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Biofuels Annual

Japan Focuses on Next Generation Biofuels

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Report Highlights:
The Government of Japan (GOJ) plans to introduce 500 thousand kilo liters (kl) (oil basis) of biofuels by 2017 and 1.8 million kl (oil basis) by 2020. Last year, the GOJ permitted sales of E10 gasoline and vehicles designed to use E10 or ETBE22. Hence, demands for bio-ethanol and ETBE are expected to increase. Due to the increase in food prices during the past few years, there is a broad debate within Japan about the use of food crops to produce biofuels. This is a major reason that Japan is focusing research efforts on cellulosic ethanol technology that does not compete with food.

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I. Executive Summary

The Government of Japan (GOJ) plans to introduce 500 thousand kilo liters (kl) (oil basis) of biofuels by 2017 and 1.8 million kl (oil basis) by 2020. Two different types of biofuels, E3 and bio-ETBE blended gasoline, are competing in the market in Japan, but Bio-ETBE blended gasoline is more prevalent as it is widely distributed. Last year, the GOJ permitted sales of E10 gasoline and vehicles designed to use E10 or ETBE22. Hence, demands for bio-ethanol and ETBE are expected to increase.

Due to the increase in food prices during the past few years, there is a broad debate within Japan about the use of food crops to produce biofuels. This is a major reason that Japan is focusing research efforts on cellulosic ethanol technology that does not compete with food.

In the wake of the nuclear power plant accident in Fukushima in 2011, the GOJ is reviewing its energy policies. Several expert panels and task forces were established to discuss the direction of Japan's energy policies from different angles, such as industrial competitiveness and environmental impacts. One highlight is the introduction of a feed-in tariff system for electricity from renewable energy sources such as solar and wind power. The system came into force on July 1, 2012.[1] According to METI's Annual Energy Report issued in June 2013, thanks to this system, the number of power generating facilities from renewable energies is increasing.

Nearly all nuclear power reactors are currently shut down. Power companies in Japan are forced to rely on other methods to generate power, such as hydro and coal. The power companies also increasingly use wood pellets as a renewable energy source. Hence, imports of wood pellets are expected to increase further.

II. Policy and Programs

Japan's first biofuels plan, "Biomass Nippon Strategy," was unveiled in December 2002 with four pillars: 1) preventing global warming; 2) creating a recycling society; 3) nurturing strategic industries; and 4) revitalizing rural communities. In March 2006, Japan revised the Biomass Nippon Strategy to emphasize the use of biofuels for transportation. It set a goal of replacing fossil fuels with 500 thousand kls (oil basis) of biofuels for the transportation sector by 2017.

Japan's Fuel Market

[1] *The power companies became obliged to buy electricity at ¥42 per kilowatt-hour for solar power, ¥23 for wind power, ¥27 to ¥42 for geothermal power, and ¥14 to ¥41 for biomass derived power. The costs incurred by power companies to buy electricity from renewable energy sources are passed on to consumers through increased electricity rates.*

The GOJ estimates that gasoline and diesel demands will continue to decrease, mainly due to a decrease in the number of automobiles and to improved fuel efficiency. In 2006, Japan's gasoline demand was 61 million kl, and the demand for diesel was 37 million kl. By 2017, Japan's gasoline and diesel demands are estimated to decrease to 52 million kl and 32 million kl respectively. Concerning jet fuel, it is estimated that the demand will increase over the next several years to 4.1 million kl due to the expansion of departure and arrival slots at Tokyo's Haneda Airport. Japan's overall oil demands in the future are estimated to decrease as its population decreases.

Japan's transportation sector is almost 100 percent dependent on fossil fuel. In the national energy strategy, released in May 2006, the GOJ articulated the goal of decreasing dependency on fossil fuel to 80 percent by 2030. Biofuels are considered to be an important renewable energy resource to achieve this goal. The GOJ plans to introduce 500 thousand kl (oil basis) of biofuels by 2017 and 1.8 million kl (oil basis) by 2020.[2] Other means to achieve the goal are batteries, hydrogen, fuel cells, and clean diesel.

Fuel Use Projections (Kilo Liters - specify unit)									
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
Gasoline Total	53,944,000	52,749,000	51,711,000	50,693,000	49,831,000	48,984,000	48,151,000	47,332,000	46,527,000
Diesel Total	32,389,000	31,957,000	31,625,000	31,277,000	30,933,000	30,953,000	30,256,000	29,923,000	29,594,000
Jet Fuel Total	4,055,000	4,022,000	4,002,000	3,978,000	3,954,000	3,930,000	3,906,000	3,883,000	3,860,000
Total Fuel Markets	90,388,000	88,728,000	87,338,000	85,948,000	84,718,000	83,867,000	82,313,000	81,138,000	79,981,000
Note: Numbers for 2018 onwards are forecast by Post.									
Source: Ministry of Economy, Trade and Industry									

Ministries Involved in Biofuels Policy

Several ministries collaborate on Japan's biofuels policy, including: the Ministry of Economy, Trade and Industry (METI); the Ministry of Agriculture, Forestry and Fisheries (MAFF); the Ministry of Environment (MOE); the Ministry of Education, Culture, Sports, Science and Technology (MEXT); the Ministry of Land, Infrastructure and Transport (MLIT); and the Ministry of Internal Affairs and Communications (MIC). MOE's main concern is meeting Kyoto Protocol commitments, preventing global warming, and expanding the conversion of waste products into energy. METI collaborates with the energy industry and is interested in analyzing the cost-benefit of shifting to renewable fuels and their impact on automobiles and infrastructure, and thus is involved in feasibility studies. MAFF's goal is to produce biofuels domestically from existing sources (sugarcane, rice, rice straw and husks, and woody materials). However, the focus has shifted to the use of sources that are not used for food, e.g., cellulosic materials. METI funds research and development, oversees the New Energy and Industrial Technology Development Organization (NEDO) and conducts post-project technology evaluations. NEDO is currently managing several of the ongoing biomass studies in Japan.

Move toward Biofuels Sustainability Standards

[2] *According to the Petroleum Association of Japan (PAJ), the supply of biofuels in the transportation sector in 2012 was 210 thousand kl (oil basis), about 0.37 percent of domestic gasoline consumption. The PAJ plans to increase the supply quantity to 500 thousand kl (oil basis) by 2017, about 1 percent of domestic gasoline consumption. The GOJ aims to increase the rate to more than 3 percent by 2020.*

The increase in food prices in 2008 caused governments around the world to re-think their biofuels strategies. European policy makers have started to consider the feasibility of biofuels using an evaluation tool called the Life Cycle Assessment, which aims to calculate the environmental impact of a good, a process or a service "from cradle to grave." The impact includes all relevant environmental aspects, such as cumulative energy demand, climatic change, acidification, nitrification, land occupation, photochemical oxidation, eco-toxicity, human health, etc. After quantifying the energy and substances flows occurring at each step of the product/service life cycle (Life Cycle Inventory or LCI), the Life Cycle Impact Assessment (LCIA) transposes these flows into a potential impact, as per the main damage categories listed above. The results are mainly used in comparative approaches, in order to compare several scenarios ending with the same functional unit. In line with the global trends, the GOJ began to consider establishing its own sustainability standards for biofuels. METI, in cooperation with MAFF and MOE, set up a Study Panel to Discuss the Introduction of Sustainable Biofuels. The panel released an interim report in March 2010. The report recommends that: 1) Japan set the LCA's CO2 reduction level at 50 percent; 2) Japan increase domestic production of biofuels, which is currently 3 percent of the total supply, to more than 50 percent (this would include biofuels produced in other Asian countries, partially supported by GOJ funding); and 3) Japan emphasize cellulosic or other non-food materials to produce biofuels in order not to compete with the food supply. Based on the discussion by the panel, METI decided to treat biofuels as a source of greenhouse gasses and require oil companies to cut emissions. Though biofuels are treated as zero-emission fuels under the Kyoto protocol, the LCA method considers CO2 emissions of primary inputs, from cultivation of raw materials to transportation of the final products. In March 2010, MOE released the first version of the "LCA Guideline for Biofuels" for manufacturers and importers of biofuels in Japan for them to assess their biofuels businesses. In November 2010, METI applied this requirement to oil firms.

Government Incentives and Import Regimes

In 2008, the GOJ introduced tax incentives to encourage the use of bioethanol by amending the Act on the Quality Control of Gasoline and Other Fuels implemented by METI. The gas tax is usually ¥53.8 per liter (approximately $0.55). Under the new tax system, if a fuel contains 3 percent bioethanol, the gas tax is lowered by ¥1.6 per liter (about $0.02). In order to guarantee bio-gasoline quality, a registration system for bio-gasoline blenders was implemented.

In October 2008, the Law to Promote the Usage of Biomass Resources to Produce Biofuels came into force. The legislation includes tax breaks and financial assistance for biofuel manufacturers and farmers producing feedstock, such as agricultural cooperatives and private businesses. The government encourages collaboration of those two groups, and their plans will be monitored by MAFF in order to qualify for the benefits. Under the scheme, between 2008 and 2014, newly built biofuel facilities that are approved for the program will have their fixed property tax reduced by half for three years. Interest-free loans for a redemption period of ten years are provided to farmers producing feedstock.

Since 2008, to further encourage the use of Ethyl Tert-Butyl Ether (ETBE), the GOJ reduced its tariffs on ETBE imports, from 3.1 percent to zero. Under the Act on Temporary Measures concerning Customs, imports of ETBE derived from biomass continue to enjoy a zero tariff this year (from April 1, 2013 to March 31, 2014.)

III. Ethanol

Production

In Japan, there are about five refineries producing bioethanol for fuel. Production in 2012 was 31,700 kl is and likely to continue at the same level for a few years. When vehicles designed to use E10 become prevalent, production is expected to increase.

Initially, Japan's biofuels movement focused on traditional production techniques, analogous to those used in the United States and other producing countries. MAFF has joint partnerships with local agricultural cooperatives, as well as alcohol and trading companies, to operate several model plants. MOE, METI and others also have a number of projects in the works. The following is a description of a select few of the model plants and facilities in Japan.

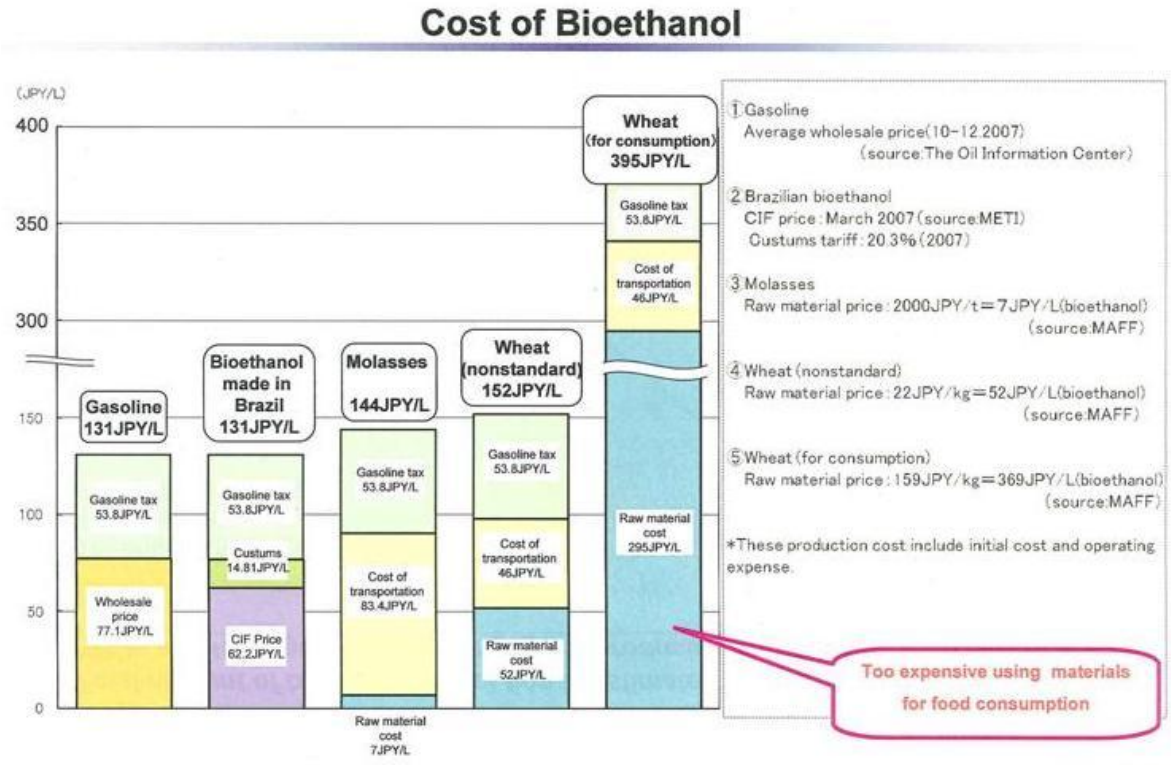
Utilizing MAFF's subsidies, which pay for up to 50 percent of the cost of building plants, two major facilities were built in Hokkaido, Japan's agricultural heartland, for launch in April 2009. One run by Oenon Holdings, a holding company of several sake breweries, is located in Tomakomai and is using rice. The other facility is in Shimizucho and is using off-spec wheat and sugar beets. The project in Shimuzucho is a public-private partnership between local private companies and Hokuren, the federation of agricultural cooperatives in Hokkaido. Oenon Holdings and Hokuren are the first plants producing commercially-viable ethanol in Japan, with an annual production of 15,000 kl each. That ethanol is used to produce ETBE. Approximately 33,000 MT of rice, 35,000 MT of wheat or 150,000 MT of sugar beets are needed to produce 15,000 kl of ethanol.

There is one model plant in Niigata that is operated by JA Zen-noh, a federation of agricultural cooperatives, with MAFF's support. It uses high yield rice grown specifically for biofuel production (800 kg/1,000 m2 compared to 500 kg/1,000 m2 in table rice yield). The project began in 2006 using fallow land set aside in MAFF's acreage reduction plan. In 2009, the facility began to produce 1,000 kl of bioethanol requiring about 2,250 tons of rice. The ethanol is used as part of an E3 blend, and its sales began in March 2009 at 20 affiliated gas stations around the Niigata Prefecture. In addition, there are ten more ethanol facilities nationwide, including two in Okinawa - one using sugar cane as the fuel stock and the other using wasted molasses. These facilities are small-scale, built for bioethanol verification projects supported by the GOJ.

In order for the operation of these plants to make economic sense, these commodities must be purchased at significantly lower market prices. For example, in the case of rice, the procurement price would have to be cheaper than that of feed-quality rice, which is already one-fifth the price of table rice. Similar to rice prices, the government also tightly manages the price of wheat and sugar beets. Therefore, there is little incentive for farmers to sell these commodities at a price ethanol plants can afford unless the GOJ provides an additional incentive to support the price gap. As a result, the production of bio-ethanol in Japan is not likely to increase substantially.

Over the past few years, the emphasis for bioethanol production has shifted to research and development of cellulosic technology using readily available inputs that will not compete with the food supply, e.g.

rice straw. Other approaches are designed to study the sustainability and the Life Cycle Assessment of biofuel and to reduce the cost of production.



Source: Ministry of Agriculture, Forestry and Fisheries

Previously, biofuels policy was aimed at nurturing agriculture and revitalizing rural communities, and one of the ways of doing so was to increase agricultural production. The use of existing feedstock such as rice straw and off-spec wheat was also included in the initial plan, and is now receiving the most focus. This is in part a reaction to the "food vs. fuel" debate prominent in the Japanese media. It also reflects a strategic refocus on how Japan can best achieve its goals in the biofuels sector. Taking used vegetable oil, rice straw or even certain rice stocks off the market does not take away from existing markets for feed. Even if ethanol production facilities operating in Japan absorb traditional commodities like rice or sugar beets, their impact on the existing food and feed markets would be negligible, because the amounts utilized are very small portions of the total supply of these commodities.

Rice used in ethanol production is only about 0.4 percent of total rice production; wheat and sugar beets used in ethanol production are 0.6 percent and 3.5 percent, respectively.

Consumption

Japan's consumption of ethanol for fuel is very small due mainly to the distribution channel for ethanol blended gasoline being very limited compared to that for bio-ETBE gasoline. Post expects that, if ethanol blended gasoline became available at more gasoline stations, consumption for ethanol for fuel would increase.

There are 80 million automobiles in Japan (gas and diesel), and domestic fuel consumption is around 53 million kl per year for gasoline and 26 million kl per year for diesel. If a three percent ethanol blend gasoline (E3) were nationalized, it is estimated that demand for ethanol would be around 1.6 million kl. Similarly, if a ten percent ethanol blend gasoline (E10) were nationalized, demand would increase to around 5 million kl per year.

In order to help reduce the GHG emission, Japanese auto industry is promoting so called "clean energy vehicles," which include battery cars, hybrid, and natural gas fueled cars. Among those, hybrid cars are most prevalent in Japan, with the number exceeding 2 million in 2011.

Number of Clean Energy Vehicles						
	2006	2007	2008	2009	2010	2011
Battery cars	9,421	9,358	8,850	8,638	16,882	32,229
Hybrid cars	343,626	429,274	536,473	983,996	1,418,779	2,033,141
Natural gas fueled cars	30,430	33,051	35,828	37,381	38,716	39,659
Total	383,477	471,683	581,151	1,030,015	1,474,377	2,105,029
Source: Japan Automobile Manufacturers Association						

In 2012, a new standard for vehicle fleet efficiency was established for gasoline fueled passenger vehicles. The standard has set a goal to attain vehicle fleet efficiency of 20.3 km per liter by 2020, compared to the 2009 level of 16.3 km per liter. The auto industry is putting more efforts into developing technologies to improve efficiency.

There are two methods for blending bio-ethanol with gasoline, "direct blending" and "ETBE." In Japan, MOE promotes direct blending, while METI supports the ETBE method. The reason for the latter is that it is more costly for oil distributors to renovate the facilities for direct blending. One report estimates the cost to replace or upgrade existing infrastructure would be Yen300-500 billion ($3-5 billion). MAFF has favored promoting direct blending. However, it is yielding to support the ETBE method in order to secure the distribution channel for domestically produced bio-ethanol.

Japan's ethanol blend limit remains relatively low, at 3 percent. A number of potential hazards were raised, including automobile part corrosion. However, as a result of feasibility studies conducted to look at the potential of introducing a 10 percent blend, the GOJ has permitted sales of E10 gasoline and vehicles designed to use E10 or ETBE22[3] fuels since April 2012. Japanese automakers have started to introduce some new automobile models that can run on E10 or ETBE22.

The GOJ has 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. E3 usage is still quite limited in Japan. For example, in Osaka, a multi-year feasibility project was completed in January 2012 during which, the number of cars registered to use E3 gasoline reached more than 1,700. During this project, up to 18 gasoline stations in Osaka and nearby prefectures sold E3 gasoline. However, since the project ended, only eight gasoline stations in Osaka and the nearby Wakayama and Kyoto prefectures continue to sell E3 gasoline. In Miyako Island, Okinawa, E3 and E10 gasolines are sold at four gasoline stations. These are projects supported by MOE to promote direct blending.

[3] *The current blend rate of ETBE into gasoline is 7 percent. The gasoline blended with 22 percent of ETBE will be marketed in the near future.*

Meanwhile, PAJ sells bio-gasoline, regular gasoline blended with seven percent bio-ETBE. The bio-gasoline is currently sold at 3,430 gas stations throughout Japan and sold at the same price as that of regular gasoline, though the production cost is higher by ¥7~8 per liter (approximately $0.07~0.08.) The difference is currently borne by the industry alone, as the government support ceased at the end of fiscal year 2008.

In 2011, an oil wholesaler began selling E3 gasoline at affiliate gas stations in the Ibaraki Prefecture. The E3 gasoline was made and supplied by Brazil-Japan Ethanol Co., an affiliate of Petrobras, the Brazilian state-run oil supplier. Brazil-Japan Ethanol Co. itself started to supply E3 gasoline to gas stations affiliated with agricultural cooperatives in the Chiba Prefecture. Both Ibaraki and Chiba prefectures are located in the greater Tokyo metropolitan area. Though the production cost is higher than that of regular gasoline, the E3 gasoline is sold at the same price thanks to MOE subsidies.

Trade

Imports of ethanol for transportation are small. Joint ventures established between Japanese and Brazilian firms started imports of ethanol for fuel in 2011. Because Japan's fuel ethanol market is still small, imports are not expected to increase substantially in the immediate future. MOE aims to supply 1.9 million kl of ethanol by 2020. Of the total, 0.9 million kl will be imports.

Japan's imports of ETBE are greater than those of ethanol for fuel. In 2012, it imported nearly 680 thousand kl of bio-ETBE from the United States. Imports of ETBE are expected to continue at the same level as in recent years.

Imports of Bio-ETBE (Kilo Liters) HS2909.19-010

Calendar Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Imports	0	7,500	6,694	56,923	699,533	692,837	678,983	700,000	700,000
Calculated volume of bioethnaol		3,214	2,869	24,396	299,800	296,930	290,993	300,000	300,000

Source: The World Trade Atlas

Japan is engaged in a mixture of public and private investment and development projects in other countries. In terms of development, in order to help reduce greenhouse gas emissions, Japan has been providing technical assistance to Southeast Asian nations, particularly Thailand and Vietnam, since 2010. Several Japanese trading companies have invested in Malaysia and Indonesia to produce biodiesel from palm oil, and bioethanol from sugar cane and jatropha. Some Japanese trading companies have also shown interest in Brazilian ethanol investments. This includes sugar cane farms, as well as the associated ethanol production facilities. For example, in July 2008, Mitsui and Petrobras announced a joint venture in the Brazilian state of Goias. One of their main goals is to export sugar-based ethanol overseas, including to Japan. In 2009, the firm started operating its ethanol facility with a production capacity of 200 thousand kl a year. In addition, Sojitz Corporation has expanded investment in its Brazilian joint venture to increase exports to Japan and Europe by aiming to triple the output capacity to 3.5 million kl by 2015.

Ethanol Used as Fuel and Other Industrial Chemicals (Kilo Liters - specify unit)									
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Beginning Stocks	22,274	62,214	77,563	86,187	40,688	90,920	126,760	135,717	133,567
Fuel Begin Stocks		0	0	0	0	0	0	0	0
Production	206,623	194,965	198,334	234,374	193,573	184,749	190,745	190,000	190,000
Fuel Production	30	90	200	15,000	25,300	27,700	31,700	31,700	31,700
Imports [1]	193,733	182,241	182,762	149,611	274,199	277,749	245,076	240,000	240,000
Fuel Imports [2]	0	0	0	0	0	1,000	1,000	1,000	1,000
Exports	156	193	194	10,787	4,820	4,667	1,010	150	150
Fuel Exports	0	0	0	0	0	0	0	0	0
Consumption	358,260	361,664	372,278	418,697	412,720	421,991	425,854	432,000	432,000
Fuel Consumption	30	90	200	15,000	22,300	28,700	32,700	32,700	32,700
Ending Stocks	62,214	77,563	86,187	40,688	90,920	126,760	135,717	133,567	131,417
Fuel Ending Stocks	0	0	0	0	0	0	0		
Production Capacity									
Number of Refineries	28	29	33	34	34	34	34	34	34
Nameplate Capacity	555,336	622,163	606,501	638,647	656,397	656,397	656,397	656,397	656,397
Capacity Use (%)	37%	31%	33%	37%	29%	28%	29%	29%	29%
Co-product Production (1,000 MT)									
Co-product A									
Co-product B									
Feedstock Use (1,000 MT)									
Sugar cane	1	1	1	1	1	1	1	1	1
Sugar beets	1	1	1	1	1	1	1	1	1
Rice for non-food purpose	1	1	1	1	1	1	1	1	1
Wood and lumber wastes	0	0	1	5	10	20	20	20	20
Market Penetration (Kilo Liters - specify unit)									
Fuel Ethanol	30	90	200	15,000	22,300	28,700	32,700	32,700	32,700
Gasoline	60,840,334	59,805,380	57,246,818	57,447,164	58,379,483	56,684,148	57,094,189	55,874,000	54,854,000
Blend Rate (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
[1] HS2207.10-121									
[2] Post estimates by information available.									
Sources: Ministry of Economy, Trade and Industry; Ministry of Agriculture, Forestry and Fisheries; The World Trade Atlas									

IV. Biodiesel

Japan's production and exports of biodiesel increased last year due to expanding private sector operations. This trend is expected to continue in the coming year as further expansion is anticipated. Japan's biodiesel consumption is expected to increase with the expansion in supply. Although Japan's biodiesel market is small, it has the potential to grow given the size of total diesel demand and the use of biodiesel as a substitute.

Municipal governments and regional non-profit organizations are participating in small-scale bio-diesel projects called "Rapeseed Project." Currently, there are about 118 projects. The projects involve growing rapeseed to produce cooking oil, collecting the used oil, and recycling it as biodiesel fuel. The biodiesel fuel is sold, for example, at stores of consumer cooperative societies who are participating in the projects for about ¥90 (approx. $0.91) per liter. There is another project by the City of Kyoto to collect used vegetable oil from restaurants and individual households. The oil is processed into biodiesel fuel at the city's refinery, which produces 5 kl per day. Approximately 1,300 kl of biodiesel fuel is produced annually in the refinery and used for the city's garbage trucks (B100) and municipal buses (B20).

In Kyoto, there is a private company producing bio-diesel fuel from used vegetable oil. The firm started from a citizen's group whose activities included collecting used cooking oil for the purpose of

environmental protection. To date, the firm has established its own network to collect used cooking oil from individual households, restaurants, and any public or private organizations nationwide. Its refinery in Kyoto can produce 30 kl of biodiesel fuel per day. According to the company, it is the largest biodiesel fuel refinery in Japan by capacity. In 2011, the company started exports of bio-diesel fuel to the Netherlands. Its exports increased in 2012, and it is eager to expand exports further in the future.

Although the most common feedstock for bio-diesel production in Japan is used cooking oil, research is now being conducted to study algae as a potential feedstock for producing biofuel. It is said that the total amount of used cooking oil discharged annually in the country is about 450 thousand metric tons, from which about 410 thousand kl of bio-diesel can be produced. Given that Japan's annual consumption of diesel fuel or light oil is about 40 million kl, it is necessary to develop or find another feedstock source. In June 2010, MAFF started a joint research project with private firms and universities to produce biofuel from algae. The research is designed to extract oil produced by *Pseudochoricystis* algae and to develop mass production technology. The goal is to commercialize the fuel as a substitute for diesel by 2020. If the effort is successful, it is estimated that algae-based biofuel could meet 10 to 20 percent of domestic demand for diesel.

Biodiesel (Kilo Liters - specify unit)									
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Beginning Stocks		0	0	0	0	0	0	0	0
Production [1]	5,000	7,000	7,500	9,000	10,000	12,000	14,000	14,800	15,000
Imports [2]							82	113	120
Exports [2]						1,500	2,340	2,800	3,000
Consumption [3]	5,000	7,000	7,500	9,000	10,000	10,500	11,742	12,113	12,120
Ending Stocks									
Production Capacity									
Number of Biorefineries [3]	22	50	75	70	70	70	70	70	70
Nameplate Capacity [3]	22,000	50,000	75,000	78,000	78,000	78,000	78,000	78,000	78,000
Capacity Use (%)	22.7%	14.0%	10.0%	11.5%	12.8%	15.4%	17.9%	19.0%	19.2%
Feedstock Use (1,000 MT)									
Used cooking oil [4]	20	28	30	36	40	48	56	59	60
Feedstock B									
Feedstock C									
Feedstock D									
Market Penetration (Kilo Liters - specify unit)									
Biodiesel, on-road use	4,700	6,580	7,050	8,460	9,400	11,280	13,160	13,912	14,100
Diesel, on-road use									
Blend Rate (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Diesel, total use	41,011,501	44,046,422	47,155,035	44,050,728	43,887,953	41,639,022	39,722,464	37,577,450	35,548,268

[1] Post has revised historial data based on information available.
[2] HS Code 3826.00. Biodieseil was harmonized in 2012. For the exports, the number before 2012 is post's estimate.
[3] Post's estimates based on available information.
[4] Post's estimate with the average recycle rate of 90.4%.
Sources: Japan Organic Recycling Association; Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade and Industry; The World Trade Atlas

V. Advanced Biofuels

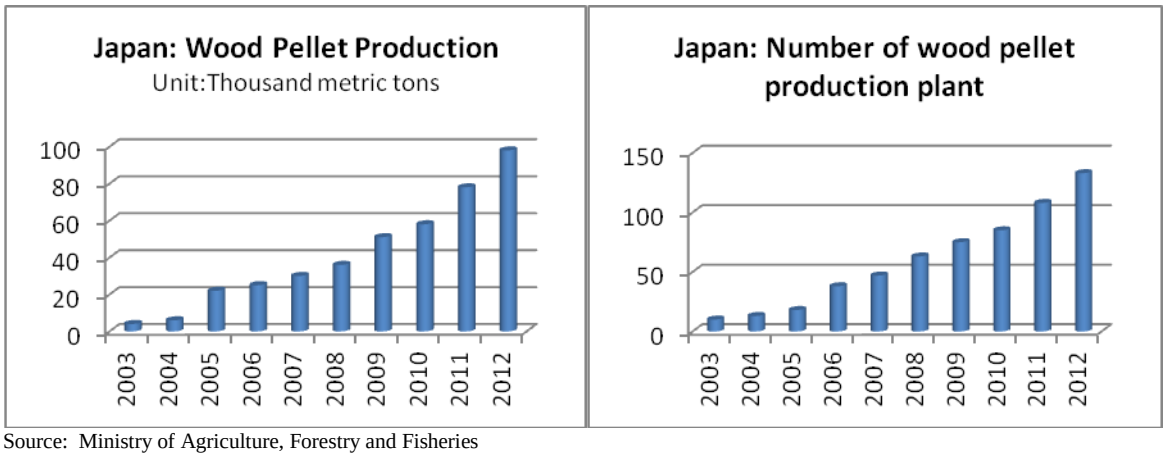
Japan's scientific community, including universities and public and private research institutions, has been expending significant effort toward basic and applied research related to biofuels. Recently, the focus of this research has shifted to cellulosic sources and technologies in light of recent discussion on the sustainability of biofuels. In June 2010, the U.S. Government and the GOJ agreed to start a joint research project on new production methods of biofuels to contribute to the reduction of greenhouse gas

emissions. In November 2011, the U.S. National Science Foundation and Japan Science Technology Agency announced that four joint U.S. and Japanese research teams were awarded funding totaling approximately $12 million. Each project will last three years, but could be extended for another two years based on the results of an evaluation to be conducted during the third year. The projects include a study on effective methods to produce fuel from algae.

The Bioethanol Division of a private company in Osaka City that operates facilities to process waste products and materials to recycle started to produce ethanol from wood and lumber wastes in 2007. The company's estimated production of ethanol was 7,000 kl in 2012. Indication was that the ethanol was supplied to several gasoline stations that sell E3 gasoline in Osaka and a couple of other neighboring prefectures.

VI. Biomass for Heat and Power

Production and imports of wood pellets are increasing in Japan. Since the GOJ's Biomass Nippon Strategy was unveiled in 2002, introduction of pellet boilers and stoves in public facilities and ordinary households has expanded. Accordingly, the number of plants and production of pellets have increased significantly. In 2003, Japan's production of wood pellets was 3.8 thousand metric tons, and there were ten plants. By 2011, the production of wood pellets increased about 20-fold to 78 thousand metric tons and more than 100 plants. Power companies started to use wood pellets as a stable source for thermal power generation, though coal is still the main source. The companies use imported wood pellets, as prices are lower compared to those produced domestically. In Japan, 48 out of 50 nuclear power reactors are currently shut down due to the national debate on the safety of nuclear power generation aroused in the wake of the nuclear power plant accident in Fukushima. Power companies are forced to rely on other methods to generate power. Hence, imports of wood pellets are expected to increase further.



Source: Ministry of Agriculture, Forestry and Fisheries

Wood Pellets (1,000 MT)									
Calendar Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Beginning Stocks		0	0	0	0	0	0	0	0
Production	25	30	36	51	58	78	86	93	100
Imports	14	14	42	59	73	74	72	78	80
Exports	4	4	4	3	3	4	4	4	4
Consumption	35	40	74	107	129	147	154	168	177
Ending Stocks									
Production Capacity									
Number of Plants	38	47	63	75	85	108	120	130	140
Nameplate Capacity									
Capacity Use (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Sources: Ministry of Agriculture, Forestry and Fisheries; Japan Woode Pellet Associaion; The World Trade Atlas									

VII. Notes on Statistical Data

Table - Fuel Use Projections (Unit: Kilo Liters)

Note: Numbers for 2018 onwards are forecast by Post.
Source: Ministry of Economy, Trade and Industry

Table - Number of Clean Energy Vehicles

Source: Japan Automobile Manufacturers Association

Table - Imports of Bio-ETBE (Unit: Kilo Liters) HS2909.19-010

Source: The World Trade Atlas

Table - Ethanol Used as Fuel and Other Industrial Chemicals (Unit: Kilo Liters)

[1] HS2207.10-121
[2] Post estimates by information available.
Sources: Ministry of Economy, Trade and Industry; Ministry of Agriculture, Forestry and Fisheries; The World Trade Atlas

Table - Biodiesel (Unit: Kilo Liters)

[1] Post has revised historial data based on information available.
[2] HS Code 3826.00. Biodieseil was harmonized in 2012. For the exports, the number before 2012 is post's estimate.
[3] Post's estimates based on available information.
[4] Post's estimate with the average recycle rate of 90.4%.
Sources: Japan Organic Recycling Association; Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade and Industry; The World Trade Atlas

Charts - Japan: Wood Pellet Production and Japan: Number of Wood Pellet Production Plant

Source: Ministry of Agriculture, Forestry and Fisheries

Table - Wood Pellets (1,000 MT)

Sources: Ministry of Agriculture, Forestry and Fisheries; Japan Wood Pellet Association; The World Trade Atlas