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Biofuels Annual

Japan Focuses on Next Generation Biofuels

Approved By:
Jennifer Clever

Prepared By:
Midori Iijima

Report Highlights:
In 2011, Japanese ethanol production for fuel increased by an estimated 35 percent to 30,000 kl. Biodiesel production also expanded by 61 percent to 14,000 kl. Imports of ethanol for fuel and other uses also increased by 29 percent while ETBE imports in 2011 held steady. Due to limited agricultural production, and the "food vs. fuel" debate, the Government of Japan has opted to focus determinedly on biofuels derived from cellulosic materials or other materials which do not compete with the food supply. Nevertheless, overall Japanese production of biofuels is expected to continue expanding.

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Executive Summary:

Government and private sector research and investment in biofuels have been on the rise since Japan's first biomass plan, "Biomass Nippon Strategy," was unveiled in December 2002. That Strategy was updated in 2008, and the Government of Japan's (GOJ's) current strategy, given the country's limited land resources, is to focus determinedly on cellulosic ethanol or algae derived biodiesel as the future for Japan's biofuel production.

During the past few years, in the wake of higher food prices, biofuel production has been under considerable criticism by Japanese lawmakers and media, often bearing the blame for driving up commodity prices. In fact, it was this supposed link between biofuels and higher commodity prices that inspired the GOJ to include food prices and food security in the G-8 Summit agenda held in July 2008 in Hokkaido, Japan.

Despite the slight backlash, the GOJ and the private sector continue to pursue biofuels production through conventional and cellulosic means with increasing focus on cellulosic sources in order to meet

Japan's Kyoto Protocol commitments to reduce greenhouse gas emissions by 6 percent from the 1990 level by 2012.[1] In fiscal 2010, Japan reduced its CO2 emission level by 0.4% from the 1990 level. However, given Japan's limited capacity for agricultural production, it will be difficult for Japan to produce enough biofuels to impact the domestic fuel market, and thereby greenhouse gas emissions, without a major technological breakthrough.

Indeed, during the mark-up of the national budget, conducted by the GOJ's Revitalization Unit in November 2010, many of the government's budget for biomass projects were slated to be reduced by half, revised, or abolished. In February 2011, the Ministry of Internal Affairs and Communications released the findings of a policy assessment of biomass promotion projects over a six-year period through March 2009. The cumulative funds spent totaled about 6.55 trillion yen (approximately $82 billion). The Ministry's Administrative Evaluation Bureau found that almost none of the government's biomass projects have produced any effective results in the struggle against global warming. They also pointed out that several ministries and agencies are conducting virtually identical projects.

In terms of Japan's biofuel production, the impact of the Great East Japan Earthquake and Tsunami that occurred on March 11, 2011 appears negligible. Additionally, despite the fact that there is wide-spread skepticism of the GOJ's nuclear energy safety protocols, the GOJ has not signaled an intention to increase investments in biofuels. This is largely because generating electricity from biofuels or biomass is costlier than other renewable energies, such as wind and hydro powers. However, the GOJ plans to build five power plants in the disaster stricken areas to generate electricity by burning wooden wreckage left from the March earthquake and tsunami. The GOJ also plans to subsidize companies that participate in this project. After all the wreckage has been cleaned up, the power plants will use wood from forest-thinning.

In the wake of a nuclear power plant accident in Fukushima, 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 will come into force on July 1, 2012. The power companies will become 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 will be passed on to consumers through electricity rates in general. The Ministry of Economy, Trade and Industry (METI) estimates that an increase in electricity charges for an ordinary household would be approximately ¥100 per month (about $1.25.)

Overview of Japan's Transportation Fuel Strategy

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

[1] *The current Japanese government (Democratic Party of Japan) has set a mid-term goal to reduce Japan's greenhouse gas emissions by 25% from its 1990 level by year 2020.*

this goal. The GOJ has set a goal to introduce 500 thousand kl (oil basis) of biofuels by 2017and 1.8 million kl (oil basis) by 2020. [2] Other means to achieve the goal are batteries, hydrogen, fuel cells, and clean diesel.

Policy and Programs:

Ministries Involved in the Bio-fuels 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). Substantial discussions and coordination among the ministries are done in the Executive Committee on Biomass Nippon Strategy, which is comprised of director-general level officials from the relevant ministries. 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 straws 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.

Policy Overview

Japan's first biofuel 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. When the Kyoto Protocol was ratified in February of 2005, Japan felt compelled to move rapidly towards the promotion of biofuels to meet its commitment to reduce CO2 emissions by 6 percent from the 1990 level by 2012. Accordingly, 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 500,000 kl (oil basis) of biofuels for the transportation sector by 2017. In February 2007, the Executive Committee on Biomass Nippon Strategy released a report titled, "Boosting the Production of Biofuels in Japan." The report presented to the Prime Minister claimed that Japan will be able to produce 6 million kl of biofuels domestically by around 2030 if appropriate technological advancement is realized. It sets a target of producing 50,000 kl of biofuels from molasses and off-spec rice, and 10,000 kl of biofuels from construction waste by 2011. In addition, the report sets a goal of producing 6 million kl (MAFF estiamte) of biofuels per year, 10% of domestic fuel consumption, from

[2] *According to the Petroleum Association of Japan, the supply of biofuels in the transportation sector in 2010 was 210 thousand kl (oil basis), about 0.35% of domestic gasoline consumption. The GOJ aims to increase the rate to more than 3% by 2020.*

cellulosic materials such as rice straw, tinned wood and resource crops such as sugar cane, sugar beet by around 2030. This ambitious target is based on the estimation that Japan has unused biomass resources (non-edible portions of farm crops and forestry residues) equivalent to 14 million kl of oil, and that it could produce resource crops equivalent to 6.2 million kl of oil by fully utilizing the abandoned arable land, which is estimated at 386,000 ha. MAFF's goals are not shared by all Ministries, but MAFF officials are optimistic that by putting all their efforts and considerable financial backing into cellulosic research and development they can meet this goal.

Move toward Biofuels Sustainability Standards

The run up in food prices in 2008 caused governments around the world to re-think their biofuels strategies. 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, nutrification, land occupation, photochemical oxidation, ecotoxicity, 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 set its requirement on oil firms. Companies who do not comply with the LCA Guidelines will face penalties. Penalties are yet to be defined.

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 $ .67.) Under the new tax system, if a fuel contains 3 percent bioethanol, the gas tax is lowered by ¥1.6 per liter (about $ .02.) This tax measure is effective until March 31, 2013. 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, the fixed property tax for newly built biofuel facilities will be reduced in half for three years. Interest-free loans for a redemption period of ten years will be provided to farmers producing feedstock.

For the past several years, to further encourage the use of ETBE, the GOJ has reduced its tariffs on ETBE imports, usually 3.1 percent, to zero. Under the Act on Temporary Measures concerning Customs, imports of Ethyl Tert-Butyl Ether (ETBE) derived from biomass will continue to enjoy a zero tariff this year (from April 1, 2012 to March 31, 2013.)

Bioethanol and Biodiesel:

Japan's Motor Vehicles Petroleum Based Energy Market

According to the Japan Automobile Manufacturers Association (JAMA), there are 74 million automobiles in Japan (gas and diesel) and domestic fuel consumption is around 60 million kl per year for gasoline and 36 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 1.8 million kl. Similarly, if a ten percent ethanol blend gasoline (E10) were nationalized, demand would increase to 6 million kl per year.

Japan's Gasoline Market

The Japanese gasoline market is made up of large companies. There are almost no independent dealers, and only a handful of companies import oil and/or gasoline. These roughly ten companies are organized into five groups, and they sell to their own contacts through a formalized distribution system. The companies form the Petroleum Association of Japan (PAJ.) In January 2007, several member companies of the PAJ jointly established a company to import bio-ETBE known as the Japan Biofuels Supply LLP (JBSL.) In April 2007, PAJ imported through JBSL 7,500 kl of bio-ETBE from France and mixed it with gasoline at a refinery in Yokohama to make a 7 percent ETBE blend. On April 27, 2007, PAJ started to sell bio-gasoline for the first time as an alternative to regular fuel on a commercial basis at 50 gasoline stations in the greater Tokyo area. In April 2008, PAJ imported approximately 6,500 kl of ETBE from Brazil; where the price was reportedly 20-30% lower than its European competitor. In October 2008, PAJ announced it entered into a long-term contract with Copersucar, the Brazilian supplier of bioethanol, to purchase 200 thousand kl per year. The ethanol is shipped to the U.S. to produce ETBE, which then is exported to Japan. In late 2009, the first shipment of 22 thousand kl of ETBE produced in the Channelview plant (Lyondell Basell, Texas) arrived in Japan. In 2011, PAJ announced that it achieved its initial goal to sell 210 thousand kl (oil basis) of bio-gasoline nationwide two years earlier than planned by importing 840 thousand kl of ETBE. PAJ is now aiming to expand the sales of bio-gasoline to 500 thousand kl (oil basis) by 2017. To date, bio-gasoline is available at 3,050 gasoline stations nationwide.

Bio-gasoline is currently sold at the same price as that of regular gasoline though the production cost is higher by ¥7~8 per liter (approximately $ .08~09.) The difference is currently borne by the industry alone as the government support ceased at the end of fiscal year 2008.

Bio-diesel Policy

With respect to bio-diesel, in order to ensure that the fuel meets safety and gas emissions standards for existing vehicles, the GOJ decided that the blending ratio of Fatty Acid Methyl Ester (FAME) into light oil should be less than 5 percent. This new requirement was added to the Light Oil Standard under the Quality Control Law and became effective in March 2007. In Japan, because 100 percent bio-diesel fuel (B100) is not subject to the light oil transaction tax, many regional governments have initiated measures to use competitive B100 for their official vehicles, such as garbage trucks. However some have pointed out that problems may occur because automobiles distributed in Japan are not designed to use B100. Indeed, media sources state that engines using B100 have reported a number of problems. The problem is reportedly caused by the fuel filter getting clogged with the impurities in the fuel made from used-cooking oil.

In the transportation sector, the GOJ hopes to promote clean diesel vehicles, as diesel fuel is more energy efficient than gasoline fuel, and its CO2 emissions are lower. The GOJ introduced tax breaks for clean diesel vehicles in 2009. Sulfur free diesel oil was introduced in the market in 2005, and is currently available throughout the nation.

Production

Ethanol Production

The initial thrust of 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 intends to use off-spec wheat and sugar beets. The project in Shimuzucho is a public-private partnership between Mitsubishi Corp. 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. A third facility in Obihiro City, Hokkaido is run by the Tokachi Foundation and is supported by prefectural and national funds. The Foundation runs a very

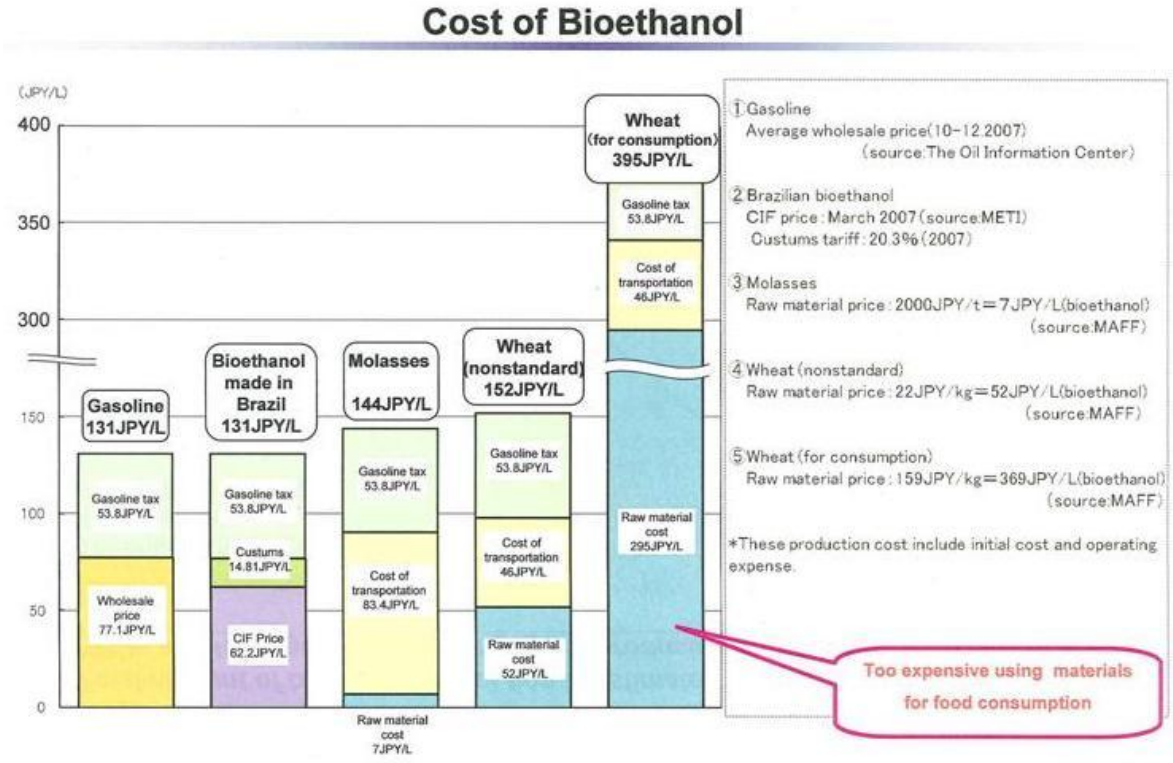
small still that converts Hokkaido-grown wheat into ethanol to fuel a single test vehicle. The equipment is all state of the art, expensive, and on a miniature scale. The Foundation says that this is a feasibility project intended simply to see whether they could produce ethanol from wheat to fuel vehicles.

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/1000 m2 compared to 500 kg/1000 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 1000 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 manages wheat and sugar beets tightly. Therefore, there is little incentive for farmers to sell these commodities at a price these ethanol plants can afford unless the GOJ provides an additional incentive to support the price gap. As a result, the above-mentioned pilot projects and small-scale production facilities will not be enough to meet the goal to domestically produce 50 thousand kl of bioethanol by 2011.

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

Bio-diesel Production

Municipal governments and regional non-profit organizations are participating in small-scale bio-diesel feasibility projects called "Rapeseed Project." As of 2009, there were up to 119 projects. The projects involve growing rapeseed to produce cooking oil, collecting the used oil, and recycling it as bio-diesel fuel. There is another small-scale project to collect used vegetable oil from restaurants and individual households. A couple of major restaurant chain operators are participating in this project. The oil is processed into bio-diesel to fuel government vehicles or municipal buses. Under this project, the current annual production of bio-diesel fuel is estimated to be 20 thousand kl.

In June 2010, MAFF started a joint research project with private firms and universities to produce biofuel from algae. The research will attempt to extract oil produced by *Pseudochoricystis* algae, to develop mass production technology, hoping to commercialize the fuel as substitute for gasoline and 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.

Impact of Use of Agricultural Feedstock in Biofuel Production on Existing Markets

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 dominating in the Japanese media. It also reflects a strategic refocus on how Japan can best achieve its goals in the biofuels sector. Thus, taking used vegetable oil, rice straw or even certain rice stocks off the market does not take away from existing markets for feed, etc. Even if ethanol production facilities operated 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

Direct Blending and ETBE

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. In 2009, two MAFF supported bio-refineries, Hokuren, the federation of agricultural cooperatives in Hokkaido, and Oenon Holding started to sell the bio-ethanol they produce to PAJ for blending with ETBE. The total production capacity of those two refineries is 30 thousand kl per year.

Japan's Ethanol Blend Limit

Japan's ethanol blend limit remains low by U.S. standards at 3 percent. A number of potential hazards have been raised, including automobile part corrosion. However, there are feasibility studies looking at the potential of introducing a 10 percent blend in the future. MOE, at present, aims to introduce E10 to the market in 2012. Japanese automakers have started to introduce some new automobile models that can run on E10. Reportedly, in 2008, Toyota Motor Corp. supplied two vehicles to the Ministry of Transportation to use in road testing of an E10 ethanol blend in the Osaka Prefecture. The number of cars supplied to the prefecture in support of this project increased to 37 in 2011. Nissan Motor Co. received approval from the GOJ for an E10 version of its Murano model.

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 feasibility project conducted for the past several years was completed in January 2012. The number of cars registered to use E3 gasoline reached 1,688 (as of February 2010.) 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 now sold at 4 gasoline stations. These are projects supported by MOE to promote direct blending.

Meanwhile, PAJ started selling bio-gasoline (regular gasoline blended with bio-ETBE) in those areas. The two different types of biofuels, E3 and bio-gasoline, are actually competing in the market. Last year, the competition expanded as Mitsui Oil Co., 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 and biodiesel for transportation are negligible. However, because of joint ventures established between Japanese and Brazilian firms starting in 2010, imports of bioethanol will likely increase. MOE aims to supply 1.9 million kl of ethanol by 2020. Of the total, 0.9 million kl will be imports. Imports of ETBE started in 2007. 7,500 kl of ETBE were imported from France in 2007 and 6,694 kl from Brazil in 2008. In 2009, 56,293 kl were imported from Brazil and the United States combined. In 2010, approximately 700 thousand kl of ETBE were imported from the United States. According to the Japan Biofuels Supply LLP (JBSL), the company importing bio-ETBE from the United States, ethanol used to make bio-ETBE in the United States is imported from Brazil.

Investment

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 green house gas emissions, since 2010 Japan has been providing technical assistance to Southeast Asian nations, in particular, to Thailand and Vietnam. Several Japanese trading companies have started to invest 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 on 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.

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. Last year, MAFF started a research project with private firms and universities to produce fuel from algae. MAFF aims to commercialize the product as a substitute for gasoline and diesel by 2020. On June 12, 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. The two nations will invest a total of ¥1 billion (approximately $11 million) over three years. The program includes a study on effective methods to produce fuel from algae.

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 the number of plants was 10. By 2010, the production of wood pellets increased 15-fold to 58 thousand metric tons and the number of plants is estimated to be over 70. 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. The average price of imported wood pellets in CIF was ¥21.8 per kg in 2009 while the average shipping price of domestic wood pellets was ¥27.5 per kg. Almost all 50 nuclear power reactors in Japan are currently put on hold. Power companies are forced to rely on other methods to generate power. Hence, imports of wood pellets are likely to increase further.

Statistics:

Fuel Ethanol - Conventional & Advanced Fuels (Kilo Liters)								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Production, Total [1]	30	90	200	15,000	22,300	30,000 [2]	50,000 [3]	50,000 [3]
Advanced Only	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Imports[4]	96,808	94,627	89,358	96,869	92,558	119,660	140,217 [5]	107,732 [5]
Exports	0	0	0	0	0	0	0	0
Consumption	30	90	200	15,000	22,300	30,000	50,000	50,000
Ending Stocks	0	0	0	0	0	0	0	0
Production Capacity - Conventional								
No. of Biorefineries	3	6	6	6	6	6	6	6
Capacity (Kilo Liters)	701	31,701	31,701	31,701	31,701	31,701	31,701	31,701
Capacity Use (%)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Production Capacity - Advanced								
No. of Biorefineries	3	4	8	9	9	9	10	10
Capacity (Kilo Liters)	116,520	116,534	116,739	116,776	116,776	116,776	116,886	116,886
Capacity Use (%)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Co-product Production - Conventional only (1,000 MT)								
n/a	-	-	-	-	-	-	-	-
n/a	-	-	-	-	-	-	-	-
Feedstock Use - Conventional (1,000 MT)								
Rice for non-food purpose	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Off-spec wheat	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Sugar beets	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Sugar cane	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Molasses	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Feedstock Use - Advanced (1,000 MT)								
Rice straw	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Wood & lumber wastes	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Soy pulp	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Imports of Bio-ETBE (KL), HS Code 2209-19-010								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Imports	0	7,500	6,694	56,923	699,533	692,837	700,000 [f]	700,000 [f]
Calculated volume of bioethanol		3,214	2,869	24,396	299,800	296,930	300,000	300,000

f = forecast

1 = Data provided by MAFF. The figures reflect production quantity of projects funded by the GOJ. Previously, Post estimated the figures based on GOJ's data and other data available. However, as other data is no longer available from this report on Post will continue to use GOJ data only. This is a more appropriate estimate and widely accepted in international forums, such as APEC.

2 = Post's estimate. The production data for 2011 is not yet available. MAFF is scheduled to release it later this year.

3 = GOJ's short term goal.

4 = HS2207.10-190. Ethanol imports for fuel use are likely to fall under this HS code. However, this also includes ethanol for other use.

5 = Post's estimate.

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

Ethanol Used as Other Industrial Chemicals (Kilo Liters)								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012[f]**	**2013[f]**
Production	375,624	354,319	360,243	398,862	400,649	369,164	376,647	381,113
Imports[1]	244,849	226,762	232,950	275,843	310,683	273,950	264,038	271,493
Exports	156	193	194	10,786	4,820	4,667	4,132	4,920
Consumption	358,230	361,574	372,078	403,697	390,420	391,991	383,952	388,428
Ending Stocks	53,682	46,500	42,385	35,555	49,119	35,696	41,851	40,921
Production Capacity								
Capacity (Kilo Liters)	554,635	590,462	574,800	606,946	624,696	624,696	624,696	624,696
Capacity Use (%)	68%	60%	63%	66%	64%	59%	60%	61%

f = forecast

1 = Because HS2207.10-130, 2207.10-190, and 2207.10-220 are used in making alcohol beverages or for other uses including fuel, those import figures are subtracted from the total import figures of 2207.10.
Sources: Ministry of Economy, Trade and Industry; The World Trade Atlas for Imports and Exports

Biodiesel - Conventional & Advanced Fuels (Kilo Liters)								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012[f]**	**2013[f]**
Production, Total	4,471	6,229	6,494	8,568	8,652	14,000	20,000	20,000
Advanced Only	0	0	0	0	0	0	0	0
Imports (Metric Tons)[1]	16,929	12,808	12,576	10,197	13,222	11,834	12,127	11,991
Exports (Metric Tons)[2]	0	0	287,495	275,687	350,593	338,165	250,388	300,466
Consumption	4,471	6,229	6,494	8,568	8,652	14,000	20,000	20,000
Ending Stocks	0	0	0	0	0	0	0	0
Production Capacity - Conventional								
No. of Biorefineries	0	4	13	22	26	31	31	31
Capacity (Mil. Liters)	-	-	-	-	-	-	-	-
Capacity Use (%)	-	-	-	-	-	-	-	-
Production Capacity - Advanced								
No. of Biorefineries	0	0	0	0	0	0	0	0
Capacity (Mil. Liters)	-	-	-	-	-	-	-	-
Capacity Use (%)	-	-	-	-	-	-	-	-
Feedstock Use - Conventional (KL)								
Recycled cooking oil	4,870	6,785	7,074	9,333	9,613	15,556	22,222	22,222
Rapeseed oil	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Sunflower oil	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Soybean oil	minimal	minimal	minimal	minimal	minimal	minimal	minimal	minimal
Feedstock Use - Advanced (1,000 MT)								
n/a	-	-	-	-	-	-	-	-
n/a	-	-	-	-	-	-	-	-
n/a	-	-	-	-	-	-	-	-
n/a	-	-	-	-	-	-	-	-

f = forecast

1 = HS Code 3824-90-200. The unit is MT. As it includes products other than biodiesel, the unit is kept unchanged.

2 = HS Code 3824-90-900. The unit is MT. As it includes products other than biodiesel, the unit is kept unchanged.

Sources: Japan Organic Recycling Association, Ministry of Agriculture, Forestry and Fisheries, Ministry of Environment, The World Trade Atlas

Fuel Pellets (1,000 MT)								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Production	25	30	36	51	58	66 [1]	75 [1]	85 [1]
Imports	14.1 [2]	14.09 [2]	41.89 [2]	59.14 [2]	73.33 [2]	73.67 [2]	17.68 [3]	70 [4]
Exports	3.64 [2]	4.47 [2]	3.7 [2]	2.81 [2]	2.51 [2]	4.46 [2]	1.1 [3]	3.36 [4]
Consumption	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ending Stocks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Production Capacity								
No. of Plants	38	47	55	64 [5]	73 [5]	80 [5]	87 [5]	95 [5]
Capacity (1,000 MT)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Capacity Use (%)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Feedstock Use (1,000 MT)								
Sawdust	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

1 = Post's estimate
2 = HS 4401.30-000, Sawdust and Wood Waste and Scrap. Wood pellets were included in this category until the end of 2011.
3 = HS 4401.31, Wood pellets. Data for Jan-Apr.
4 = Post's estimate
5 = Post's estimate
Sources: MAFF; The World Trade Atlas; Japan Wood Pellet Association

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