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Sugar Ethanol Industry in Latin America

Global Biofuels Market Boosts Sugar Ethanol Industry in Latin America

Worldwide concerns about climate change from greenhouse gas (GHG) emissions paired with the current price environment of record-high and rising crude oil prices have led to a growing demand for renewable sources of energy for the transportation sector around the world. In most countries in Latin America, as is the case for various countries around the world, government policy incentives and programs have set the goal of significantly expanding liquid biofuels made from biomass as an alternative for transportation fuel in the coming decades.

The best known biofuels in the transportation sector are ethanol (produced from a variety of feedstocks) and biodiesel (derived from vegetable oil and animal fats).

Brazil and India use sugarcane to produce ethanol, while U.S. producers rely most heavily on corn. China relies mostly on corn, although it also extracts fuel from rice and wheat. The European Union (EU) mainly produces biodiesel from rapeseed and other vegetable oils. The Americas, mostly the United States and Brazil, account for 70% of the world's biofuel production. Brazil alone produces 40% of the world's biofuels, whereas the United States, the EU, China and India produce much of the balance. Brazil, a pioneer in the production and use of fuel ethanol in its transportation sector, plays a large role in global biofuels markets thanks to decades of public and private investment in agrifuels development and the Government's past and current incentives toward sugarcane, sugar and ethanol production.

The Brazilian success at integrating sugar ethanol into the fuel supply to reduce dependence on petroleum is more significant given that the transportation sector accounts for 61% of liquid fuel consumption in the country (Empresa de Pesquisa Energética, EPE). Several countries in Latin America, as well as many other developed and developing countries around the world, are looking at Brazil as the model for developing biofuel programs in their own countries.

A Growing World Biofuel Market Influencing Energy Supply and Biomass Use in Latin America

Promotion of liquid biofuels made from biomass as the best alternative for transportation fuel is not a new effort. Over the past two decades the renewable share of world-marketed energy use has been expanding and it now accounts for 8% of total energy supplied. Global biofuel production has tripled since 2000, reaching 15.7 billion gallons in 2007. The United States and Brazil were the world's two largest producers of ethanol, contributing 6.5 billion and 5.3 billion gallons (F.O. Licht).

Total energy supply and use in Latin America remains modest compared with energy supply and use in the United States and other industrialized countries: In 2005 Latin America's total energy supply per capita was 14% of energy supply in the United States (IEA).

Latin America's current energy matrix includes production and use of oil, coal, gas, hydroelectric power, and biomass. Although the largest share of Latin America's total energy supply is crude oil (54%), the production of renewable fuels from Economic Research Service, USDA hydroelectric and biomass sources now represent 29% of its energy market compared with more than 40% in Brazil and 12% globally. Fully 18% of Latin America's energy came from biomass in 2006 compared with a high 27% for Brazil and 10% for the world (IEA). Biomass includes cane bagasse, alcohol, wood and coal.

With continuing expansion in economic activity, rising personal incomes and urbanization, demand for oil and other liquid fuels is expected to continue to increase in the transportation sector. Biofuels currently meet just over 1.59% of road-fuel demand worldwide, but the long-term prospects are for biofuels to play a much larger role in meeting world road-transport fuel demand. The International Energy Agency forecasts this share to quadruple by 2030. In the United States, biofuels such as ethanol and biodiesel represent 2.45% of the transportation fuels market, and 1.29 for the EU, and just 0.16 for Latin America, excluding Brazil. But, in the case of Brazil, biofuels represent over 26% of the transportation fuels market (fig. 1B).

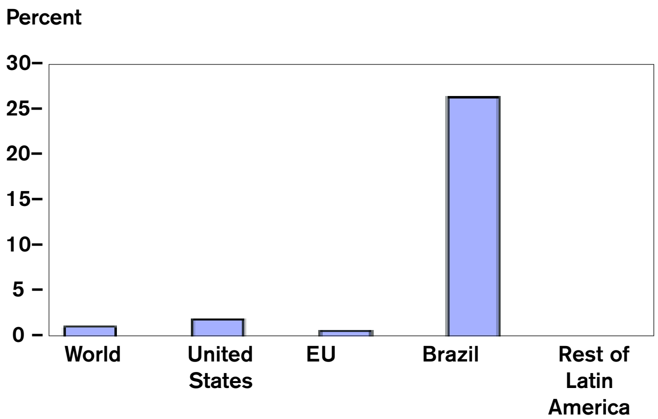
Brazil's Comparative Advantage in Sugar Ethanol Production

Brazil's ready availability of land, water and labor has made it the world's largest sugarcane producer and exporter of sugar and ethanol. Sugarcane production in Brazil reached 428 million tons, growing at a rate of 11% per year since 2000. Sugarcane production in 2007/08 is expected to reach an all-time high of 491 million tons, a 14.7% increase over the previous year (USDA/FAS).

About 53% of Brazil's sugarcane harvest is being distilled into fuel ethanol[1] (CEPEA), compared with a world average of 10% (Earth Policy Institute). The remaining 47% of Brazil's annual sugarcane harvest goes into producing sugar for domestic consumption and for export, a significant change from the 1970s when more than 80% of total sugarcane output went into sugar production.

[1] This represents 5.9 billion gallons (22.4 billion liters) of fuel ethanol -2.1 billion gallons of anhydrous and 3.8 billion gallons of hydrous ethanol.

Figure 1B
Brazil leads the world in the share of biofuels used as fuel for road transportation.



Source: OECD, IEA, 2007

Brazil is the largest exporter of ethanol in the world. Brazil's ethanol exports represent 56% of the world's ethanol export market (GTIS, 2007). Despite the large role that Brazil plays in global export markets, the country exports just 20% of its ethanol production. Brazil exports both anhydrous ethanol (which is added to gasoline) and hydrous ethanol (used as a gasoline substitute). Hydrous ethanol exports represent between 90% and 97% of the total value of ethanol exports, in any given year, with anhydrous ethanol exports accounting for the remainder.

Brazil's ethanol exports in 2007 were $1.4 billion. Major Brazilian markets for fuel ethanol in 2007 included the United States ($361 million), the EU ($421 million) and Japan (US$153 million). Exports of ethanol dehydrated in Central America were re-exported duty free to the United States because under the Caribbean Basin Initiative the United States exempts Central American countries from paying the 54-cent duty on U.S. ethanol imports. In 2007 the U.S. imported 245 million gallons of fuel ethanol under the CBI quota fill (ITC).

Brazil's production and use of fuel ethanol since 1975 represent the most successful program of renewable fuel for transportation implemented to date. In 2007 over 82% of the new car fleet in the country used fuel ethanol. The recent interest in converting biomass to biofuels throughout the world is leading to increased domestic and foreign demand. Brazil's ethanol and sugar industries are experiencing more rapid growth, expansion in arable land and increased yields from technological advancements in new sugarcane varieties. As demand for Brazilian ethanol continues to rise, the production of ethanol will continue to exceed that of sugar in the sugarcane production mix.

Brazilian Government officials and researchers expect area planted to sugarcane to expand by 3-4 million hectares over the next 5 years by expanding sugarcane cultivation in degraded pastureland. The expansion of Brazil's sugar/ethanol complex is leading to new investments in infrastructure and technology. However, despite recent rapid growth and new investments in the sector, ethanol supply still lags demand. At times when ethanol shortages have led to rapid price increases to levels above those agreed upon by refinery owners and the Federal Government, Brazilian authorities have intervened to reduce the percentage of ethanol mixed with gasoline sold at gas stations from 25% to 23 or 20 percent, which in turn has led to a reduction in the use of ethanol.

Latin America's Potential for Biofuels Production

In addition to Brazil, several other Latin American countries have potential for ethanol production. For Latin American countries, biofuel developments provide an opportunity to reduce their dependence on imported liquid fuel and an export opportunity for regionally produced ethanol for use as fuel abroad. Biofuel development is also seen as a means to reduce poverty in the region, by engaging more farmers in crop production and crop diversification. As ethanol can be produced from a variety of biomass crops grown in Latin American--sugarcane, corn, cassava and cellulosic feedstocks (i.e. wood, grasses, and agricultural residues) – development of an ethanol industry holds great potential for the region (table 1-B).

For most Latin American countries and given their experience with sugarcane cultivation, ethanol produced from sugar cane as a feedstock is their primary interest. Out of 33 Latin American countries, excluding Brazil, 21 countries are growing sugarcane: Argentina, Bolivia, Colombia, Costa Rica, Chile, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, and Venezuela.

Biodiesel production from soyoil presents development potential in Argentina (third largest soybean producer), Paraguay and Uruguay. Other important palm oil producers include Colombia (fifth largest palm oil producer), and Ecuador (table 2-B).

Latin America's Foreign Demand Opportunities for Sugar Ethanol

Brazilian flex-fuel technology for automobiles is beginning to spread around the world. Although several countries are developing flex-fuel models in cooperation with Brazil, other countries, mostly in Europe and Asia, have already introduced "E85 models." E85 models are powered by an engine based on the Brazilian technology that can be fueled with 85% ethanol and 15% gasoline.

The vast markets of the United States,

the EU and Asia represent important opportunities for sugar-ethanol producing Latin American countries, in a manner similar to that of Brazil. The United States is the world's largest consumer of ethanol and is seeking to use 36 billion gallons of renewable and other alternative fuels by 2022. The Clean Air Act requirement to add oxygenates (such as ethanol) to gasoline and the ban on methyl tertiary butyl ether (MTBE) as a gasoline additive is also, in addition to the blend subsidy, driving consumption in the United States. In addition, rising costs of crude oil, paired with drive to reduce dependence on foreign oil, have played an important role in the recent growth of the U.S. ethanol industry. The United States produced about 6.5 billion gallons of ethanol in 2007 and is forecast to more than double output by 2010.

The United States applies a 2.5% ad valorem tariff and an additional duty applicable under HTS subheading 9901.0050 of $0.54 per gallon of ethanol (for fuel use) to imports into the United States. However, under the Caribbean Basin Initiative (CBI), countries in Central America and the Caribbean have had duty-free access to the United States since 1989 for ethanol from regional feedstocks. Access for ethanol derived from nonregional feedstocks has been limited by a CBI quota equal to 7% of total U.S. ethanol consumption.

Brazil and Central America are already exporting ethanol to the United States, and large U.S. corporations such as Cargill have plants in Latin America that produce ethanol for export to the United States. For example, exports from Brazil to the Central American countries of El Salvador, Jamaica, Costa Rica and Trinidad and Tobago totaling $202 million in 2006, were imported by the United States under the CBI (GTIS data) (table 3-B). To further benefit from this tariff exemption, Brazil is jointly investing with Central American countries to build new distilleries in Mexico, El Salvador, Jamaica, Guatemala, Panama, and the Dominican Republic.

While Central America (particularly Guatemala and El Salvador) may offer some of the best prospects for biofuel production and increased exports, several other countries in Latin America with well established sugar industries including Colombia, Peru and Ecuador also have potential for sugar ethanol development. Brazil is partnering with other countries to develop technical standards that would allow fuel ethanol to become an international commodity that could soon be traded daily in international markets.

National Biofuel Programs in Latin America

Several countries in Central and South America have either initiated or are planning national biofuel programs of some kind, including Argentina, Costa Rica, Colombia, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Uruguay and Venezuela (table 4-B). Colombia is viewed as the country with the second most advanced biofuels program in South America, after Brazil (Jank et al.). In 2005, Colombia established a mandatory 10% ethanol blend (E10) in gasoline, which is to be raised to 25% by 2010. A 5% mandatory biodiesel blend is also required in some selected regions beginning in 2008. Mexico is planning to double current sugarcane area for sugar ethanol production in order to meet a 10% mandatory blend of fuel ethanol in gasoline by 2012.

In 2003, Guatemala, an important world sugar producer and the largest sugarcane producer in Central America, passed the Law of Incentives for the Development of Projects in Renewable Energy. Under this law, all biofuel projects are exempt from import duties, value-added taxes (VAT) on machinery imports for the stages of preinvestment and execution, and income taxes for 10 years during commercial operation. The government expects ethanol producers to sell in the international market soon. In Honduras, the government has encouraged sugar production to supply two ethanol distilleries. Costa Rica has set a target of substituting 7% of its gasoline with ethanol by the end of 2008.

El Salvador produces sugarcane and benefits from CBI preferential treatment to enter the U.S. market, under which a maximum quantity of 75 million gallons of ethanol was re-exported to the United States in 2007. This quantity is set to increase by 1.3 million gallons per year through 2020 (Jank et al.).

The Americas' agroenergy potential over the next two decades will be influenced by changes in macroeconomic policy and management, including exchange rate and trade policies, external factors (i.e, international prices of feedstock supplies and foreign demand for renewable fuel), and domestic production and use policies. These policies include blending targets, credit availability for biofuel production at subsidized interest rates, tax exemptions that favor production of feedstocks and/or processing of biofuels, and social

Table 1B Selected Western Hemisphere countries with potential for biofuels production				
Countries	Feedstock supplies		Potential for exports	
	Ethanol	Biodiesel	Ethanol	Biodiesel
USA	Primarily corn	Soyoil, other oilseeds oil, animal fats, recycled fats/oils	x	x
Canada	Corn, wheat, straw	Vegetable oils, animal fats	x	x
Mexico	Sugarcane, corn, sorghum	Palm oil	x	
Brazil	Sugarcane	Castor seed oil, soyoil, palm oil	x	x
Argentina	Sugarcane, corn, sorghum, potatoes, rice, barley	Soyoil, sunflower oil	x	x
Uruguay	Rice	Soyoil	x	x
Chile	Beet	Soyoil		
Colombia	Sugarcane, rice, potatoes, cassava, corn	Palm oil	x	x
Ecuador	Sugarcane	Palm oil, soyoil		x
El Salvador	Sugarcane	Palm oil, soyoil	x	
Guatemala	Sugarcane, corn	Palm oil, soyoil	x	x

Note: Other potential markets for biofuels include: Bahamas, Peru, Haiti, Suriname, Trinidad and Tobago, Venezuela.

Source: USDA/FAS, Countries Attaché Reports

Table 2B World rank in production and global export market share					
Item	World rank production	World rank exports	Global exports market share	Exports in 2006	Growth rates 2000-06
			Percent	U.S. $ Millions	
Brazil					
Sugar	1	1	42	3.919	20
Ethanol	2	1	51	766	79
Soybeans	2	1	35	5.345	22
Corn	3	4	35	121	48
Argentina					
Soyoil	3	1	55	2.789	21
Paraguay					
Soybeans	6	3	3	441	8
Guatemala					
Sugar	4	3	5	299	7
Colombia					
Palm oil	5	7	1	109	26

Source: USDA's Foreign Agricultural Service and Global Trade Information Services data policies that may impact the cost structure and profitability of biofuels.

Various other factors, such as increased public and private investment to improve the capacity and efficiency of transportation and marketing infrastructure, may impact the competitiveness of the region's biofuel sector. New technologies to advance the biofuels sector that focus on developing new varietals that increase sugarcane yields and the development of new technologies for a more efficient processing of products to increase ethanol production will also be crucial.

The new H-Bio technology patented by Petrobrás (Brazil's state-oil company) for mixing vegetable oils into diesel fuel, and Brazil's progress to date in "second generation" biofuels (refers to biofuels extracted from non-food crops) to obtain ethanol from sugarcane bagasse (cellulosic ethanol) will also be important factors. The Americas' efforts to create biofuels markets will also be affected by the various bilateral, regional and multilateral trade agreements in which these countries may participate.

Sources

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CONAB, Companhia Nacional de Abastecimento, Brazil.

Earth Policy Institute. "Supermarkets and Service Stations Now Competing for Grain," by Lester R. Brown, July 17, 2006.

Table 3B U.S. imports of fuel ethanol, by source, 1996-2007

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
						Million gallons						
Jamaica	21	9	13	24	28	29	29	39	39	36	67	80
Costa Rica	17	7	12	16	24	11	12	15	26	33	36	42
El Salvador	13	6	4	7	8	3	5	7	6	24	38	75
Canada			1	2	3	6	6	0	0	0	9	6
Brazil									94	31	434	189
Trinidad &Tobago										10	25	43
Netherlands											2	0
Pakistan											6	0
China											37	1
TOTAL	52	22	31	49	63	50	52	61	164	135	653	436

Source: International Trade Commission

Table 4B Biofuel policies, programs and blend levels

	Current	Blending targets
USA	E10 and E85	The Energy Independence and Security Act of 2007 raises the renewable fuel standard from 4.7 billion gallons in 2007 to 36 billion gallons (about 15 billion gallons from corn and the rest from cellulose and other sources) by 2022.
Canada	E10 and E85	Government plans to mandate a 5% ethanol content in gasoline by 2010, and a blend of 2% biodiesel in diesel by 2012.
Mexico	E10	E10 mandatory since 2006.
Brazil	E20 to E25, and E100	Current blending ratio of ethanol with gasoline is 25% (E25). A 2% blend of biodiesel with diesel (B2) is mandated for 2008, rising to 5% in 2013. Exports exempted from taxes.
Argentina	E2	Mandatory E5 and B5 by 2010. Export tax for biodiesel 5% and 2.5% tax rebate is lower than for soyoil (24%).
Uruguay	E18	
Colombia	E10	E10 mandatory since 2005. To be raised to 25% by 2010. B5 mandatory by 2008. Tax exemption: VAT and income for biodiesel producers.
Peru	E7	E7 mandatory since 2007. B5 mandatory in 2010.
Costa Rica	E10	
Guatemala	E25	E25 mandatory since 1985. VAT, income, import tax exemptions.

Source: USDA/FAS, Countries Attaché Reports

EPE, Empresa de Pesquisa Energética, Brazil.
USDA/FAS, U.S. Department of Agriculture, Foreign Agricultural Service, Countries Attaché Reports.
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