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Drivers and Policies

South Korea enacted the new Renewable Fuel Standard (RFS) program in 2019. Accordingly, it is mandatory to supply biodiesel to diesel fuel, and refineries must mix and sell both at a predetermined ratio, as shown in Table 1.

Table 1 Ratio of New and Renewable Energy Fuel Blending to Transportation Fuel

Year	Blending Ratio
2015	0.025
2016	0.025
2017	0.025
2018	0.03
2019	0.03
2020	0.03

Note: To determine the compulsory blending amount by year, multiply the compulsory blending ratio by year times the domestic sales volume of transportation fuel, including mixed renewable energy fuels.

As of July 31, 2015, the annual compulsory ratio will be reviewed every three years, taking into consideration the level of technology development of new and renewable energy and the fuel supply and demand situation.

As of January 1, 2018, the blending ratio was revised to 3%; after the standardized three-year period, the blending ratio again will be reviewed in 2020. However, the blending ratio can be changed before 2020 depending on market conditions and mixed performance results.

In the case of bioethanol, an empirical study was undertaken for South Korea's supply beginning in May 2016. The feasibility of this fuel for manufacturing, supply, infrastructure, and vehicle use was verified by the end of April 2019. Researchers selected one gas station and checked equipment and storage problems by season for 365 days. Researchers also tested durability for 45,000 km using four demonstration vehicles, systemically checking emission gas and vehicle condition. Additionally, new technology development for parts affected by fuel (combustion system, fuel pump) is being pursued.

In the case of marine fuels, the amendment to the International Maritime Pollution Prevention Convention (MARPOL) came into force in January 2020 through the International Maritime Organization (IMO), limiting the sulfur content to 0.5% m/m for marine fuels internationally. In order to prepare for this change, domestic desulfurization facilities were developed through government and private companies and the expansion of low-sulfur crude oil supply; use of liquefied natural gas (LNG) was considered. In South Korea, technological development and private investment in the production of low-sulfur oil and emission reduction technologies (e.g., scrubber) are increasing.

SK energy plans to start operating the Residual Oil Desulfurization Facility (VRDS) in April 2020. This is an eco-friendly, low-sulfur oil production facility that began construction in November 2017. S-OIL is also seeking to supply low sulfur oil through capacity expansion.

In order to prepare for the introduction of bio aviation oil, research on bio aviation oil synthesis and empirical evaluation using non-petroleum-based raw materials has been conducted in several industries, in academia and research fields such as the Advanced Biomass R&D Center and the Institute for Advanced Engineering.

In particular, since December 2016, the Agency for Defense Development (ADD) has studied the application of biofuel derived from vegetable oils produced by applying domestic technology to jet engines. Korean Air made its first 14-hour flight to Chicago in November 2017, with a 5% blended fuel oil extracted from plants.

Advanced Motor Fuels Statistics

Table 2 shows classification of newly registered vehicles in South Korea, from 2014 to 2018, by fuel type. Figure 1 shows the change rate of the vehicle registration number by year in comparison with the previous year. New registrations for gasoline vehicles did not change much by year, and for diesel vehicles, new registrations decreased from 2016.

The South Korean government is providing tax benefits and subsidies for the dissemination of eco-friendly hybrid cars, electric cars and hydrogen fuel cell cars. As a result, new registrations for hybrid and electric vehicles are steadily increasing. The number of newly registered CNG and hydrogen fuel cell vehicles is not large but has continued to increase since 2015.

Table 2 Vehicle registration number by fuel type

Year	2014	2015	2016	2017	2018
Gasoline	661,919	681,601	747,718	758,635	777,499
Diesel	805,609	962,127	872,640	820,457	792,404
LPG	149,014	137,121	123,077	137,932	118,436
HEV, PHEV	34,516	39,014	62,210	84,614	93,094
Electric	1,315	2,932	5,177	14,332	31,154
CNG, Fuel Cell, etc.	9,495	10,991	12,219	14,018	14,554
Total	1,661,868	1,833,786	1,823,041	1,829,988	1,827,141

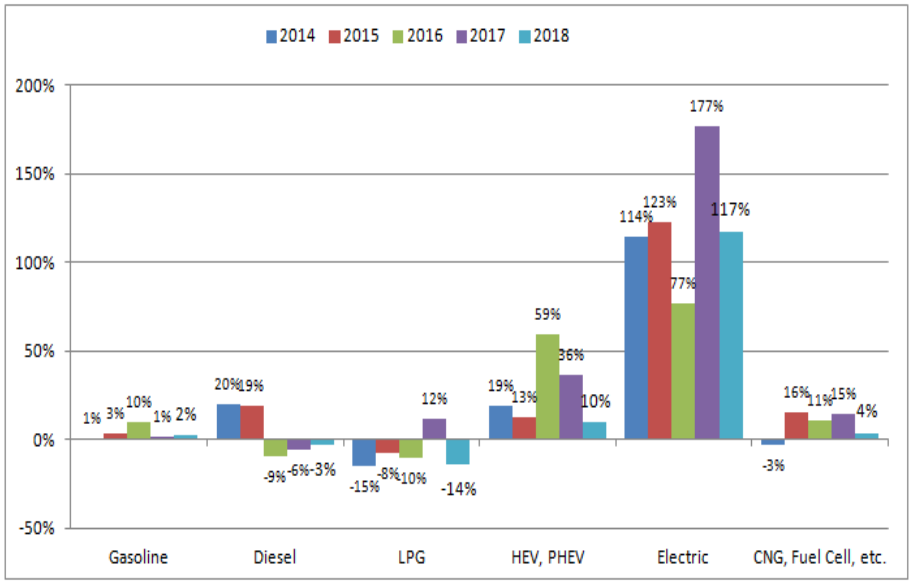

Fig. 1 Annual change rate of vehicle registration

Research and Demonstration Focus

The South Korean government supplied 80,000 electric cars and 3,500 hydrogen cars as of September 2019, and it has plans to increase the proportion of eco-friendly vehicles by 33% by 2030.

In the case of electric vehicles, South Korea aims to electricize all models of sedans, SUVs, and trucks (more than 5 tons) to have 600 km in driving range and three times the charging speed in comparison to those in existence now.

In the case of hydrogen vehicles, South Korea is promoting the localization and R&D of parts to ensure durability up to 500,000 km and to lower vehicle price to $34,000 US.

Figure 2 shows Kia Motors' Niro EV, which is produced in Korea and exported abroad. Figure 3 shows Neptune, a hydrogen heavy duty truck of Hyundai Motors, which began exporting to Switzerland in 2020.

Fig. 2 Kia Motors' Niro EV, a Gen3 Hydrogen vehicle

Fig. 3 Hyundai Motors' Neptune, a Fuel Cell Manufacturing Plant Fuel Cell Bus

To expand the infrastructure for eco-friendly cars, the South Korean government developed a plan to build 15,000 rapid chargers for electric vehicles by 2025, and 660 hydrogen charging stations by 2030.

In the case of electric car chargers, the plan provides for the building of more than 1,500 units every year, intended for supermarkets, gas stations, and rest areas. New hydrogen refueling stations are planned for construction within 20 minutes of major cities and within 75 kilometers on highways.

The government plan also allows for the expansion of the supply of eco-friendly vehicles by providing tax reduction and purchase subsidies

In the case of subsidies provided to manufacturers, the subsidies will be reorganized around performances such as energy consumption efficiency and mileage of electric vehicles to induce higher efficiency and improve performance. Subsidies provided to consumers will be expanded, but the scale of those subsidies will be reviewed after 2022, and the level of subsidies will be changed.

Outlook

According to the RFS policy of South Korea, the blending ratio of biodiesel to diesel fuel will be maintained at 3% until July 2020. In 2020, however, the blending ratio will be reviewed through a separate review process.

Although bioethanol has been studied with biobutanol, it remains unclear whether the exact pilot operation plan or supply plan has been finalized.

Based on the results of research on the application of bio-aviation oil through government departments, aviation oil is expected to establish a legal, institutional, and infrastructure maintenance base for domestic bio-aviation oil utilization.

Additional Information Sources

- Advanced Biomass R&D Center, https://www.biomass.re.kr
- Institute for Advanced Engineering, www.iae.re.kr
- K-Petro, www.kpetro.or.kr
- Korea Register, www.krs.co.kr
- Ministry of Trade, Industry and Energy, www.motie.go.kr