



Commodities and Products

Biofuels Coming Online: International Biofuel Use Expands

By Phil Jarrell and Mary Rekas

One day, the oil used in preparing last night's dinner might just be recycled to make biodiesel to run the family automobile. Once considered too expensive to compete with petroleum products, biofuels are becoming economically viable as petroleum prices surge and technological advances decrease biofuel costs.

The biofuel industry promises not only to reduce U.S. dependence on imported crude oil, but to create more demand for U.S. commodities used to make bio-products. U.S. commodity producers are already selling surpluses for biofuels as the industry grows.

In the United States, biofuel feedstocks range from grease wastes, animal fats, and soybeans for biodiesel to corn and sorghum for ethanol. Not far in the future, dedicated crops may begin to supply the biofuel industry. However, the development of biofuels is by no means limited to the United States. A number of other countries are investing heavily in their biofuel industries.

World Biofuel Snapshots

In the United States, ethanol is the primary biofuel in use. U.S. ethanol production now makes up about 3 percent of U.S. annual gasoline usage. In calendar 2005, the United States consumed

Global Drivers of Biofuels

- Energy security
- Enhanced rural development
- Environmental benefits

139.9 billion gallons of gasoline and 4.04 billion gallons of ethanol. By comparison, biodiesel consumption made up about 75 million gallons, out of 38.3 billion gallons of the diesel consumed for transportation.

To further encourage U.S. biofuel consumption, the Energy Policy Act of 2005 for the first time established a federal mandate — called the Renewable Fuel Standard—to require a certain amount of biofuel consumption. Under the Act, Congress mandated a 4-billion gallon total for national biofuel consumption in 2006, with an increase to 7.5 billion gallons by 2012.

While the U.S. biofuel industry has been growing considerably, biofuels in other countries have been quite active as well. Similar to the United States, the EU (European Union) has established a biofuel mandate for member states, from a voluntary target of 2 percent of fuel consumption in 2005, up to 5.75 percent in 2010. While actual use for 2005 was below the target, biofuel use is still growing considerably in the EU.

In part reflecting the large use of diesel fuel, biodiesel has been the biofuel of choice in the EU, comprising 80 percent of EU biofuel use. Biodiesel production has significantly increased the consumption of rapeseed within the EU. Although biodiesel currently dominates in the EU, the increased

Biofuel Inputs by Product



- **Biodiesel:** animal tallow, vegetable oils (soy, corn, canola, sunflower, palm, cottonseed), recycled greases
- **Ethanol:** starches (corn, other grains, potatoes), sugars (sugar cane, sugar beets), biomass

World Consumption of Crude

In 2003, transportation worldwide burned up almost 500 billion gallons of crude — 192 billion gallons of diesel and 307 billion gallons of gasoline. That same year, the United States used 176 billion gallons of petroleum, almost double that of the EU, the next highest consumer at 92 billion gallons. China, Japan, Canada, Russia, Mexico, and Brazil rounded out the top consumers of crude oil for transportation purposes.

mandate in EU biofuel consumption is also likely to cause significant growth in the production and consumption of ethanol.

Brazil, the world's biggest producer of ethanol, already requires a 20-percent blend of ethanol with all gasoline that is sold (down from 25 percent earlier this year). Significant government support, including favorable tax incentives, has helped make ethanol a viable industry in the country, with production at 4.14 billion gallons in 2005. The recent advent of the flex-fuel vehicle has turned domestic consumption of ethanol around, and spurred investments in additional ethanol production.

Apart from its strong domestic growth, Brazil could be a significant beneficiary of increased biofuel use around the world, and the country has plentiful arable land for expanding these crops. The use of bagasse (residue left after extraction of oil or juice from commodities like olives, grapes, or sugar cane) to co-generate power for the sugar/ethanol mills results in lower energy usage in Brazilian ethanol production, a significant cost savings helping to make Brazil a major competitor.

Can Biofuels Compete?

As the world biofuel situation becomes more dynamic, there are several analytical issues to consider. One key issue is the long-term competitiveness of biofuels vis-à-vis petroleum. Most biofuels are currently price-competitive with petroleum. However, production costs of biofuels vary, depending on feedstock and other input prices, as well as the technology used to make the product.

In general, ethanol from corn in the United States and sugar cane in Brazil—both more established industries – will likely be cost-competitive with petroleum products even if petroleum prices fall considerably. Other biofuel production will likely require sustained petroleum prices to remain competitive.

Effects on Trade

Another key issue to consider in the biofuel arena is the impact of increased biofuel usage on the underlying feedstock. For example, what impact will increased corn ethanol usage in China have on Chinese corn exports, or how will EU sugar reforms affect the world ethanol market?

Another issue is how nonagricultural and nonpetroleum-producing countries will react to the availability of biofuels. In these countries (Japan, for example), some drivers for increased biofuel use are missing. Nevertheless, if such countries embrace biofuel use, then trade could play a larger role in filling their energy needs.

Finally, two ancillary issues regarding biofuels in the international arena are: 1) How will technological improvements affect the competitiveness of biofuels, relative to other fuels, and among countries? 2) What will be the impact of higher levels of byproducts from biofuel production on underlying feedstock markets?

Reports by FAS

About 30 countries currently either have active biofuel programs or will have soon. As the biofuel industry develops and worldwide consumption increases, FAS will be including analyses and descriptions of markets for biofuels and biofuel feedstocks in attaché reports. These reports will be located on the FAS Web site at: <http://www.fas.usda.gov/scriptsw/AttacheRep/default.asp>

Included with this overview article in the current edition of FAS Worldwide is "Belgium and the Netherlands Gearing Up for Biofuel Production," a description of the Netherlands and Belgium biofuel industry, and EU plans to increase biofuel use, based on FAS Report E35235 by the FAS Office of Agricultural Affairs at The Hague, Netherlands.

For extensive reporting on Brazil's ethanol dynamics, please see FAS Reports BR6002 and BR6001. ■

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