The Oil and Gas Industry and the Development of the Natural Gas Automobile Industry

Hao Zhang¹, Dandan Yin²

¹Departments of oil-gas storage and transportation, Zhejiang ocean university, Zhoushan, Zhejiang Province, 316000, China
²Departments of oil-gas storage and transportation, Zhejiang ocean university, Zhoushan, Zhejiang Province, 316000, China

*Corresponding author’s e-mail:924079125@qq.com

Abstract. Since the 21st century, the natural gas industry has matured gradually with the accelerating consumption of oil resource, so that the traditional gas-guzzling automobile industry developed a new direction for the new fuel-efficient car industry. The proportion of natural gas import continues to increase with the continuous downturn of oil price. This is not a lack of domestic gas supply capacity, but follows market and current policy trends to encourage gas imports. For decades, Europe and Japan have invested a lot of money and manpower used in automobile alternative clean fuels, research, development and test of new car, and accumulated rich experience in technology and popularization. Although it started late in China, it is close to or above the international level in some technical fields, such as electric cars.

1. Introduction
The production and consumption of domestic refined oil have increased year by year in recent years. However, the growth rate of both shows a downward trend every year and oil prices remain low, the processing capacity of domestic refineries is excessive, crude oil processing has maintained high growth and domestic product oil demand growth has slowed down. With the release of domestic refining capacity, the future export of refined oil is an inevitable trend. At the beginning of the 21st century, 85% of the finished oil was consumed by cars, and more than 60% of the CO2 and CH compounds in the air pollution in the central cities of China were caused by automobile exhaust emissions, so it is inevitable to reduce the consumption of fossil energy and the emission reduction of automobile exhaust.

Relevant departments of the state have also jointly launched the national automobile cleaning initiative, which has been well tested and popularized in China. Together with the present situation of our country's energy structure, characteristics, and the development of automobile industry, automobile industry should walk hybrid fuel to alternative fuels, eventually transition to renewable clean fuel or electric cars.

2. Recent developments in the global oil and gas industry
The world's proven oil reserves have increased year by year since the 21st century and it has reached 1.7 trillion barrels in 2016. In terms of reserves distribution, OPEC holds 71.6 percent of the world's oil reserves, while non-opec countries hold only 28.4 percent. Regional differences in reserves are also
evident. The proven reserves in the Americas reached 555.4 billion barrels, accounting for 33%. The continent has proven reserves of 161.5 billion barrels, accounting for 9.5%. Countries in the Middle East hold 813 billion barrels of reserves, accounting for 47.7% of the total. Africa has 128 billion barrels of reserves, or 7.5 percent. The Asia-pacific region holds 48.4 billion barrels of reserves, or 2.8%. In 2016, the world's proven reserves of natural gas were 186.6 trillion cubic meters. With the development of exploration and exploitation technology, there is a tendency to increase the remaining proved recoverable reserves. At present, the average ratio of natural gas production and storage in the world is 53 years. The rich reserves provide sufficient ammunition for natural gas consumption and provide a solid foundation for the rapid development of the natural gas industry.

2.1 China's oil and gas consumption pattern.
In the last decade, the pattern of global oil consumption is changing, and China has become one of the major consumers of oil. China is a big oil consumer, and its domestic supply is insufficient, which makes China very dependent on oil import. The oil import volume increases year by year, and the increase is on the rise. China was already the world's largest energy consumer in 2014, accounting for 23 percent of global consumption and 61 percent of global net growth, according to BP's world energy statistics yearbook 2015. China's energy structure continues to improve, with coal accounting for a record low share. China's net oil imports rose 8.4 per cent to 7m barrels a day, the highest on record, overtaking the us as the world's largest oil importer. In natural gas industry, the domestic production of natural gas is also increased year by year in recent years, gradually decreases, and increase yield tends to be stable. On the one hand it is the total energy consumption growth is down due to macroeconomic transformation, on the other hand, the oil shale revolution loose supplies of oil and gas resources environment, oil and gas imports cost advantage to improve gas foreign import dependence in recent years. In 2010, China's natural gas import proportion was only 7.25%, but in 2017, it has reached 36.48%, which is enough to show that China's dependence on foreign gas import is strong, and the import proportion is likely to continue to increase.

2.2 Recent developments in the domestic oil and gas industry.
Faced with the aggravation of the contradiction between supply and demand of oil and gas in China, we have continuously increased the import volume of foreign oil and gas to meet the strong domestic demand. The theme of today's world is still development and peace. The unstable and even non-peaceful international structure will bring hidden impacts to the world's energy industry. Behind the events of wars in the Middle East, the south China sea issue, the Diaoyu island question and so on, it includes energy competition factors, all of these events are very likely to today by upheaval in the energy industry. Excessive oil and gas external dependence will bring adverse effects on national energy security, which determines that China must intensify exploration and development to improve the self-sufficiency rate of oil and gas resources. In order to realize such intention, it has brought a great test to China's oil and gas exploitation technology, which requires further improvement in the mature mining system. In previous years, domestic oil and gas exploitation has gradually entered the stage of unusable oil reservoirs, which requires higher technology and capital expenditure per unit of production will also be increased. Oil companies' capital spending is also influenced by oil price fluctuations, and influence of the oil industry, oil companies' capital spending is the boom of oil price fluctuations affect the oil industry conduction medium. Influenced by the periodic fluctuation of oil price, the capital expenditure of petrochina shares was at a high level from 2010 to 2013, and has been declining since 2014. The exploration and development of oil and gas in China has led to the development of oilfield engineering technical service market. Generally speaking, drilling engineering technical service accounts for more than 50% of exploration and development investment. The indexes to measure the market scale of drilling engineering technology service industry include drilling quantity and drilling footage. China national petroleum corporation and sinopec group hold the majority of the domestic drilling project market share. As China's oil and gas system reform process of gradual, natural gas upstream gas right of access and exit will be more flexible, middle level will
reduce, pipeline and sales will gradually separate, the influence of the private enterprises will be various. On the one hand, the involvement of private enterprises in the upstream and middle industries will be enhanced to improve the current situation that private enterprises concentrate on the downstream areas. The intermediate links, on the other hand, loss of lean as well as the future shelter-forest market open, the information transparency and price linkage system of state-owned enterprises to launch will enhance the use efficiency of oil and gas resources, will reduce the cost of natural gas prices. The fall in gas prices will increase the real efficiency of the coal-to-gas policy in low-subsidy areas. The lower reaches of natural gas are mainly used in urban gas, industrial field, natural gas power generation and natural gas chemical industry. Due to the high thermal efficiency of natural gas, the emission of pollutants after burning is much lower than that of coal and oil, which belongs to clean energy. With the same amount of heat released, natural gas will emit about 30% less carbon dioxide after burning than oil, and about 45% less than coal. Compared with fuel cars, LNG automobile exhaust in 97% less carbon monoxide, hydrocarbons decreased by 72%, 90% less carbon dioxide, such as benzene and lead dust decreased by 100%, 40% reduction in engine noise, environmental advantage is very obvious, greatly reduces the environmental pollution caused by automobile exhaust.

3. Domestic natural gas automobile industry development

In view of China's fuel cars more than ten years of rapid growth, growth in 2009 cars for the world first, fuel automobile exhaust huge pollution and deterioration of ecological environment, has been committed to the development and research of natural gas vehicle in our country. As early as the 1950s, China began to understand sex research. The first CNG gas station was set up in Sichuan in the 1980s. In the 90s realized the LPG station equipment and car modification parts localization of the imported technology, technical standards, standardization, and in the late 90s started the Beijing, Tianjin, Shanghai, Xi'an, Shenzhen 12 pilot cities in areas such as clean energy application work, in the application of CNG vehicles and gas station construction has achieved unprecedented success. According to the relevant departments of statistics, China's natural gas industry hit a new record in 2007, natural gas vehicles in Sichuan province is close to 130000, more than 40000 cars in Chongqing gas, about 50000 cars in development of natural gas in Shanxi province, Beijing, Shijiazhuang, Urumqi, Jinan, Yinchuan, Haikou, ordos, the Linyi city gas record car ownership, such as mobile vehicle gas stations and commercial operation. At present, CNG is mainly used in natural gas vehicles, and more than 100 new CNG refueling stations have been added every year. The state encourages and supports to promote gas cars, especially in 10% of car ownership, from 40% to 50% of the total to bus and taxi industry in the promotion of natural gas vehicle, and formally established clean car key popularized city (area) with 19, including Beijing, Shanghai, Tianjin, Chongqing, such as gas increased utilization of the increase of car ownership and greatly increase the gas car alternative energy efficiency, alternative fuel oil one million tons a year, to improve the energy and environment in China has made a great contribution.

3.1 Development prospect of natural gas automobile industry.

With the advantages of environmental protection, economy, safety and support from national policies, natural gas vehicles have been developed rapidly and have a good development prospect. The main manifestations include: the rapid growth of car ownership, the severe situation of oil resources and environmental protection, which determines that the development of natural gas vehicles is an important way to solve energy and environmental problems. During the period of "11th five-year plan", the new type of clean energy vehicles have been listed in the medium and long-term national science and technology development planning", the state will continue to organize the implementation of major s&t project involving all kinds of clean energy vehicles, the key support, including natural gas vehicle, vehicle, spare parts and other key technologies, will further promote the development of natural gas vehicle. It is possible to accelerate the development of CNG and gas station in China through large-scale development of natural gas resources and pipeline construction. According to
natural gas utilization planning in our country, nearly a decade "west-east gas", "the Shanxi-Beijing second line" and so on a large number of gas pipeline and successively built along the city gas pipeline and large-scale use of natural gas in China gradually improve the infrastructure, gas stations and gradually form a network.

4. Conclusion
Transformation to improve the energy structure in China, but the oil industry still occupies the main position, in the transformation of energy structure, natural gas industry obtained the good development opportunities, including natural gas vehicle technology after more than half a century of research and development, in the 21st century has made unprecedented progress, in order to further improve our environment, do a good job in our environmental protection not only to natural gas vehicle, our country further efforts to develop cleaner, environmental protection of the new type of car industry, including electric cars have begun to take shape, believe that with the constant innovation of future technology, various energy environmental protection technology, Let our global village become more and more beautiful.

Acknowledgments
This paper is financially supported by the national innovation training program for college students (201810340031).

Reference
[1] Information on http://www.chyxx.com/industry/201612/478875.html
[2] Information on http://www.chyxx.com/industry/201709/568199.html
[3] Information on http://www.chyxx.com/industry/201708/551471.html
[4] Information on http://www.chyxx.com/industry/201706/531388.html
[5] TIAN Chunrong: Analysis of Oil and Gas Import and Export Situations of China, edited by International Petroleum Publications, 2013, 21(3): 44–55 (in Chinese).