The Current Situation, Problems and Countermeasures of China’s Energy Industry Based on Five Development Concepts

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ABSTRACT

In the past 40 years of reform and opening up, China's energy industry has undergone tremendous changes. The total energy production and consumption has jumped to the top in the world, and the proportion of clean energy consumption has continued to increase, injecting a steady stream of momentum into social and economic development. This paper puts forward the development proposals of the energy industry by analyzing the development status and existing problems of the energy industry and combining the five development concepts of “innovation, coordination, green, openness and sharing”.

INTRODUCTION

Over the past 40 years of reform and opening up, China's energy development has achieved unprecedented major changes, and has achieved remarkable historical progress. The total energy production and consumption ranks first in the world. With continuous advancement of the structural reform of the energy supply side, China's energy production has grown from weak to strong, achieving great development.

According to preliminary calculations performed by the National Bureau of Statistics, the total energy consumption in 2017 was 4.49 billion tons of standard coal, an increase of 2.9% over the previous year. Among them, the National Development and Reform Commission data show that the apparent consumption of crude oil for the year was 610 million tons, exceeding 600 million tons for the first time, an increase of 6.0% year-on-year, and the growth rate was 0.5 percentage points higher than the previous year. Natural gas consumption for the year was

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237.3 billion cubic meters, up 15.3% year-on-year, and the growth rate was about twice that of the previous year. The share of natural gas in China's primary energy consumption structure has increased to approximately 7.2%.

In terms of energy production, the total energy production was 3.59 billion tons, raw coal production in 2017 was 3.45 billion tons (2.46 billion tons of standard coal), an increase of 3.2% year-on-year. Crude oil production was 190 million tons (270 million tons of standard coal), down 4.0% year-on-year. Natural gas production was 147.42 billion cubic meters (196 million tons of standard coal), an increase of 8.5%. Hydropower, nuclear power and wind power generation capacity is 1,748.5 billion kWh (660 million tons of standard coal).

It can be seen that China's energy security capacity has been continuously enhanced, the energy structure has been continuously optimized, and energy conservation and consumption reduction have achieved remarkable results, providing a solid and strong foundation for China's sustained and rapid economic development and continuous improvement of people's living standards. However, problems such as inadequate energy use, policy dependence, environmental impact, and poor adaptability of the power grid have emerged. The five development concepts of innovation, coordination, green, openness and sharing are the basic measures of energy work in China's “13th Five-Year Plan” and even longer. Understanding the essence of the five development concepts and using them flexibly will help solve the problems in the process of energy development.

Figure 1. 2010-2017 Statistics on China's energy consumption.
MAJOR PROBLEMS IN ENERGY INDUSTRY

Energy Production Capacity Continues to Increase but with Low Efficiency

China's current energy supply pattern is mainly based on coal, with electricity as the center, and efforts to promote a comprehensive and sustainable development of oil and gas and clean energy. In 2017, China's coal and natural gas production increased by 3.6 and 8.5%, respectively, and oil production fell by 3.8%. The energy production capacity is continuously improved and the production structure is continuously diversified. The comprehensive transportation system for power generation and power supply of power stations has made great progress, but the conversion efficiency of source processing and the conversion rate of power
generation and power supply are small. Compared with other developed countries, China's coal resource exploitation conditions have inherent disadvantages. Most of the coal needs deep mining. A small number of them can be directly exploited in the open air. Most of the oil and natural resources are underground, and the mining conditions are relatively poor. For exploration and development technology, there are more stringent requirements. [1]The hydropower resources that can be developed are mainly concentrated in relatively remote places, which are farther away from power plants, and have higher use costs, lower utilization efficiency of renewable energy, and lack of competitiveness.

High Dependence on Foreign Energy

Although China's energy production capacity is gradually increasing, it still cannot meet the excessive energy consumption and demand in China. The dependence on energy is still high, and the energy import structure is still relatively simple. China's dependence on foreign oil rose to 68%, and the external dependence on natural gas, which is the highest in history, is as high as 34%. The fact that oil and natural gas are heavily dependent on foreign imports constitutes a potential danger to China's energy security. The shale gas revolution in the United States has caused its dependence on foreign energy to decline year by year. Russia's position in the global energy landscape has changed. The development of international geopolitics has increasingly affected China's energy diplomacy.

The New Energy Industry has a Weak Foundation and Backward Technology

China's energy is mainly based on coal, oil, natural gas and other energy sources. The new energy industry started relatively late. The foundation of industrial development is far from traditional energy, and it is inconsistent with foreign advanced new energy industrial technology. At the same time, the new energy structure is over-represented, and some areas are abandoning wind, water, and light. The photovoltaic industry is forming a new round of surplus. In 2016, the national abandoned wind volume was 49.7 billion kWh, and the average abandoned wind rate was about 17%. The light rate is 20%, and the water resources in Sichuan and Yunnan provinces are as high as 50 billion kWh. Because the domestic emphasis on the new energy industry is not high enough, the government's leading mechanism is not strong enough, the enterprise blindly expands, the technology innovation ability is low, the industrial development encounters technical and financial bottlenecks, and the management system and core technology are not sound enough, which makes the overall development of China's new energy industry is relatively slow and lagging, and there is still a certain distance from the development level of developed countries.
Energy Consumption Structure needs to be Optimized

According to the BP Energy Statistical Yearbook 2018, coal, oil, natural gas and other energy sources accounted for 60, 19, 7, and 14% of China's primary energy consumption in 2017, respectively. The energy consumption structure was optimized. The total amount has not decreased, mainly showing the characteristics that the increment is still large and the growth rate is declining. In 2017, China's GDP energy consumption decreased by 3.7%, and the overall energy consumption decreased. In 2017, the energy consumption per 10,000 RNB of GDP was 0.61 tons of standard coal. Although it was 3.7% lower than 2016, it was still 4.3 times that of Japan’s 2.2 times, thus improving energy efficiency and optimizing the consumption structure still has a long way to go.
USE THE FIVE DEVELOPMENT CONCEPTS TO SOLVE PROBLEMS

Promote Innovation and Lead

Adhere to innovation and development, and build the first impetus for high-quality energy transformation. In order to accelerate energy transformation, we must rely on innovation to solve technical bottlenecks and inherent interests that constrain energy development. In terms of energy technology innovation, it provides the technical means for solving resource security, coping with climate change, and improving environmental quality. The focus on fossil energy innovation is to improve the clean, low-carbon and efficient use of coal. The focus of non-fossil energy innovation is to continuously reduce the cost of wind power generation and develop more advanced nuclear power technology. In terms of market innovation, we should comprehensively deepen institutional and institutional reforms and accelerate the formation of a unified, open, competitive and orderly market system. Energy prices should be oriented to the market and the formation of an energy price mechanism determined by factors such as resource scarcity, market supply and demand, and environmental compensation costs; energy supervision should improve regulatory institutions, regulatory systems, regulatory standards, and regulatory approaches; Civilization construction and energy transformation and reform require the establishment and improvement of a complete energy legal system.

Promote Coordinated Development

Coordination is the inherent requirement of sustainable and healthy development, and solves the imbalance and insufficient problems in energy development. The energy industry should implement the concept of coordination, and needs to strengthen coordination in the aspects of energy development layout, development and transportation, and power operation. First, it is necessary to scientifically determine the timing and layout of energy base development. China's coal resources are mainly distributed in the western and northern regions. The hydropower resources are mainly concentrated in the southwestern region. First, the layout of coal and coal power should be increased in the west and north, and hydropower development in the western region should be strengthened. The second is to promote the coordinated planning and construction of energy development bases and transportation corridors. Optimize and adjust the “Western Coal East Transportation, North Coal South Transportation” channel, construct a comprehensively covered oil and gas pipeline network, promote the construction of trans-regional transmission channels, third, increase the flexibility of power supply construction, accelerate the flexibility of coal-fired power units, increase the UHV For inter-regional transmission projects, develop a peaking service compensation mechanism, promote the application of energy storage facilities, and give full play to the grid resource optimization configuration function. [2]
Adhering to the Concept of Green Development

Adhering to green development is to protect the ecological environment and building a clean, low-carbon, safe and efficient modern energy system. Optimize the energy structure to achieve clean and low carbon development[3]. Through the greening of energy production and consumption, various pollutants and carbon emissions are greatly reduced. On the production side, on the one hand, it is necessary to reduce pollutant emissions from coal mining and utilization. The measures taken include vigorously promoting green mining of coal, developing high-efficiency coal-fired generating units, and deep processing demonstration of coal; on the other hand, we must accelerate the development of various types of low-emissions and even Zero-emission clean energy. On the consumption side, the focus is on controlling the total energy consumption and improving energy efficiency. According to the plan, by 2020, the proportion of non-fossil energy consumption in China will increase to more than 15%, natural gas consumption will reach 10%, and the proportion of coal consumption will fall below 58%.[4]

Open Development Drives "Introduction" and "Going out"

Adhering to open development is to solve the problem of internal and external linkages, "bringing in" and "going out" to promote deeper and higher levels of opening up. First, we must learn and introduce advanced foreign concepts and technologies, broaden the scope of cooperation, and achieve deepening cooperation in international production capacity and equipment manufacturing. The second is to speed up the energy interconnection between the “Belt and Road” countries and regions, expand the source of energy imports, strengthen the construction of import channels, and at the same time combine the “One Belt, One Road” national construction needs, give play to comparative advantages, cultivate a number of multinational enterprises, and enhance international competitiveness. Promote energy production and energy-efficient equipment, technology and services to “go global”. Actively implement the China-ASEAN Clean Energy Capacity Building Program and promote the China-Arab Clean Energy Center and the China-Central and Eastern Europe Energy Project Dialogue and Cooperation Center. The third is to strengthen international cooperation in all aspects and achieve energy security under open conditions. Build a broad community of energy interests and improve China's institutional voice in global energy governance. Relying on the multi-bilateral energy cooperation mechanism, the “One Belt, One Road” energy cooperation will be promoted to develop deeper and wider. Actively participate in energy cooperation under the multilateral frameworks of the United Nations, the G20, APEC, and so on. Continue to strengthen cooperation with the International Energy Agency, the Organization of Petroleum Exporting Countries, and other energy international organizations.
Achieve Shared Development

Adhering to shared development is to solve the problem of social equity and justice, and the development results are shared by all the people. In the construction and operation of energy projects, we should take into account the interests of the local people and play an active role in promoting poverty alleviation and building a well-off society in an all-round way. First, we must speed up the construction and transformation of urban and rural distribution networks, rural power grids, natural gas pipelines and other energy infrastructures, and create conditions for the masses to produce and use high-quality energy. Second, we must increase energy poverty alleviation efforts, and through the poverty alleviation measures such as photovoltaic poverty alleviation and major energy project poverty alleviation, while realizing the universal service of living energy, we will promote the economic development and people's livelihood improvement of the people in economically underdeveloped areas with energy development. The third is to promote the deep integration of energy and information, explore and promote new technologies, new models and new formats, and continuously release the “sharing” dividend, so that more and more people are becoming energy producers while enjoying energy.

CONCLUSIONS

The energy situation in the world today is undergoing complex and profound changes. The global energy supply and demand relationship has generally eased, and climate change has entered a new stage. A new round of energy science and technology revolution has accelerated, and a new mechanism for global energy governance is gradually taking shape. Everyone enjoys sustainable energy. The goal is still far from being achieved, and the problems facing the energy development of various countries are still grim. [5] We should thoroughly study and understand the spirit of the five development concepts, use the five development concepts to solve specific problems in the development of the energy industry, and achieve the healthy and sustainable development of China's energy industry.

REFERENCES