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Korea, Republic of

Bio-Fuels

Bio-Fuels Production Report

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Report Highlights:
Among OECD countries, Korea has one of the worst air pollution problems and is one of the top 10 producers of greenhouse gases. One-third of all cars run on diesel consuming 18 million tons of diesel fuel per year. As a result, the government is pursuing policies aimed at increasing the use of new and renewable energy sources to equal up to five percent of Korea's total energy usage by 2011. For the most part, Korea must import the biomaterials it needs to produce biodiesel.

Includes PSD Changes: No
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SECTION I. EXECUTIVE SUMMARY

The air pollution problem in Seoul is one of the worst among OECD countries and some observers say that it even surpasses Mexico City's air pollution problem. Environmental experts attribute much of this pollution to the increase in diesel-fueled automobiles. Among the 15 million vehicles in the country, diesel-powered buses, trucks and multi-purpose vehicles account for more than 30 percent. In Korea, one-third of all vehicles run on diesel consuming approximately 18 million tons of diesel fuel per year. The remaining two-thirds run on gasoline consuming approximately 9 million tons per year. In addition, because of its dependence on heavy industries, Korea is one of the top 10 greenhouse-gas-producing countries in the world.

The government has allowed the sale of diesel-powered passenger sedan cars since 2005. This is likely to aggravate the air pollution problem.[1] Biodiesel is quickly emerging as a promising solution to this problem. The government is pursuing policies aimed at increasing the use of new and renewable energy sources. The goal is that by 2011 up to 5 percent of Korea's total energy will be supplied by these energy sources. As of the end of 2005, new and renewable energy sources made up only 2.2 percent of the total energy used in the country.

Although the cost of producing biodiesel is higher than the cost of refining crude oil, tax incentives should help reduce future CO_2 emissions and provide environmental benefits. While Korea is currently not obligated to reduce greenhouse gases under the Kyoto Protocol, it is expected to do so along with other industrialized countries by 2013.

SECTION II. TRADE AND PRODUCTION

Commercial Production of Biofuels

Since May 2002, the Ministry of Commerce, Industry and Energy (MOCIE) has been supporting BD-20 production through the use of tax exemptions.

Korea's Biodiesel Producers and their Production Capacities
(Unit: tons)

Company	Production Capacity	Website
KAYA Energy Co.,Ltd.	100,000	http://www.neoenergy.co.kr
Dansuk Industrial Co.,Ltd.	60,000	http://www.dansuk.co.kr
BND Energy	50,000	http://www.bndenergy.com
Ecoenertech	40,000	http://www.ecoenertech.co.kr
Bizel	25,000	http://www.bizeloil.com
3Msafety	20,000	http://www.3msafety.co.kr
BDK	6,000	
Moodeung Bioenergy	6,000	http://www.powerbio.co.kr
TOTAL	307,000	

Source: Ministry of Commerce, Industry and Energy (MOCIE)

There are eight registered biodiesel facilities in Korea with a total production capacity of a little over 300,000 tons annually. MOCIE forecasts that biodiesel production will expand to 700,000 tons within the next few years. Currently, only BD-20 is being produced. BD-20 is

[1] The Korea Times, "Seoul's Air Pollution Worst Among OECD Members" by Soh Ji-Young, March 31, 2003

composed of 20 percent biomaterials and 80 percent diesel. BD-20 is only available for use in special vehicles such as trucks and buses.

Production Under Development

Earlier this year, the Korean government introduced biodiesel-5 (BD-5), which can be used in sedan passenger cars. It is a combination of 5 percent vegetable oil and 95 percent normal diesel.

In January 2006, the Petroleum and Petroleum Substitute Fuel Business Act was revised to allow for sales of BD-5. Five major local oil refineries reached an agreement with MOCIE to voluntarily supply BD-5 to gas stations across the nation beginning in July 2006, and to supply the fuel to all gas stations by June 2007. MOCIE expects that total demand for biodiesel will reach 180,000 kiloliters for the time period covered by this agreement. BD-5 can also be used in petroleum diesel engines. BD-5 price is 7 Korean won cheaper than regular diesel due to the elimination of the traffic tax, the mileage tax, and the education tax levied on diesel.

Biodiesel Consumption by Year

(Unit: Metric tons)

	2002	2003	2004	2005	2006[1]	2007[1]
Diesel Consumption	16.4 million	17.5 million	17.6 million	17.8 million	18 million	18 million
Biodiesel Consumption	1,588	3,755	6,835	15,533	90,000	90,000
Biodiesel Share	0.01%	0.02%	0.04%	0.09%	0.5%	0.5%

Source: Ministry of Commerce, Industry and Commerce (MOCIE)
1/ 2006 and 2007 consumption estimates are based on oil industry sources. Biodiesel consumption for these years is based on the 5 major oil companies' voluntary supply of BD-5.

The Ministry of Environment (MOE) and MOCIE are considering a mandatory requirement that a certain portion of diesel consumption be biodiesel to become effective in 2008 after the voluntary agreement expires.

Imports

For the most part, raw materials for the production of biofuels are not available in Korea. Imported soybean oil accounts for 85 percent and used frying oil accounts for the remaining 15 percent of the biomaterials used to produce BD-20. Industry analysts estimate that out of 200,000 tons of used frying oil production; currently, only 70,000 tons are being recycled and presumably, the remainder is being disposed of improperly.

There are various government proposals underway to look at the possibility of producing biomaterials domestically. The Ministry of Agriculture and Forestry (MAF) and the South Chobuk provincial government have developed a plan to grow rapeseed (500 hectares) for biodiesel production starting from 2007 to 2009. However, MAF's concern is that feed supplies remain stable.

Investment Outside of Korea

Due to the lack of inexpensive domestic raw materials, a Korean biodiesel producer, ECO Solutions, and the Malaysian state-run Palm Oil Company (POIC) established the Palm Biodiesel International (PBI) Joint Venture Company on December 12, 2005. PBI will produce about 150,000 tons of biodiesel from the latter half of 2007. MOCIE, however, recently announced that the import into Korea of palm oil biomaterials for use in biodiesel is prohibited because palm oil tends to freeze in the winter.

SECTION III. POLICY

Domestic Policy Environment

In the past, Korea's energy policies were focused on establishing a stable energy supply and on supplying the fuels necessary for economic growth. However, energy policies are now aimed at ensuring sustainable development taking into consideration both economic growth and environmental protection.

The Ministry of the Environment (MOE) began testing biodiesel and biodiesel fuel blends in early 2002. As a result of these emission tests, MOE recommended biodiesel as a renewable fuel to MOCIE. MOCIE is responsible for setting standards for petroleum and petroleum substitutes and MOE is responsible for regulating air pollution.

In late 2002, 73 gas stations in the Seoul metropolitan area and Chonbuk Province were designated as demonstration stations and began carrying BD-20. By January 2006, the number of stations testing BD-20 reached 200.

For the purposes of the demonstration, temporary standards were developed. Fuel and automotive companies did not readily accept the temporary standards at the time. They felt that the quality of BD-20 was not being adequately managed and that this resulted in poor vehicle performance. In addition, the local automotive industry has not been satisfied with the amount of research conducted on BD-20 and feels that satisfactory vehicle performance can only be guaranteed with BD-5. Biodiesel has a tendency to become less efficient in colder weather.

In 2003, Korea began preparing official biodiesel standards and the biodiesel demonstration was extended to June 2006. The final standards, drafted in September 2004 by MOCIE, were adopted in January 2006 and are very similar to EN14214, the European biodiesel standards.

Korean Biodiesel Standards

January 2006

Specification	Unit	Korean Standards	
		(2002. 5. 25)	(2006. 1. 1) [1]
Density 15°C	Kg/m^3	815-855	860-900
Viscosity 40 °C	mm^3/s	1.9-6.0	1.9-5.5
Distillation 90%	°C	360 max	-
Flash point	°C	100 min	120 min
CFPP	°C	-	-
Pour point	°C	-	-
Sulphur	mg/kg	0.02 max	0.001 max

Carbon residues (10% dist.rersidue)	% mass	0.5 max	0.5 max
Sulphated ash	% mass	-	0.02 max
Oxide ash	% mass	0.01 max	0.02 max
Water	mg/kg	-	500 max
Total contamination	mg/kg	-	24 max
Water and sediment	% vol	0.05 max	0.05 max
Cu corrosion max	3h/ 50°C	Class 1	Class 1
Oxidation stability	hrs/110 °C	-	6 min
Cetane number	-	49 min	
Acid value	mgKOH/g	0.8 max	
Methanol 10 °C	% mass	-	0.2 max
Ester content	% mass	95 min	96.5 min
Monoglyceride	% mass	-	0.8 max
Diglyceride	% mass	-	0.2 max
Triglyceride	% mass	-	0.2 max
Free glycerol	% mass	0.02 max	0.02 max
Total glycerol	% mass	0.24 max	0.25 max
Iodine value	-	-	-
Phosphorus	mg/ kg	-	10 max
Alkaline metals Group I	mg/kg	-	5 max
Alkaline metals Group II	mg/kg	-	5 max
Linolenic acid ME	% mass	-	12 max
Polysaturated (C(x:4)) ME	% mass	-	1 max
Lubricity 60°C	μm	-	460 max

Source: Ministry of Commerce, Industry and Energy

The cold filter plug point (CFPP) of pure biodiesel will not be regulated because only biodiesel blended fuels, BD-20 and BD-5 are being used in Korea. However, the CFPP of biodiesel fuel blends should meet the CFPP specification for diesel. In addition, no specification for measuring cetane numbers is given because the necessary equipment is not available. This specification will be developed later if necessary. This is the only specification on which all participants of the voluntary agreement could not agree. The oil industry and automotive companies insisted on using the specification for acid values spelled out in the European standards EN14214 (0.5 mg KOH/g), but the biodiesel producers preferred the U.S. specification (0.8 mg KOH/g). MOCIE is now in the process of deciding which specification to use in the new Korean standards.

Fleet tests of the new Korean biodiesel standards began in September 2004 and are expected to continue until June 2006. Major Korean automotive, oil and biodiesel producers are now participating in this project. Biodiesel composed of vegetable oil for the production of BD-20 is currently only for business fleets that have the facilities to supply BD-20.

The Korean government will spend 2.5 billion won (approximately US$2.7 million) in 2006 and in 2007 to support feasibility studies on bioethanol. There is a growing interest in bioethanol as an alternative fuel and the government estimates that the price will be competitive with crude oil if it reaches $80-90 per barrel.

Recently, Korea opened its first biomass power plant. The plant uses 145 tons of wood chips and pellets daily to generate 52 tons of steam and 50 kilowatts of electricity an hour. Korea has an estimated four million tons of leftover wood chips, equivalent to 1.6 million tons of oil.

Prices

In 2004, the price of diesel was only 70 percent of the price of gasoline; however, it is expected that the price will increase to about 85 percent by the end of 2007.

In general, the cost of fuel is very high in Korea, mainly due to the amount of taxes levied on these products. For example, 50 percent of the total cost of diesel and 71 percent of the total cost of gasoline is from taxes.[2]

Price Comparison Between Diesel and Biodiesel

(Unit: Korean Won / Liter)

	2004	2005	2006
Factory price (diesel)	400	560	560
Tax (diesel)	340	410	560
Tax-added price (diesel)	740	970	1120
Biodiesel factory price	-	900-950	-

Source: Korea National Oil Corporation (KNOC) and Biodiesel Industry

[2] 'Recent Development and Barriers on Bioenergy in Korea.' January 1, 2005, by Lee, Jin Suk

SECTION IV. APPENDIX

Production and Distribution of Corn Incorporating Biofuel Usage
Unit: Metric tons

	Corn Production	Corn Imports	Total Supply	Corn Exports	Corn Feed Use	Corn for Biofuel Use	Corn for Sweetener Use[1/]	Cron Total Use 2/
2001	57,218	8,481,831	8,539,049	17	6,436,040	0	1,892,772	8,328,829
2002	73,223	9,125,577	9,198,800	1	6,646,587	0	1,920,694	8,567,282
2003	70,242	8,782,362	8,852,604	23	6,659,594	0	1,924,274	8,583,891
2004	77,616	8,371,011	8,448,627	70	6,439,875	0	1,865,924	8,305,869
2005	73,470	8,533,254	8,606,724	41	6,628,528	0	1,837,414	8,465,983

Source: Korea Trade Information Services (KOTIS), Ministry of Agriculture and Forestry (MAF) Korea Feed Association (KFA)
Notes:
1/ Corn for wet milling such as starch, syrup, dextrose and fructose
2/ Excludes corn for dry milling purposes

Production and Distribution of Corn Byproducts Usage
Unit: Metric tons

	Ethanol Production	Ethanol Imports 1/	Ethanol Exports 1/	Ethanol Total Use	Sweetener Production 2/	Sweetener Imports 3/	Sweetener Exports 3/	Sweetener Total Use
2001	153,563	165,588	2,218	316,933	1,298,820	3,250	177	1,301,893
2002	154,456	181,064	1,074	334,446	1,315,300	2,841	280	1,317,861
2003	154,456	179,922	1,549	332,829	1,262,772	2,292	698	1,264,366
2004	162,952	187,785	1,241	349,496	1,233,544	2,716	349	1,235,911
2005	160,000	190,311	4,868	345,443	1,212,464	3,122	387	1,215,199

Source: Korea Trade Information Services (KOTIS), Korea Corn Processing Industry Association (KCPIA), Korea Alcohol and Liquor Industry Association (KALIA).
Notes:
1/ Includes only ethanol, denatured (HS No. 220720) and undenatured (HS No. 220710)
2/ Includes starch, dextrose, and fructose
3/ Includes only solid corn sweetener (HS No. 170250) and liquid sweetener (HS No. 170260)

Production and Distribution of Soybean Incorporating Biofuel Usage

Unit: Metric Tons

	Soybean Production	Soybean Imports	Soybean Total Supply	Soybean Exports	Soybean Feed Use	Soybean for Biofuel Use	Soybean for Crushing	Soybean Total Use
2001	117,723	1,355,214	1,472,937	430	267,861	0	1,092,747	1,361,038
2002	115,024	1,473,899	1,588,923	315	286,591	0	1,235,449	1,522,355
2003	105,089	1,508,333	1,613,422	586	311,522	0	1,212,089	1,524,197
2004	138,570	1,283,491	1,422,061	685	338,931	0	988,825	1,328,441
2005	183,338	1,330,201	1,513,539	88	339,784	0	744,181	1,084,053

Source: Korea Trade Information Service (KOTIS), Ministry of Agriculture and Forestry (MAF), Korea Agro-Fisheries Trad Corporation (aT)

Production and Distribution of Biodiesels

Unit: Metric tons

	Biodiesel Produc-tion	N.E.S.O.I. Imports 1/	N.E.S.O.I. Exports 1/	Biodie-sel Total Use	Soybean Oil Produc-tion	Soybean Oil Imports	Soybean Oil Exports	Soybean Oil Total Use
2001	0	476,107	152,955	0	194,509	170,435	4,700	369,644
2002	1,588	484,603	195,749	1,588	222,427	177,606	9,498	409,531
2003	3,755	492,504	207,554	3,755	216,902	162,567	5,708	385,177
2004	6,835	582,517	191,370	6,835	177,084	223,327	4,791	405,202
2005	15,533	507,997	209,108	15,533	172,842	256,119	4,231	433,192

Source: Korea Trade Information Service (KOTIS), Ministry of Agriculture and Forestry (MAF)
Notes:
1/ Includes only chemical products and preparations for chemical or allied industries, N.E.S.O.I. (HS No. 382490)