BIOFUEL IN BRAZIL AND JAPAN
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1. INTRODUCTION
Brazil is one of the largest producers of fuel ethanol in the world. The product has been used for 35 years as a biofuels in vehicles and this has led the country to acquire knowledge and experience in its production and use as fuel. By grace of good geographical localization, Brazil has good climate, abundant fresh water and adequate land; therefore Brazil can produce agricultural products with the best condition in the world. The United States and Brazil lead the industrial production of ethanol fuel, accounting together for 89% of the world's production in 2009. In 2009 Brazil produced 27 billion liters representing 38% of the world's total ethanol used. Moreover, Brazil is considered to have the world's first sustainable biofuel economy and the biofuels industry leader. The total area of Brazil is 851 million ha, while agricultural area accounts for only 72,0 million ha. The main utilization of Brazilian land are: Preserved area - 425.6; pasture-210.6; soybean-21.3; corn-14.6: sugarcane- 7.8; bean - 4.0; rice - 2.9; coffee - 2.1; cassava-1.9; wheat- 1.7; cotton- 1.1; orange - 0.8; others -13.7 The country still has a very large potential for growth in the area of biomass production. According to estimates, it would be possible to increase the available area for food and biomass production by around 70 millions ha without invading forestry or preserved areas. The energy matrix of Brazil is much different from the average of the world. The main differences are: the big amount of renewable energy such as a hydroelectricity is used in Brazil: about 45% of the total in Brazil while 13,0% in the world, and the biofuels as a transport fuel that is 29 % in Brazil and only 11% in the world.

2. OVERVIEW OF BIOFUEL IN BRAZIL
Due to adequate climate and good capability of production, many kinds of biomass are used as a feedstock to produce biofuels. The production of ethanol in 2009 was 27,00 billion liters and the biodiesel was 1,7 billion liters. Ethanol produced in Brazil uses sugar cane as raw material due to advantages such simple fermentation, semi-perennial cultivation, and merchandisable farming. Sugar cane is the most utilized raw material in the world to produce ethanol, because of its high productivity, while the production of ethanol from sugar cane is about 7,000 liters/ha, from corn is only 4,000 liters/ha. Ethanol yield has grown 3.77% per year since 1975 and productivity gains have been based on improvements in the agricultural and industrial phases of the production process. Many kinds of raw material are used for the production as biodiesel. The most important raw materials are: palm, soybean, castor bean, corn, palm, cotton, coconut, canola, sunflower and jatropha.

3. BIOETHANOL PRODUCTION AND USE AS FUEL
In Brazil, ethanol is produced in two regions: a) 11% is produced in the northeast, where 85 industrial plants are installed; b) 89% is produced in southeast, where 315 plants are installed. The crop is ready from September to March in the northeast region, and from April to December in southeast. Sugarcane has been cultivated in Brazil
since 1532 for sugar. It was one of the first commodities exported to Europe by the Portuguese settlers. The first use of sugarcane derived ethanol as a fuel in Brazil dates back to the late twenties and early thirties of the twentieth century with the introduction of the automobile in the country. Blends were only used sporadically until the seventies, when the first oil crisis resulted in gasoline shortages and awareness of the dangers of oil dependence. As a response to this crisis, the Brazilian government began promoting bioethanol as a fuel. The National Alcohol Program - Pro-Alcool, launched in 1975, was a nation-wide program financed by the government to phase out automobile fuels derived from fossil fuels, such as gasoline, in favor of ethanol produced from sugar cane. In 2003 Brazilian VW Gol 1.6 Total Flex was the first flexible-fuel car capable of running on any blend of gasoline and ethanol. 

There are many agents to deal with the ethanol industry. The first involves the agricultural activities; in this step, the sugar cane is planted and cropped, about 7.8 millions ha of land is used, and more than 50 thousand growers and million of farmer workers are involved. The second involves the industrial activities, where the sugar cane is transformed to sugar and ethanol. There are more than 400 industrial plants. Each industrial plant can produce sugar and ethanol. The third are distributors, there are more than 160 distributors and more than 27,000 gas stations involved. The forth are the carmakers, which adjust the vehicle to the new situation. In order to coordinate this entire program many ministries of government take part in this program.

In 2003, the production of Flex Fuel vehicle began. This car can use 0% to 100% of ethanol, or 0% to 100% of gasoline. After the launch of flex fuel, moved by the acceptance by driver, the sales of flex-fuel cars suddenly increased and today it represents about 80% of the total. A 2009 study published in Energy Policy found that the use of ethanol fuel in Brazil has allowed to avoid over 1.2 billion tons of CO₂ emissions since 1975, when the Pro-Alcool Program began.

4. BIODIESEL PROGRAM

In 2004 the use of biodiesel was defined, and in 2005 the government set the following target: 2% of biodiesel from 2008, and 5% from 2013, the target was set to achieve by January 2010. According to this mandatory definition, it’s expected that consumption of biodiesel will be about 2,600,000 liters in 2010. Brazil has good condition to produce many kinds of raw materials to produce biodiesel. The most important feedstock of vegetable oil is from soybean (5,600,000 liters/year); cotton (315,000 liters); palm (151,000 liters).

There are 56 biodiesel production plants, using some number of technologies as FAME, Fischer-Tropsch. Petrobras developed its own technology, patented as HBio Process, which uses the vegetable oil as a feedstock and utilize existing facilities of oil refineries (Hydrogen Diesel Treatment). The yield of the process is 96%; it means by processing 100 liters of vegetable oil, it produces 96 liters of bio diesel.

5. NEW TECHNOLOGIES OF BIOFUEL

Global biofuels production has been increasing rapidly over the last decade, but the expanding biofuels industry has recently raised important concerns. In particular, the sustainability of many first-generation biofuels – which are produced primarily from food crops such as grains, sugar cane and vegetable oils – has been increasingly questioned over concerns such as reported displacement of food-crops, effects on the environment and climate change. It is increasingly understood that most first-generation biofuels, with the exception of sugar cane ethanol.
Second generation biofuels use biomass to liquid technology, including cellulosic biofuels, biohydrogen, biomethanol, DMF, Bio-DME, Fischer-Tropsch diesel, biohydrogen diesel, mixed alcohols and wood diesel. Cellulosic ethanol production uses non-food crops or inedible waste products and does not divert food away from the animal or human food chain. Many Brazilian companies are developing the new technology to maintain the advantage in biofuel business. Petrobras is developing some: a) the Lignocellulosic Bioethanol using the sugar cane bagasse, was tested in pilot plant scale, and the demonstration will be ready in 2011; b) Synthetic Biofuel – BTL, the demonstration plant will be concluded in 2011.

6. PROGRAM OF BIOFUEL PRODUCTION AND USE IN JAPAN
The government of Japan supports the development of innovative technologies for low-cost fuel ethanol. The main programs are: Sugarcane in Okinawa, wheat and corn unsuitable for food in Hokkaido, sorghum in Yamagata, wood residues in Okayama and Osaka, rice in Niigata. It will also rely on technological breakthroughs in lignocellulosic ethanol in the near future, which would allow the use of waste material such as crop and wood residues.

As a signer to the Kyoto Protocol, Japan has pledged to reduce CO2 emissions by 6.0% from 1990 levels by the year 2010. To reach that goal, the Japanese government plans to replace fossil fuels with 500,000 kiloliters of ethanol for the transportation sector by 2010.

In 2007 Japan started the use of ETBE (ethyl tertiary butyl ether) introduced by the Petroleum Association of Japan (oil companies).

In 2005 test of E3 (5% ethanol and 97% gasoline) began in Miyakojima, Okinawa prefecture. In 2006, production of the ethanol by Bio Ethanol Japan Kansai (wood origin) started in Osaka Prefecture. In 2009 BRAZIL–JAPAN ETHANOL Co., Ltd., started the production of E3, using the ethanol imported from Brazil (sugarcane origin), to attend gas stations in Kanto area. In 2009 JA ZEN-NOH Niigata (agricultural cooperative) started to produce ethanol by own plant (rice origin), and to supply E3 to gas stations in Niigata

Variety of R&D supported by the government investigating the measures to achieve the newly announced target (25% reduction in 2020 compared to 1990). Sustainability criteria for biofuels under consideration by Ministry of Energy, Trade and Industry (METI), along with MAFF and MOE, and published the first draft in March 2010.

GHG-Basic concept is similar to EU directive.

7 COOPERATION PROGRAM AROUND THE WORLD
In March 2007 American and Brazilian presidents signed the Memorandum of Understanding (MOU) to promote the production and use of sugar cane based ethanol throughout Latin America and the Caribbean. The two countries also agreed to share technology and set international standards for biofuels. Brazil has also extended its technical expertise to several African countries, including Ghana, Mozambique, Angola, and Kenya. Another 15 African countries have shown interest in receiving Brazilian technical aid to improve sugarcane productivity and to produce ethanol efficiently. Brazil also has bilateral cooperation agreements with several other countries in Europe and Asia.

Many Japanese companies are making negotiation with Brazilian producers, to invest in Brazil to produce ethanol for exportation.

Petrobras signed MOU with Nigeria, Venezuela, South Africa, Indonesia, Korea, Portugal and India.

CONCLUSION
Brazil is the world’s largest exporter of ethanol. Since 2004 the United States has been the main customers for Brazilian exporters, others countries are: Netherlands, Japan, Sweden, India, and South Korea. As U.S. EPA’s 2010 final ruling for the Renewable Fuel Standard designated Brazilian sugarcane ethanol as an advanced biofuel. In order to guarantee a sustainable development of ethanol production, in September 2009 the government issued a countrywide agro ecological land use zoning by decree to restrict sugarcane growth in or near environmentally sensitive areas such as the Pantanal wetlands, the Amazon Rainforest and the Upper Paraguay River Basin. The government considers that the suitable areas are more than enough to meet the future demand for ethanol and sugar in the domestic and international markets foreseen for the next decades.

Brazil is prepared to attend part of biofuels needs of the world and contribute to improve the environmental condition.