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# Ethanol and Other Biofuels: Potential for U.S.-Brazil Energy Cooperation

September 27, 2007

**Congressional Research Service**
https://crsreports.congress.gov
RL34191

**CRS REPORT**
Prepared for Members and
Committees of Congress

# Summary

In the past several years, high oil and gas prices, instability in many oil-producing countries, and concerns about global climate change have heightened interest in ethanol and other biofuels as alternatives to petroleum products. Reducing oil dependency is a goal shared by the United States and many countries in Latin America and the Caribbean, a region composed primarily of energy-importing countries. In the region, Brazil stands out as an example of a country that has become a net exporter of energy, partially by increasing its production and use of sugar-based ethanol.

On March 9, 2007, the United States and Brazil, which together produce almost 70% of the world's ethanol, signed a Memorandum of Understanding (MOU) to promote greater cooperation on ethanol and other biofuels in the Western Hemisphere. The countries agreed to (1) advance research and development bilaterally, (2) help build domestic biofuels industries in third countries, and (3) work multilaterally to advance the global development of biofuels.

Many analysts maintain that the United States would benefit from having more energy producers in the region, while Brazil stands to further its goal of developing ethanol into a globally traded commodity. In addition to these economic benefits, some analysts think that an ethanol partnership with Brazil could help improve the U.S. image in Latin America and lessen the influence of oil-rich Venezuela under Hugo Chávez. However, obstacles to increased U.S.-Brazil cooperation on biofuels exist, including current U.S. tariffs on most Brazilian ethanol imports.

While some Members of Congress support greater hemispheric cooperation on biofuels development, others are wary of any cooperative efforts that might negatively affect U.S. ethanol producers. The Energy Diplomacy and Security Act of 2007, S. 193 (Lugar), approved by the Senate Foreign Relations Committee on March 28, 2007, would increase hemispheric cooperation on energy. S. 1007 (Lugar), the United States-Brazil Energy Cooperation Pact of 2007, calls for the same hemispheric cooperation groups as S. 193, and directs the Secretary of State to work with Brazil and other Western Hemisphere countries to develop biofuels partnerships. H.Res. 651 (Engel) recognizes and supports the importance of the U.S.-Brazil MOU on biofuels. In the 109th Congress, legislation was introduced that would have eliminated current tariffs on foreign ethanol, but in December 2006, Congress voted to extend the ethanol tariffs through December 31, 2008 (P.L. 109-432). In the 110th Congress, S. 1106 (Thune) would extend those tariffs through 2011, and H.R. 196 (Pomeroy) would make the tariffs permanent.

This report discusses the opportunities and barriers related to increasing U.S. cooperation with other countries in the hemisphere on biofuels development, focusing on the U.S.-Brazil agreement. This report may be updated. For more information, see CRS Report RL33290, *Fuel Ethanol: Background and Public Policy Issues*, by Brent D. Yacobucci, and CRS Report RL33693, *Latin America: Energy Supply, Political Developments, and U.S. Policy Approaches*, by Mark P. Sullivan, Rebecca G. Rush, and Clare Ribando Seelke.

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# Introduction

Recent high oil and gas prices and concerns about global climate change have heightened interest in ethanol and other biofuels as alternatives to petroleum products. The Western Hemisphere produces more than 80% of the world's biofuels, led by Brazil (producing sugar-based ethanol) and the United States (producing corn-based ethanol).[1] Some have argued that increasing biofuels production in Latin America could bolster energy security, reduce greenhouse gas emissions, and promote rural development in the region. Others are concerned about the huge investment outlays and government subsidies needed to build up nascent biofuels industries. Skeptics also worry about the potential negative effects that increased biofuels production may have on the environment, labor conditions, and food prices in the region.

The United States and Brazil, the world's largest ethanol producers, have recently agreed to work together to promote the use and production of ethanol and other biofuels throughout the Western hemisphere. Increasing U.S.-Brazil energy cooperation was a top agenda issue when President Bush visited Brazil and when President Lula visited Camp David earlier this year. On March 9, 2007, the two countries signed an agreement to (1) advance research and development bilaterally, (2) help build domestic biofuels industries in third countries, and (3) work multilaterally to advance the global development of biofuels.[2]

Many Bush Administration officials and Members of Congress note that the new biofuels partnership with Brazil may help improve the U.S. image in Latin America and diminish the influence of President Chávez in the region. In the past few months, the U.S.-Brazil biofuels agreement has already had a significant political effect in Latin America. "Ethanol diplomacy" appears to be helping Brazil reassert regional leadership relative to oil-rich Venezuela under Hugo Chávez.[3]

Increasing biofuels cooperation with Brazil and other countries in Latin America may prompt challenges to existing U.S. trade, energy, and agriculture policies. For example, U.S. tariffs on foreign ethanol imports may prove to be an obstacle to U.S.-Brazil energy cooperation. In the 109th Congress, legislation was introduced that would have eliminated current tariffs on foreign ethanol. While some Members support ending the ethanol tariffs, other Members of Congress support further extensions of the ethanol import tariffs. Some have also proposed using tariff duties collected on foreign ethanol imports to fund advanced ethanol research and production within the United States.

This report examines the opportunities and barriers related to increasing U.S. cooperation with other countries in the hemisphere on biofuels development, focusing on the U.S.-Brazil agreement. It provides background information on Western hemisphere energy challenges, the ethanol industries in Brazil and the United States, and the biofuels potential in the region. It then raises a number of policy issues that Congress may choose to consider related to bolstering the development of ethanol and other biofuels in Latin America.

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[1] Inter-American Development Bank (IDB), *A Blueprint for Green Energy in the Americas*, April 2007, p. 7, available at http://www.iadb.org/biofuels.

[2] "Memorandum of Understanding Between the United States and Brazil to Advance Cooperation on Biofuels," U.S. Department of State, Office of the Spokesman, March 9, 2007, available at http://www.state.gov/r/pa/prs/ps/2007/mar/81607.htm.

[3] "Energy Summit was Stage for Oblique Regional Leadership Contest," *Latin News Weekly Report*, April 19, 2007; "Chávez, Lula Promote Competing Visions," *Miami Herald*, August 10, 2007.

# Biofuels: A Definition

The term *biofuels* generally refers to motor fuels produced from agricultural commodities or other biological materials such as agricultural and municipal wastes. The most widely used biofuel is ethanol (both in the United States and worldwide), an alcohol usually produced from the fermentation and distillation of sugar- or starch-based crops such as sugarcane or corn.[4] Ethanol can also be produced from cellulose-based materials (such as perennial grasses and trees), although the technology to produce cellulosic ethanol is in its infancy, and no commercial-scale cellulosic ethanol plants have been constructed.[5] Other biofuels include biodiesel and other renewable diesel fuel substitutes produced from vegetable oils or animal fats (such as soybean or palm oil), and butanol produced from various biological feedstocks.[6]

Biofuels have several potential benefits relative to petroleum-based fuels. First, the use of biofuels can reduce emissions of some pollutants relative to gasoline or diesel fuel. Second, most biofuels lead to lower emissions of greenhouse gases than petroleum fuels—some can lead to substantial greenhouse gas reductions. Third, biofuels can be produced domestically to displace some petroleum that would otherwise be imported. Finally, some biofuels can reduce overall fossil energy consumption, given that much of the energy needed to grow the feedstock plant material is supplied by the sun.

There are also many potential drawbacks to biofuels. First, in nearly all cases, biofuels are more expensive to produce than petroleum fuels. Second, infrastructure limitations can lead to even higher costs for biofuels than for conventional fuels. Third, biofuels have their own potential environmental drawbacks, including increased emissions of some pollutants and the potential for increased greenhouse gas emissions (in some cases, depending on the particular biofuel) when the entire production process is taken into account.

While both the United States and Brazil—as well as many other countries—are studying and investing in many different biofuels, this report focuses on ethanol supply and use for several reasons: (1) ethanol production and consumption far exceeds that of other biofuels;[7] (2) ethanol can be (and is) used as a direct blending component with gasoline, and gasoline engines are dominant in passenger automobiles and light trucks;[8] and (3) current mandates in both Brazil and the United States favor ethanol use, either directly or indirectly.

[4] Ethanol can also be produced from petrochemical feedstocks, but such fuel is generally considered a fossil fuel, as opposed to a biofuel. For more information on ethanol, see CRS Report RL33290, *Fuel Ethanol: Background and Public Policy Issues*, by Brent D. Yacobucci.

[5] However, interest is growing. In February 2007, the U.S. Department of Energy announced $385 million in grants to construct the first six commercial-scale cellulosic ethanol plants in the United States. It is expected that these plants will be operational between 2009 and 2011.

[6] For more information on biodiesel and other renewable fuels, see CRS Report RL32712, *Agriculture-Based Renewable Energy Production*, by Randy Schnepf.

[7] In 2006, the United States produced roughly 5.4 billion gallons of ethanol, as opposed to roughly 200 million gallons of biodiesel. The production of all other biofuels was even less.

[8] Biodiesel and other renewable diesel fuels must be used in diesel engines, which play a larger role in transporting goods. In those countries where diesel engines play a larger role in the light-duty vehicle market, renewable diesel fuels could play a larger role.

# Biofuels: A Potential Solution to Latin America's Oil Dependency?[9]

While oil and gas producers such as Venezuela, Mexico, Argentina, Bolivia, Colombia, Ecuador, and Trinidad, and Tobago are net energy exporters, most Latin American and Caribbean nations are net energy importers. Countries that rely on oil as their primary energy source are particularly vulnerable to increases in global oil prices. In many Caribbean island nations, oil accounts for more than 90% of total energy consumed. In Central America, oil dependency ranges from an estimated 51% in Costa Rica to 73%-78% in El Salvador, Honduras, and Panama, and to 84-85% in Guatemala and Nicaragua.[10]

Many Latin American countries experienced dramatic increases in their energy bills after oil price hikes began in 2005, straining government budgets in Central America and the Caribbean. To fill a clear need and attempt to extend his influence in the region, Venezuelan President Hugo Chávez has offered oil on preferential terms in a program known as PetroCaribe launched in 2005.[11] His government has also reached preferential energy agreements with South American countries such as Argentina, Bolivia, and Ecuador. In December 2005, Mexico, perhaps in an attempt to act as a countervailing force to Venezuela in the region, initiated the Meso-American Energy Integration Program (PIEM) with Central America, the Dominican Republic, and Colombia.[12] As part of the plan, Mexico will supply the bulk of the crude oil to be processed by a new oil refinery in either Guatemala or Panama, which will be used primarily to satisfy Central America's energy needs.

Given declining oil production levels in both Venezuela and Mexico and the unstable political environment in Bolivia, a major natural gas producer in the region, some analysts have pointed to biofuels as a potential solution to Latin America's petroleum dependency. Producing biofuels would, some argue, allow oil-importing countries in the region to reduce energy costs and the need for imported oil. The Western Hemisphere produces more than 80% of the world's biofuels, led by Brazil (producing ethanol from sugar) and the United States (producing ethanol from corn). Biofuels proponents argue that the climate, surplus of arable land, and excess production of sugarcane and other potential biofuels crops make parts of Latin America ideally suited for an expanded biofuels industry.[13] The potential is greatest in tropical countries that have high crop yields and low costs for land and labor, characteristics that are present in several countries in Central America and the Caribbean.[14]

An April 2007 study by the Inter-American Development Bank (IDB), *A Blueprint for Green Energy in the Americas*, reports that some Latin American and Caribbean countries have shown great interest and promise in the development of biofuels. Beyond Brazil, which has been the

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[9] For background on energy challenges facing countries in the Western Hemisphere, see CRS Report RL33693, *Latin America: Energy Supply, Political Developments, and U.S. Policy Approaches*, by Mark P. Sullivan, Rebecca G. Rush, and Clare Ribando Seelke.

[10] U.S. Department of Energy, March 2, 2006, "Latin America and High Oil Prices: Economic and Political Impact," *Latin American Special Report*, October 2006; House International Relations Committee, Hearing on "Western Hemisphere Energy Security," Testimony by Karen A. Harbert, Assistant Secretary for Policy and International Affairs.

[11] For more information, see CRS Report RL34288, *Smart Grid Provisions in H.R. 6, 110th Congress*, by Amy Abel.

[12] Mexico Challenges Venezuela in Petro-Diplomacy Game," *EFE News Service*, June 2, 2006.

[13] IDB report, April 2007.

[14] Worldwatch Institute, "Biofuels for Transportation," Washington, D.C., June 7, 2006; Masami Kojima and Todd Johnson, "Potential for Biofuels for Transport in Developing Countries," World Bank, February 2006.

leader in ethanol development and production, the study also highlights several other countries with potential for biofuels development. The study also suggests ways the IDB could support the development of biofuels production in the region, including support for a biofuels development fund, the development of regulatory frameworks, and research and development.[15] Regional highlights from the IDB study include the following:

- **Central America:** The bulk of ethanol production in Central America involves reprocessing hydrous ethanol from Brazil or the European Union (EU) for export to the United States. The IDB study asserts that while the sugarcane harvesting season in Central America is shorter than in Brazil, Costa Rica, El Salvador, and Guatemala have efficient sugar industries and could produce significant sugar-based ethanol. Costa Rica and Guatemala, which house 44% of Central America's ethanol processing factories, have the most well-developed policies in place for biofuels development. Under the Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR), signatory countries continue to share duty-free access for some ethanol exports to the United States under conditions established by the Caribbean Basin Initiative (CBI)[16], but exports from Costa Rica and El Salvador enjoy specific allocations. In the future, CAFTA-DR could spur indigenous ethanol production in Central America.
- **Caribbean:** Within the Caribbean, Jamaica has exported the largest amount of ethanol to the United States under CBI, most of it reprocessed hydrous ethanol from Brazil. Trinidad and Tobago has an ethanol dehydration plant, but the largest ethanol plants in the Caribbean are located in Jamaica and the Dominican Republic. Beyond Jamaica and the Dominican Republic, Grenada has been identified as having future production potential for sugar-based ethanol. The United Nations is working with Brazil to provide technology transfer and technical assistance to examine the potential of a biodiesel industry in Haiti from jatropha, a drought-resistant shrub that can grow almost anywhere.[17]
- **South America:** Most biofuels production in South America currently goes to satisfy domestic consumption, with Colombia and Argentina possessing the largest government programs in support of biofuels development. Biofuels exports from non-CBI countries are constrained by tariff barriers in the United States and the EU. Should Colombia and/or Peru conclude free trade agreements with the United States, their biofuels export potentials could expand. Argentina, Colombia, and Peru have potential to further develop ethanol from sugarcane; Colombia and Ecuador to produce more biodiesel from palm oil; and Chile has potential for second-generation ethanol production from woodchips.

[15] IDB report, April 2007.

[16] Most ethanol imports to the United States are subject to a 2.5% ad valorem tariff and (more significantly) a 54-cent-per-gallon added duty. However, to promote development and stability in the Caribbean region and Central America, the Caribbean Basin Initiative (CBI) allows imports of most products from those countries, including ethanol, duty-free. While many of these products are produced in CBI countries, ethanol entering the United States under the CBI is generally produced elsewhere and reprocessed in CBI countries for export to the United States. Up to 7% of the U.S. ethanol market may be supplied duty-free by ethanol imports from CBI countries. For more information, see CRS Report RS21930, *Ethanol Imports and the Caribbean Basin Initiative (CBI)*, by Brent D. Yacobucci.

[17] Johanna Mendelson Forman, "Jatropha and Peace-building in Haiti," Statement for the Record for the House Foreign Affairs Committee, Subcommittee on the Western Hemisphere, March 19, 2007.

# Brazil and the United States: Hemispheric Leaders in Ethanol Production

Brazil and the United States are by far the world's largest ethanol producers. In 2006, the United States was the largest producer of ethanol, with almost 4.9 billion gallons, followed closely by Brazil, with 4.5 billion gallons; together, the two countries produced 69% of ethanol in the world. Prior to discussing the U.S.-Brazil Memorandum of Understanding on biofuels, this section provides background information on ethanol production and usage in the two countries.

## Ethanol Production Process

U.S. ethanol is generally produced and consumed in the Midwest, close to where the corn feedstock is produced.[18] In Brazil, São Paulo state is the key area for sugarcane and ethanol production, where integrated sugar plantations and mills produce refined sugar and fuel ethanol. Regardless of the feedstock, the main steps to ethanol production from sugar- or starch-based crops are as follows:

- the feedstock (e.g., corn or sugar) is processed to separate fermentable sugars;
- yeast is added to ferment the sugars;
- the resulting alcohol is distilled, resulting in "wet" or hydrous ethanol; and
- for use in gasoline, the distilled alcohol is dehydrated to remove any remaining water, resulting in "dry" or anhydrous ethanol.

To produce ethanol from cellulosic materials, considerably more physical and chemical/enzymatic processing is necessary to separate fermentable sugars that can then be converted to ethanol. This additional processing adds significant costs, making cellulosic ethanol currently uncompetitive with corn- or sugar-based ethanol.

## U.S. Ethanol Industry and Market

The United States is currently the largest producer and consumer of fuel ethanol in the world. In 2006, the United States consumed roughly 5.4 billion gallons of fuel ethanol. Most of that ethanol (4.9 billion gallons) was produced in the Midwest from corn. A smaller amount was produced domestically from other feedstocks (e.g., sorghum) or imported directly or indirectly from Brazil. Over 99% of U.S. ethanol is blended into gasoline. Ethanol is blended into gasoline at up to the 10% level (E10), although much is blended at lower levels (5% to 7%). Roughly one-third of U.S. gasoline contains some ethanol. A small amount of ethanol is blended in purer form as E85 (a blend of 85% ethanol and 15% gasoline), which can be used in flexible fuel vehicles (FFVs) specifically designed for its use.[19]

Various federal and state incentives promote the production and use of ethanol in the United States.[20] Since the 1970s, ethanol blended into gasoline (to make "gasohol") has been eligible for

[18] When ethanol is shipped long distances, fuel costs are higher, as the fuel cannot be transported by pipeline and must be shipped by rail, truck, or barge. This added transport cost can be as much as 5 to 10 cents per gallon.

[19] It should be noted that while FFVs in the United States are designed to use any mixture of ethanol and gasoline up to E85, these vehicles are generally optimized to run on conventional gasoline and thus may not achieve some of the potential efficiency benefits possible with higher-level ethanol blends.

[20] For more information on federal biofuels incentives, see CRS Report R40110, *Biofuels Incentives: A Summary of Federal Programs*, by Brent D. Yacobucci.

tax incentives of various forms. Currently, each gallon of pure ethanol blended into gasoline earns the blender a tax credit of 51 cents per gallon. Additional tax incentives exist for small producers. Further, as part of the Energy Policy Act of 2005 (P.L. 109-58), Congress established a Renewable Fuel Standard (RFS). Each year, the RFS requires a certain amount of renewable fuel be blended into gasoline. For 2007, the mandate is 4.7 billion gallons. The vast majority of this mandate will be met using ethanol. The mandate increases annually and will reach 7.5 billion gallons in 2012.

U.S. ethanol production capacity has grown rapidly in recent years, and is expected to grow even faster in the next few years. This rapid growth has generated upward pressure on corn demand and corn prices (as well as production of co-products such as animal feed), while lowering wholesale ethanol prices.

## Brazil's Ethanol Industry and Market

Until 2004, Brazil was the largest producer of ethanol in the world. Since then, the United States has moved ahead of Brazil in annual production. Brazilian ethanol is produced almost exclusively from sugar cane. Brazilian ethanol plants tend to be integrated with sugar plantations and sugar mills. Depending on market forces, these plants have the capacity to shift some production from sugar to ethanol, or vice-versa.

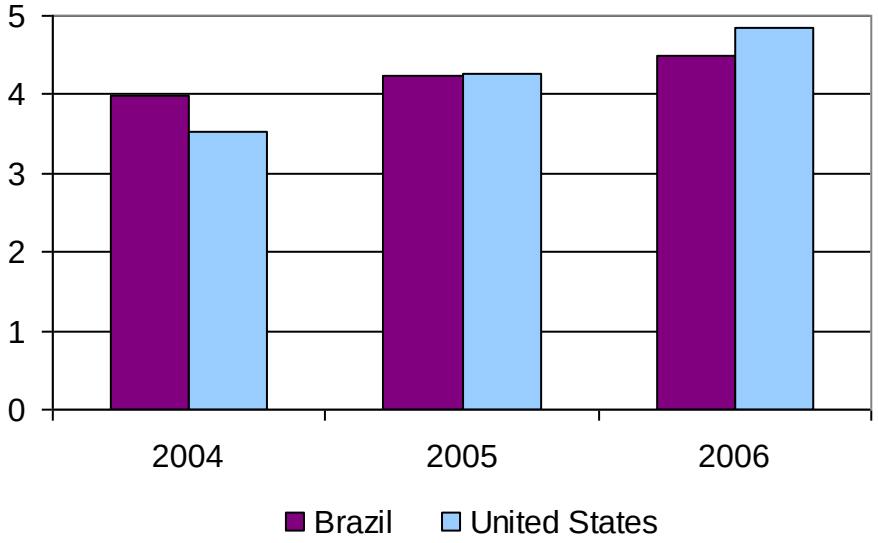
Brazilian government support for ethanol began in 1975 when a presidential decree established the Brazilian National Alcohol Program ("Proalcool"). Originally established mainly as a way to support the Brazilian sugar industry from a collapse in sugar prices, Proalcool set a production target of 3 billion liters (some 0.8 billion gallons) in 1980.[21] The second phase of the program, established in 1979 in response to the OPEC oil embargo, made Proalcool explicitly into an energy policy and further expanded the production goal to 10.7 billion liters (2.8 billion gallons) by 1985.[22] In 2006, Brazil produced roughly 16.5 billion liters (4.4 billion gallons).

[21] F. Joseph Demetrius, *Brazil's National Alcohol Program: Technology and Development in an Authoritarian Regime*, New York, 1990, p. 11.

[22] Demetrius, op. cit. p. 44.

**Figure 1. Annual Ethanol Production in Brazil and the United States**

(billion gallons)




**Source:** Renewable Fuels Association, *Industry Statistics.* Accessed September 14, 2007, at http://www.ethanolrfa.org/industry/statistics/.

To promote the goals of the Program, the Brazilian government has employed various policies through the years. These include requiring Petrobras, the state-owned oil company, to purchase a set amount of ethanol; tying the pump price of a liter of ethanol to a percentage of the price of gasoline (originally 59%, later increased to 80%); and requiring Brazilian automakers to produce dedicated ethanol vehicles that could run only on 100% ethanol.[23]

Currently, the Brazilian ethanol industry is thriving, and many of the requirements and policies from Proalcool have been eliminated. However, one key policy remains: all gasoline sold in Brazil must contain at least 20%-25% ethanol. Because of this mandate, as well as a large number of flexible fuel vehicles (FFVs) that can run on any blend of ethanol and gasoline, ethanol represents 40% or more of Brazilian gasoline demand.

[23] Demetrius, op. cit.; Jose R. Moreira and Jose Goldemberg, "The Alcohol Program," *Energy Policy*, April 1999, vol. 27, no. 4, pp. 229-245; Jose Goldemberg, "Brazilian Alcohol Program: An Overview," *Energy for Sustainable Development*, May 1994, vol. 1, no. 1, pp. 17-22.

**Brazilian Ethanol: A Timeline**

**1973-1974**—Arab oil embargo.

**1975**—Sugar prices plummet after a rapid expansion in production brought on by earlier historically high prices.

**November 1975**—Proalcool established by presidential decree. The program set a target of 3 billion liters (0.8 billion gallons) of ethanol by 1980, largely blended into gasohol. To promote the industry, the government required Petrobras, the state-owned oil company, to purchase ethanol at a guaranteed price and blend it into gasoline. Brazilian ethanol production less than 1 billion liters per year.

**1979**—Second oil shock; annual ethanol production at 3.7 billion liters (980 billion gallons).

**July 1979**—Phase 2 of the Proalcool program is established. The production goal was expanded to 10.7 billion liters (2.8 billion gallons) in 1985. To promote this goal, several new policies were established: (1) the installation of100% ethanol pumps (as opposed to gasohol) was mandated at fueling stations; (2) the price of a liter of ethanol was pegged at 59% of the per-liter price of gasoline; (3) the government provided low-interest loans to agribusinesses to produce ethanol; and (4) the government and the Brazilian auto industry reached an agreement whereby the auto industry would produce a majority of new cars and light trucks as dedicated ethanol vehicles.

**1980**—Neat (pure) ethanol sales permitted, sales of pure alcohol vehicles begins. Annual ethanol production at 5.5 billion liters (1.5 billion gallons).

**1985-1995**—Annual ethanol production at roughly 11 billion liters (3 billion gallons).

**1986**—Alcohol vehicle sales peak at roughly 90% of new light vehicle sales.

**1989-1990**—Rise in ethanol prices, decrease in petroleum prices, and elimination of some ethanol subsidies lead to a drop in ethanol supply. Alcohol vehicle sales drop substantially.

**1998**—Pure alcohol vehicle sales discontinued.

**1999**—Ethanol prices liberalized. Annual ethanol production at roughly 11 billion liters (3 billion gallons).

**2003**—Flexible fuel vehicle (FFV) sales begin.

**2006**—Annual ethanol production at 17 billion liters (4.5 billion gallons). FFV sales represent roughly 90% of new vehicle sales by end of year.

**Sources:** Michael Barzelay, *The Politicized Market Economy: Alcohol in Brazil's Energy Strategy*, Berkeley, 1986; Christoph Berg, *World Fuel Ethanol Analysis and Outlook, Kent*, UK, 2004; Christoph Berg, *World Ethanol Production 2001*, Kent, UK, 2001; F. Joseph Demetrius, *Brazil's National Alcohol Program: Technology and Development in an Authoritarian Regime*, New York, 1990; Renewable Fuels Association, http://www.ethanolrfa.org; Harry Rothman, Rod Greenshields, and Francisco Roillo Calle, *The Alcohol Economy*, London, 1983.

## The Role of Ethanol and Gasoline in the United States and Brazil

The United States consumed 5.4 billion gallons of ethanol in 2006, or roughly 4% of U.S. gasoline demand by volume. Nearly all of this fuel was consumed as gasohol at the 10% level or lower. A much smaller amount was consumed as E85 in FFVs. In contrast, Brazil's roughly 4 billion gallons of ethanol consumption in 2006 represented roughly half of Brazilian passenger vehicle fuel supply,[24] by volume. Because ethanol has a lower energy content than gasoline, in terms of energy, ethanol represents roughly 40% of Brazil's passenger vehicle fuel supply.

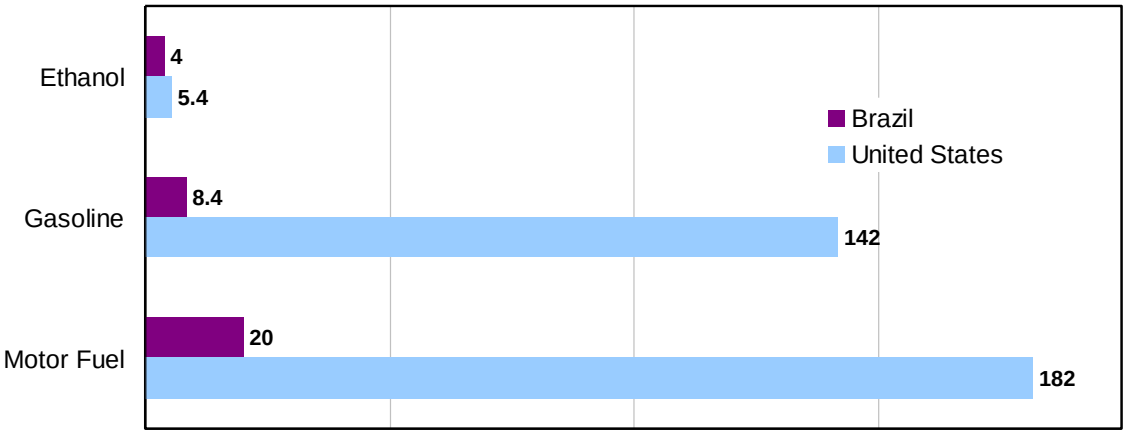
The Brazilian transportation sector is considerably smaller than the U.S. transportation sector, and diesel fuel plays a much larger role in motor vehicle fuel demand (including heavy trucks). While diesel fuel represents roughly a quarter of total U.S. highway fuel consumption,[25] in Brazil, diesel fuel consumption represents nearly two-thirds of all motor fuel. Therefore, while ethanol in Brazil displaces nearly half of all passenger vehicle fuel consumption, it represents a smaller percentage of total highway fuel consumption—perhaps 20% by volume and 14% in terms of energy.

[24] Passenger vehicle fuel in Brazil consists mostly of gasoline and ethanol.

[25] Stacy C. Davis and Susan W. Diegel, Oak Ridge National Laboratory, *Transportation Energy Data Book: 26th Edition*, Oak Ridge, TN, 2007.

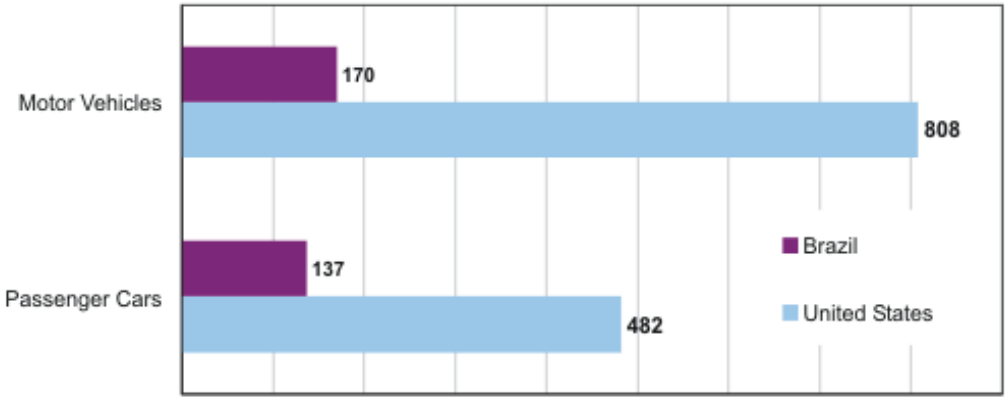
**Figure 2. Fuel Consumption in the United States and Brazil**

(billion gallons)



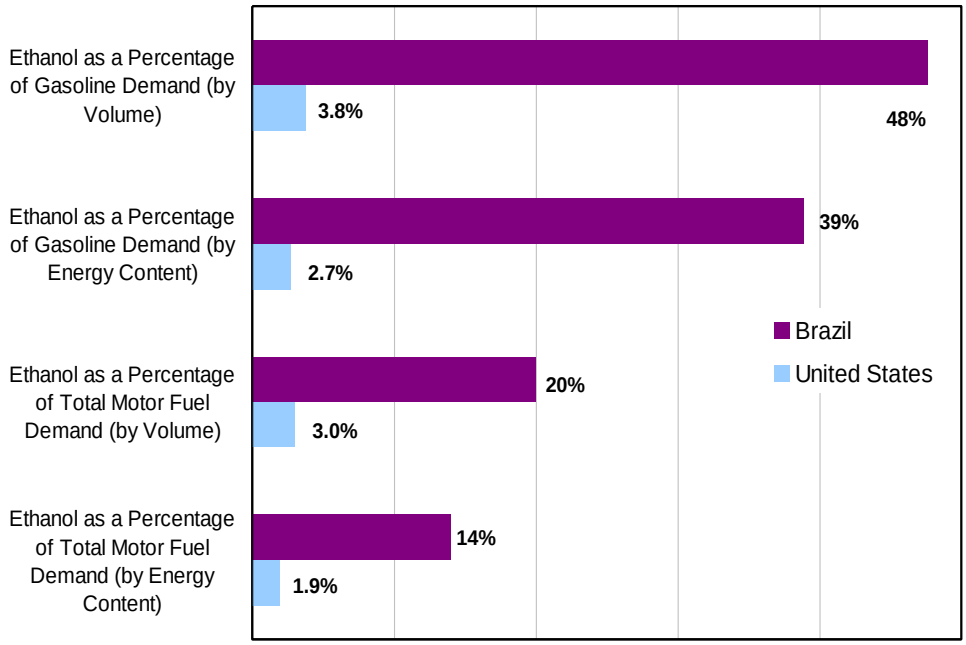

**Sources:** Energy Information Administration, *International Energy Annual 2004*, Washington, June 2006; Renewable Fuels Association, *Industry Statistics*, http://www.ethanolrfa.org/industry/statistics, accessed July 20, 2007.

**Figure 3. Vehicles Per 1,000 People in the United States and Brazil**




**Source:** The World Bank, *World Development Indicators 2006*, April 2006.

**Figure 4. Ethanol as a Share of Fuel Demand in the United States and Brazil**




**Sources:** Energy Information Administration, *International Energy Annual 2004*, Washington, June 2006; International Energy Agency, *World Energy Outlook 2006*, Paris, 2006.

## U.S. Ethanol Imports

Because of such high domestic demand, most Brazilian ethanol is produced for domestic consumption. However, U.S. imports of Brazilian ethanol have increased in recent years, especially in times of tight domestic supply. For example, in the spring of 2006, high U.S. ethanol demand, fueled by the phase-out of MTBE[26] (a competing gasoline blending component) led to a rapid rise in ethanol blending by gasoline suppliers that could not be met with domestically produced ethanol. As U.S. ethanol production capacity is growing rapidly—from roughly 5.5 billion gallons at the end of 2006, to roughly 6.2 billion gallons in July 2007, and an expected 11 to 12 billion gallons by the end of 2008[27]—whether it will remain profitable to import ethanol directly from Brazil is an open question.

Until recently, most Brazilian ethanol was imported into the United States through Caribbean Basin Initiative (CBI) countries in order to avoid import duties. (See section below on "Import Tariffs and Duties.") However, when U.S. ethanol prices are high relative to Brazilian production costs, it may be advantageous to import Brazilian ethanol directly, regardless of the tariff, as happened in the spring of 2006. **Figure 5** shows U.S. ethanol imports over the past eight years.

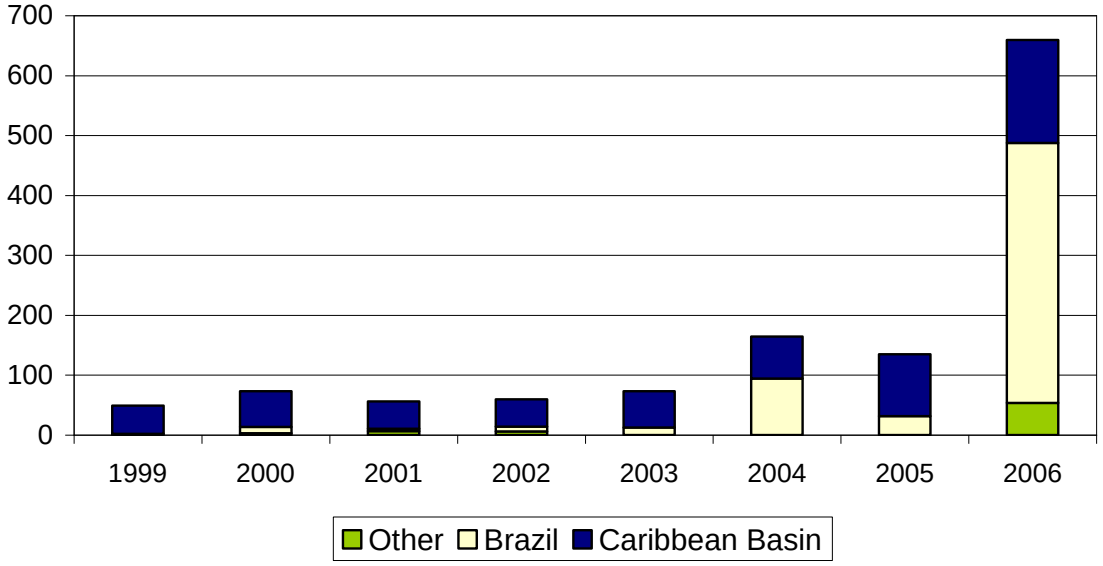
[26] Ethanol and MTBE have been used in the United States to extend gasoline stocks, increase the octane rating of gasoline, and to add oxygen to the fuel to meet clean air standards. For more information on MTBE, see CRS Report RL32787, *MTBE in Gasoline: Clean Air and Drinking Water Issues*, by James E. McCarthy and Mary Tiemann.

[27] Renewable Fuels Association, *Industry Statistics*, available at http://www.ethanolrfa.org/industry/statistics/, accessed: July 18, 2007.

Import data through the end of May 2007 suggest that 2007 imports will fall below 2006 levels but will remain high relative to previous years—perhaps 450 million gallons total.[28]

**Figure 5. Annual Ethanol Imports to the United States**

(million gallons per year)




**Sources:** U.S. International Trade Commission (USITC), *Interactive Tariff and Trade DataWeb*, at http://dataweb.usitc.gov, accessed March 9, 2006, and USITC, *U.S. Imports of Fuel Ethanol, by Source 1996-2006*, updated April 10, 2007.

# U.S.-Brazilian Memorandum of Understanding on Biofuels

On March 9, 2007, the United States and Brazil signed a Memorandum of Understanding (MOU) to promote greater cooperation on ethanol and biofuels in the Western hemisphere. The agreement involves (1) technology-sharing between the United States and Brazil, (2) conducting feasibility studies and providing technical assistance to build domestic biofuels industries in third countries, and (3) working multilaterally to advance the global development of biofuels. The first countries targeted for U.S.-Brazilian assistance are the Dominican Republic, El Salvador, Haiti, and St. Kitts and Nevis.[29]

Since March 2007, the United States and Brazil have moved forward on all three facets of the agreement.[30] Specific actions have included the following:

[28] USITC, *U.S. Imports of Fuel Ethanol, by Source, by Month: January 2007 through May 2007*.

[29] "Memorandum of Understanding Between the United States and Brazil to Advance Cooperation on Biofuels," U.S. Department of State, Office of the Spokesman, March 9, 2007, available at http://www.state.gov/r/pa/prs/ps/2007/mar/81607.htm; "Joint Statement on the Occasion of the Visit by President Luiz Inácio Lula da Silva to Camp David," White House Press Release, March 31, 2007, available at http://www.state.gov/p/wha/rls/prsrl/07/q1/82519.htm.

[30] "Advancing Cooperation on Biofuels: U.S.-Brazil Steering Group Meets August 20 in Brasilia," U.S. Department of State, Office of the Spokesman, August 22, 2007.

- **Bilateral:** Several high-level visits have taken place aimed at boosting bilateral cooperation on biofuels. A team of Brazilian scientists visited the U.S. Department of Energy and Department of Agriculture Laboratories in mid-September. A group of U.S. scientists are scheduled to visit Brazil in November. Officials from both countries are exploring bilateral professorial and graduate student exchanges.
- **Third-country efforts:** The U.S. and Brazilian governments are working with the Organization of American States (OAS), IDB, and the U.N. Foundation (UNF) to conduct feasibility studies in Haiti, the Dominican Republic, and El Salvador. The feasibility study on St. Kitts and Nevis has been completed. Officials from these four countries visited the United States in August to attend a biofuels conference.
- **Global efforts.** The United States and Brazil are working with other members of the International Biofuels Forum (IBF) to make biofuels standards and codes more uniform by the end of 2007. IBF members include Brazil, the United States, the European Union, China, India, and South Africa.

Some argue that the U.S.-Brazil agreement could provide the impetus needed to develop a viable biofuels industry in Latin America, a region with a comparative advantage in biofuels production. Other observers are less sure. They are concerned about the huge investment outlays that governments would have to make to ramp up biofuels production. The IDB estimates that at least $200 billion in new investments would have to be made for biofuels to provide even 5% of the region's transport energy by 2020.[31] Skeptics question whether countries that lack the type of enabling environment that Brazil possesses—infrastructure, research and extension services, technology, educated workforce, and credit market—should lend their support to biofuels before those items are in place.[32] On the domestic front, some analysts worry that increasing biofuels cooperation with Brazil and other countries in Latin America may prompt challenges to existing U.S. trade, energy, and agriculture policies.

# Policy Considerations

## Import Tariffs and Duties

Because of lower production costs and/or government incentives, ethanol prices in Brazil are generally significantly lower than in the United States. To offset the U.S. tax incentives that all ethanol (imported or domestic) receives, most imports are subject to a 2.5% ad valorem tariff, plus an added duty of $0.54 per gallon. This duty effectively negates the tax incentives for covered imports and has been a significant barrier to ethanol imports when U.S. domestic prices are low.

However, under certain conditions ethanol imports from Caribbean Basin Initiative (CBI) countries are granted tariff/duty-free status, even if the ethanol was actually produced in a non-CBI country. In this particular case, the CBI countries participate only in the final step of the

[31] IDB report, April 2007.

[32] Kojima and Johnson, 2006.

production process—dehydration, after which the ethanol is shipped to the United States.[33] Up to 7% of the U.S. ethanol market may be supplied duty-free by ethanol dehydrated in CBI countries.

As shown in **Figure 2**, until recently, most U.S. ethanol imports came through the CBI. Whereas previously most imported ethanol imported was produced in Europe and dehydrated in CBI, now most CBI ethanol is produced in Brazil. As part of the Dominican Republic-Central American Free Trade Agreement (CAFTA-DR), Costa Rica and El Salvador are granted specific allocations within the 7% quota.

Because CBI ethanol is actually produced in countries subject to the duties, some stakeholders view this treatment of ethanol from the CBI as a "loophole" to avoid these duties. Proponents of the CBI provisions argue that the dehydration of ethanol promotes economic development in CBI countries, even if those countries are not using local feedstocks.

In addition to the concerns over imports of duty-free ethanol from CBI countries, there is also growing concern that a large portion of ethanol otherwise subject to the duties is being imported duty-free through a "manufacturing drawback."[34] If a manufacturer imports an intermediate product then exports the finished product or a similar product, that manufacturer may be eligible for a refund (drawback) of up to 99% of the duties paid. There are special provisions for the production of petroleum derivatives.[35] In the case of fuel ethanol, the imported ethanol is used as a blending component in gasoline. Jet fuel (containing no ethanol, but considered a "like commodity" to the finished gasoline) is exported to qualify for the drawback in lieu of finished gasoline containing the originally imported ethanol.[36] Some critics estimate that as much as 75% or more of the duties were eligible for the drawback in 2006. Therefore, critics question the effectiveness of the ethanol duties and the CBI exemption.

Proponents of the domestic ethanol industry argue that foreign ethanol producers receive benefits and incentives from their home countries, and that U.S. duties on imported ethanol should be strengthened. Further, they argue, limiting imports and promoting the domestic industry furthers U.S. national security and lowers our dependence on energy imports. Opponents of the duties argue that elimination of the duties would allow us to further diversify our energy supply and move toward more environmentally sound transportation fuels. Further, they argue that importing ethanol from Brazil is preferable to importing petroleum from less stable parts of the world.

On December 20, 2006, President Bush signed the Tax Relief and Health Care Act of 2006 (P.L. 109-432). Among other provisions, the act extended the duty on imported ethanol through December 31, 2008.

## Energy Bill and Farm Bill Considerations

The U.S. Congress is currently considering new energy legislation, as well as a new Farm Bill. Both pieces of legislation could affect U.S. and foreign biofuels production.

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[33] Ethanol currently comes from four CBI countries: Costa Rica, Jamaica, El Salvador, and Trinidad and Tobago. CBI imports represent a significant percentage of U.S. fuel ethanol imports. For more information on ethanol imports from CBI countries, see CRS Report RS21930, *Ethanol Imports and the Caribbean Basin Initiative (CBI)*, by Brent D. Yacobucci.

[34] For more information on drawbacks, see U.S. Customs Service, *Drawback: A Refund for Certain Exports*, Washington, February 2002.

[35] 19 U.S.C. 1313(p).

[36] Peter Rhode, "Senate Finance May Take Up Drawback Loophole As Part Of Energy Bill," *EnergyWashington Week*, April 18, 2007.

### Energy Bill

The Senate-passed energy bill (H.R. 6) would expand and extend the existing Renewable Fuel Standard (RFS). The RFS currently mandates the use of 7.5 billion gallons of renewable fuel in gasoline by 2012. The Senate bill would increase the mandate to 13.2 billion gallons in 2012 and 36 billion gallons in 2022. Further, by 2022, the bill would mandate the use of 21 billion gallons of "advanced biofuels," defined as "fuel derived from renewable biomass other than corn starch." Such a mandate would mean a significant increase in the role of non-corn-based ethanol. If enacted, the new RFS could mean a significant increase in demand for Brazilian sugar-based ethanol, especially if costs remain high for cellulosic ethanol and other non-corn biofuels.

### Farm Bill

The previous farm bill, the Farm Security and Rural Investment Act of 2002 (P.L. 107-171), established an energy title (Title IX). Among other provisions, Title IX contained sections to promote the research and development of new biofuels, as well as to expand the production of existing biofuels. Those programs expired at the end of FY2006. The Administration's 2007 proposed farm bill energy title (IX) provides $1.6 billion in new funding for basic and applied research, as well as to share the risk associated with developing and commercializing a new technology through loan and loan guarantee programs. The primary focus of USDA's proposed new funding is the development of cellulosic ethanol production.

On July 27, 2007, the House approved its version of the Farm Bill, H.R. 2419. Among other provisions, the bill proposes a total of $3.2 billion in new funding for Title IX energy provisions over five years, including $1.4 billion for production incentive payments on new biofuels production. A key departure from current farm bill-related energy provisions is that most new funding is directed away from corn- starch-based ethanol production and towards cellulosic-based biofuels production or to new as-yet-undeveloped technologies with some agricultural linkage.[37]

## Food vs. Fuel Debate

Because most ethanol is produced from food crops (either corn or sugar), there is concern that increasing biofuels production could lead to higher food prices.[38] In the case of corn, most corn in the United States is used for animal feed. Higher feed costs ultimately lead to higher prices for poultry, hogs, and cattle. The price of corn is also related to the price of other competing foodstuffs, such as grains and soybeans. In 2006, the expansion of corn-based ethanol production led to a sharp rise in corn prices, which some predicted would lead to higher U.S. and world food prices. In fact, the futures contract for March 2007 corn on the Chicago Board of Trade rose from $2.50 per bushel in September 2006 to a record high of over $4.37 per bushel in February 2007. Some analysts predict that if high oil prices continue, increases in global biofuels production may push corn prices up by 20% by 2010 and 41% by 2020.[39] On the other hand, commodity prices are dependent on many other factors besides the demand for biofuels crops. Corn prices have fallen slightly in the past few months since growers began predicting record crop yields for 2007, while wheat prices have soared because of weather-related production problems in many countries.[40]

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[37] For more information, see CRS Report RL34130, *Renewable Energy Policy in the 2008 Farm Bill*, by Tom Capehart.

[38] This section was drawn from CRS Report RL33928, *Ethanol and Biofuels: Agriculture, Infrastructure, and Market Constraints Related to Expanded Production*, by Brent D. Yacobucci and Randy Schnepf.

[39] C. Ford Runge and Benjamin Senauer, "How Biofuels Could Starve the Poor," *Foreign Affairs*, May/June 2007.

[40] K.T. Arasu, "Wheat Eclipses Corn as Investors New Darling," *Reuters*, September 6, 2007.

Since most U.S. households do not spend a large percentage of their budgets on food, they may be able to absorb any increases in food prices that result from increasing biofuels production, at least in the short run. However, that is not likely to be the case for low-income households in the United States or for households in Latin America, the poorest of which often spend more than half of their household incomes on food. In January 2007, Mexico faced widespread strikes and social unrest as rising corn prices, fueled by the demand for corn-based ethanol, led to a 30% rise in the cost of corn tortillas, a basic dietary staple. Through Latin America, inflation rates have increased as a result of higher food prices, which have been attributed to increased demand for production of ethanol and other biofuels.[41]

Critics of biofuels argue that unless new technology is developed to produce biofuels from cellulosic materials, increasing biofuels production will lead to higher global food prices, which will in turn result in hunger and malnutrition in many developing countries. Ethanol proponents dispute those predictions. They maintain that the availability of arable land, especially in Latin America, will allow plenty of space for biofuels production without encroaching upon other crops. In Brazil, for example, less than 9% of the country's total planted area is dedicated to sugar. They further argue that the food-versus-fuel debate may be more applicable in the case of corn than in the case of sugar, as recent expansion in ethanol production from sugarcane has not significantly affected global sugar prices.[42]

## Environmental Concerns

While there are significant potential benefits from biofuels in terms of reduced petroleum consumption and reduced air pollution, there are also potential environmental drawbacks. These include the potential for increased greenhouse gas emissions, higher levels of surface water contamination, and increased pressure on land and water resources.

### Greenhouse Gas Emissions

One of the key environmental concerns over biofuels is their effect on overall greenhouse gas emissions. Depending on the production process, biofuels can either lead to a net increase or decrease in greenhouse gas emissions throughout the fuel cycle relative to petroleum fuels. Because ethanol contains carbon, combustion of the fuel necessarily results in emissions of carbon dioxide ($CO_2$), the primary greenhouse gas. Further, greenhouse gases are emitted through the production and use of nitrogen-based fertilizers used in corn production, as well from fuels used in the operation of farm equipment and vehicles to transport feedstocks and finished products. However, because photosynthesis (the process by which plants convert light into chemical energy) requires absorption of $CO_2$, the growth cycle of the feedstock crop can serve, to some extent, as a "sink" to absorb some fuel-cycle greenhouse emissions.

Recent studies on energy consumption and greenhouse gas emissions have concluded that corn-based ethanol results in 13% to 22% lower greenhouse gas emissions relative to gasoline.[43] Ethanol from other feedstocks can lead to even lower greenhouse gas emissions. For example, sugar requires far less fertilizer to produce than corn, and less processing is necessary to prepare

[41] "Guatemala: Economic: Inflation: Recent Developments," *Global Insight*, August 27. 2007.

[42] K.T. Arasu, "Ethanol Boom Won't Threaten Food Supply," *Reuters*, June 4, 2007.

[43] Alexander E. Farrell, Richard J. Plevin, Brian T. Turner, Andrew D. Jones, Michael O'Hare, and Daniel M. Kammen, "Ethanol Can Contribute to Energy and Environmental Goals," *Science*, January 27, 2006, pp. 506-508; U.S. Environmental Protection Agency (EPA), *Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuels Use*, April 2007.

the feedstock for fermentation. Net greenhouse gas emissions from sugarcane-based ethanol could be as much as 56% lower than gasoline, and cellulosic ethanol could reduce emissions by 90% relative to gasoline.[44]

Ethanol production processes themselves can also lead to air quality concerns. For example, without proper emissions controls, ethanol plants produce emissions of volatile organic compounds (hydrocarbons) that can lead to negative health effects and can contribute to ozone (smog) formation. Further, burning of sugarcane fields before manual clearing can increase fuel cycle pollutant and greenhouse gas emissions. Mechanized harvesting without burning can improve the emissions profile of sugarcane ethanol, but greater mechanization would likely come at the cost of fewer jobs for cane cutters.

Because of the favorable emissions profile of ethanol from non-corn feedstocks, there is growing interest in moving U.S. biofuels consumption away from corn ethanol to either imported sugarcane ethanol or domestically produced cellulosic ethanol.

## Water Contamination

Another key environmental concern surrounding ethanol is its effects on water quality. In the United States, corn requires a significant amount of chemical inputs. Runoff from fertilizers and pesticides finds its way into streams and other surface waters, potentially leading to algae blooms and other problems.

In Brazil, a key problem has been the discharge of nutrient-rich waste from ethanol production—"vinasse"—directly into streams or indirectly through soil contamination. Although legislation has been introduced to address this problem, lax enforcement of environmental standards in Brazil mean that pollution from ethanol production will likely continue to be a problem.[45]

## Water Consumption

In addition to concerns over water quality, water consumption may also become an environmental concern, especially in the United States. Currently, Brazilian sugar and U.S. corn production do not require large amounts of water inputs. However, as feedstock production, especially U.S. corn, expands into drier areas, more water may be needed, putting additional pressure on already stretched water resources.

## Land Use/Soil Quality

Concerns have also been raised about the effects of agricultural production for biofuels on land resources. For example, in the United States, corn has generally been rotated with soybeans to promote soil quality. However, as corn production for ethanol expands, much of the land that had been in rotation is shifting away from soybean production. This could lead lower concentrations of soil nutrients, increasing the need for fertilizers and other chemical inputs. And while cellulosic biofuels in general appear more sustainable, some concerns have also been raised about their sustainability, especially if environmentally sensitive areas (e.g., Conservation Reserve Program land) are used for bioenergy production.

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[44] EPA. Op. cit.

[45] Jose Moreira. "Water Use and Impacts Due Ethanol Production in Brazil," *International Water Management Institute and Food and Agricultural Organization Conference: Linkages between Energy and Water Management for Agriculture in Developing Countries*, Hyderabad, India, January 29-30, 2007.

In Brazil, concerns focus on protection of habitats in the cerrado (Brazilian savanna) and the Amazon rain forest. Expansion of sugarcane planting has led to rapid depletion of wooded areas of the cerrado. Further, as ethanol expands into existing pastureland, cattle-breeding has been displaced into the cerrado and the Amazon.[46] Increased demand for soybeans (both for food and as a feedstock for biodiesel) has added pressure to expand soybean production into the Amazon.

## Labor Issues

Some analysts see expanding the region's biofuels industry as a way to create jobs and promote rural development in Latin America. In most countries in the region, biofuels production is a labor-intensive process that creates jobs in agriculture, manufacturing, and transport. UNICA, the São Paulo Sugarcane Association, estimates that roughly 1 million direct jobs and 3 million indirect jobs have been created in Brazil as a result of the country's biofuels industry. Another study asserts that some 2,333 jobs are created in Brazil for every 1 million tons of sugarcane harvested. Most of those jobs are as sugarcane cutters. Ethanol proponents estimate that some 14,000 jobs could be created in Central America through increased production of E10 (10% ethanol) fuel. Similar forecasts have been made for other countries and subregions in Latin America and the Caribbean.[47]

Analysts agree that biofuels production generates jobs, but some question the number and quality of those jobs.[48] Skeptics argue that because biofuels production often displaces other existing agricultural activities, net job gains may be minimal. They also assert that unless governments make a concerted effort to ensure that small-scale producers have a role to play in biofuels production, large agribusinesses will continue to dominate the biofuels industry in Latin America. Finally, most analysts acknowledge that as biofuels production becomes increasingly mechanized, a development that brings efficiency and environmental benefits, less agricultural jobs are going to be generated. As was stated above, there is likely to be a tradeoff between increased employment and more environmentally benign practices.

Skeptics of using biofuels to promote rural development also question the quality of most jobs created by the biofuels industry, particularly in countries producing ethanol from sugarcane, where jobs are often low-paying, hazardous work as seasonal cane cutters. The Brazilian government has acknowledged that there have been instances of forced labor on some sugarcane properties in Brazil, particularly in the northeast region of the country.[49]

## Biofuels and Geo-politics in Latin America

The U.S.-Brazil MOU on biofuels, the agreement is also intended to have a political effect in the region. Many Bush Administration officials and Members of Congress note that the new biofuels partnership with Brazil may help improve the U.S. image in Latin America and diminish the influence of President Chávez in the region. The United States has increasingly regarded Brazil as

[46] Isaias de Carvalho Macedo, editor, *Sugar Cane's Energy*, Sao Paulo, September 2005, pp. 133.

[47] Presentation by Alfred Szwarc, Senior Advisor to the São Paulo Sugarcane Association (UNICA), at the Corporación Andina de Fomento Conference on Trade and Investment in the Americas, September 5, 2007; "Issue Paper on Biofuels Development in Latin America and the Caribbean," prepared for the IDB, 2006; Luiz Augusto Horta Noguierz, "Perspectivas Para las Biocombustibles en América Central," Incentivos a las Renovables y Biocombustibles, Alianza en Energía y Ambiente para Centroamérica, El Salvador, February 2006.

[48] For a discussion of these problems, see Worldwatch Institute, June 2006, and Kojima and Johnson, World Bank, February 2006.

[49] "Brazil Labor Minister Calls Sugarcane Labor 'Degrading,'" *Dow Jones Commodity Service*, June 11, 2007.

a significant power, especially in its role as a stabilizing force and skillful interlocutor in Latin America. U.S. officials tend to describe Brazil as an amicable partner governed by a moderate leftist government and have responded positively to Brazil's efforts to reassert its regional leadership, which has recently been challenged by the rise of oil-rich Hugo Chávez in Venezuela.[50]

In recent months, Brazil has increasingly used so-called "biofuels diplomacy" as a diplomatic and economic tool to raise its profile in Latin America and throughout the world. President Chávez, recognizing that increasing biofuels production and usage in Latin America could diminish his regional influence, quickly attacked the Brazil-U.S. biofuels agreement, stating that it would raise food prices and hurt the poor. In early April 2007, despite Chávez's criticisms of ethanol, one of his allies, President Correa of Ecuador, signed a biofuels production agreement with Brazil. Some Members of the Morales government in Bolivia are also supportive of biofuels production. In mid-April 2007, Chávez was forced to backtrack on his initial opposition to all biofuels production in the region while attending South America's first regional energy summit. Competition between Brazil and Venezuela for leadership in the region has accelerated in the past few months. In August 2007, as President Lula took a six-day tour of Mexico, Central America and the Caribbean to promote biofuels production agreements, President Chávez visited Argentina, Bolivia, Ecuador and Uruguay, where he signed a series of oil and gas agreements.[51]

# Congressional Action

In the past two years, there has been significant congressional interest in issues related to energy security. Some of that interest has focused on how to ensure that countries in the Western Hemisphere, which currently supply about half of U.S. imports of crude oil and petroleum products, remain reliable sources of energy for the United States. Another area of interest has been to promote cooperation among Latin American countries, which are divided between net energy exporting and importing nations, to ensure that enough clean, affordable, and reliable energy sources are exploited to support regional growth and development. Members have cited Brazil as an example of a country that has successfully reduced its reliance on foreign oil by using alternative energies. In addition to the importance of following Brazil's example in the field of biofuels development, some Members have cited the importance of U.S. engagement in regional efforts to develop biofuels and other renewable energies.

On September 19, 2007, the House Western Hemisphere Subcommittee held a hearing on "U.S.-Brazil Relations" during which Chairmen Eliot Engel and many of the witnesses cited biofuels cooperation as a primary example of the expanding strategic relationship between the United States and Brazil. They discussed how the U.S.-Brazil MOU on biofuels may encourage both countries to work together to advance their national, regional, and international interests. Despite this potential for increasing U.S.-Brazil collaboration on biofuels, one witness warned that this unique opportunity may be lost if the countries are unable to resolve the underlying agricultural disputes that divide them, such as current U.S. subsidies and tariffs that protect corn-based ethanol producers.[52]

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[50] Monte Reel, "U.S. Seeks Partnership with Brazil on Ethanol; Countering Oil-rich Venezuela is Part of Aim," *Washington Post*, February 8, 2007.

[51] "Brazil Gets Tough on Energy," *Latin American Regional Report*, April 2007; "Venezuela, Brazil at Odds Over Ethanol as Chávez Hosts South American Energy Summit," *AP*, April 16, 2007; Marifeli Perez-Stable, "Marching to Different Drummers; Lula, Chavez," *Miami Herald*, August 17, 2007.

[52] Testimony of Paulo Sotero, Director of the Brazil Institute of the Woodrow Wilson International Center for Scholars, before the House Western Hemisphere Subcommittee, September 19, 2007.

## Legislation

In the 109th Congress, Members were somewhat divided over whether to keep the current 2.5% ad valorem tariff and added duty of $0.54 per gallon on foreign ethanol imports in place. Legislation was introduced that would have eliminated the two duties on foreign ethanol: H.R. 5170 (Shadegg) and S. 2760 (Feinstein), the Ethanol Tax Relief Act of 2006. However, in December 2006, Congress voted to extend the duties on foreign ethanol through December 31, 2008 (P.L. 109-432). In the 110th Congress, S. 1106 (Thune) would extend those tariffs through 2011, and H.R. 196 (Pomeroy) would make the tariffs permanent.

Several legislative initiatives in the 110th Congress would increase hemispheric cooperation on energy issues, including biofuels development and distribution. S. 193 (Lugar), the Energy Diplomacy and Security Act of 2007, calls for the establishment of a regional-based ministerial forum known as the Hemisphere Energy Cooperation Forum that would, among its many activities, be involved in developing an Energy Sustainability Initiative to promote the development, distribution, and commercialization of renewable fuels in the region. The bill also calls for the establishment of a Hemisphere Energy Industry Group to increase public-private partnerships, foster private investment, and enable countries to devise energy agendas on various topics, including the development and deployment of biofuels. The Senate Foreign Relations Committee reported favorably on the bill on April 12, 2007, without amendment (S.Rept. 110-54).

Another initiative, S. 1007 (Lugar), the United States-Brazil Energy Cooperation Pact of 2007, calls for the same cooperation groups as S. 193, and directs the Secretary of State to work with Brazil and other Western Hemisphere countries to develop partnerships to accelerate the development of biofuels production, research, and infrastructure. The bill was introduced on March 28, 2007, and referred to the Senate Foreign Relations Committee.

H.Res. 651 (Engel), introduced on September 19, 2007, recognizes the warm friendship and expanding relationship that exists between the United States and Brazil, commends Brazil for reducing its dependency on oil by using alternative energies, and recognizes the importance of the March 9, 2007, United States-Brazil Memorandum of Understanding (MOU) on biofuels cooperation.

# Outlook

Rising demand for ethanol and other biofuels has sharpened attention on whether the United States and Brazil, the leaders in biofuels production, should increase cooperation, share technology, and work to expand the global biofuels market. Of the three pillars of the U.S.-Brazil MOU on biofuels, progress on the first (technology-sharing) and third (working multilaterally to advance biofuels) pillars are likely to occur most quickly. In the short to medium term, collaborative research and development activities may yield the largest potential benefit for both countries, particularly if they are able to hasten the development of cellulosic ethanol technology. Producing ethanol from dedicated energy crops and waste products may allay many of the environmental and food-versus-fuel concerns that are drawbacks of producing ethanol from food crops like sugar or corn. Both countries also stand to benefit from working together on the global front to establish consistent ethanol standards and codes, a crucial step in the process for ethanol to become a globally traded energy commodity.

While some analysts believe the U.S.-Brazil agreement may be enough to spur viable biofuels markets in “third countries” (pillar two), those efforts may not be feasible. First, governments may lack the resources or political will to make the huge investment outlays necessary to develop

their biofuels industries. Second, many countries lack the arable land necessary to develop biofuels without encroaching on traditional agricultural lands. A third concern with increasing sugar-based biofuels production is that the sugar industries of many countries in the Caribbean (including the Dominican Republic) are struggling because of high labor costs and efficiency problems. Fourth, as previously mentioned, there are serious labor and environmental concerns about rapidly increasing biofuels production.

In the next few months, results from U.S.-Brazil feasibility studies for Haiti, the Dominican Republic, and El Salvador are expected to be completed. The St. Kitts study has already determined that although producing biofuels for transport would not be feasible there, bio-electricity could be generated for domestic use. The results of the other feasibility studies and the willingness of the governments of each of those countries to embrace biofuels development are likely to affect the selection of a second round of countries to receive U.S.-Brazil technical assistance. While U.S. officials are eager to expand third-country initiatives into South America, Brazilian officials have reportedly been reluctant to give the United States a foothold into its sphere of influence.

While some Members of Congress have been supportive of energy cooperation efforts like the U.S.-Brazil MOU, others might not support any initiatives that they feel will adversely affect U.S. corn-based ethanol producers. Indeed, the U.S.-Brazil MOU does not address two key issues that many Brazilians feel are significant obstacles to expanding bilateral and regional biofuels cooperation, namely the current subsidies and tariffs that protect U.S. corn-based ethanol producers. Since many Members strongly favor extending the current subsidy programs for corn producers and tariffs on foreign ethanol, these issues may be obstacles to maintaining expanded U.S.-Brazil biofuels cooperation. In addition, Members who feel that Brazil's positions on agricultural trade during the failed Free Trade Area of the Americas (FTAA) and in the World Trade Organization (WTO) negotiations have adversely affected U.S. interests may also be opposed to the MOU on biofuels. On the other hand, some may see energy cooperation as an issue on which a positive U.S.-Brazil agenda can be based, presenting a unique opportunity to overcome past trade disputes.

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