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Japan

Biofuels Annual

Market for Liquid Transport Biofuels Remains Steady as Japan Remains Focused on Advanced Fuels

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Report Highlights:
Japan's current renewable energy policy focuses on generating power from solar, wind, and geothermal sources. Imports of wood pellets have been increasing for thermal power generation. For biofuels, the Government of Japan (GOJ) maintains its 2010 plan to introduce 500 million liters (crude oil equivalent) of biofuels by 2017. 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 technology to produce biofuels from sources that do not compete with food.

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I. Executive Summary

Japan's current renewable energy policy focuses on generating power from solar, wind, and geothermal sources. For biofuels, the Government of Japan (GOJ) maintains its 2010 plan to introduce 500 million liters (crude oil equivalent) of biofuels by 2017, and has required the oil industry to meet the goal. The oil industry decided to introduce 1,940 million liters of bio-ETBE, which is equivalent to 500 million liters of biofuel, to the Japanese market. The discussions to set a target for after 2017 are likely to start this year.

Bio-Ethyl Tert-Butyl Ether (ETBE) blended gasoline is far more prevalent than E3 gasoline as it is widely distributed. In 2012, the GOJ permitted sales of E10 and ETBE22 gasoline and vehicles designed to use these biofuels; however, this change has had a limited effect on the market as the supply of E3 and E10 remains small compared to that of bio-ETBE gasoline. The Japanese petroleum industry does not have any plans to supply ETBE22 gasoline.

When considering biofuels, there are two significant issues that Japan takes into account: 1) food-vs-fuel and 2) carbon emissions.

Japan has a low food self-sufficiency rate; imports comprise the majority of the food it consumes. As a result, Japanese people are highly sensitive to issues of rising food prices, leading to 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, which is not seen to compete with food.

Japan has established its own sustainability standards for biofuels and only allows for bioethanol with a CO2 emission of less than 50 percent that of gasoline. The GOJ used the Life Cycle Assessment (LCA) to calculate the CO2 emissions of the entire chain, from the initial cultivation of the raw material to the transportation of the final product to the end consumer, and concluded that only Brazilian sugarcane ethanol meets Japan's sustainability standards. Based on available sources, Japan's imports of ethanol for fuel in 2014 were estimated to be approximately 65 million liters, all of which was imported from Brazil.

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

Major Ministries Involved in Biofuel Policy

A number of ministries collaborate on Japan's biofuels policy, but three ministries - the Ministry of Economy, Trade and Industry (METI), the Ministry of Environment (MOE), and the Ministry of Agriculture, Forestry and Fisheries (MAFF) – play major roles in developing and implementing biofuels policies. MOE's main concerns are preventing global warming and meeting Japan's commitment to reduce its greenhouse gas (GHG) emissions. In May 2015, Japan announced its commitment to reduce its 2013 levels of GHG emissions by 26 percent by 2030. In terms of energy security, METI is interested in biofuels as a supplemental source of fuel and is interested in analyzing the cost-benefit of shifting to renewable fuels and their impact on automobiles and infrastructure. METI collaborates with the oil industry to introduce biofuels in the market. MAFF's goal is to revitalize rural communities by producing biofuels domestically from existing sources (e.g., sugar beets, wheat, and rice).[1] However, its focus has shifted to producing renewable energies (e.g., heat and power) from livestock and wood wastes.

Policy Goals

On April 11, 2014, Japan published its Basic Energy Plan for the next five years. This strategy considers renewable energies as important sources of energy mainly for three reasons: (1) Japan needs to increase its domestic production of renewable energy to ensure a stable supply. This has become especially important since the 2011 Great East Japan Earthquake, when all of the nuclear reactors were shut down, as Japan's imports of energy for generating power have increased by approximately three trillion yen (approximately $30 billion); (2) To prevent global warming; and (3) To promote a dispersed power system to revitalize regional economies.

Japan aims to increase the share of its power supply from renewable energy sources to 22-24 percent by 2030. For biofuels, the Basic Energy Plan states that "Concerning biofuels, which are mostly imported, Japan continues to introduce the fuels in light of international trends and technical development of the next generation of biofuels." According to sources, this statement indicates the GOJ's belief that biofuels from sources that do not compete with food, e.g., cellulosic ethanol, are to be considered as part of Japan's energy supply. Under the Sophisticated Methods of Energy Supply Structure Act, the GOJ requires oil refiners to supply 500 million liters (crude oil equivalent) of biofuels by 2017[2]; discussions to set a target for after 2017 are likely to start this year.

[1] In 2014, MAFF discontinued providing assistance to three projects producing bioethanol for fuel, because it determined that, without government support, high production costs - including an increase in feedstock prices - make continuation of these businesses extremely difficult.

[2] In order to meet the requirement, the oil industry has decided to supply 1,940 million liters of ETBE by 2017.

Road Map to Introduce Bio-ETBE in Japanese Market by the Oil Industry (Million Liters)											
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Introduction Bio-ETBE - Road Map	Test marketing period		200	840	→	→	→	→	→	→	1,940
Bio-ETBE: Penetration in Japaense Market											
Domestic Production of Bio-ETBE*	0	0	143	140	175	175	175	175			
Imports of Bio-ETBE	8	7	57	700	693	679	787	1,081			
Total	**8**	**7**	**200**	**840**	**868**	**854**	**962**	**1,256**	→	→	1,940
Calculated volume of bioethanol	3	3	85	356	368	362	408	532			822
Sources: The World Trade Atlas; Petroleum Association of Japan											
* Post's Estimate based on available sources.											

Government Incentives

In 2008, the GOJ introduced tax incentives to encourage the use of bioethanol by amending the Quality Control of Gasoline and Other Fuels Act. The gas tax is usually ¥53.8 per liter (approximately $0.53). Under the special measure, if a fuel contains 3 percent bioethanol, the gas tax is lowered by ¥1.6 per liter (about $0.02). It is a fixed-term special measure, which is effective until March 31, 2018.

Also in 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 are monitored by MAFF in order to qualify for the benefits. Under the scheme, newly built biofuel facilities that are approved for the program by 2016 will have their fixed property tax reduced by half for three years. The redemption period for interest-free loans for farmers will be extended by two years, to a total of 12 years, for farmers producing feedstock.

Sustainable Standards

In 2010, MOE released the first version of the "Life Cycle Assessment (LCA) Guideline for Biofuels" to allow manufacturers and importers of biofuels in Japan to assess their biofuels businesses.[3]

The GOJ established its own sustainability standards for biofuels. METI notified oil distributors that, in light of the LCA, GHG emissions from bioethanol they procure must be less than 50 percent that of gasoline, and the bioethanol must not compete with the food supply. According to METI's LCA analysis, the only source of bioethanol which can fulfill Japan's GHG emissions requirements is bioethanol from sugar cane grown on existing farmland in Brazil.

Feed-in Tariff System

In 2012, the GOJ introduced a feed-in tariff (FIT) system for electricity from renewable energy sources such as solar and wind power. Under the system, power companies are obliged to buy electricity at set rates. The rates are reviewed annually and are expected to lower as the costs incurred by power companies to buy electricity from renewable energy sources are passed on to consumers through increased electricity rates. Since the system was introduced, the number of power generating facilities using renewable energies has steadily increased.

[3] For more details about LCA, refer to GAIN JA4018.

FIT Purchase Rates for FY2015	
Solar power	Y27-35 (approximately $0.27-0.35) per kWh
Wind power	Y22-55 (approximately $0.22-0.55) per kWh
Geothermal power	Y26-40 (approximately $0.26-0.4) per kWh
Biomass derived power	Y13-40 (approximately$0.13-0.4) per kWh

In 2013, renewable energy accounted for 10.7 percent of Japan's total power supply. Hydropower accounts for 8.5 percent. Although the GOJ aims to increase the proportion of renewable energies to more than 20 percent, this goal may be challenged by the high cost of generating power from renewable sources. For example, the cost born by consumers in 2014 for the FIT system was ¥0.75 per kilowatt-hour, for a total of ¥650 billion (approximately $6.4 billion). This issue of high costs was addressed by the METI Minister during the first meeting of the Council of Ministers for Renewable Energies in April 2014, where member ministers agreed that the high cost of renewable energies needed to be reduced in order to expand their use.

Trends in Fuel Use

The GOJ estimates that gasoline and diesel demands will continue to decrease, mainly due to three factors: (1) the decrease in the number of automobiles as a result of the decline in Japan's population, (2) improved vehicle fuel efficiency, and (3) the increase in energy-saving automobiles, such as hybrid cars. In 2014, demand for gasoline was 53 billion liters, and the demand for diesel was 34 billion liters. By 2020, Japan's gasoline and diesel demands are forecast to decrease to 47 billion liters and 33 billion kl respectively. Demand for jet fuel is expected to decline slightly due mainly to improvement in airplane fuel efficiency.

Japan's transportation sector (excluding railways) depends on fossil fuel for 98 percent of its energy, followed by electricity (two percent) and natural gas (0.1 percent). In its 2014 Basic Energy Plan, the GOJ stated that it will promote diversification of energy sources in the transportation sector. Biofuels are considered to be an important energy source along with electricity, natural and LP gases, and hydrogen. Although the demand for jet fuel is expected to decline, the GOJ projects that the proportion of the use of biofuels in jet fuel will increase in the future.

Fuel Use Projections (Millions of Liters)										
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gasoline Total	51,823	50,678	49,458	48,310	47,160	46,038	44,942	43,872	42,828	42,057
Diesel Total	33,761	33,571	33,564	33,532	33,465	33,398	33,331	33,264	33,197	33,131
Jet Fuel Total	5,123	5,062	5,061	5,046	5,021	4,996	4,971	4,946	4,921	4,896
Total Fuel Markets	90,707	89,311	88,083	86,888	85,646	84,432	83,244	82,082	80,946	80,084
Source: Ministry of Economy, Trade and Industry										
Notes:										
- Numbers for 2020 onwards are forecast by Post.										
- Years are Japanese fiscal year, April - March.										

III. Ethanol

Production

Most ethanol in Japan is imported. Japan imports un-refined ethanol, which is then distilled to produce refined ethanol for industrial purposes. Currently, two companies produce approximately one million liters of ethanol annually from ethylene for the use of industrial chemicals, and three refineries produce approximately two million liters of ethanol from feedstock for fuel in Japan.

Refineries of Ethanol for Fuel		
Location	**Feedstock**	**Estimated production in 2014**
Niigata Prefecture	Rice for non-food purpose	0.4 million liters
Okinawa Main Island	Molasses	1.6 million liters
Okinawa Miyakojima Island	Molasses	15 thousand liters

Of those three facilities, one is located in Niigata Prefecture and is operated by JA Zen-noh, a federation of agricultural cooperatives. It uses high yield rice grown specifically for biofuel production. The facility produces approximately 0.4 million liters of bioethanol from rice annually. The ethanol is used as part of an E3 blend, and the E3 gasoline is sold at six affiliated gas stations around Niigata Prefecture.

The two other facilities are located in Okinawa Prefecture; one is on the main island of Okinawa, and the other is on Miyakojima Island, about 300 kilometers southwest of the main island of Okinawa. The ethanol facility on the main island of Okinawa is supervised by MOE and produces approximately 1.6 million liters of ethanol from molasses, obtained from the process of making sugar from sugarcane. The facility on Miyakojima Island is run by the Miyakojima City Government in cooperation with a local oil supplier on Miyakojima Island. It also uses molasses to produce ethanol. It currently produces 15 thousand liters of bioethanol per year. The ethanol produced on those islands is used as part of an E3 and E10 blend and is sold at gas stations on the two islands.

In 2014, MAFF discontinued providing assistance to three refineries producing bioethanol for fuel, because it determined that, without government support, high production costs - including an increase in feedstock prices - make continuation of their business extremely difficult. Two of those refineries produced approximately 24 million liters of bioethanol annually in Hokkaido. They sold the bioethanol to Japan Biofuels Supply LLP, a company established jointly by PAJ member companies, to produce ETBE. Since MAFF discontinued its support, they have shut down their operations. The third is the refinery in Niigata Prefecture noted above. It continues to operate but has reduced production to less than half of what it used to produce.

Domestic Production of ETBE

In 2010, Japan Biofuels Supply LLP started to produce ETBE domestically. Each year, the company produces 140 million liters of ETBE, and utilizing 59 million liters of ethanol. Previously, both domestically produced and imported ethanol was used to make ETBE, but since the two ethanol refineries in Hokkaido were shut down, the company is now forced to rely on imported ethanol.

Consumption

Two Blending Methods in Japanese Market

There are two methods for blending bioethanol 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.

Biofuels Blend Rates

Japan's direct blend limit for ethanol is regulated in the Gasoline Quality Assurance Law at three percent (E3). The blend rate of ETBE into gasoline is seven percent. In April 2012, the law was revised to allow the sale of types of gasoline blended with 10 percent of ethanol (E10) or 22 percent of ETBE (ETBE22). The E10 or ETBE22 gasoline is only allowed to be used with vehicles designed to use E10/ETBE22 fuel. Japanese automakers have started to introduce some new automobile models that can run on E10 or ETBE22, but the number of these cars is very small.

Consumption and Distribution Channel

In Japan, ethanol is primarily used for food processing, cosmetics and toiletry products, and medical and hygienic purposes. Japan's consumption of ethanol for fuel is very small mainly due to the distribution channel for ethanol blended gasoline (E3/E10) being very limited compared to that for ETBE blended bio-gasoline. E3/E10 gasoline is available only in a few prefectures, e.g., Okinawa, Osaka, and Niigata. However, ETBE blended bio-gasoline is available throughout the nation. Consumption of ETBE blended bio-gasoline is expected to increase over the next few years as the PAJ is mandated to introduce 1,940 million liters of ETBE by 2017.

Trends in Engine Technology

In order to help reduce its GHG emissions, the Japanese auto industry is promoting so called "clean energy vehicles," which include electric, hybrid, and natural gas fueled cars. Japanese auto companies have started to sell hydrogen fuel cell vehicles this year. Since the GOJ introduced subsidies and tax incentives for "clean energy vehicles" in 2009, the number of these kinds of vehicles has been increasing, with the total number of "clean energy vehicles" in Japan exceeding four million in 2013. Although clean energy vehicles still only account for 5.4 percent of the total number of automobiles in Japan, their numbers are expected to increase further.

Number of Clean Energy Vehicles					
	2009	2010	2011	2012	2013
Hybrid cars					3,870,000
Plug-in hybrid cars					30,000
Battery cars					54,000
Natural gas fueled cars					41,000
Clean diesel cars					145,000
Total	1,030,000	1,480,000	2,110,000	3,020,000	4,140,000
Source: Japan Automobile Manufacturers Association					

Development in Vehicle Fleet Efficiency

In 2012, a new standard for vehicle fleet efficiency was established for gasoline fueled passenger vehicles. The goal of the new standard is 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 effort into developing technologies to improve efficiency to achieve this goal.

Trade

In 2014, Japan imported 523 million liters of ethanol for transportation. According to available information, all imported ethanol for fuel comes from Brazil.

In 2009, Japan Biofuels Supply LLP started to import ethanol to produce ETBE domestically. It imported approximately 35 million liters of ethanol each year through 2014. The import quantity is expected to increase to approximately 59 million liters as a result of the two major suppliers of ethanol for fuel in Hokkaido closing their operations.

In 2010, a joint venture established between Japanese and Brazilian companies started importing ethanol for fuel. The company supplies ethanol for fuel mainly in Okinawa Prefecture.

Imports of ETBE are greater than those of ethanol for fuel. In 2014, Japan imported 1,211 million liters of bio-ETBE from the United States. Imports of bio-ETBE are expected to increase further, as the PAJ aims to supply 1,940 million liters of bio-ETBE by 2017. Of these, 1,800 million liters is projected to be imported from the United States since PAJ has a purchase contract with a U.S. company.

Since 2008, to further encourage the use of ETBE, the GOJ reduced its tariff on ETBE imports from 3.1 percent to zero. Under the 2014 Temporary Measures concerning Customs Act, imports of ETBE derived from biomass continue to be tariff free through March 31, 2018.

PS&D – Ethanol

Ethanol Used as Fuel and Other Industrial Chemicals (Millions of Liters)										
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Beginning Stocks	53	35	30	6	16	10	3	15	19	13
Fuel Begin Stocks	0	0	0	0	4	3	3	2	2	1
Production	0	0	20	25	24	23	22	12	3	3
Fuel Production*	0	0	20	25	24	23	22	12	3	3
Imports	325	325	397	700	687	691	750	884	948	1,071
Fuel Imports*	3	3	66	336	345	341	389	523	587	710
Exports	0	0	11	5	5	1	0	0	0	0
Fuel Exports	0	0	0	0	0	0	0	0	0	0
Consumption	343	330	430	710	713	720	760	892	957	1,086
Fuel Consumption	3	3	86	358	370	365	411	535	590	713
Ending Stocks	35	30	6	16	10	3	15	19	13	1
Fuel Ending Stocks	0	0	0	4	3	3	2	2	1	1
Total BalanceCheck	0	0	0	0	0	0	0	0	0	0
Fuel BalanceCheck	0	0	0	0	0	0	0	0	0	0
Production Capacity										
Number of Refineries	28	32	35	35	35	35	37	37	37	37
Nameplate Capacity	590	575	607	625	625	625	625	626	626	626
Capacity Use (%)	0%	0%	3%	4%	4%	4%	3%	2%	0%	0%
Co-product Production (1,000 MT)										
Co-product A										
Co-product B										
Feedstock Use* (1,000 MT)										
Molasses	0	1	1	1	2	5	8	8	9	9
Rice for non-food purpose	0	0	2	2	2	2	2	1	1	1
Off-spec wheat	0	0	25	31	31	28	25	0	0	0
Sugar beet	0	0	95	124	116	105	95	0	0	0
Market Penetration (Millions of Liters)										
Fuel Ethanol	3	3	86	358	370	365	411	535	590	713
Gasoline	59,076	57,473	57,347	55,643	57,215	56,207	55,419	53,022	53,187	51,823
Blend Rate (%)	0.0%	0.0%	0.1%	0.6%	0.6%	0.6%	0.7%	1.0%	1.1%	1.4%
Imports of Bio-ETBE (Millions of Liters) HS2909.19-010										
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Imports of Bio-ETBE	8	7	57	700	693	679	787	1,081	1,211	1,500
Calculated volume of bioethanol***	3	3	24	296	294	288	334	458	513	636

Sources: The World Trade Atlas; Ministry of Economy, Trade and Industry; Ministry of Agriculture, Forestry and Fisheries

Notes:

- * Post's estimates.
- ** The conversion factor for ETBE into ethanol is 0.4237l. Reference: METI's "Provisions related to the Sophisticated Methods of Energy Supply Structure Act" (http://www.enecho.meti.go.jp/notice/topics/017/pdf/topics_017_002.pdf). These numbers are reflected into the numbers of above Ethanol Imports.

IV. Biodiesel

Production

Japan's production of biodiesel is small, estimated at 14 million liters. Post estimates that the production will remain stable at this level, as the demand for biodiesel is not expected to grow. The most common feedstock for bio-diesel production in Japan is used cooking oil. 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 million liters of bio-diesel could be produced if there was sufficient demand.

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 project 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 five thousand liters per day. Approximately 1.3 million liters 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 also 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 thousand liters 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 are expected to increase further in the future.

Consumption

In 2013, Japan's gasoline consumption was 56,796 million liters, while that of diesel was 24,345 million liters in the transport sector.

Japan's blend rate for biodiesel is five percent (B5). By receiving special approval from METI, operators are able to use biodiesel with a blend rate higher than five percent for their trucks and buses, as is the case for the City of Kyoto.

According to the Japan Organic Recycling Association, approximately 94 percent of biodiesel in Japan is used for trucks and buses, and the rest is used for generating power.

According to an industry source, consumption of biodiesel in the transportation sector is not expected to increase much for a variety of reasons, such as the fact that the distribution channels are not established and the national blend rate has remained at a low five percent due to concern that fuel with a higher blend rate may cause engine trouble.

Japan's imports of biodiesel have been increasing. According to an industry source, biodiesel probably is imported for the use of generating power.

Trade

Since 2011, a private company in Kyoto has been exporting biodiesel to the Netherlands. (See Production section above.)

In 2014, Japan imported 614 thousand liters of biodiesel. Of these, 72 percent was from Malaysia and 20 percent was from Indonesia. The import tariff for biodiesel from Malaysia and Indonesia is zero due to

the economic partnership agreement between Japan and those countries. Otherwise, the import tariff is 3.9 percent.

Key Suppliers of Biodiesel to Japan				
Partner Country	Unit			
		2012	2013	2014
World	KL	82	492	614
Malaysia	KL	0	416	442
Indonesia	KL	0	0	124
Germany	KL	34	32	38
Austria	KL	0	0	9

Source: The World Trade Atlas

PS& D – Biodiesel

Biodiesel (Millions of Liters)										
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Beginning Stocks	0	0	0	0	0	0	0	0	0	0
Production*	7	8	9	10	12	14	14	14	14	14
Imports						0.1	0.5	0.6	0.6	0.6
Exports						2.3	3.1	3.2	3.2	3.2
Consumption*	7	8	9	10	12	12	11	11	11	11
Ending Stocks	0	0	0	0	0	0	0	0	0	0
BalanceCheck	0	0	0	0	0	0	0	0	0	0
Production Capacity										
Number of Biorefineries	74	74	74	74	74	74	74	74	74	74
Nameplate Capacity										
Capacity Use (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Feedstock Use (1,000 MT)										
Used Cooking Oil*	7	8	9	10	12	13	13	13	13	13
Feedstock B										
Feedstock C										
Feedstock D										
Market Penetration (Millions of Liters)										
Biodiesel, on-road use										
Diesel, on-road use	31,336	29,999	28,247	27,426	26,014	24,724	24,345	23,973	23,606	23,245
Blend Rate (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Diesel, total use										
Sources: Japan Organic Recycling Association; Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade										
Notes:										
- * Post's estimates based on available information.										
- ** Post's estimates with the average recycle rate of 90.4%.										
- *** Numbers are based on the annual survey conducted by the National Biodiesel Fuel Utilization Council										
- Numbers for 2015 are forecast by Post.										

V. Advanced Biofuels

Research and Development

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. The focus of this research is cellulosic sources and technologies in light of discussion on the sustainability of biofuels.

In 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. Another research project on producing biofuel from algae is conducted by a joint venture established by a major heavy machinery manufacturer and two bio-venture firms. The joint venture firm aims to produce jet fuel from algae and commercialize it by 2020.

Production and Consumption

The Bioethanol Division of a private company in Sakai City, Osaka that operates facilities to process waste products and materials to recycle started to produce ethanol from wood and lumber wastes in 2007. Its annual production capacity is 1.4 million liters. According to a source, for the first several years, the company supplied the ethanol to a couple of oil distributors who make E3 gasoline and then sell at the distributors' affiliated gas stations. However, because E3 gasoline has not come into wider use, the ethanol is not supplied to the oil distributors. The company is currently using most of the ethanol it produces to generate power to use at its facility, and it sells the rest of the ethanol to an industrial alcohol distributor.

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 for heating 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 2013, the production of wood pellets increased 29-fold to 110 thousand metric tons from 115 plants.

In Japan, all 48 nuclear power reactors are currently shut down due to the national debate on the safety of nuclear power generation that began in the wake of the nuclear power plant accident in Fukushima. Japan is now forced to rely on other methods to generate power.

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. Japan has a zero import tariff for wood pellets (HS4401.31).

In 2014, Japan's imports of wood pellets increased by 13 thousand metric tons from the previous year to 97 thousand metric tons. Of these, 91 thousand metric tons, or 94 percent, were imported from Canada, followed by Thailand (3 percent) and Vietnam (2 percent). Imports of wood pellets are likely to increase in the coming years because the trend of mixing wood pellets with coal for thermal power generation is expected to continue. Further, the number of thermal power facilities is projected to increase due to deregulation of electric power which starts in 2016.

Key Suppliers of Wood Pellets to Japan			
	Quantity (Metric Tons)		
	2012	2013	2014
World	71,981	83,769	96,745
Canada	66,470	72,151	90,676
Thailand	265	1,242	2,682
Vietnam	3,533	2,897	1,979
United States	233	326	563
Indonesia	15	629	410

Source: The World Trade Atlas

Wood Pellets (1,000 MT)										
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Beginning Stocks										
Production*	30	36	51	58	78	98	110	121	133	146
Imports**	14	42	59	73	74	72	84	97	111	127
Exports**	4	4	3	3	4	4	5	4	4	4
Consumption	40	74	107	128	148	166	189	214	240	269
Ending Stocks										
BalanceCheck	0	0	0	0	0	0	0	0	0	0
Production Capacity										
Number of Plants*	47	63	75	85	108	109	115	118	120	122
Nameplate Capacity										
Capacity Use (%)	#DIV/0!	#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 Wood Pellets Association; The World Trade Atlas										
Notes:										
- * Numbers for 2014 onwards are forecast by Post.										
- ** Numbers for 2015 onwards are forecast by Post.										

Since the introduction of the FIT program in 2012, the number of biomass power generation facilities has been increasing. At this time, there are 51 facilities that generate power from forest thinning and wood waste and are certified by ANRE, with a total generation capacity of approximately 750,000 kW. Currently, the amount of electricity generated from wood biomass power generation facilities is approximately 46,000 kW. Sources indicate that more such facilities are under construction, and power generation from wood materials is expected to increase further.

VII. Notes on Statistical Data

Table – Road Map to Introduce Bio-ETBE in Japanese Market (Unit: Million Liters)

Source: Petroleum Association of Japan; The World Trade Atlas
*Post's estimate based on available sources.

Table – FIT Purchase Rates for FY2015

Table – Fuel Use Projections (Unit: Million Liters)
Source: Ministry of Economy, Trade and Industry
Notes: - Numbers for 2020 onwards are forecast by Post.
- Years are Japanese fiscal year, April – March.

Table – Refineries of Ethanol for Fuel

Table – Number of Clean Energy Vehicles
Source: Japan Automobile Manufacturers Association

Table – PS&D Ethanol Used as Fuel and Other Industrial Chemicals (Unit: Million Liters)
Sources: Ministry of Economy, Trade and Industry; Ministry of Agriculture, Forestry and Fisheries; The World Trade Atlas
Notes: *Post's estimate based on information available.
**ETBE contains

Table – Key Suppliers of Biodiesel to Japan (Unit: Kilo Liters)
Source: The World Trade Atlas

Table – PS&D Biodiesel (Unit: Million Liters)
Sources: Japan Organic Recycling Association; Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade and Industry; The World Trade Atlas
Notes: - *Post's estimate based on available information.
- **Post's estimates with the average recycle rate of 90.4%
- *** Numbers are based on the annual survey conducted by the National Biodiesel Fuel Utilization Council
- Numbers for 2015 onwards are forecast by Post.

Table – Key Suppliers of Wood Pellets to Japan (Unit: Metric Tons)
Source: The World Trade Atlas

Table – PS&D Wood Pellets (Unit: 1,000 MT)
Sources: Ministry of Agriculture, Forestry and Fisheries; Japan Wood Pellet Association; The World Trade Atlas
Notes: - *Numbers for 2014 onwards are forecast by Post.
- ** Numbers for 2015 onwards are forecast by Post.