

## Ethanol Boom in the U.S.: an Export Opportunity for the Caribbean and Central American Countries?

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The United States (U.S.) is the world largest consumer of petroleum, utilizing over 3.2 billion liters (840 million gallons) of petroleum products each day. Almost half of it is gasoline used in over 200 million motor vehicles<sup>2</sup>. Although the U.S. is an oil producer, imports represent 64 percent of oil consumption. The country has engaged in a quest to substitute part of its oil dependency by renewable fuels and many governmental policies have been enacted to boost domestic ethanol production and consumption. The current mandatory consumption targets will be easily surpassed by the projected installed production capacity. However, ethanol production in this country is based on a single commodity – corn – and the impacts on the commodity's price and stocks have been intense and worrisome.

The current ethanol tariff protects the U.S. market from most of the potential exporters, such as Brazil. However, under the Caribbean Basin Initiative (CBI) many Caribbean and Central American countries have free access to the U.S. market. Several of them are significant sugar and sugar cane producers. Considering that sugar cane ethanol is cheaper to produce than corn ethanol, it is possible to assume that an ethanol production in those countries would be more competitive than in the U.S. This could open a window of opportunity for ethanol exports in the medium run.

The objective of this article is to analyze the U.S. need for ethanol imports and the export potential of Caribbean and Central American countries to the U.S. market. Basically, such export potential depends on 3 factors: (a) the U.S. level of production and consumption and, therefore, its import needs; (b) the trade pref-

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<sup>2</sup> Energy Information Agency (EIA), "Where Does my Gasoline Come From," Energy Information Administration Brochures, DOE/EIA X059, May 2006. Available at <http://www.eia.doe.gov/-neic/brochure/gas06/gasoline.htm>. Accessed on April 5th, 2007.

erential treatment under the CBI and (c) the production and consumption level of those countries and, therefore, their export potential. This article aims at analyzing those three variables.

### U.S. Ethanol Production and Demand<sup>3</sup>

The U.S. ethanol demand has been driven by strong public policies. In 1995 the U.S. government established the federal Reformulated Gasoline program (RFG) which required a certain level of oxygen in the content of the gasoline sold in specified areas as a means of combating air pollution. The main additive used for that purpose was Methyl tert-butyl ether (MTBE). However, MTBE was found to cause serious contamination of ground water, and beginning in 2003 more and more U.S. jurisdictions instituted bans on its use. Ethanol was the chosen substitute, it boosted its consumption.

Later, in August 2005, President Bush signed the Energy Policy Act. The legislation established targets for renewable fuels consumption under the Renewable Fuels Standard (RFS). Their levels were set at 15.1 billion liters in 2006, increasing gradually to 28.4 billion liters by 2012; it represents around 5 percent (in volume) of gasoline consumption projected for that year. According to the political public discourse, the U.S. might go beyond this objective. In his 2007 State of the Union Address, President Bush called for a mandatory fuel standard that will require 132.5 billion liters of renewable and alternative fuels by 2017, nearly five times the 2012 target now in force. It would displace 15 percent<sup>4</sup> of the projected annual conventional gasoline use.

The growth rate of ethanol fuel production and consumption has been extremely elevated in the past years. Between 2002 and 2006, production increased by an annual average of 23 percent. The U.S. produced 18.5 billion liters in 2006, which makes the country the world's largest producer. Consumption has grown by 27 percent per year in the same period. As a result, ethanol blend (in volume) in gasoline rose from 1.5 percent in 2002 to 3.8 percent in 2006, representing a consumption of 20.4 billion liters<sup>5</sup>.

The projected installed capacity—considering only current projects—is expected to be 45.2 billion liters in 2009<sup>6</sup>. If we assume an average idle capacity of 10

3 This and the following section are based on: JANK, KUTAS, AMARAL and NASSAR, *US and EU Policies on Biofuels: Potential Impacts on Developing Countries*, German Marshal Fund, forthcoming.

4 In energy equivalent. In volume it would represent around 24 percent of its light vehicles transportation fuel needs (assuming that the target would be met using only ethanol).

5 Renewable Fuels Association (RFA), *Industry statistics*. Available at: <http://www.ethanolrfa.org/-industry/statistics>, accessed on April 4, 2007.

6 We assume a residual increase on capacity that follows gasoline predicted growth (1.5 percent per year) and we consider new plants are 5 percent more productive than old ones.

percent<sup>7</sup>, the U.S. would be able to produce 41.7 billion liters in 2012 (47 percent more than the RFS targets), requiring 107 million tons of corn. This represents 7.4 percent of gasoline demand. Some specialists believe that national production could reach up to 53 billion liters<sup>8</sup>, representing a 9.4 percent blend. However, an extra 2 percent substitution (going from 7.4 to 9.4 percent) would require an additional 5 million hectares and 44 million tons of corn. As a result and considering the U.S. current situation, it is possible to assume that there will not be any sharp increase in domestic production unless a new mandatory objective is set.

Finally, it is important to point out that in the medium term; the upper level of ethanol consumption in the U.S. is expected to be 10 percent (in volume) of the gasoline consumption. It would represent 56.6 billion liters of ethanol in 2012. According to the automobile industry, greater use would require some technical adaptations in the American fleet to allow for such a blend.

### U.S. Border Protection and Potential Imports

In the U.S., the MFN<sup>9</sup> customs duty on ethanol is 2.5 percent. In addition, there is a 0.14 US\$/liter<sup>10</sup> secondary tariff applying to imports (representing an ad valorem equivalent of 46 percent). Such tariff is prohibitive in most cases, but with the MTBE ban ethanol consumption and prices were boosted in 2006 and opened a window of opportunity for developing countries (mainly Brazil) that were ready to supply ethanol to the U.S. market. However, as new plants started operating, production increased and prices dropped to previous levels. Brazilian exports became less competitive. As a result, Brazilian sales to the U.S. are expected to be much lower in 2007 than in 2006.

There are some countries that benefit, or will benefit, from a preferential access to the U.S. market, many of them in Latin America. Mexico and Colombia, two potential ethanol producers, will have duty free access as a result of the free trade agreements they have negotiated with the U.S. However, those countries are implementing biofuel programs and the majority of their ethanol production will be probably absorbed by their expressive internal markets.

Other Latin American and Caribbean countries (countries benefiting from CBI) enjoy also a preferential access to the U.S. market. If produced from at least 50 percent of local feedstock (e.g., ethanol produced from sugarcane grown in the CBI beneficiary countries), ethanol may be exported duty-free to the U.S. If the local feedstock

7 We assume a residual increase on capacity that follows gasoline predicted growth (1.5 percent per year) and we consider new plants are 5 percent more productive than old ones.

8 BABCOCK, *Projections of U.S. Ethanol Production and Associated Impacts on U.S. and World Agriculture*, presentation made at the Woodrow Wilson Center seminar: Global Dynamics of Biofuels, Washington, February 22nd, 2007.

9 Most favoured nation.

10 54 cents per gallon.

content is lower, limitations apply on the quantity of duty-free ethanol. Nevertheless, up to 7 percent of the U.S. market may be supplied duty-free by CBI ethanol containing no local feedstock. In this case, hydrous (“wet”) ethanol produced in other countries – historically, Brazil or European countries – can be shipped to a dehydration plant in a CBI country for reprocessing. After the ethanol is dehydrated, it is imported duty-free into the U.S. In 2005, imports of dehydrated ethanol under CBI were far below the 7 percent cap (approximately 3 percent)<sup>11</sup>.

As a consequence, future U.S. imports will probably be determined by the export potential of countries benefiting from duty free access to the U.S. market.

## CBI Countries Export Potential

### Data and assumptions

The ethanol export potential, in the medium run (2012), of some selected CBI countries will be assessed in this section. The only raw material considered for ethanol production in the region will be sugar cane. The top CBI cane producers chosen for the analysis were: Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica and Nicaragua. Focus is on raw material production capacity, the potential implementation costs of new ethanol plants are not considered. The analysis is centered on the ethanol export capacity based only on internal production, which has limitless duty free access to the U.S. Exports under the quota for ethanol that is only dehydrated in CBI countries are not considered.

The calculations made in this section are based on a study made by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC)<sup>12</sup>. The input data is updated and different assumptions are made. The dependent variable in this case will be those countries' ethanol export potential, in the cited study it was the cane harvest area.

Two scenarios were made to meet this objective. Both of them are optimistic and try to identify an amount that would more or less represent their maximum export capacity. The potential sugar cane production is calculated taking the largest sugar cane harvested area in each country in the period between 1990 and 2005. Scenario A takes also in consideration each country's highest yield (Table 1). The majority of the countries have very good productivity, except the Dominican Republic and Jamaica that could notably increase their yields. Therefore, Scenario B considers an average yield of 75 tons per hectare for those two countries and maintains the values for the other ones.

11 YACOBUCCI, *Ethanol Imports and the Caribbean Basin Initiative*, CRS Report for the Congress, RS 21930, March 10, 2006.

12 HORTA NOGUEIRA, *Aspectos complementarios para la definición de un programa de bioetanol en América central*, UN Economic Commission for Latin America and the Caribbean (ECLAC), May 28th 2004.

Table 1: Sugar Cane production

<i>Period unit</i>	<b>Current Cane Production</b>	<b>Highest Cane Area between</b>	<b>Highest Cane Yield</b>
	<i>Average 2004-2005</i> 1000 tons	<i>1990 – 2005</i> 1000 há	<i>1990 – 2005</i> ton/há
Costa Rica	370.1	49.2	89.2
Dominican Republic	5198.9	234.0	57.1
El Salvador	4662.8	77.2	92.6
Guatemala	18250.0	192.0	114.9
Honduras	5545.7	75.9	85.9
Jamaica	2000.0	45.0	66.5
Nicaragua	3921.8	55.7	93.7
TOTAL	43289.3	728.9	-

Source: FAO-STAT

The scenarios assume that there will be no impact on sugar production, a very important product for many of those countries. We presume that the current cane production would be entirely dedicated to sugar. Also, 75 percent of the molasses available today (miel agotada) would be used for ethanol production (each ton of molasses produces around 6 liters of ethanol). Such percentage considers that there are other uses for such product, once again, isolating the impacts on other sectors.

Table 2: Assumptions

Molasses use for ethanol	75%
Ethanol productivity using molasses	6 l/ton
Ethanol productivity using juice	75 l/ton

Finally, many countries in Central America and the Caribbean are engaging in biofuel programs or are planning to do so. As a consequence, Scenario A assumes a 10 percent mandatory blend in volume in all the gasoline consumption projected for the year 2012<sup>13</sup>, while Scenario B assumes only 5 percent.

## Results

Table 1 shows that Guatemala is currently the main sugar cane producer in the group, meaning that it is one of the countries with the highest ethanol production and export potential. However it is interesting to point out the case of the Dominican Republic. Even though the country is currently only the third cane producer in the region, in the past it had the largest area dedicated to sugar cane (234 thousand

<sup>13</sup> A 1.5 percent annual average growth is assumed.

hectares). On the other hand its higher yield in the period was only 57 tons per hectare, the lowest value among the selected countries. Any increase on this country's area or yield could represent a major increase on ethanol production in the region. The results of both scenarios show that the country could become the top producer and exporter of sugar cane and ethanol.

It is also interesting to note the effect that national programs can have on the countries export potential. Costa Rica, for example, would be a net ethanol importer with the adoption of a 10 percent nationwide mandatory blend (Scenario 1) and an exporter if such value is fixed at 5 percent. However, national ethanol industry could hardly be developed in absence of a mandatory blend in the domestic market.

Finally, it is possible to conclude that the export potential of CBI countries is limited. Even in the very optimistic scenarios that have been presented, they would not be able to export more than 1.6 billion liters, representing only 0.3 percent of the projected U.S. gasoline consumption in 2012. It does not mean, however, that there would not be positive impacts on those countries' productions and economies (the Dominican Republic is the main example).

The following tables summarize the results for Scenarios A and B.

SCENARIO A					
<i>Mandatory blend of 10% and the country's highest yield</i>					
	Ethanol production from molasses <i>million liters</i>	Ethanol Consumption <i>million liters</i>	Sugar Cane Production <i>1000 tons</i>	Ethanol production from juices <i>million liters</i>	Potential Export Capacity <i>million liters</i>
Costa Rica	16.7	82.2	4387.2	50.8	-14.8
Dominican Republic	23.4	141.7	13357.6	611.9	493.6
El Salvador	21.0	58.8	7145.8	186.2	148.4
Guatemala	82.1	111.7	22051.3	285.1	255.5
Honduras	25.0	45.2	6516.0	72.8	52.5
Jamaica	9.0	69.1	2993.6	74.5	14.5
Nicaragua	17.6	23.5	5213.9	96.9	91.0
<b>TOTAL</b>	<b>194.8</b>	<b>532.3</b>	<b>-</b>	<b>1378.2</b>	<b>1040.7</b>

SCENARIO B					
<i>Mandatory blend of 5% and the country's highest yield or 75 tons/ha</i>					
	Ethanol production from molasses <i>million liters</i>	Ethanol Consumption <i>million liters</i>	Sugar Cane Production <i>1000 tons</i>	Ethanol production from juices <i>million liters</i>	Potential Export Capacity <i>million liters</i>
Costa Rica	16.7	41.1	4387.2	50.8	26.4
Dominican Republic	23.4	70.8	17550.8	926.4	879.0
El Salvador	21.0	29.4	7145.8	186.2	177.8
Guatemala	82.1	55.9	22051.3	285.1	311.4
Honduras	25.0	22.6	6516.0	72.8	75.1
Jamaica	9.0	34.5	3375.0	103.1	77.6
Nicaragua	17.6	11.8	5213.9	96.9	102.8
<b>TOTAL</b>	<b>194.8</b>	<b>266.2</b>	<b>-</b>	<b>1721.3</b>	<b>1649.9</b>

## Conclusions

The U.S. has engaged in a quest to substitute part of its oil dependency by renewable fuels. The production and consumption levels in the country have gone incredibly up, so has the pressure on corn prices and stocks, affecting many corn dependent markets. The projected installed capacity in the country is more than sufficient to meet its current consumption targets for 2012. For all those reasons, unless a new and more ambitious target is adopted, it is possible to assume that no additional or very low investments in the ethanol industry will be made.

Given the high tariff protection currently in force on ethanol, the candidates to complement the U.S. market are the countries with duty free access. CBI countries are among those. However, their export capacity is limited and imports from those countries could only represent 0.3 percent of the projected U.S. gasoline consumption in 2012. Other countries with great potential to produce ethanol such as Mexico and Colombia will also benefit from an unlimited access to the U.S. market, however, they are implementing biofuel programs and the majority of their ethanol production will probably be absorbed by their significant internal markets. A deeper analysis for those two countries is needed. However, it is possible to conclude that if the U.S. wants to advance further on its quest for oil substitution, it will need to import from other potential exporters which have no duty free access to its market. Brazil is the first in line. ■