USDA Foreign Agricultural Service
GAIN Report
Global Agricultural Information Network

Required Report - public distribution

Date: 11/5/2018
GAIN Report Number: JA8093

Japan

Biofuels Annual

Japan Biofuels Annual 2018

Approved By:
Jess Paulson
Prepared By:
Midori Iijima

Report Highlights:
Japan's current renewable energy policy focuses on the generation of power from solar, wind, biomass, and geothermal sources. In April 2018, the Government of Japan (GOJ) extended its mandate to use 500 million liters (crude oil equivalent) of biofuels per year until 2022. It also revised its biofuel policy to allow up to 44 percent U.S. corn-based ethanol in imported bio-Ethyl Tert-Butyl Ether (ETBE), whereas before only Brazilian sugar cane ethanol was used. The revision also established an incentive for the introduction of next generation bioethanol (made from non-food sources). Japan continues to rely on woody biomass for cogeneration with coal, with imports reaching 506,000 metric tons (MT) in 2017.

Post: Commodities:
Tokyo

I. Executive Summary

Japan's current renewable energy policy focuses on the generation of power from solar, wind, biomass, and geothermal sources. The Government of Japan (GOJ) extended its mandate to introduce 500 million liters (crude oil equivalent) of biofuels until 2022. In turn, Japanese industry is expected to introduce 1.94 billion liters of bio-Ethyl Tert-Butyl Ether (ETBE) into the market in 2018, which contains 822 million liters of ethanol and is equal to 500 million liters (crude oil equivalent) of biofuels - nearly all of which will be imported. In April 2018, Japan revised its biofuel policy to allow up to 44 percent U.S. corn-based ethanol in imported ETBE, whereas before only Brazilian sugar cane ethanol was used. The first shipment of ETBE containing U.S. ethanol could arrive in Japan in mid-2019.

Bio-ETBE blended gasoline is far more prevalent than E3 gasoline and is widely distributed. There are two methods for blending bioethanol with gasoline: "direct blending" and "ETBE." The oil industry in Japan promotes the ETBE method because the industry supply chain is currently structured to deliver ETBE and a change to direct blending would require new investments in blending, storage and distribution.

Japan has one of the lowest penetration rates for ethanol in gasoline of any country with a biofuels program that includes fuel ethanol. The national average blend rate has risen under its biofuels program to only 1.8%. Given that the use mandate will be held constant thru 2022 and the expectation of a shrinking gasoline fuel pool, a slight increase in the average blend rate to 1.9% by 2022 is forecast.

The food-vs-fuel debate is a significant issue in Japan, which 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 rising food prices, leading some in Japan to question the use of food crops to produce biofuels. The GOJ has introduced an incentive for Japanese industry introduce next generation biofuels (those made from non-food-sourced feedstock). However, next generation biofuels have yet to become commercially viable.

With no policy support to introduce large volumes of biodiesel, the demand for biodiesel in Japan is very limited, and thus biodiesel plays virtually no role in meeting renewable energy goals.

Japan has restarted a limited number of its nuclear power reactors since the 2011 Great East Japan Earthquake, forcing Japan's power companies to rely on other methods to generate power, such as hydro and coal. The power companies are also turning to wood pellets as a renewable energy source. Imports of wood pellets, which reached a record 506 thousand metric tons (MT) in 2017, are expected to further increase. The trend of mixing wood pellets or Palm Kernel Shells (PKS) with coal for thermal power generation is expected to continue.

II. Policy and Programs

Overview

Biofuels are part of a larger renewable energy policy in Japan that draws from solar, wind, biomass, and geothermal sources. To meet its Paris Agreement commitment to reduce greenhouse gas (GHG) emissions by 26 percent from 2013 levels by the year 2030, Japan plans to source 22-24 percent of its energy from renewable sources. Japan plans to reduce the bulk of its carbon emissions through nuclear energy, with renewable energy slated to meet 8 percent of Japanese energy consumption. On July 3, 2018, Japan published its latest Basic Energy Plan (available in English), which Japan reviews and revises every three to four years. The plan considers renewable energy an important low-carbon source of energy that Japan can produce domestically. For biofuels, the Basic Energy Plan states, "As for biofuels, which are mostly imported, GOJ continues the introduction of such fuels while taking into consideration international situation and the technology development trend concerning next-generation biofuels." According to industry sources, this statement reflects the Government of Japan's (GOJ) policy to source biofuels from non-food crops (e.g., cellulosic ethanol).

In 2009, the GOJ passed the Sophisticated Methods of Energy Supply Structure Act (available in Japanese) which established a target of using 500 million liters (crude oil equivalent[1]) of biofuels by 2017. This goal was met on time. In April 2018, the GOJ revised the Act to include new GHG emissions reduction values for gasoline, for Brazilian sugarcane-based ethanol, and to create a reduction value for U.S. corn-based ethanol. As a result of the revision, Japan may now import U.S. ethanol to meet up to 44 percent of the ethanol used to produce its ETBE (see GAIN Report JA8026). The GOJ also extended the biofuels mandate of 500 million liters (crude oil equivalent) per year for the next five years (i.e., until March 2023).

Table 1 - Japan's Biofuel Mandate

Japan's Biofuel Mandate (Unit: Million Liters)												
	First Phase							Second Phase				
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crude Oil Equivalent	**210**	**210**	**260**	**320**	**380**	**440**	**500**	**500**	**500**	**500**	**500**	**500**
Ethanol	**350**	**350**	**430**	**530**	**630**	**720**	**820**	**820**	**820**	**820**	**820**	**820**
ETBE	**820**	**820**	**1,010**	**1,240**	**1,480**	**1,710**	**1,940**	**1,940**	**1,940**	**1,940**	**1,940**	**1,940**
(Imports)	650	650	840	1,070	1,310	1,540	1,770	1,770	1,770	1,770	1,770	1,770
(Domestic Production)	170	170	170	170	170	170	170	170	170	170	170	170

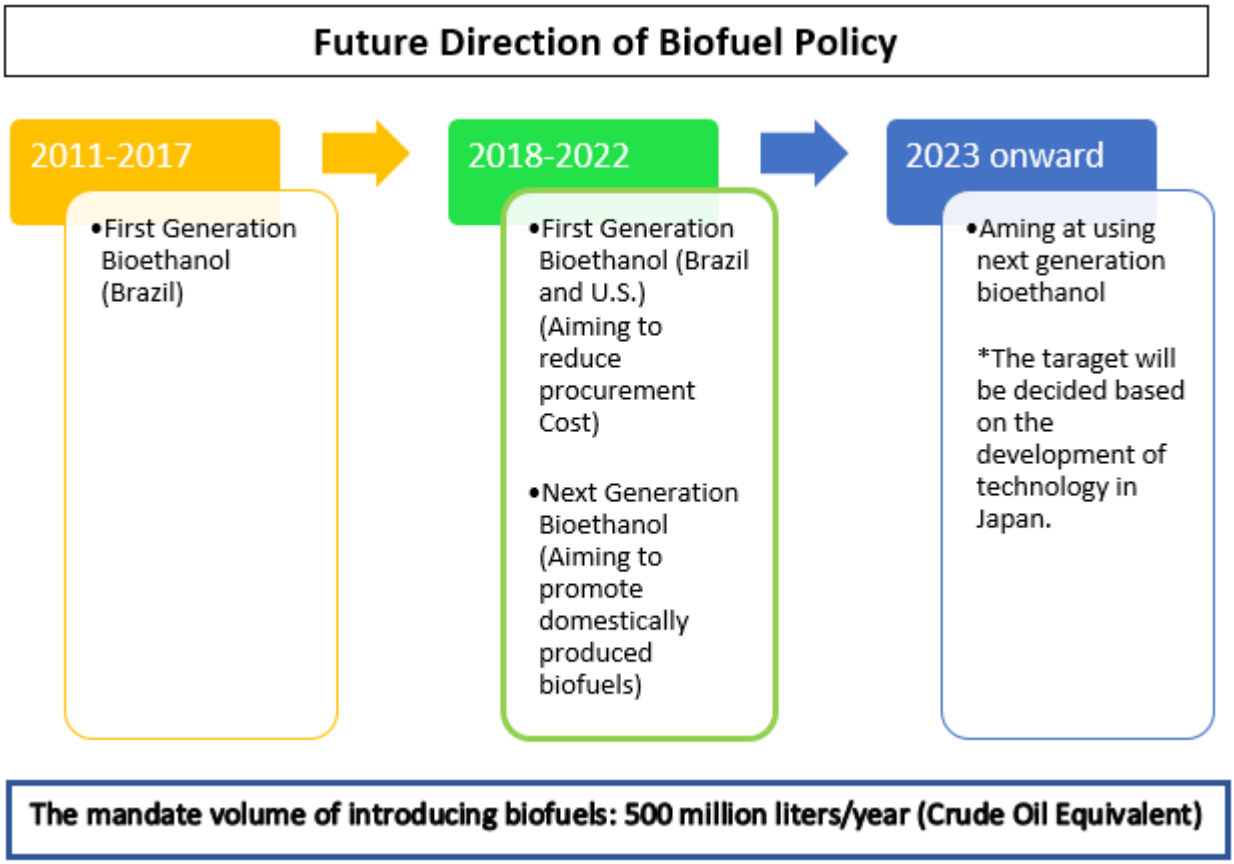
Source: Japan Biofuels Supply LLP (JBSL)

Notes:
- FAS Tokyo created this table based on information from JBSL.
- The years reflect Japanese Fiscal Years: April 1 – March 31
- The conversion factor for ETBE into ethanol is 0.4237 and that for ethanol into crude oil is 0.607.

Reference: Japan Ministry of Economy, Trade, and Industry's (METI) "Provisions related to the Sophisticated Methods of Energy Supply Structure Act" (Available in Japanese)

Figure 1 – The Progression of Japan's Biofuel Policy

[1] The conversion factor for ethanol into crude oil is 0.607. Thus, 500 million liters (crude oil equivalent) of biofuels is equal to 824 million liters of ethanol. Reference: METI's "Provisions related to the Sophisticated Methods of Energy Supply Structure Act" (Japanese only)



Source: METI. http://www.meti.go.jp/committee/kenkyukai/energy_environment/bio_nenryo/pdf/001_04_00.pdf
Note: FAS Tokyo created this figure based on information from METI.

Although the GOJ mandated the utilization of biofuels, Japanese industry decides how to meet the requirement. Industry opted to incorporate bio-Ethyl Tert-Butyl Ether (ETBE), whose inclusion requires the least infrastructure investment and changes to current gasoline refining. The Japanese tax structure for gasoline and diesel likely played a part in Japanese industry selecting ethanol over biodiesel. Japan taxes gasoline at the national level, whereas diesel is taxed at the prefectural level. Ethanol, therefore, more suitable to meet a national biofuels policy.

Japan has capped the maximum bioethanol blend rate at three percent (E3, except for some vehicles that have been specifically designed for a 10 percent blend (E10)) due to concerns that higher ethanol blends may damage modern vehicle engines. Despite Japanese vehicles in Europe all running on E5-10, E10 - E15 on newer models in the United States, and blend levels above E10 in Brazil and Argentina, Japan is not currently considering to raise the blend limit beyond E3.

The blend rate for biodiesel is five percent (B5) for cars, busses, and trucks. Of the 33.7 billion liters of diesel Japan used in 2017, approximately 76 percent (25.5 billion liters) was for on-road use. METI provides ad-hoc approvals for operators to use biodiesel at a blend rate higher than five percent for trucks and buses (see JA7100 for more information).

Government program and financial support for industry

The GOJ maintains the following tax incentives to promote the use of biofuels:

- In 2008, the GOJ amended the "Quality Control of Gasoline and Other Fuels Act" to lower the gasoline tax (¥53.8/liter) by ¥1.6 per liter (about $0.02/liter) for fuel that contains 3 percent bioethanol. The incentive is effective until March 31, 2023. (Japan applies a tariff to HS2710.12.137 of 3,003 yen per kiloliter ($26.58/kiloliter[2]) on the import of gasoline for vehicles.)

- In 2008, the GOJ amended the "Customs Tariff Act" and the "Temporary Tariff Measures Act" to eliminate the 3.1 percent import tariff on bio-ETBE. In 2016, the GOJ amended these Acts to eliminate the ten percent import tariff on bio-ethanol for the production of bio-ETBE. The tariff exemption does not apply to the import of ethanol for use other than the production of bio-ETBE. The Acts must be renewed annually and are currently approved through March 31, 2019.[3]

Environmental Sustainability Standards for Liquid Biofuels Used in Transportation

In the "Sophisticated Methods of Energy Supply Structure Act" (Available in Japanese) of 2010, the GOJ established an environmental sustainability standard for biofuels that required that bioethanol not compete with the food supply. Biofuels must also reduce greenhouse gas (GHG) emissions by at least 50 percent (when compared to gasoline emissions) based on a life cycle assessment (LCA). According to METI's analysis of each feedstock, the only source of first generation bioethanol that fulfilled METI's GHG emission standard was bioethanol derived from sugarcane grown on existing farmland in Brazil. However, in 2016, METI began reviewing the latest statistics and data available for the GHG emissions of bioethanol and gasoline, and on April 17, 2018, METI announced revised values (see JA8026 for more information). The key points of the announcement include:

1. A new emissions value for gasoline, raising the value from 81.7 to 84.11 grams of carbon dioxide equivalent per megajoule (gCO2eq/MJ).

2. A revised emissions value for Brazilian sugarcane-based ethanol from 32.7 to 33.61 gCO2eq/MJ.

3. Establishing an emissions value for U.S. corn-based ethanol of 43.15 gCO2eq/MJ.

4. Raising the emissions reduction target for ethanol introduced into the fuel supply from 50 to 55 percent compared to the emissions for gasoline.

5. Allows oil refiners[4] to count each liter of next-generation bioethanol (produced from non-food feedstocks such as cellulosic ethanol) as two liters towards meeting the 500 million liter biofuel mandate.

---

[2] Based on an exchange rate of 113 yen/$1.
[3] METI is currently proposing to extend the incentive through March 31, 2020, and the Ministry of Finance must approve the incentive by March 2019.
[4] Those oil refiners that produced or supplied 600 million liters or more of gasoline in the previous fiscal year (April to March).

METI's approval of a GHG reduction value for U.S. corn-based ethanol allows the import of a maximum volume of U.S. ethanol relative to the volume of Brazilian ethanol that meets the 55 percent emissions reduction target. Based on METI's calculation to determine the volume of ethanol that meets the GHG reduction target, U.S. corn-based ethanol may supply up to 44.44 percent (or 366 million liters) of Japan's mandate for bio-ethanol. The value of this volume is estimated at $170 million (based on 2017 U.S. bioethanol export prices).

Feed-In Tariff (FIT)[5] System to Promote Renewable Energy in Heat and Power Plants

In July 2012, the GOJ introduced a FIT system for the production of electricity from renewable energy sources, such as solar and wind power. Under this energy-purchase quota system, power companies are obliged to buy electricity at set rates for predetermined periods (generally 10 to 20 years). The purchase prices are reviewed annually and the costs incurred by power companies to buy electricity from renewable energy sources are passed on to consumers via electricity prices. Since the system was first introduced, the amount of power generated by renewable energy facilities has steadily increased. For example, the power generated under the FIT system by December 2012 was 5,234 MW, but it has increased to 15,252 MW by March 2017. (For more details, see GAIN/JA7100).

The following are notable revisions in the biomass category of the FIT system:

The revision divided "General Wood Biomass" into two categories based on a facilities' power generating capacity: 10 MW or more, and less than 10 MW. The revision created an auction system[6] for power plants of 10 MW or more, and the result of the auction for FY2018 will be announced in December 2018. The FIT for power plants with less than 10 MW remains ¥24 per kWh for FY2018, and the rate for FY2019 will be decided by the end of March 2019.

Some members of the Procurement Price Calculation Committee have raised concerns about an increasing number of accredited projects to generate power that rely on palm oil due to its reported impact on the environmental and a higher cost compared to that of other wood biomass sources, such as PKS. Therefore, the committee created a category of "Biomass Liquid Fuel (palm oil)" to separate the tariff rate for palm oil from other biomass sources. It further established an auction system to replace the fixed price per kWh to lower the purchase cost. In JFY 2018, the auction system will purchase power generated from palm oil beginning with the lowest offered price until it reaches the target tender of 20MW.

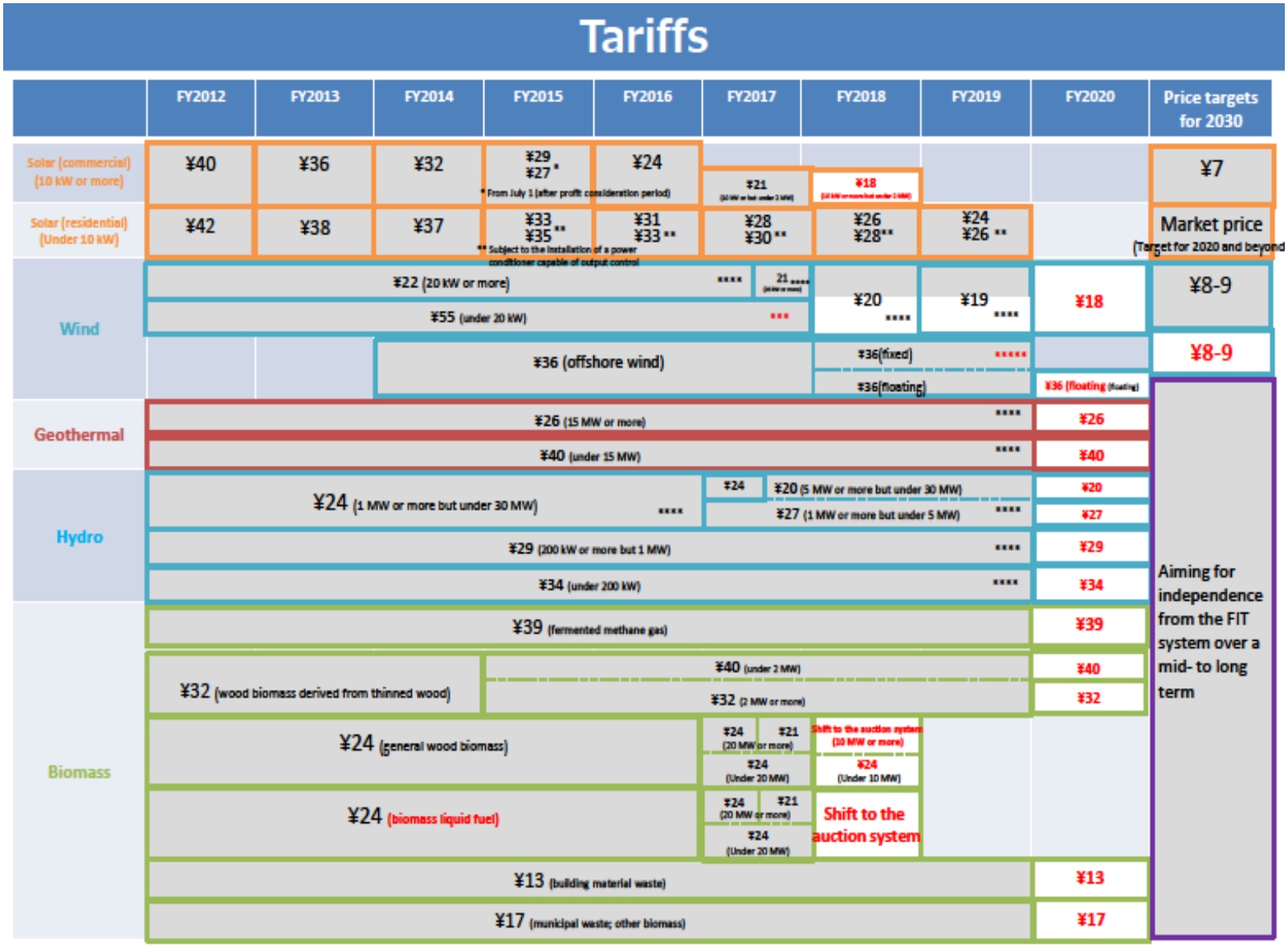
The "General Wood Biomass" category includes wood chips, wood pellets, and palm kernel shell (PKS) and requires a certification issued based on Japan's Forestry Agency's "Guideline of Woody Biomass for Power Generation" (available only in Japanese) to verify the legality and sustainability of the wood products. If the products do not meet these requirements, the feedstock will be classified as "Building Material Waste." (For the details of the certification, see GAIN/JA8002).

---

[5] For details of the FIT system in Japan, see "Present Status and Promotion Measures for the Introduction of Renewable Energy in Japan".

[6] Concerning the auction for "General Wood Biomass" in 2018, the total volume of power to be purchased is 180 MW. The power will be bought in ascending order according to price until reaching the total volume. The successful bid prices continue for 20 years.

Figure 2 - FIT Tariff Rate (per kWh) Announced in 2018 (on the following page)



Source: Ministry of Economy, Trade and Industry
Note: ¥10 is approximately $0.10.

III. Gasoline and Diesel Markets
Trends in Fuel Use

The GOJ estimates that Japan's demand for gasoline will continue to decrease, largely due to three factors: (1) the decrease in the number of automobiles and miles travelled as a result of the decline in Japan's population, (2) improved vehicle fuel efficiency, and (3) the increase in "next generation vehicles," such as electric, hybrid, and fuel cell cars. In 2017, Japan's demand for gasoline was 52 billion liters, and by 2022 is forecast to decrease to 46 billion litters.

In 2017, demand for on-road diesel was 25 billion liters. According to METI' Energy White Paper published in June 2018, the internet mail-order market grew 1.8 times in the past five years. Based on continued economic growth projections and related demand for services such as delivery, diesel demand is forecast to remain flat for the next several years.

Overall demand for jet fuel (5.2 billion liters in 2017) is expected to decrease slightly in 2018. Although demand for air travel and air cargo is expected to increase slightly due to increased tourism and the economic activity associated with hosting the Tokyo Olympic Games in 2020, METI projections reflect aspirational improvements in airplane fuel efficiencies by commercial airline carriers that would offset the increase in demand[7].

Table 2: Japan Fuel Use (2009-2017)

Fuel Use History (Million Liters)										
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018f**
Gasoline Total	57,347	55,643	54,116	56,207	55,419	52,975	53,127	52,508	51,686	50,591
Diesel Total	32,308	31,324	30,525	33,391	34,079	33,583	33,619	33,326	33,678	33,726
On-road	28,247	27,426	26,014	24,724	24,345	25,685	25,679	25,443	25,468	25,494
Jet Fuel Total	5,087	5,025	5,060	5,053	5,171	5,340	5,488	5,294	5,240	5,234
Total Fuel Markets	94,742	91,992	89,701	94,651	94,669	91,898	92,234	91,128	90,604	89,551

f = forecast

Fuel Use Projections (Million Liters)										
Calendar Year	**2019p**	**2020p**	**2021p**	**2022p**	**2023p**	**2024p**	**2025p**	**2026p**	**2027p**	**2028p**
Gasoline Total	49,640	48,391	47,203	45,929	N/A	N/A	N/A	N/A	N/A	N/A
Diesel Total	33,809	33,712	33,731	33,776	N/A	N/A	N/A	N/A	N/A	N/A
On-road	25,519	25,545	25,570	25,596	N/A	N/A	N/A	N/A	N/A	N/A
Jet Fuel Total	5,229	5,228	5,195	5,190	N/A	N/A	N/A	N/A	N/A	N/A
Total Fuel Markets	88,678	87,331	86,129	84,895	N/A	N/A	N/A	N/A	N/A	N/A

p = projection

Source: Ministry of Economy, Trade and Industry (METI)

Notes:

- The data for 2010 and 2011 are provided by METI, but are forecasts that were developed in 2010. Final, confirmed data for 2010 and 2011 were not collected due to the Great East Japan Earthquake, which occurred in March 2011.
- Gasoline, Diesel, On-road Diesel, Jet Fuel Totals: METI calculated the data and forecast through 2022. Post calculated the forecasts from 2023 to 2028 by multiplying the five-year (2017-2022) average geometric mean by the estimates of the Totals for 2022, and carried these forward to 2028.
- The years reported are Japanese fiscal years, April - March (e.g., April 2018 - March 2019 is 2018.

[7] See page 6 of METI's "FY2018-2022 Estimates for Demand of Petroleum Products" http://www.meti.go.jp/shingikai/enecho/shigen_nenryo/sekiyu_gas/sekiyu_shijo/pdf/005_02_00.pdf (available only in Japanese)

Trends in Engine Technology

In its 2018 Basic Energy Plan, the GOJ argues that because automobiles consume most of the energy in the transportation sector, it is important to continue improving automobile energy efficiency. In order to achieve further energy savings and to help reduce Japan's GHG emission, the GOJ aims to increase the market share of next-generation vehicles (e.g., electric and fuel cell vehicles) to 50 -70 percent by 2030.

Since the GOJ introduced subsidies and tax incentives for "next-generation vehicles" in 2009, the number of these vehicles has been increasing, with the total number of "next generation vehicles" in Japan at approximately seven million in 2016 (the last year for which data is available). Next-generation vehicles account for 9.2 percent of the total number of automobiles in use, and their numbers and market share are expected to further increase in the future.

Table 3: Next Generation Vehicles in Use in Japan

Number of Next-Generation Vehicles in Use						
	2011	2012	2013	2014	2015	2016
Electric Vehicles	22,262	38,707	54,757	70,706	80,511	89,844
Plug-in Hybrid Vehicles	4,132	17,281	30,171	44,012	57,130	70,323
Fuel Cell Vehicles	-	-	-	150	630	1,807
Hybrid Electrical Vehicles	2,029,009	2,852,105	3,813,387	4,717,344	5,764,401	6,971,035
Total	2,055,403	2,908,093	3,898,315	4,832,212	5,902,672	7,133,009

Source: Next Generation Vehicle Promotion Center

Developing Vehicle Fleet Efficiency

The Ministry of Land, Infrastructure and Transport (MLIT) and METI jointly established a minimum requirement for gasoline-fueled passenger vehicles set to attain a vehicle fleet efficiency of 20.3 km per liter by 2020. The auto industry attained an average fleet efficiency for gasoline fueled passenger cars of 21.8 km per liter ahead of schedule in 2014. The ministries are developing a new fleet efficiency standard.

IV. Ethanol

Table 4: Japan's Ethanol Utilization (2009-2018)

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018f**
Beginning Stocks	15	13	12	3	3	4	4	5	5	7
Fuel Begin Stocks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Production	20	25	24	23	22	2	2	1	0	0
Fuel Production*	20	25	24	23	22	2	2	1	0.2	0.2
Imports	346	669	697	682	737	874	965	1,131	1,257	1,257
Fuel Imports	66	336	345	341	389	517	607	757	890	890
*>of which is ETBE (a)***	24	296	294	288	334	458	539	696	822	822
Exports	11	5	5	1	0	0	0	0	0	0
Fuel Exports	0	0	0	0	0	0	0	0	0	0
Consumption	357	690	725	704	758	876	966	1,132	1,255	1,257
Fuel Consumption	86	361	369	364	411	519	609	758	890	890
Ending Stocks	13	12	3	3	4	4	5	5	7	7
Fuel Ending Stocks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Production Capacity (Million Liters)										
Number of Refineries	6	6	6	5	5	5	3	3	1	1
Nameplate Capacity	35	35	35	34	34	34	4	4	1	1
Capacity Use (%)	57%	71%	69%	68%	65%	6%	50%	25%	20%	20%
Feedstock Use for Fuel (1,000 MT)										
Molasses	1	1	2	5	8	8	8	2	0	0
Rice	2	2	2	2	2	2	0	0	0	1
Wheat Kernals	25	31	31	28	25	0	0	0	0	0
Sugar Beets	95	124	116	105	95	0	0	0	0	0
Market Penetration (Million Liters)										
Fuel Ethanol	86	361	369	364	411	519	609	758	890	890
Gasoline	57,347	55,643	54,116	56,207	55,419	52,975	53,127	52,508	51,686	50,591
Blend Rate (%)	0.1%	0.6%	0.7%	0.6%	0.7%	1.0%	1.1%	1.4%	1.7%	1.8%

f = forecast

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

Notes:

N/A = not available and not included in balance

* Post's estimates are based on interviews with industry and government sources.

** The conversion factor for ETBE into ethanol is 0.4237. 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)

*** The conversion rate for rice into ethanol: 1MT=445 liters. Reference: JA Zen-noh, "Making the energy recycling model in Niigata Prefecture by rice made bio-ethanol"

Consumption

Japan's gasoline consumption estimate in 2018 is 51 billion liters. The pure ethanol equivalent of ETBE consumed, plus a small amount of ethanol consumed in direct blending, brings Japan's total fuel ethanol consumption to 890 million liters, and yields an effective national average blend rate of 1.8 percent.

Production

Today, Japan has one refinery that produces approximately 0.2 million liters of bioethanol for fuel use from domestic rice. There is no change expected to this level of production in 2019. The refinery is

located in Niigata Prefecture and is operated by JA Zen-noh, the federation of agricultural cooperatives. It uses high yield rice grown specifically for biofuel production. The ethanol is used as part of an E3 blend, and the E3 gasoline is sold at six affiliated gas stations around Niigata Prefecture.

Domestic Production of ETBE

In 2010, Japan Biofuels Supply LLP (JBSL) began producing ETBE domestically. Each year, the company produces 170 million liters of ETBE, using 72 million liters of ethanol. The company is fully reliant on imported ethanol. Japan's oil industry is now permitted to use U.S. ethanol to produce ETBE to meet Japan's biofuels mandate.

Trade

While JBSL has not announced contracts for the use of U.S. ethanol in 2019, Japanese industry would likely use the maximum volume of U.S. ethanol (366 million liters) due to its price competitiveness. If utilized, the first shipment of ETBE containing U.S. ethanol could arrive in Japan in mid-2019. According to the data provided by the U.S. Grains Council, the price of U.S. ethanol (FOB Gulf) is $0.363 per liter while the price for Brazilian ethanol (FOB Santos) is $0.54 per liter.

V. Biodiesel

Table 5: Japan's Biodiesel utilization (2009-2018)

Biodiesel (Million Liters)										
Calendar Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018f
Beginning Stocks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Production*	9	10	12	14	14	15	15	16	17	17
Imports	N/A	N/A	N/A	0.1	0.5	0.6	1.1	1.3	1.2	1.2
Exports	N/A	N/A	N/A	2.3	3.1	3.2	3.6	5.5	5.8	6.0
Consumption	9	10	12	12	11	12	13	12	12	12
Ending Stocks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Production Capacity (Million Liters)										
Number of Biorefineries**	66	58	58	40	46	43	43	43	43	43
Nameplate Capacity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock Use for Fuel (1,000 MT)										
Used Cooking Oil***	10	11	13	15	15	16	16	17	18	18
Market Penetration (Million Liters)										
Biodiesel, on-road use	9	10	12	12	11	12	12	11	11	11
Diesel, on-road use	28,247	27,426	26,014	24,724	24,345	25,685	25,679	25,443	25,468	25,494
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	32,308	31,324	30,525	33,391	34,079	33,583	33,619	33,326	33,678	33,726

f = forecast

Source: National Biodiesel Fuel Utilization Council (NBUC); The World Trade Atlas; Ministry of Economy, Trade and Industry

Notes:

- N/A = not available; stocks, imports and exports designated as such are not included in balance.
- Years are Japanese fiscal year, April - March.

* Post's estimates are based on information provided by NBUC.

** The number of bio-refineries is based on an annual survey conducted by the NBUC.

*** Post's estimate for the average recycle rate of 91% is based on data from the NBUC.

Japan's biodiesel market is extremely limited, meeting just 0.04 percent of national on-road transportation demand for diesel fuel, and there is no renewable diesel market. Post estimates biodiesel production was 16 million liters in 2016 (the latest data available) based on the data provided by the

National Biodiesel Fuel Utilization Council (NBUC). Post forecasts that the production will increase to 17 million liters due to a minor increase in exports of biodiesel, primarily to Switzerland (previously to the Netherlands), and little to no change in consumption and imports. However, no change is expected to the 2019 supply and demand. Domestic demand for biodiesel remains small mainly because no established distribution channels exist for the fuel, few established larger-scale collection systems for feedstock exist, and its use is largely limited to small fleets of municipal vehicles in local and regional programs.

Biodiesel has no role in meeting the GOJ target to introduce 500 million liters of biofuels (crude oil equivalent) in the market, even though there is considerable unrealized potential since Japan is the 4th largest diesel market following the EU, United States and Brazil. The Japanese oil industry selected bio-ETBE and bioethanol to meet the renewable fuel target because this solution requires no significant oil industry investment in new delivery infrastructure. That said, renewable diesel (hydrogenated vegetable oil is one type which is produced on a commercial scale in Europe, Singapore and the United States) is fully substitutable with fossil diesel and thus requires no new investments in infrastructure. Also, used cooking oil (UCO) is the only abundant feedstock locally available and few large-scale collection systems exist to exploit this resource in a cost effective manner.

For more information about Japan's biodiesel market, please see the 2017 Biofuels Annual (GAIN/JA7100).

VI. Advanced Biofuels

Research and Development

Japanese private companies and Japan's scientific community, including universities and public and private research institutions, have continued to work toward basic and applied research related to biofuels. The focus of their research projects is cellulosic and algal feedstock, and technologies to produce biofuels on a commercial scale in a sustainable way. Please see pages 17-18 of the 2017 Biofuels Annual for additional details (GAIN/JA7100).

Bio Jet Fuel

The GOJ wants to introduce bio jet fuel for commercial flights in 2020, the year that Tokyo will host the Summer Olympic Games and Paralympic Games. Four manufactures of bio jet fuel are participating in the project. These companies make bio jet fuel from cellulosic or algal feedstock and aim to supply 10,000 – 20,000 liters of bio jet fuel in 2020. The blend rate of the bio jet fuel will be about 10 percent.

VII. Biomass for Heat and Power

Japan's FIT system supports the import of wood pellets, and PKS are increasing as a source for biomass

power generation (see II. Policy and Programs). Power generators mix woody biomass with coal to help reduce GHG emissions.

Japan shut down all of its nuclear power reactors in 2011 due to the nuclear incident caused by the Great East Japan Earthquake. As of October 2018, Japan has only resumed operations at nine reactors, and of Japan's 60 nuclear power plants, 22 are slated for decommissioning predominantly due to their age. Japan will need to resume operations at all remaining 38 nuclear power plants to reach METI's target of providing 22-24 percent of Japan's energy needs through renewable sources by 2030. However, the number of plants that will resume operation remains a topic of national debate. Accordingly, Japan currently relies on other energy sources to generate power – primarily coal and liquid natural gas.

After the nuclear incident, power companies began using wood pellets and PKS as a source for thermal power generation, though coal is still the primary source. Japan does not apply a tariff to imported wood pellets (HS4401.31). As a result, Japan's imports of wood pellets and PKS are expected to increase for years to come.

Table 6 – Japan's Imports of Wood Pellets

Japan Import Statistics						
Commodity: 440131, Wood Pellets						
Year Ending Series: December, 2012 - 2017						
	Quantity (Metric Tons)					
Partner Country	2012	2013	2014	2015	2016	2017
World	71,981	83,769	96,745	232,425	346,855	506,353
Canada	66,470	72,151	90,676	146,150	260,935	360,068
Thailand	265	1,242	2,682	194	451	951
Vietnam	3,533	2,897	1,979	27,440	62,441	131,115
United States	233	326	563	237	306	316
Source: The World Trade Atlas						
Note: HS Code 4401.31						

Table 7 – Japan's Imports of PKS

Japan Import Statistics						
Palm Nut Or Kernel Oilcake And Other Solid Residues Resulting From The Extraction Of						
Year Ending Series: December, 2012 - 2017						
	Quantity (Metric Tons)					
Partner Country	2012	2013	2014	2015	2016	2017
World	26,211	131,224	244,178	456,084	761,410	1,137,464
Indonesia	8,673	62,645	131,678	255,104	398,171	792,736
Malaysia	17,143	68,560	112,500	200,913	363,239	344,728
Source: The World Trade Atlas						
Note: HS Code 2306.60						