 2008, and 5 percent for 2009. However, due to the lack of sufficient local supply, in June 2009 the mix was reduced to a minimum 1 percent until further notice. The maximum blending mix at gas stations can reach 20 percent.
- Establishes mix mandates for ethanol of a minimum of 20 percent and a maximum of 24 percent in gasoline of 95 octanes or under. In March 2009, the government set all mixes at 24 percent.
- Biofuel use is mandatory as long as there is sufficient local supply.
- Encourages the production of different feedstocks for biofuel production, which has to be of local

origin.

- Established tax benefits, especially concerning investment.
- The Ministry of Industry will control investment and will determine production levels. The Ministry of Agriculture and Livestock will certify feedstocks

In May 2008, the government passed Decree 12240 reducing the Value Added Tax (VAT) on biodiesel and ethanol to 2 percent and eliminating import duties on flex fuel and E85 new and used cars.

In August 2010, the government, through Decree 4952, established that local importers of fossil fuel have to present every month the documentation of their purchases of local biofuels in order to be allowed to import fuel.

There is no compulsory government environmental requirement for the production of feedstocks or the industrial process for biofuels.

Industry contacts report that the local ethanol industry is growing slowly, but steadily and has a good future, thanks to expected growth of the domestic market and potential exports. Ethanol mandates are being fulfilled and producers of ethanol currently enjoy very good returns as production costs are lower than the selling price to local fuel distributors. Contacts point out that the current bottleneck to increase production is the limited sugarcane area. Paraguay has the potential to expand significantly its acreage.

These same sources are doubtful about the future of biodiesel in Paraguay. Of the total fossil fuel demand, which is entirely imported, diesel accounts for approximately 70 percent. Contacts indicate that despite the Biofuel Law, most fuel distributors do not comply with the mandate. Petropar, the national oil company, is practically the only company which purchases biodiesel from local producers, paying a price similar to what it sells its diesel fuel. This price scheme reportedly does not cover the cost of production of biodiesel from vegetable oil and the very few producers using tallow lately prefer to export the fat. The industry is trying to have the government include in the cost of diesel the higher price of biodiesel, which they claim, should be paid by consumers.

The Ministry of Agriculture has in place research programs on jatropha, coco and sugarcane. The university, private entities and companies also have developed some research. Private companies are adopting new sugarcane varieties, which in most cases come from Brazil and Argentina. There is also research on the use of grains and manioc.

## **Ethanol**

### Production

Ethanol production is expected to reach 180 million liters in 2012, a steady increase since the Biofuels Law was put in place. Blending requirements for ethanol with gasoline changed several times in the past years. Paraguay has had mixing requirements since Decree 2162 of March 1999 and its following resolutions. It first established that gasoline be mixed with 7 percent ethanol. The last modification took place in March 2009, through Resolution 162 of the Ministry of Industry and Commerce, by which it set mandated mixes at as much as 24 percent. In practice, the current mix is almost 25 percent.

In 2011, roughly 50 percent of ethanol in Paraguay will be obtained from sugarcane (and a small volume from molasses), and the rest from grains, primarily corn. Most ethanol refineries own part of the sugarcane they process, however, Petropar, the national oil company, buys cane exclusively from third parties.

There are eight sugar mills in Paraguay, of which two have distilleries that produce anhydrous ethanol. In addition, there are two distilleries, which produce hydrated ethanol. Two of the sugar mills have the capacity to utilize grains once the sugar cane harvest is over. There are 12 autonomous distilleries and 10 dehydrators in Paraguay. Inpasa is a relatively new company which already produces over 50 percent of Paraguay's ethanol. It primarily uses corn, and in smaller proportions sorghum, manioc and sugarcane as feedstocks. Petropar is the country's second largest ethanol producer accounting for approximately 18 percent of the total.

Paraguay is the world's largest exporter of organic sugar. The sugarcane area is estimated between 105,000-110,000 hectares. Official studies indicate that the country has the potential to expand to 450,000 hectares. Sugarcane is produced in 14 of the 17 departamentos (states), but the largest concentration is in the central part of the eastern region. Planted area has been growing continuously since 2001. Sugarcane production has a strong social and economic importance as more than 25,000 farmers, most of which are small-scale producers, make a living with it. Private estimates indicate that about 20 percent of the sugarcane crop is used directly for the production of ethanol. Most players point out that the current bottleneck for increased ethanol output is the limited crop area. Private estimates indicate that an additional 20,000 hectares of sugarcane are needed to have the sugar and ethanol sector operating at full capacity. Several refineries are investing in the expansion of plantations.

There is one sugar mill in the eastern part of the country that mostly uses grains, primarily corn. Paraguay's normal corn production is about 2-3 million tons, of which about half is exported and the balance used domestically for animal feed, human consumption, and ethanol. The distilled grains are used for animal feed for the export and domestic market. Another alternative feedstock for ethanol production is manioc, also known as cassava, which is widely produced in Paraguay.

Paraguay's ethanol production capacity is projected at 300 million liters in 2012. Producers are investing in expanding capacity, improving efficiency at their plants, and expanding cane plantations. Two new ethanol biorefineries will be inaugurated in 2012. Private projections indicate that by 2014, Paraguay could produce approximately 300 million liters of ethanol, consume 250 million liters and export the balance.

Most players in the local ethanol industry are in a good financial situation as the business is profitable. Refineries currently sell ethanol to fuel companies at approximately US\$1.09 per liter, well above production cost. E85 currently sells at US\$1.20 per liter at the pump and E24 at US\$1.55 per liter. The big difference is the tax paid by gasoline.

## Consumption

Ethanol domestic consumption for 2012 is forecast at 180 million liters. Consumption in 2011 is estimated at 150 million liters. As a result of the recent official permission to import flex fuel and E85 cars duty free, the demand for ethanol is growing. Approximately 95 percent of all ethanol sold is dehydrated.

Paraguay's gasoline market in 2011 is estimated at 520 million liters (including ethanol).

Practically the whole demand is for private vehicle use. Historically, of the total fuel consumption, diesel accounted for 80 percent and gasoline 20 percent. With new policy in place, the importation of E85 and flex fuel cars, and the conversion of many engines to flex fuel, is resulting in a larger use of gasoline (and thus, ethanol). Currently, the proportion is estimated to be closer to 70/30.

The use of flex fuel cars and E85 has promoted the use of E85 gasoline, which in 2009 totaled about 12 million liters. The sale of this fuel continues to be provisionally authorized, and it is expected to increase to 18 million liters in 2011.

## Trade

Paraguay does not export ethanol for fuel use. However, some local industries are confident that they will begin to export small quantities of ethanol (either for fuel or industry) in 2013. The main market is expected to be the EU under the GSP+ program. Despite exports being duty-free, local exporters indicate that current prices in that market are still not attractive compared to local prices.

Exports of ethanol are free while imports pay no duties but have to be approved by the Ministry of Industry and Commerce.

## Statistical Information

<b>Ethanol - Conventional &amp; Advanced Fuels (Mil. Liters)</b>							
<b>Calendar Year</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Production, Total</b>	46	65	90	120	130	150	180
Advanced Only							
<b>Imports</b>	0	0	6	0	0	0	0
<b>Exports</b>	0	0	0	0	0	0	0
<b>Consumption</b>	45	60	86	110	130	150	180
<b>Ending Stocks</b>	10	15	25	35	35	35	35
<b>Production Capacity - Conventional</b>							
No. of Biorefineries			9	11	12	12	14
Capacity (Mil. Liters)			236	250	260	260	300
Capacity Use (%)			38%	48%	50%	58%	60%
<b>Production Capacity - Advanced</b>							
No. of Biorefineries							
Capacity (Mil. Liters)							
Capacity Use (%)							
<b>Co-product Production - Conventional only (1,000 MT)</b>							
Product Y							
Product Z							
<b>Feedstock Use - Conventional (1,000 MT)</b>							
Sugarcane			900	960	1,100	1,200	1,300
Grains			50	115	140	190	240
Feedstock C							
Feedstock D							
<b>Feedstock Use - Advanced (1,000 MT)</b>							
Feedstock A							
Feedstock B							

Feedstock C							
Feedstock D							

## Biodiesel

### Production

Biodiesel output for 2012 is projected at 12 million liters, although the final volume will depend on official policies. Some contacts doubt that even that volume will be reached. Although there is a law and regulations which promote the production and use of biodiesel, the higher cost of production vis-à-vis imported fossil diesel slow its development. Contacts indicate that some of the most important problems faced by the local industry are: 1) normally the national oil company sets diesel prices below cost; 2) resistance to increase the price of diesel (with biodiesel) at the pump, reflecting higher production costs of biodiesel; and 3) lack of consumer knowledge on biodiesel and some technical problems, especially during winter time.

Currently, biodiesel is not being produced at a commercial level. There is some production in the interior of the country in hands of small processors using vegetable oil. The largest local processors mainly use tallow (and can also switch to vegetable oil), but they are not currently producing. The country's entire supply of tallow is only sufficient to reach a 1 percent blending ratio and this does not take into account competing uses for tallow, which is currently being exported. To accomplish the original 5 percent blending mandate, Paraguay will have to utilize vegetable oil (most likely from soybeans) as feedstock. Its production cost is also significantly higher than the current local price of diesel. At current prices and costs of production, industry contacts indicate that B5 made of vegetable oil would cost US\$0.015 per liter more than pure diesel at the pump, which currently sells at US\$1.17 a liter.

Resolution 236 of June 2009 of the Ministry of Industry and Commerce reduced the obligatory mix of 5 percent of biodiesel in diesel to a minimum of 1 percent. The lack of local supply, high cost of feedstock and controlled diesel prices did not encourage production. This resolution is not being enforced, as the mix is nowadays almost inexistent.

There are currently six biodiesel plants approved by the government, with an estimated production capacity of 45 million liters (some contacts report that some of these plants are being dismantled, reducing the country's real capacity). Most of them can use vegetable oil and animal fat as feedstock. Two leading local meat packers own biodiesel plants. The production capacity of the approved companies vary from 4-12 million liters a year. There are around 20 small biodiesel plants for self-consumption scattered around the country and have no official control. Their production is primarily based on vegetable oil produced by them, and in most cases, it is for self consumption.

Imports of diesel in Paraguay are not restricted, but the government, through Petropar, sets the price of diesel. The price is often below the cost of importation, with private fuel distributors only importing when prices are profitable.

Paraguay's soybean crop in 2010-11 was approximately 8 million tons, ranking it as the world's 6th largest producer and 4th largest exporter. Paraguay's crushing capacity is roughly two million tons. Soybeans that are not processed are exported as beans. The large production provides potential opportunities to eventually replace some imports of diesel with renewable fuels produced

from locally grown feedstock.

Apart from tallow and soybean oil, Paraguay has good potential in producing biodiesel from Coco Mbokaya (*Acrocomia totai*), a palm which is widely found in a vast area of the country.

Research in feedstock for biofuels is limited. There are a few public and private programs on research and extension of coco, castor oil, and jatropha. Coco Mbokaya is a native palm and some studies estimate that about 50 percent of the beans are not harvested. Its oil is of excellent quality and it is widely used in the soap and cosmetic industry. The government is trying to develop a system by which smaller producers harvest the beans in order to obtain an additional income.

Official sources estimate that there are 10,000 hectares of castor oil plants in Paraguay and there are plans to increase the area, and install a few "buying centers". The government and the private sector are very interested in jatropha production. The plant produces very well in Paraguay, especially in the western Chaco region. Preliminary results based on research of the Ministry of Agriculture's experiment stations; show that three-year-old plants yield 3-4 tons of beans per hectare, with 37 percent oil content of excellent quality. The harvest is done manually and this is seen as an opportunity for thousands of small-scale producers.

Petropar since 2008 has had the only laboratory that can test biodiesel quality, a key point in the development and use of biodiesel.

## Consumption

Biodiesel consumption for 2012 is projected at 12 million liters. However, there are some who think this level is somewhat optimistic. Of the country's total fuel market, diesel accounts for roughly 70 percent with an estimated volume of 1.1 billion liters in 2011. Approximately 30 percent of it is consumed by cargo and passenger transport, another 30 percent by the industry and farm equipment, and the balance by private vehicles.

Currently, there is no private fuel company buying biodiesel in Paraguay.

There is some discussion on the quality of biodiesel made from tallow. While producers report no concerns or problems, some contacts recommend that it should not be used during the coldest months of the year because it can eventually clog engine filters. Contacts in the industry envision a market where tallow biodiesel is sold during the summer time while vegetable oil biodiesel is sold throughout the year.

## Trade

Biodiesel exports from Paraguay are not expected in the short or medium term. Apart from enforcing policies to promote biodiesel production, Paraguay will need to invest in infrastructure and logistics (terminals, storage, transportation, etc.) before thinking of exporting significant volumes of biofuels in the future.

Paraguay is a landlocked country surrounded by Argentina, Bolivia and Brazil. However, it has good connections to the Atlantic Ocean with a barge system through the Paraguay and Parana rivers, and with a trucking system connected to Paranagua port in Brazil (800 kilometers from the eastern border of the country).

Exports and imports of biodiesel are duty free but have to be approved by the Ministry of Industry and Commerce.

#### Stocks

Local biodiesel production is small and there are normally no stocks. Contacts indicate that Petropar holds some stock throughout the year, but this responds to the company's commercial strategy.

#### Statistical Information

<b>Biodiesel - Conventional &amp; Advanced Fuels (Mil. Liters)</b>							
<b>Calendar Year</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Production, Total</b>		3	10	8	6	1	12
Advanced Only							
<b>Imports</b>		0	0	0	0	0	0
<b>Exports</b>		0	0	0	0	0	0
<b>Consumption</b>		3	10	4	10	1	12
<b>Ending Stocks</b>		0	0	4	0	0	0
<b>Production Capacity - Conventional</b>							
No. of Biorefineries			5	6	6	6	6
Capacity (Mil. Liters)			30	45	45	45	45
Capacity Use (%)			33%	18%	13%	2%	27%
<b>Production Capacity - Advanced</b>							
No. of Biorefineries							
Capacity (Mil. Liters)							
Capacity Use (%)							
<b>Feedstock Use - Conventional (1,000 MT)</b>							
Feedstock A		3	10	8	6	1	12
Feedstock B							
Feedstock C							
Feedstock D							
<b>Feedstock Use - Advanced (1,000 MT)</b>							
Feedstock A							
Feedstock B							
Feedstock C							
Feedstock D							