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Bio-Fuels

Bio-Fuels Production Report

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Report Highlights:

Bio-fuel production and consumption in India is still at a nascent stage. Recently, the government initiated policy measures to encourage the use of ethanol (for blending with gasoline) and bio-fuels from non-edible oils (for blending with diesel).

Includes PSD Changes: No
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SECTION I: BIO-FUELS DOMESTIC POLICY ENVIRONMENT

Policies Supporting Production and Use of Bio-Fuels

The government of India recently initiated policies to encourage bio-fuel production and usage, with the foci on promoting the use of ethanol for blending with gasoline, and the use of bio-fuels derived from non-edible oils for blending with diesel. The bio-fuel policies are driven by the need to lower India's dependence on imports of crude oil, provide environmentally friendly alternative fuels, and to support Indian farmers by devising ways to support higher production of sugarcane.

India is one of the world's leading producers of sugar, and its domestic rectified spirits (alcohol) and ethanol production comes from sugar molasses, a byproduct of the sugar industry. Corn and other food grains are not used for sweetener, alcohol, or ethanol production. Most of the bio-diesel production efforts are focused on using non-edible oils from plant (*Jatropha curcus*, *Pongamia pinnata*, etc) and animal sources.

Ethanol policy

The commercial production and marketing of ethanol-blended gasoline started in January 2003, when the government launched a program to mandate the blending of 5 percent ethanol in gasoline in nine states (out of a total of 29) and four union territories (UT) (out of a total of 6). The program foresaw an ethanol supply of 320 to 350 million liters from the domestic sugar industry (mostly mills with distilleries) to the oil companies.

Despite this mandatory requirement, the program could only be implemented in a staggered manner, as ethanol was not consistently made available by the sugar industry to the oil companies. Sugarcane and sugar production declined sharply in marketing year (MY) 2003/04 (October/September), resulting in a severe shortage of molasses and a consequent increase in alcohol and ethanol prices. Ethanol supplies to the oil companies came to a virtual halt by September 2004. The government was forced to remove the mandatory supply condition, and introduced new pricing conditions on the use of ethanol for blending purposes¹ in October 2004.

The resurgence in sugar and molasses production in MY 2005/06 resulted in a renewed interest in the ethanol program. In August 2005, the government brokered an agreement between the sugar industry and the oil companies to enable the purchase of ethanol at Rs. 18.25 per liter (\$1.52 per gallon), and the ethanol program has restarted in most designated states and UTs.

Recently, the Petroleum Ministry announced plans to implement the second stage of the ethanol program which aims to supply ethanol-blended gasoline across the country, beginning in the 2006/07 sugar marketing year. This would require about 600 million liters of ethanol to blend with gasoline at five percent. In the third stage, the plan is to increase the ethanol blending ratio from five percent to ten percent.

Sugar mills that are interested in setting up ethanol production facilities (using molasses and sugarcane) are offered subsidized loans up to a maximum of 40 percent of the project cost from the government-held Sugar Development Fund. However, there is no direct financial assistance for the production or marketing of ethanol.

¹ See notification from the Ministry of Petroleum website http://petroleum.nic.in/supply_of_ethanol.htm

Bio-diesel Policy²

The Government has identified *Jatropha curcus* as the most suitable tree-borne oilseed for the production of bio-diesel. Since early 2001, the Ministry of Rural Development and several state governments have carried out programs to encourage large-scale planting of *Jatropha* on wastelands, by providing subsidized planting material and other inputs. The Indian government's Planning Commission set an ambitious target of 11.0 million hectares to be planted with *Jatropha* by 2012, in order to generate sufficient bio-diesel to blend at 20 percent with petro-diesel.

In October 2005, the government announced a "bio-diesel purchase policy," by which oil companies would purchase bio-diesel and blend it with high-speed diesel (HSD) at five percent. This would take place in 20 procurement centers spread across major producing area in the country, effective January 2006. The bio-diesel will be procured at a pre-determined price (reviewed every six months), which currently is fixed at Rs. 25 per liter (\$ 2.08 per gallon). Market sources report that the cost of production of bio-diesel is 40 to 80 percent higher than this purchase price, however, resulting in few sales of bio-diesel at the centers. The government does not provide any direct financial assistance for the production of bio-diesel or to set up the necessary facilities.

Motor Vehicles Petroleum-Based Energy Market

Spurred on by sustained economic growth, the rise in income levels, and the increased availability and choice of vehicles, India's petroleum-based energy demand for the transport sector is expected to grow steadily in the future.

Consumption of gasoline and HSD has grown by 5.2 percent and 2.7 percent, respectively, over the last five years (see table below).

Table 1: Total Consumption of Petroleum Products for Motor Vehicles
(Quantity in million tons)

(Indian fiscal year April/March)						
Item	2001/02	2002/03	2003/04	2004/05	2005/06	Growth Rate
Gasoline ("Motor Spirits")	7.01	7.57	7.90	8.25	8.65	5.2
High Speed Diesel (HSD) ³	36.55	36.65	37.07	39.65	40.15	2.7

Source: Ministry of Petroleum and Natural Gas, Government of India

The latest available statistics⁴ indicate that the total number of vehicles has increased more than threefold, from 21.3 million (including 14.2 million 2-wheelers) in 1991 to 67.0 million (including 47.5 million 2-wheelers) in 2003. Market sources report that the motor vehicle population is projected to grow by 10-12 percent over the next few years. This growth is expected to fuel an 5 to 8 percent growth in the demand for petroleum-based energy in India. An efficient implementation of India's bio-fuel program will likely go a long way in reducing India's growing expenditures on crude oil and other petroleum product imports.

² "Bio-diesel" – Fuel from plant sources, which is used for blending with petroleum-based diesel (fuel from refined petroleum products).

³ Used for railway and road transport (truck, bus, etc), agriculture (tractor, irrigation pumps, etc), and power generation.

⁴ Source: Ministry of Surface Transport, Government of India.

Bio-fuel Production Capacities

Ethanol

Almost all spirits and ethanol in India are produced from sugar molasses, and not directly from sugarcane juice. India has about 300 distilleries, with a production capacity of about 3.2 billion liters of rectified spirits (alcohol) per year. The government's ethanol policy has led to 120 distilleries modifying their plants to include ethanol production, and these have a total capacity of over 1.2 billion liters per year. Industry sources estimate that this is enough to meet the estimated ethanol demand for the five percent blending ratio with gasoline.

Table 2: India's Ethanol Requirement for 5 Percent Blending with Gasoline
(Figures in million liters)

(Sugar MY Oct./Sept.)			
Item	2005/06	2006/07	2007/08
Molasses production (million tons)	8.55	10.13	10.60
Opening stocks of alcohol	379	359	631
Potential alcohol production ⁵	2052	2431	2544
Demand for industrial use, potable alcohol, etc.	1443	1477	1515
Ethanol demand for 5 percent blend in gasoline for the country (figure in parentheses is demand at 10 percent blend)	629 (1258)	682 (1369)	741 (1482)
Total demand	2072	2159	2256
Carryover stock	359	631	918

Source⁶: Industry sources.

If India has to adopt a ten percent ethanol blending program, production capacities need to be enhanced by expanding the molasses based ethanol plants, and by setting up sugarcane juice-based production facilities. Since the production of ethanol directly from sugarcane juice requires additional investments for technological modifications, most of the mills are closely assessing the market demand for ethanol and the efficacy of the government's ethanol policy before making the necessary investments. Recent reports indicate that one of the leading business conglomerates in India plans to set up three processing units to convert sugarcane juice to ethanol, mostly for in-house consumption. There are currently no foreign players in Indian sugar (and associated distillery) industry, as it is one of the most controlled agribusiness-sectors in the country (see policy section of Sugar Annual IN6029). However, the increased consumption of ethanol by oil companies, and the production of ethanol from sugarcane juice by local companies may attract foreign investment in the future.

⁵ "Potential alcohol production" assumes all molasses is converted into alcohol, and there is no diversion for feed, other uses, and waste. The average production of alcohol per ton of molasses is estimated at 240 liters.

⁶ Official statistics on the production and distribution of molasses, alcohol, and ethanol are not available. This table was assembled from industry sources estimates.

Bio-diesel

Due to the slow progress in *Jatropha* planting, there has been negligible production of bio-diesel until now. The Planning Commission's Bio-Fuels Report (2003) states that for an estimated demand of 52 million tons of petro-diesel in Indian FY 2006/07, approximately 2.6 million tons of bio-diesel will be required for a 5 percent blend. This will require approximately 2.2 to 2.6 million hectares of *Jatropha*, but only 0.4 million hectares have been planted to-date. Consequently, it is very difficult to procure sufficient *Jatropha* seeds to crush for bio-diesel destined for the oil companies.

The small quantities of *Jatropha* and other non-edible oilseeds procured by traders are mostly crushed for oil, which is used for lighting lamps and other non-edible uses. A few entrepreneurs have established small plants to extract bio-diesel, but the product is mostly sold in the unorganized sector and is used in irrigation pumps and other agricultural uses. Indian Railways and some other state-owned transport companies have set up trial projects for bio-diesel production, but solely for their own consumption.

Import Regulations for Bio-Fuel

Although there are no quantitative or SPS restrictions on imports of bio-fuels, high duties on tariff lines associated with bio-fuels (see below) appear to make imports economically unfeasible at this time. The government of India does not provide any special concessions for imports of bio-fuels.

India does not export ethanol or other bio-fuels, nor does the government provide any financial assistance for exports of these products.

Table 3: India's existing import duty on tariff lines associated with bio-fuels.

ITC HS Tariff Number	Total Import Duty (Percent ad valorem on CIF value)
2207.10 Ethanol denatured	253 to 605
2207.20 Ethanol undenatured	52.24
3824.90 Chemical products not elsewhere specified	36.82

SECTION II: BIO-FUELS STATISTICS AND ANALYSIS

Bio-Fuel Trade

India has neither imported nor exported ethanol or other bio-fuels for fuel purposes. During the years of low sugar production (MY 2003/2004 and MY 2004/2005), and the consequent molasses and alcohol shortages, India imported some alcohol, but mainly for industrial use and potable liquor production.

Ethanol and Sweetener Produced from Corn

India does not produce sweetener or ethanol from corn. India's corn supplies are used for food, feed, and a small quantity for industrial usage (see India's Corn PS&D from the FAS website).

Ethanol Produced from Sugar Molasses

The commercial production of ethanol for fuel purposes started in MY 2002/03, after the announcement of the ethanol program in January 2003. There was a lull in ethanol production during MY 2003/04 and 2004/05 due to insufficient supplies of molasses and alcohol. With improved sugar supplies in MY 2005/06, ethanol production blending with gasoline has restarted in many states.

Table 4: Production & Distribution of Molasses and Alcohol for Alternate Use

(Sugar MY Oct/Sept)				
Item	2002/03	2003/04	2004/05	2005/06
Total Molasses Production (million tons)	8.87	6.16	5.50	8.55
Molasses for:				
Alcohol Production (million tons)	7.38	5.13	4.58	7.91
Other Use (feed, other uses & waste) (million tons)	1.49	1.03	0.92	0.64
Total Alcohol Production (million liters)	1770	1232	1100	1900
Opening Stocks (million liters)	400	708	708	483
Imports (million liters)	0	200	100	0
Alcohol for:				
Industrial Use (million liters)	551	578	607	619
Potable Liquor (million liters)	661	694	728	747
Ethanol for Blended Gasoline (million liters)	180	90	20	200
Other Use (million liters)	70	70	70	75
Carryover Stocks of Alcohol (million liters)	708	708	483	742

Source: Industry sources.

Table 5: Production and Distribution of Sugarcane for Alternate Use
(Figures in million tons)

(Sugar MY Oct./Sept)				
Item	2002/03	2003/04	2004/05	2005/06
Total Sugarcane Production	287.4	237.3	232.2	266.9
Sugarcane Utilization for:				
Mill Sugar ⁷	194.3	132.5	124.8	180.0
Khandsari/Gur ⁸	58.6	76.3	78.4	54.9
Seed, Feed, and Other Use	34.5	28.5	29.0	32.0

Source: Industry and government sources.

⁷ Molasses is a byproduct of mill sugar.

⁸ "Khandsari" is a low-recovery centrifugal sugar prepared by open-pan evaporation.
Gur is a crude non-centrifugal sugar in lump form prepared by open-pan evaporation.

Bio-diesel from Oilseeds, Vegetable Oil, Animal Fats, and Other Bio Mass

Due to the domestic shortage of oilseeds and vegetable oil and the consequent high prices, it is not economically feasible to produce bio-diesel from anything other than molasses. A few entrepreneurs have established small facilities to produce bio-diesel from non-edible oil. Production information on bio-fuels is not available in large part due to the miniscule production levels of these few units. Except for some experimental trials, there is no commercial production of bio-fuels from other biomass.

Bio-fuels Impact on Traditional Uses (Feed, Food, and Trade)

India's production (of ethanol) for fuel purposes has not been significant enough to impact production and trade of sugar for food, molasses for feed and alcohol for other uses (industrial, potable liquor, etc.). When Phase II of the ethanol program will be implemented in year 2006, it may impact the availability of sugar molasses for use in cattle feed, and the use of alcohol for industrial and potable liquor. However, it is too early to provide a quantifiable estimate of that effect. As India's bio-diesel program is based on the use of non-edible vegetable oil, bio-diesel production will not have an impact on feed, food, and trade of oilseeds, vegetable oils and other edible products.