

## Republic of Korea

### *Drivers and Policies*

The new Renewable Fuel Standard (RFS) program was enacted in South Korea's National Assembly in July 2015. Accordingly, it is mandatory to supply biodiesel to diesel fuel, and refineries must mix and sell them at a predetermined ratio (see Table 1).

Table 1 Ratio of New and Renewable Energy Fuel Blending Ratio 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.

The annual compulsory ratio will be reviewed every three years as of July 31, 2015, taking into consideration the level of technology development of new and renewable energy and the fuel supply and demand situation. On July 31, 2018, the blending ratio was revised to 3%. The blending ratio will be reviewed in 2020 and can be changed before 2020, depending on market conditions and mixed performance results.

In the case of bioethanol, an empirical study is underway for the supply from May 2016, and the feasibility of this fuel for manufacturing, supply, infrastructure, and vehicle is under verification. We selected one gas station and are checking the equipment and storage problems by season for 365 days. We are also carrying out the durability test for 42,000 kilometers (km) through four demonstration vehicles and checking the emission gas and vehicle condition. Apart from this, technology development for parts affected by fuel (combustion system, fuel pump) is also being carried out.

In the case of marine fuels, the amendment to the International Maritime Pollution Prevention Convention (MARPOL) will come into force in January 2020 through the International Maritime Organization (IMO),

limiting sulfur content to 0.5% m/m for marine fuels internationally. To prepare for this change, government and private companies are developing domestic desulfurization facilities, the low-sulfur crude oil supply is being expanded, and the use of liquefied natural gas (LNG) is under consideration. In Korea, technological development and private investment in the production of low-sulfur oil and emission reduction technologies (scrubber, etc.) are increasing. For example, domestic SK energy will invest KRW 1 trillion by 2020 to build a desulfurization plant with a production capacity of 40,000 barrels per day, while S-OIL is also planning to construct an upgrading facility for residual oil.

For the introduction of bio-aviation oil, aviation oil is part of ongoing research on the synthesis and demonstration evaluation of bio-aviation oil using non-petroleum-based raw materials in various industry-university-institute efforts, such as the Advanced Biomass R&D Center (ABC, <https://www.biomass.re.kr>) and the Institute for Advanced Engineering (IAE, [www.iae.re.kr](http://www.iae.re.kr)). In particular, since December 2016, the Agency for Defense Development (ADD) has been studying the application of biofuel derived from vegetable oils produced by applying domestic technology to jet engines. Korean Air made its first 14-hour flight in November 2017 to Chicago, using a 5% blend of fuel oil extracted from plants. Currently, the Ministry of Land, Infrastructure and Transport (MOLIT) is conducting a feasibility study on biofuel for greenhouse gas (GHG) reduction in order to introduce domestic biofuel in 2017.

### ***Advanced Motor Fuels Statistics***

Table 2 shows the classification of the newly registered vehicles in Korea from 2013 to 2017 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 government is providing tax benefits and subsidies for disseminating 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 new registrations of compressed natural gas (CNG) and hydrogen fuel cell vehicles has steadily increased since 2015.

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Table 2 Vehicle Registration Number by Fuel Type

Year/Fuel	2013	2014	2015	2016	2017
Gasoline	656,128	661,919	681,601	747,718	758,635
Diesel	672,025	805,609	962,127	872,640	820,457
LPG	175,958	149,014	137,121	123,077	137,932
HEV, PHEV	29,060	34,516	39,014	62,210	84,614
Electric	614	1,315	2,932	5,177	14,332
CNG, Fuel Cell, etc.	9,779	9,495	10,991	12,219	14,018
Total	1,543,564	1,661,868	1,833,786	1,823,041	1,829,988

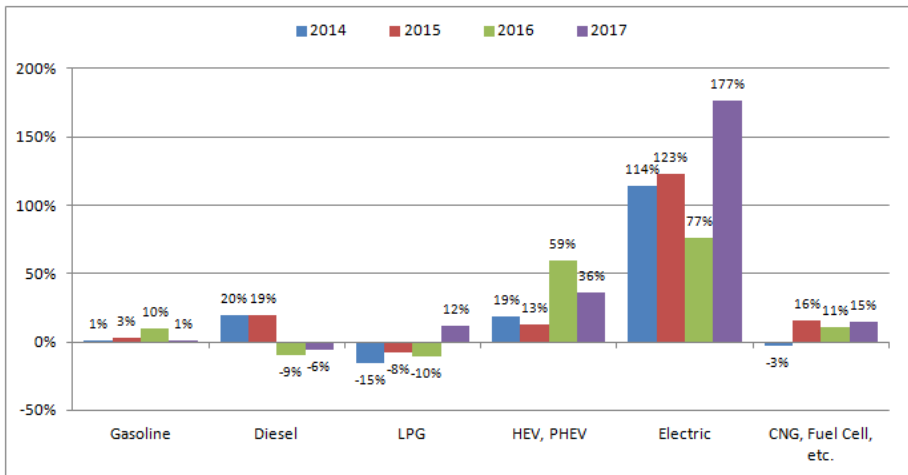


Fig. 1 Annual Change Rate of Vehicle Registration

### Research and Demonstration Focus

The Government of Korea supplied 25,593 electric cars and 177 hydrogen cars by 2017. In addition, 1,790 high-speed electric chargers and 12 hydrogen filling stations are under operation. In 2022, however, 430,000 electric cars and 65,000 hydrogen fuel cell cars will be supplied. To meet this volume, 10,000 high-speed electric chargers and 310 hydrogen filling stations will be constructed. The government is working to expand the supply of eco-friendly vehicles through tax relief and subsidies, but the electric charging and hydrogen filling stations are still insufficient compared to domestic gas stations (about 12,000 stations). We are continuing to provide support for additional supplies.

Subsidies for electric cars will be maintained until 2022 but then will be reduced step by step. In the case of hydrogen fuel cell cars, mass production will be maintained until the prices of parts and vehicles are stabilized. However, after the stabilization, the subsidy will be reduced step by step.

In addition, the city of Ulsan initiated the operation of the first hydrogen fuel cell bus in October 2018 (Figure 2). Thirty hydrogen fuel cell buses in six cities will be operated on a pilot basis from March 2019 until the end of 2020. By improving operational problems and resolving technical problems during the pilot stage, the Korean government plans to supply 2,000 hydrogen fuel cell buses by the end of 2022. Moreover, 310 hydrogen filling stations will be constructed to meet the supply of hydrogen buses.

In August 2017, Hyundai Mobis Company, a Korean auto parts company, built a facility capable of producing powertrain fuel cell complete modules, which integrate various core parts of hydrogen vehicles. This facility can produce 3,000 units per year and is expected to produce all the core parts required for hydrogen automobiles in one factory, which will help to expand the supply of hydrogen automobiles (Figure 3).



Fig. 2 Hyundai Gen3 Hydrogen Fuel Cell Bus



Fig. 3 Fuel Cell Manufacturing Plant

## Outlook

According to the RFS policy of 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 still is not clear whether the exact pilot operation plan or supply plan has been finalized.

On the basis of the results of research on the application of bio-aviation oil through the government departments, aviation oil is expected to establish a

base for domestic bio-aviation oil utilization, such as legal, institutional, and infrastructure maintenance.

#### ***Additional Information Sources***

- K-Petro, [www.kpetro.or.kr](http://www.kpetro.or.kr)
- Korea Register, [www.krs.co.kr](http://www.krs.co.kr)