

IEA-Advanced Motor Fuels ANNUAL REPORT 2019

Japan



Japan

Drivers and Policies

Fossil fuel plays a central role as a source of energy in Japan. However, the country's domestic sources of fossil fuel are limited, making it dependent on imports. Japan enacted the Basic Act of Energy Policy in June 2002 to ensure the steady implementation of energy policy.

Primarily, the point of Japan's energy policy is to ensure stable supply ("Energy Security") and to realize low-cost energy supply by enhancing efficiency ("Economic Efficiency") on the premise of "Safety." It is also important to maximize efforts to pursue environment suitability ("Environment").

The Basic Energy Plan is revised every four years. Its Fifth edition¹ was issued July 3, 2018, and indicated a policy for 2030 and 2050. For 2030, to achieve the goal of "steadily realizing an energy mix to reduce greenhouse gases by 26%", the main measures are (1) renewable energy, (2) nuclear power, (3) fossil fuel, (4) energy saving, and (5) hydrogen/electricity storage/distributed energy. For 2050, Japan is aiming for "80% reduction of greenhouse gases and taking on the challenge of energy conversion and decarbonization". The main measures in addition to the above items are heat, transportation, and distributed energy, and there is focus on decarbonization by hydrogen and electricity storage and decentralized energy systems.

In the transportation sector, to improve the energy efficiency of automobile transportation, "New fuel economy standards for passenger cars" was issued². This effort focuses on (1) target year: FY2030, (2) a standard value of 25.4km/L (32.4% improvement from FY2016 results), (3) scope, which includes gasoline vehicles, diesel vehicles, liquefied petroleum gas (LPG) vehicles, electric vehicles (EVs), and plug-in hybrid vehicles (PHEVs).

Furthermore, Japan will take measures such as increasing the ratio of next-generation vehicles (e.g., hybrid vehicles, EVs, PHEVs, fuel cell vehicles [FCVs], clean diesel vehicles, and compressed natural gas [CNG] vehicles) to all new vehicles to 50% to 70% by 2030.

¹ Agency for Natural Resources and Energy, 2018, "Cabinet Decision on the New Strategic Energy Plan" website, https://www.meti.go.jp/english/press/2018/0703_002.html

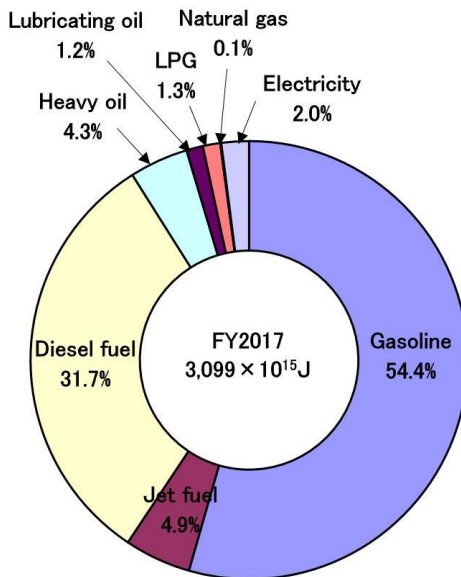
² The Ministry of Economy, Trade and Industry 2019.6.3
https://www.meti.go.jp/english/press/2019/0603_002.html

Now that biofuels, electricity, natural gas, LPG, and hydrogen are available as energy sources, an environment is being created in which consumers' vehicle choice promotes competition not only for fossil fuels, but also for a wider variety of energy sources.

In spreading and expanding the introduction of next-generation vehicles, research and development and infrastructure building are indispensable. Thus, the Government of Japan and the private sector will collaborate to disseminate infrastructure for next-generation vehicles.

Advanced Motor Fuels Statistics

Figure 1 shows the energy sources used in the transportation sector³ in Japan. Oil-related energy accounts for 97.9% of total usage. The market for alternative fuels is very small in Japan, as is the number of alternative fuel vehicles (Table 1). Methanol, CNG, hybrid, EVs, and FCVs currently constitute the environmentally friendly vehicles. The number of hybrid vehicles is rather large, owing to the number of passenger hybrid vehicles. CNG vehicles currently account for the largest number of vehicles in the low-emission truck category. The penetration of FCVs in the market has expanded; Japan has 3,009 FCVs.



³ Government's white paper on energy, 2017 (in Japanese).

Fig. 1 Energy Sources Used in the Transportation Sector in Japan in 2017

Table 1 Current Penetration of Low-Emission Vehicles in Japan

Vehicle Type	Methanol ⁴	CNG ⁵	Hybrid ⁶	EV ⁶	FCV ⁶	Vehicle Registration ⁷
Passenger vehicles	0	1,607	8,331,443 (PHV:122,008)	105,919	3,009	39,498,871
Light, mid, and heavy-duty trucks	576	6,318	31,493	1,512	0	5,916,211
		20,457				
Buses	0	1,584			0	232,933
Special vehicles	0	4,095			0	1,598,298
Small vehicles	0	11,092	1,102,481	6,323	0	31,137,246
Total	576	45,153	9,587,425	113,754	3,009	78,383,559

Research and Demonstration Focus

Hydrogen

*The Strategic Roadmap for Hydrogen and Fuel Cells*⁸ (revised version), which includes new goals and specific explanations of the new efforts to be undertaken, was released on March 22, 2016. In concrete terms, the revised version of the roadmap stipulated the following:

- Future price targets for household fuel cells.
- Targets for the dissemination of FCVs: in total, about 40,000 vehicles by 2020, about 200,000 vehicles by 2025, and about 800,000 vehicles by 2030.
- Targets for the construction of hydrogen stations: about 160 stations by 2020 and about 320 stations by 2025.
- Clarification of descriptions concerning hydrogen power generation.
- The technical and economic challenges concerning the utilization of hydrogen generated using renewable energy.

⁴ LEVO, the Organization for the Promotion of Low Emission Vehicles (cumulative total number: out of production).

⁵ Japan Gas Association, as of March 2018 (cumulative total number). <https://www.gas.or.jp/ngvj/spread/> (in Japanese)

⁶ Next Generation Vehicle Promotion Center, as of March 2018 (estimated numbers of vehicles owned). <http://www.cev-pc.or.jp/tokei/hanbai.html> (in Japanese)

⁷ Automobile Inspection and Registration Information Association, as of August 2019. <http://www.airia.or.jp/publish/statistics/number.html>

⁸ Agency for Natural Resources and Energy, 2016, *The Strategic Roadmap for Hydrogen and Fuel Cells*, (revised version), March 22.

On December 26, 2017, the Ministerial Council on Renewable Energy, Hydrogen and Related Issues held its second meeting and decided on a basic hydrogen strategy to accomplish a world-leading hydrogen-based society.⁸⁴

The goals pertaining to hydrogen for 2030 are: (1) Supply: Build an international hydrogen supply chain and establish hydrogen production technology; (2) Supply volume: Meet capacity for 300,000 tons; (3) Cost: Provide hydrogen supply for 30 yen (about 33 cents)/Nm³; (4) Use (power generation): Generate supply for 17 yen (about 18.7 cents)/kWh; (5) Mobility: Build and maintain 900 stations or more, 800,000 FCVs, 1,200 FC buses, 10,000 FC forklifts, and (6) FC utilization: Aim to reach 5.3 million Ene-Farm (domestic fuel cell type cogeneration system). By 2050, the goals are (1) Supply: Provide CO₂ free hydrogen (brown coal x CCS, using renewable energy); (2) Supply volume: Increase to 10 million tons; (3) Cost: Reduce cost to 20 yen (about 22 cents)/Nm³; (4) Use (power generation): Generate supply for 12 yen (about 13.2 cents)/kWh, and (5) Mobility: Aim to replace gasoline and gas stations.

As of December 2019, hydrogen stations for fuel cell vehicles are operated in 112 locations nationwide.⁹

Natural Gas

Approximately half of the natural gas vehicles (NGVs) in Japan are commercial vehicles such as trucks, buses, or garbage trucks. Of the trucks, the majority are light- to medium-duty vehicles designed for short- or medium-distance transportation. In this context, Isuzu Motors Limited announced the Giga CNG in December 2015.¹⁰ The introduction of this heavy-duty CNG truck to the market is expected to increase the use of NGVs for long-distance transportation.

In fiscal year 2018, the three-year project subsidized by the Japanese Ministry of Environment for development and demonstration of heavy-duty LNG trucks was completed. The trucks' performance with a running range of more than 1,000 km and the availability of LNG filling stations that can also supply CNG were both demonstrated. CO₂ emissions from heavy-duty LNG trucks were reduced by about 10% in the latest diesel trucks. Isuzu Motors Limited and the Organization for the promotion of Low Emission Vehicles (LEVO) are continuing this project beyond 2019.

⁹ Next Generation Vehicle Promotion Center.
http://www.cev-pc.or.jp/suiso_station/index.html (in Japanese)

¹⁰ Isuzu Motors Limited, website, <http://www.isuzu.co.jp/product/giga/cng/>

Bioethanol

The Ministry of Environment's 2011 project in Okinawa Prefecture to promote the use of biofuels such as E3 gasoline terminated in fiscal year 2016 because of no clear path to commercialization.¹¹ In Miyakojima City, the supply of E3 gasoline was terminated in April 2016.¹² Sale of bio-gasoline blended with ethyl-tertiary-butyl ether (ETBE) is continuing to the 2017 target of 500,000 kL (crude oil equivalent) of bioethanol established in the Act on Sophisticated Methods of Energy Supply Structures,¹³ in 2016, sales of this blended gasoline reached a total of 441,000 kL.¹⁴

Outlook

In July 2018, the Japanese government approved the Strategic Energy Plan (the fifth plan),¹⁵ which forms the basis for Japan's energy policies. The plan further strengthens efforts toward the realization of the energy mix in 2030 and sets forth the challenge for energy conversion and decarbonization in 2050 with new energy options.

Additional Information Sources

- FY2018 Annual Report on Energy, https://www.meti.go.jp/english/press/2019/pdf/190607_001.pdf
- Agency for Natural Resources and Energy, July 2015, Long-term Energy Supply and Demand Outlook, http://www.meti.go.jp/english/press/2015/pdf/0716_01a.pdf

Benefits of Participation in the AMF TCP

Participation in the AMF TCP makes it possible to obtain the latest information on advanced motor fuels for stakeholders, policy makers, and industry in the world. AMF TCP activities facilitate an international network on advanced motor fuels.

¹¹ Ministry of Environment website, http://www.env.go.jp/earth/ondanka/biofuel/okinawabio/bio_hokokusyo.pdf. (in Japanese)

¹² The Miyakomainichi newspaper, <http://www.miyakomainichi.com/2016/09/92895/> (in Japanese)

¹³ Petroleum Association of Japan website, <http://www.paj.gr.jp/eco/biogasoline/> (in Japanese)

¹⁴ Ministry of Economy, Trade, and Industry, Agency for Natural Resources and Energy (1/2018), http://www.meti.go.jp/committee/kenkyukai/energy_environment/bio_nenryo/pdf/002_03_00.pdf (in Japanese)

¹⁵ Ministry of Economy, Trade, and Industry, Agency for Natural Resources and Energy (7/2018), http://www.enecho.meti.go.jp/en/category/others/basic_plan/5th/pdf/strategic_energy_plan.pdf