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Bio-Fuels

Bio-Fuels Production Report

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Report Highlights:
Unlike the United States, Japan has few prospects for production of biofuels. In the interest of meeting its Kyoto Protocol commitment to reduce CO2 emissions by 6% from the 1990 level by 2010, the Government of Japan (GOJ) is committed to importing ethanol for use in ETBEs. The GOJ also supports an ethanol blend of up to 3% and is engaged in a number of feasibility studies for the production and distribution of ethanol. Preliminary indications are that production is severely limited by Japan's shrinking agricultural production.

Includes PSD Changes: No
Includes Trade Matrix: No
Trade Report
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SUMMARY/OVERVIEW

The biofuels situation in Japan is in its nascent stage. There are at least six feasibility studies under way that are analyzing the prospects for biofuel production. However, the prospects for production and distribution of biofuels are severely limited by Japan's shrinking agricultural production. In order for biofuels to be adopted nationwide, Japan would need to import either the raw commodities or the biofuels. Indeed, Japan has begun imports of ethanol from Brazil and is incorporating them into ETBE production. The primary force driving the Government of Japan's move toward biofuel study and use is its commitment under the Kyoto Protocol to reduce emissions. If Japan were to expand its biofuels use it would essentially be substituting petroleum imports for biofuel imports.

BIO-FUELS POLICY

Domestic Policy Environment

Japan's domestic environment is fundamentally distinct from that of the United States because of Japan's position as an importer of 60% of its food. For Japan, the prospect of moving toward renewable fuels simply substitutes dependence on oil producers with dependence on grain producers. The main impetus for establishing a biomass policy is the commitment made by Japan under the Kyoto Protocol to reduce CO2 emissions by 6% from the 1990 level by 2010. To reach that goal, the Government of Japan's (GOJ's) plan is to replace fossil fuels with 500,000 kl (oil basis) ethanol for the transportation sector by 2010. Most of that fuel will come from imports. They are also looking at ways to increase fuel efficiency to reduce emissions. On May 18, 2006 the Ministry of Economy, Trade and Industry (METI) introduced a new strategy to decrease fossil fuel dependency by 20% by 2030. The final report is due by May 26, but information so far indicates that the focus is on raising oil reserves, increasing exploration, and raising the maximum percentage of ethanol mix from 3% to 10% by 2020.

Several ministries collaborate on Japan's renewable fuels policy: Ministry of Environment (MOE), Ministry of Economy, Trade and Industry (METI), and Ministry of Agriculture Forestry and Fisheries (MAFF). MOE's main concern is meeting Kyoto Protocol commitments; MOE would also be interested in expanding ethanol use. METI collaborates with industry and is interested in analyzing the cost-benefit of shifting to renewable fuels and is thus involved heavily in feasibility studies. MAFF is interested in utilizing existing biomass (monster cane, woody material, etc.) in the production of energy and also promoting sustainable rural economies; indeed there is hope that these programs will help to revitalize rural areas and reinforce the "multifunctionality" of agriculture. Also involved is the GOJ's New Energy and Industrial Technology Development Organization (NEDO), which manages R&D project planning and development and post-project technology evaluation functions on a wide range of topics. NEDO is managing several of the biomass studies ongoing in Japan.

Japan's first biomass plan, Biomass Nippon Strategy, was unveiled in 2002. The Strategy analyzed biomass resources and set targets for the future introduction of biomass with the goal of increasing utilization of domestic food waste, wood and other materials. A 2005 review indicated that while Japan was on track to meet its 2010 goals for food waste it was not for wood. In addition, the Kyoto Protocol ratification in February sent Japan into high gear to meet its commitment to reduce CO2 emissions by 6% by 2010. To do so, Japan's Biomass Strategy sets out to use 500,000 kl (oil basis) of biofuels for transportation (contributing to a .6% reduction in CO2). The plan incorporated a 2003 decision to allow up to 3% blending of ethanol (E3) and for ETBE blending up to 8% (please see Japan's Law for Securing Quality of Volatile Oil for details). In practice, since January 2005 six gasoline stations have offered E3 blended gasoline.

Japan's ethanol blend limit is low by U.S. standards and that is because Japan is taking its usual cautious approach to introducing a new technology with potential safety implications.

A number of potential hazards have been raised. First, according to the Japan Automobile Manufactures Association (JAMA), METI tests showed some corrosive impact to aluminum and rubber car parts in vehicles using E5 ethanol. Relatedly, there is concern that above the E3 level ethanol could harm the petrol delivery infrastructure. Third, the industry raised a red flag about the potential costs of ethanol blending since the distribution system would, in their view, have to be altered. Currently there is no consensus on where ethanol blending would occur (possibly at terminals or refineries rather than gas stations). Fourth, according to industry sources, the high humidity in Japan can cause moisture to reach the ethanol thereby causing "phase separation" (if the moisture exceeds 1,000 ppm in E3 the ethanol will shift into water and the water layer containing ethanol will separate from the gasoline). Thus, Japan believes the quality guarantee for fuel would have to be addressed. Fifth, there is concern that consumers would have to bear additional costs in order to pass Japan's strict emissions tests. Finally, Post was told that a number of years ago an ethanol-related explosion made headline and the GOJ and industry believe that this incident is still fresh in the minds of the Japanese people making it vital to assure complete safety of biofuels.

All these factors have led the GOJ to develop a rigorous testing and monitoring scheme to measure the effects of E3 on vehicles and the environment and how best to introduce ethanol to the market. In 2004 and 2005, METI commissioned the Japan Petroleum Energy Center to conduct experimental studies on the prospects for buying or producing, distributing and using ethanol-blended fuel. The study also addresses concerns related to fuel quality. The ethanol is refined in Yokohama and distributed to service stations in: Akita, Chiba, Toyama, Mie, Osaka and Fukuoka Prefectures. Japan will only begin to consider moving to a nationwide scheme or to a higher percentage blend when studies such as this on production and distribution, the production feasibility studies mentioned above and other ethanol-related R&D not listed herein are complete. Ironically, at the E3 level it is widely accepted internationally that CO2 emissions are not reduced and in fact the environment may be harmed. So, the prospects for moving to a higher blend based on a success with E3 could be hampered. Certainly it will be ten years or more before something like E10 would become a possibility.

Additional Costs to Petroleum Industry of Adopting Ethanol
1. Revamp transport/delivery network (50,000 SS, 230 terminals, 30 refineries, 9 brands)
2. Construction cost for ethanol mixing equipment
3. New transportation requirements (ship/train/lorry/tanker)
4. Construction of equipment at SS (fueling pumps, underground tanks, etc.)

TOTAL COST ESTIMATE = Y300-500 billion (US$2.58-4.31 billion)

Estimate provided by NEDO, January 2005

Nevertheless, in Japan's FY07 (April 07-March 08) the GOJ will introduce a new tax incentive for blending ethanol whereby the Y53.8/liter distribution tax will be removed. Beginning in FY05 tax incentives of various degrees were established for consumers purchasing special fuel efficient or clean-energy vehicles.

With respect to biodiesel, there are no standards but the GOJ is considering establishing standards. No time frame has been given. There is some passing interest in processing used vegetable oil domestically into bio diesel but there is no concerted effort to produce or import soybeans or other inputs for this purpose. On May 12, 2006, Nippon Oil Corporation and Toyota Motor Corporation announced they have jointly developed a palm oil-based biodiesel that performs comparably to gasoline. They claim to have removed the oxygen from the palm oil, which would normally cause the fuel to degrade. Nippon Oil aims to develop a commercially viable biodiesel by 2010. Current annual production of biodiesel from used vegetable oil is estimated at 2 to 3,000 kl.

On the other hand, the introduction of ETBEs has become generally supported by the industry. There are currently four MTBE facilities sitting dormant in Japan that would be able to get back into production making ETBEs. In addition, ETBEs could relatively easily be used on a national scale while ethanol blends would only be feasible locally or regionally. METI organized a working group in April 2005 to study the feasibility of ETBE usage: ease of introduction, supply stability and economic efficiency, CO2 emissions reduction in ETBE-blended gasoline, safety assessment as a new chemical substance and the status of Europe's introduction of ETBEs. The report is due at the end of this fiscal year (roughly March 2007). At this point, the GOJ supports the switch from MTBEs to ETBEs over widespread ethanol use mainly due to the cost and logistical implications noted above. In January 2006, the Petroleum Association announced it would aim to use 360,000 kl of ethanol by 2010 (equivalent to 210,000 kl of oil) to make an 8% ETBE blend. On the downside, ETBEs still present possible environmental hazards and the oil industry must show they are taking countermeasures to reduce those potential impacts within about two years' time. The cost of such countermeasures was not disclosed.

According to JAMA, there are 70 million automobiles in Japan (gas and diesel) and domestic fuel consumption is around 60 million kl. If E3 were nationalized it is estimated that demand for ethanol would be around 1.8 million kl. In the case of E10, demand would be 6 million kl. The Japanese gasoline market is made up of large companies and no independent dealers. Only a handful of companies import oil and/or gasoline. These roughly ten companies are organized into four groups. They sell to their own contacts in a very formalized distribution system.

Despite somewhat lackluster sales in the past ten years, the automobile industry remains a critical part of the Japanese economy – and a symbol of national pride. The Japanese automakers have a cautious approach to integrating biofuels into the Japanese market. The automakers see ETBEs as a relatively painless change in that at the percentage rates ETBEs are being incorporated (8%, even at 20-25%) they have very little to no impact on car parts and no changes to the production or distribution infrastructure are required. JAMA has conveyed concerns to the GOJ that ethanol blends at E5 or above would harm car parts (e.g. the fuel line erosion) and possibly pipelines. One report estimates the cost to replace or upgrade existing infrastructure would be Y300-500 billion ($2.58-4.31b, please see table above). Ironically, many of the same cars that would be subjected to robust testing before ethanol would be used are already being sold in the United States. Indeed, JAMA acknowledges this fact and states that if the GOJ adopted an E10 ethanol policy the automakers would be prepared to support it. The GOJ and the automakers agree that it is vital to continue to pursue fuel efficiency as another means of reducing CO2 emissions. So, the bottom line is that all of the possible positive and negative factors much be weighed and studied before any change is made and at this point the automakers are not convinced that the costs would be worth the gains.

Domestic production of renewable fuels is minor. The GOJ has six "feasibility studies" calculating the potential for production, distribution and use running in different locations around the country. For example, in Hokkaido they are investigating the prospects for converting "non-spec" wheat (not suitable for consumption) and wood waste. In the Okinawa area they are working on conversion of "monster cane" to ethanol. Production of ethanol from molasses is also under study. The sugar subsidy system will be revamped in 2007, abolishing the minimum price moving sugar cane and sugar beet production into different support sectors. (In recent years, production of beets has risen while cane has declined. Cane is used in ethanol production in Japan because beet is less efficient. For more on Japan's sugar situation please see GAIN Report #6008: Sugar Annual http://www.fas.usda.gov/gainfiles/200602/146176734.pdf.) Cane will have a

commodity-specific subsidy while beets will fall under the blanket direct payment. The outlook is for 19 additional facilities to go on line in 2006 and 25 more in 2007. MAFF estimates that, if commercialized, Japan could reasonably expect to supply only 360,000 kl per year. Meanwhile MOE expects Japan could meet only 10% of the 500,000 kl target with domestic ethanol production.

One Japanese company has developed a patented "nanotechnology membrane" that enables cost reduction during ethanol dehydration. That company also has invested in Brazil in an effort to improve ethanol production, supply and supply logistics.

The alcohol industry is not in a position to fill any gaps in the domestic renewable fuels market. Demand for alcohol is around 540,000 kl/year and has been increasing slightly for the past 10 years. The bulk of the raw materials must be imported (in the form of crude alcohol) primarily from China, Brazil and Thailand. A small amount is occasionally imported from the United States. Until April 2006, the market was controlled by Japan's government-owned industrial alcohol "company", at which point it was privatized. Roughly 294,000 kl of industrial alcohol are produced annually. The main uses of industrial alcohol are for food (vinegar, soy, etc.) followed by chemical and then household use. Alcohol for fuel use is limited to the government trials underway.

In Japan, there is not a noticeable consumer movement toward renewable fuels. Although hybrid vehicles are frequently seen about the country, the main factors driving consumer decisions are (a) passing Japan's strict emissions tests and (b) the price of gasoline. Prior to taxes, retail gasoline is Y35-45/liter.

Given industry's reluctance and the lack of market potential for domestic crops, Japan's renewable fuels prospects are largely guided by government policy rather than market forces.

Import Regimes for Bio-Fuels

Japan began importing notable amounts of ethanol in 2001, roughly 472 million liters. Since that time the volume has grown to 509 million liters total from the world, including roughly 359 million liters from Brazil. In 2005 the Brazilian Agriculture Ministry reported exports of ethanol to Japan were mainly for use in chemical products and alcoholic beverages.

The widespread use of ethanol in Japan is somewhat influenced by the import and domestic tax structures. The import tax on crude oil is Y0.17/l. The import duty on alcohol (including ethanol) was 27.2% but starting in FY06 was lowered to 23.8% and will go down each year until it reaches 10% in 2010. The incremental tax structure for gasoline and ethanol is below. The GOJ estimates that inclusive of all taxes, the cost of gasoline is roughly Y123.7/l versus imported ethanol at Y149.7/l.

COMPARISON OF TAXES APPLIED TO GASOLINE AND ETHANOL

Gasoline Taxes:		TOTAL TAX	AVERAGE PRICE
	Y 0.17/l Import Duty for Crude Oil	Y56.01/l + 5%	Y123.7/l
	Y 2.04/l Petroleum and Coal Tax (paid by refiners)		
	Y 53.8/l Consumer Tax/Gasoline Tax		
	5% Consumer Tax (paid at retail)		
Ethanol Taxes:			

	27.2% Import Duty for Ethanol*	27.2% + Y53.8 + 5%	
	Y 53.8/l Gasoline Tax		Y149.7/l
	5% Consumer Tax (paid at retail)		

* The import duty for ethanol will be reduced to 10% by FY10.

Up to now, Japan has seen Brazil as the only possible reliable supplier of ethanol. In 2004, Prime Minister Koizumi visited Brazil, where the Brazilians created a favorable impression of their sugar cane ethanol production. In 2005, the Brazil-Japan Working Group on Biomass was established to share information and examine possible avenues for bilateral cooperation. Also that year, Brazil's state-owned Petrobras Internacional Braspetro BV incorporated with Japan's state-owned Nippon Alcohol Hanbai KK to form Brazil-Japan Ethanol Co., Ltd. The company is the exclusive franchise for Brazilian ethanol imports in Japan and will also be involved in R&D related to ethanol use and distribution. In April 2006, Brazil's Foreign Minister and Minister of Commerce came to Japan and the two countries agreed that Brazil would supply 210,000 kl (oil basis) of sugar cane-based ethanol to Japan. This will be used to make E3 blends of high-octane fuel that account for about 20% of all gasoline in Japan. Despite this friendly alliance, some in Japan are skeptical Brazil will be able to keep up with export demand given the growth of Brazil's domestic demand. In addition, they worry that if the price of sugar for food use goes up Brazil's ethanol supply will be diverted. One study by MAFF shows that if Japan were to nationalize E3 the world sugar price would increase 1%. They are also watching what happens to the EU sugar regime for similar reasons. Japan will also investigate India as a possible supplier. Japan already imports roughly 60% of its sugar.

Imported ethanol costs roughly Y20 to Y40 more than gasoline in terms of calories (the calories per liter of gasoline is equivalent to 1.7 liters of ethanol). Ethanol blends are estimated to cost Y0.6 higher per liter than regular gasoline.

BIO-FUELS STATISTICS AND ANALYSIS

Trade Tables:

(a)

Production and Distribution of Biofuels: Ethanol (in 1,000 L)				
Year	Production	Imports	Exports	Total Use
2001	0	471637	254	471384
2002	0	432616	1176	431440
2003	0	403911	132	403779
2004	0	494562	207	494355
2005	0	509161	22664	486497

HS Codes: 220710, 220720

(b)

Production and Distribution of Biofuels: Residuals of the Chemical Industry (000MT)				
			Biodiesel	
	Imports	Exports	Production	Total Use

2001	585.4	174.0	0	411.4
2002	525.3	208.3	0	317.0
2003	482.2	216.6	0	265.6
2004	455.8	248.5	0	207.4
2005	455.9	256.3	0	199.6

HS code: 382490

Annual production of biodiesel from used vegetable oil is anecdotally estimated around 2,500 kl. Production of bio-diesel from other inputs is minimal.

(c)

Production and Distribution of Corn Sweetener* (in 1,000 MT)				
Year	Production	Imports	Exports	Total Use
2001	731.39	29.61	0.02	761.00
2002	740.05	27.95	0.02	768.00
2003	755.44	35.56	0.02	791.00
2004	764.33	31.67	0.04	796.00
2005	743.92	38.08	0.12	782.00

Table refers only to HFCS solids, HS code 170250

Corn sweetener production is regulated under Japan's starch policy, which aims to support domestic (potato) starch and sugar producers. Corn for starch is imported without duty but under a quota system (HS 100590091) whereby cornstarch processors must pay a levy on the starch produced from imported corn and must also use a certain percentage of domestic potato starch. Cornstarch demand is about 2.53 million tons/year and has been strong in recent years, primarily due to a strong beverage demand for corn sweeteners. 84% of Japan's starch demand is met by production from imported corn (primarily US origin). With respect to high fructose corn syrup, demand is roughly 1.2 million tons/year of which 1.1 million tons is US origin. (For additional information on grains please see GAIN #JA6012, http://www.fas.usda.gov/gainfiles/200603/146176973.pdf.)

(d)

Production and Distribution of Feedstock Commodity									
Incorporating Use for Bio-Fuels Production: Corn Use (in 1,000 MT)									
								Sweetener	
Year	Production	Imports	Total Supply*	Exports	Feed	Food	Biofuel	Production	Total Use**
2001	1	16395	17693	0	12000	2907	0	0	17693
2002	1	16868	18262	0	12300	3038	0	0	18262
2003	1	16781	18239	0	12400	3161	0	0	18239
2004	1	16485	17825	0	12200	3375	0	0	17825
2005	1	16500	17626	0	12100	3474	0	0	17626

*Total supply includes stocks

**Total use includes end stocks
*** Imports are for MY Oct-Sep

(e) Bio-Fuels' Impact on Traditional Users such as Feed, Food, Trade
The main impact on the feed and food sectors in Japan will be due to any shortages in supply of commodities like corn and soybeans due to increased biofuel production in the United States and other countries.

Exchange rate: $1 = Y 116
1 Liter = 0.26 Gal (1 Gal = 3.79 Liters)