

IEA-Advanced Motor Fuels ANNUAL REPORT 2015



CHINA

China

Introduction

From January to December in 2015, 276 million tons of petroleum products (including diesel and gasoline fuels) were consumed in China — an increase of 1.2% year-on-year. Of this, the consumption of gasoline fuels increased by 7.0% and diesel fuels decreased by 3.7%. Fuel consumption by road transportation vehicles is the main source of total Chinese gasoline and diesel consumption.

Natural gas is another main energy source for vehicles in China. From January to December 2015, natural gas consumption reached 193.2 billion cubic meters (m³) — an increase of 5.7% from 2014.

In 2015, China's auto production and sales were 24.5 million vehicles and 24.6 million vehicles, respectively, with a year-on-year growth of 3.3% for production and 4.7% for sales.

Compressed natural gas (CNG) stations have spread over more than 200 cities across the country's 31 provinces. In 2014, there were 1.176 million new CNG vehicles, while total ownership reached 4.411 million cars — an increase of 36.6% over 2014. In 2014, there were 723 new CNG stations, and the total number of stations was 4,455 — an increase of 19.4% over 2013. In 2014, more than 54,000 new liquefied gas (LNG) vehicles were produced, while total ownership reached 1.84 million cars — an increase of 33.5% over the previous year.

By the end of 2013, cumulative sales of M15 methanol gasoline in Shanxi Province amounted to 2.8 million tons. Also, about 300,000 tons of gasoline with a high proportion of methanol (M85–M100) had been consumed. The number of fill-ups was more than 100 million. The number of vehicles refitted for the use of high-methanol blends in Shanxi Province was more than 130,000; of these, the one with the “highest mileage” (i.e., the longest driving distance) had gone more than 400,000 kilometers (km). The number of filling stations with gasoline with a low proportion of methanol in Shanxi Province was more than 1,200. There were approximately 39 stations with gasoline with a high proportion of methanol (M85 and M100).

Policies and Legislation

Development Plan for an Energy-Saving and Alternative-Energy Automotive Industry (2012–2020)

The automotive industry is a main industry in the Chinese economy and plays an important role in the country's economic and social development. Along with China's sustained, rapid economic development and accelerating urbanization, automotive demands continue to increase, and the energy shortage and environmental pollution problems that are resulting will become more prominent. Speeding up the cultivation and development of energy-saving and alternative-energy vehicles is urgently needed to effectively alleviate energy and environmental pressures and promote the sustainable development of the automobile industry. It is also needed as a strategic initiative to accelerate the transformation and upgrading of the automobile industry and to cultivate new economic growth and give China a competitive advantage internationally. China's plan was especially formulated to implement the decisions of the State Council to develop a strategic emerging industry and to strengthen energy savings and emission reductions, as well as to accelerate the cultivation and development of an energy-saving and alternative-energy automotive industry. The plan spans 2012–2020.

Technical Route

The goal is to make the pure electric drivetrain a main technology used in developing alternative vehicles and transforming the automotive industry. Currently, the focus is on promoting the industrialization of the pure electric and plug-in hybrid electric vehicle. As part of this focus, China will promote and popularize non-plug-in hybrid and energy-saving vehicles with internal combustion (IC) engines to improve the overall technological level of the country's automotive industry.

Main Objectives

- *Significantly advance industrialization.* By 2020, the production capacity for pure electric and plug-in hybrid vehicles must be up to 2 million, and cumulative production and sales must be more than 5 million cars. The development of fuel cell vehicles and the hydrogen vehicle industry in China must be done in cooperation with the international community.
- *Significantly improve fuel economy.* By 2020, the average fuel consumption of current passenger vehicles must be reduced to 5.0 L/100 km, and that of energy-saving passenger vehicles must be reduced to 4.5 L/100 km or less. The fuel consumption capacity of commercial vehicles must be comparable to the advanced level around the world.
- *Substantially increase the level of technology.* Alternative energy vehicles, power batteries, and key components must achieve the technologically advanced level recognized around the world. Together,

the energy savings associated with using gas hybrids, advanced IC engines, efficient transmissions, automotive electronics, lightweight materials, and other key core technologies are expected to be leveraged to form a group of energy-saving and alternative-energy vehicle enterprises that are more competitive.

- *Significantly enhance the ability to support technology.* Both the technology levels and production scales of key components must meet China's basic market demands. The construction of charging facilities must meet the requirements of alternative-energy vehicles and their operation in key regions and within cities.
- *Significantly optimize the management system.* China plans to (a) establish an effective management system associated with energy-saving and alternative-vehicle companies and products; (b) build a marketing, after-sales service and battery recycling system; and (c) improve support policies to form a relatively complete system of technical standards and management practices.

Main Tasks

- *Implement a technical innovation project to create energy-saving and alternative-energy vehicles.* Enhancing the capability for technical innovation is central to cultivating and developing the energy-saving and alternative-energy vehicle industry. To accomplish that objective, China will:
 - Strengthen the industry's position as it relates to technological innovation.
 - Concentrate innovative elements toward preponderant enterprises.
 - Improve the technological innovation system to define market orientation, in combination with production and research.
 - Through the national science and technology plan, special projects, and other channels, increase support for key, breakthrough core technologies and enhance industrial competitiveness.
- *Increase technical research and development (R&D) on energy-saving vehicles.* China plans to significantly improve vehicle fuel economy and actively promote the integration and innovation of vehicle energy-saving technology, as well as its introduction, absorption, and secondary innovation. In addition, China will:
 - Focus on the development of hybrid technology research, develop special hybrid engine and electromechanical coupling devices, and support R&D on efficient IC technology and advanced electronic control technology, including diesel high-pressure common-rail, direct injection, homogeneous combustion, and turbo-charging engines.

- Support the development of six-gear and more mechanical transmissions, dual-clutch automatic transmissions, and automatic control mechanical transmissions for commercial vehicles.
- Create breakthrough low-resistance components, lightweight materials, and laser welding molding technology.
- Substantially increase the technology level of small-displacement engines.
- Effectively carry out technical research on polluting emissions, such as nitrogen oxides.
- *Accelerate the establishment of an R&D system for energy-saving and alternative-energy vehicles.* China will guide industry to increase its R&D investment in energy-saving and alternative-energy vehicles, encourage the establishment of cross-industry technology development of energy-saving and alternative-energy vehicles, and accelerate the construction of common technology platforms. In addition, China will:
- Focus on the R&D of key core technology for pure electric passenger vehicles, plug-in hybrid passenger vehicles, hybrid commercial vehicles, and fuel cell vehicles.
- Establish a (a) shared test platform of related industries, (b) product development database, and (c) patent database to enable resource sharing, and integrate existing science and technology resources.
- Construct several national research and test bases for vehicles and components.
- Build a sound foundation platform for technological innovation.
- Construct several international advanced engineering platforms.
- Develop a number of industrial technology innovation alliances led by industry, with active participation by research institutions and universities.
- Encourage industry to implement trademark and brand strategies.
- Strengthen intellectual property right creation, utilization, protection, and management.
- Build the patent system for the whole industry chain and improve industrial competitiveness.

Existing National Standards on Alternative Motor Fuels

- GB/T 23510-2009, “Fuel methanol for motor vehicles” was released on April 8, 2009, and implemented on November 1, 2009.
- GB/T 23799-2009, “Methanol gasoline (M85) for motor vehicles” was released on May 18, 2009, and implemented on December 1, 2009.
- GB 18047-2000, “Compressed natural gas as vehicle fuel” was released on April 3, 2000, and implemented on July 1, 2000. This standard specified the technical requirements for CNG and the test method.

- GB 18350-2001, “Denatured fuel ethanol,” and GB 18351-2001, “Ethanol gasoline for motor vehicles,” were released on April 2, 2001, and implemented on April 15, 2001.
- GB 18351-2013, “Ethanol gasoline for motor vehicles (E10),” and GB/T 22030-2013, “Blendstocks of ethanol gasoline for motor vehicles,” were released on October 10, 2013, and implemented on January 1, 2014.
- GB/T 20828-2007, “Biodiesel blend stock (BD100) for diesel engine fuels,” was released in March 26, 2007, and implemented on May 1, 2014.
- GB/T 25199-2010, “Biodiesel fuel blend (B5),” was released on September 26, 2010, and implemented on February 1, 2011.
- GB/T 25199-2014, “Biodiesel fuel blend (B5),” and GB 20828-2014, “Biodiesel blend stock (BD100) for diesel engine fuels,” were released on February 19, 2014, and implemented on June 1, 2014.
- GB/T 25199-2015, “Biodiesel fuel blend (B5),” and GB 20828-2014, “Biodiesel blend stock (BD100) for diesel engine fuels,” were released on May 8, 2015, and implemented on May 8, 2015.

Implementation: Use of Advanced Motor Fuels

Promotion of Methanol Gasoline Vehicles Pilot Project

At the end of February 2012, the Ministry of Industry and Information Technology announced that three pilot projects involving methanol vehicles had been launched in Shanxi, Shanghai, and Shaanxi Provinces. This indicated that methanol gasoline had entered a new era of development. By the end of 2013, 26 provinces had entered the field, to different degrees, where five provincial governments had organized and implemented the pilot projects.

Shanghai is one of the cities that is carrying out the methanol vehicle pilot project required by the Ministry. As part of that project, a taxi test was conducted for 36 months. The cumulative quantity of methanol gasoline used for refuelling has risen to 1,551,200 L. The traveling distance covered by vehicles running on this fuel was 9,695,300 km during the 36-month test, without any related security incidents.

Shanxi Province was the first province to promote the use of methanol gasoline. The province now has 14 production bases. There are more than 900 filling stations operated by Sinopec, Petro China, and the Government that sell methanol gasoline. In 2012, sales reached 800,000 tons. In 2013, a total of 281 methanol vehicles (four models) ran in the pilot operation

carried out in Shanxi Province. The pilot cities included Jinzhong, Changzhi, Xi'an, Baoji, Xianyang, Yulin, Hanzhong, and Shanghai.

In June 2015, 100 methanol taxis appeared on the streets of Guiyang, which officially marked the national pilot run of methanol vehicles in the city. It is expected that 300 methanol taxis will be on the streets of Guiyang in 2015.

Outlook

On June 28, 2012, the State Council officially issued the *Development Plan for Energy-Saving and Alternative Energy Vehicle Industry (2010–2020)*, which defines the technical pathways and main goals of energy-saving and alternative-energy vehicle development. By 2050, the accumulative output of pure electric vehicles and plug-in hybrid vehicles will reach 500,000; by 2020, the capacity will reach 2 million, and the accumulative production and sales amount will reach more than 5 million. The plan clarified five tasks: (1) technical innovation project for energy-saving and alternative-energy vehicles, (2) scientific plan for industry structure, (3) accelerated promotion of demonstrations, (4) active promotion of charging equipment manufacturing, and (5) enhancement of step utilization and recycling of power batteries.

- In terms of industrial structure, China should focus on building the power battery industry to form two to three leading enterprises with an output of more than 10 billion watt-hours; establishing the research and production capability for key materials; and developing two to three key industries for components and materials, such as anodes and cathodes, diaphragms, and electrolytes.
- In terms of application and commercialization, China should enlarge the demonstration scope of alternative-energy vehicles in public areas of medium- and large-sized cities; carry out a pilot program for subsidizing the private purchase of alternative-energy vehicles; explore different business models for alternative-energy vehicles, battery leasing, and charging services; and greatly promote and popularize energy-saving vehicles.
- In terms of the construction of charging facilities, China should focus on (a) developing and implementing pilot programs for charging facilities within cities, (b) bringing charging facilities into the relevant industrial areas of city-wide transportation systems and construction, and (c) actively carrying out the spreading slow-charging mode at private and public parking stands.

3 THE GLOBAL SITUATION

According to the biomass energy section of *12th Five-Year Development Plan (2011–2015) for Renewable Energy*, the power-generation capacity of biomass will reach 13 million and 30 million kilowatts (kW) by the end of 2015 and 2020, respectively, thereby increasing the capacity 1.36 fold and 4.45 fold from 5.5 million kW at the end of 2010. By the end of the *12th Five-Year* period, agriculture and forestry biomass power generation will reach 800 million kW, methane power generation will reach 200 million kW, and waste-incineration power generation will reach 300 million kW. During the *12th Five-Year* period, the use of biomass molding fuel, biomass ethanol, biodiesel, and aviation biofuel will reach 10 million tons, 3.5 million to 4 million tons, 1 million tons, and 100,000 tons, respectively.

According to the study of the China Industrial Gases Industry Association, China will usher in the golden age of natural gas vehicle development over the next 10 years. According to the national plan, by 2020, China's natural gas vehicle (LNG and CNG vehicles) output could reach 1.2 million vehicles per year, including buses and trucks at 200,000 (LNG cars accounting for 50%), and passenger cars at 1 million (LNG cars accounting for about 20%). By 2020, the population of natural gas vehicles will reach 10.5 million, which means the position of natural gas as the number one alternative vehicle fuel will be unshakable.

Plans are that by 2020, the use of methanol gasoline will be up to 2.4 million tons, the number of refitted vehicles will reach 120,000, and new methanol load vehicles will reach 40,000.

References

- China Association of Automobile Manufacturers (CAAM), <http://www.caam.org.cn/>
- China Automotive Technology and Research Center (CATARC), http://www.catarc.ac.cn/ac_en/index.htm
- China EV Corporation, <http://www.chinaev.org/>
- National Development and Reform Commission, <http://www.ndrc.gov.cn/fzgggz/jjyx/gjyx/>
- 2013 Yearbook of Energy-Saving and New Energy Vehicles, China Economic Publishing House, 2014, <http://www.chinabookshop.net/energysaving-energy-vehicles-yearbook-2013-english-p-19196.html?osCsid=sb14t34uh7lm5b88jdmcvd1v62>