Study on Challenges and Countermeasures of China's Energy Economy

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Keywords: Energy crisis; Energy economy; Diversification; Economic development

Abstract: With the sustained and rapid development of China's economy and society, the energy crisis and environmental pollution problems are becoming increasingly serious, and it is urgent to find the right countermeasures. Energy security is an important manifestation of national economic security. The demand for energy and the gap between supply and demand are increasing year by year. The pressure of energy supply is highlighted, and the security situation is becoming more and more serious. Energy supply in economic development has always been attached importance by the Party and the government. Since the founding of the People's Republic of China, China has made tremendous achievements in energy security, and its energy supply capacity has gradually increased. To improve the institutional arrangements for maintaining energy security, accelerate the transformation of economic development methods, and implement a diversified energy strategy, in order to ensure the national energy security of our country. Actively developing and utilizing renewable energy is an inevitable choice for realizing China's economic and social sustainable energy strategy. Based on the concept of energy economy and its role, this paper analyzes the challenges faced by China's energy economy and proposes corresponding countermeasures.

1. Introduction

Energy is the basic support of the national economy and the basis for human survival. It directly affects national security, sustainable development and social stability. With the sustained and high-speed growth of China's economy, the constraints of energy shortage on economic development are becoming increasingly prominent [1]. The energy security situation is worrying, and the pressure of environmental protection is highlighted. Energy insecurity is mainly reflected in the temporary interruption or shortage of energy supply and the damage to a country's economy caused by soaring prices [2]. The degree of damage depends mainly on the economy's dependence on this kind of energy and its resilience. Although the energy industry has made tremendous achievements. We must also clearly understand that these achievements are mainly achieved by relying on extensive development models that consume large amounts of energy resources [3]. China's renewable energy has a unique advantage and is an important strategic alternative energy source. It plays an important role in increasing energy supply, improving energy structure and protecting the environment [4]. How to ensure that energy meets the needs of sustainable economic and social development and ensure the security of energy supply is related to the success or failure of China's modernization drive.

China's energy security issues have rapidly improved in the national security system, and maintaining national energy security has been promoted to a major national strategy [5]. China's total energy consumption has leapt to the top in the world, and there is also a trend of increasing economic growth. Energy supply in economic development has always been valued by the party and the government. Since the founding of the People's Republic of China, China has made tremendous achievements in energy security, and its energy supply capacity has gradually increased [6]. The extensive development model puts more pressure on China's already scarce energy resources and fragile ecological environment. At the same time, the rapid economic development supported by this extensive mode of development will not last. China's renewable energy development is facing multiple obstacles and challenges [7]. Actively developing and utilizing renewable energy is the inevitable choice to realize the energy strategy of sustainable economic and social development in China. Energy, especially primary energy, is a special natural resource. Its

  DOI: 10.25236/icebfm.2019.019

own characteristics of non-renewability and scarcity determine that energy is not inexhaustible. Therefore, the sustainable development of energy economy has once again become the focus of attention of society and people.

2. China's Energy Crisis and Environmental Crisis

The essence of China's energy security issue is that energy reserves, supply structure and energy consumption structure are not completely matched. Energy utilization technology is backward and utilization is low. Under the conditions of rapid economic growth, China's energy consumption is faster than other countries. The threat of energy depletion may come earlier and more seriously. The high energy consumption, high cost, high pollution characteristics of traditional energy sources and the energy security problems caused by lack of energy [8]. This has led countries to turn to new and renewable energy sources in the process of economic development and industrial layout. Along with China's energy strategy to the world, large-scale trade in energy resources highlights the importance of energy security issues. Sustainable development of energy economy means that the development of energy not only meets the needs of economic development, but also does not cause intolerable damage to the environment and ecological health and life of human beings. It not only meets the needs of contemporary people for energy, but also does not harm the ability of future generations to meet their needs. With every innovation of energy technology and wide application of new energy, energy can always provide convenience for people's lives and improve people's quality of life.

The energy pressure caused by the increasing external energy demand compels us to find a way out of the energy crisis. Large imports of overseas oil require strong naval backing. However, in view of China's current diplomatic capacity in resource-rich areas and its control over energy transport routes, it is impossible to provide adequate security. For a long time to come, the energy consumption structure dominated by coal will not change fundamentally. On the one hand, in the current energy consumption structure of our country, the proportion of various energy sources differs greatly from the average level of the world energy consumption structure [9]. On the whole, China has entered the initial stage of the mid-industrialization. It has changed from a big agricultural economy to a big industrial economy. Safeguarding energy supply security not only requires us to increase the absolute supply of traditional fossil energy, but also requires us to transform through technology. Energy-saving and efficiency increase the effective supply of energy, and at the same time make alternative development work for new clean energy. The process of China's economic modernization has entered a new stage of fulfilling the core task of transforming from an industrial economy to an industrial economy and promoting industrial modernization.

The coordinated operation of the carbon capture power plant and the wind power can make full use of the excess wind power and increase the energy consumption of the capture during the low valley period to process the stored rich liquid. Coordinated operation of carbon capture power plants and wind power can improve the ability of the system to absorb wind power, and at the same time obtain certain carbon emission reduction benefits. Table 1 shows the results of the system optimization operation before and after the configuration of the carbon capture power plant. Figure 1 shows the system load and wind power output.

Table 1 System optimization operation results before and after configuring carbon capture power plants

	Carbon capture plant	Carbon-free capture plant
Generation cost	316.24	328.96
Cost of carbon emissions	235.68	210.77
Abandonment rate of wind power	5.64	0
Capture efficiency	1.28	18.56
Comprehensive cost	551.92	539.73

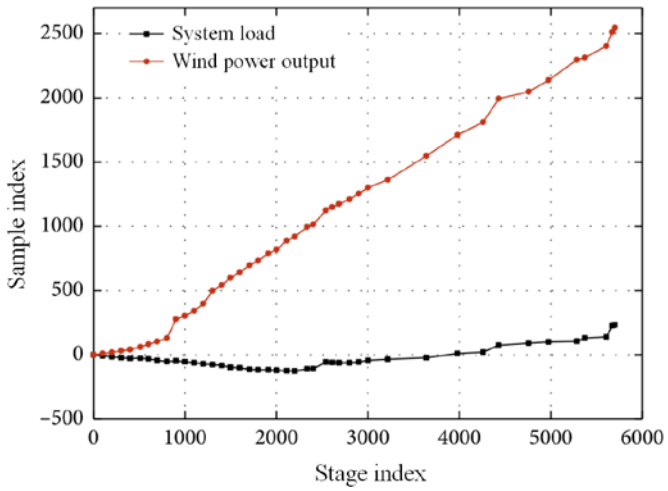

Fig. 1 System load and wind power output

Economic sustainability can be understood as today's energy use should not reduce future real income. That is to say, when development can guarantee the increase of the welfare of the contemporary people, it will not reduce the welfare of future generations. China's oil and gas resources in a certain forecast period, under a certain technology permit conditions, not much water resources available for mining, except for some of the development due to geographical conditions, the rest have been developed and utilized. The history and reality of economic development and energy structure in all countries of the world show that the quality of energy structure is closely related to the level of economic development. In sharp contrast to the energy structure of developed countries, China's energy structure and consumption structure are unreasonable and fail to achieve full structural optimization. China's resource conditions determine the current coal-based energy consumption structure. Long-term coal consumption is ensuring national economic development. Great economic achievements have been made, but at the same time, it has also caused serious environmental damage and the rapid deterioration of the ecosystem in China. To properly promote the development of nuclear power in China is conducive to optimizing China's energy structure. And improve the energy self-sufficiency rate to ensure the sustainable and safe supply of energy supply in China.

3. Solutions to Energy Economy Problems in China

The construction of a sustainable development assessment system for the energy economy. The energy economy sustainable development assessment system consists of four sub-assessment systems: energy use, environment, economy and society. Due to the difficulty in the development of renewable energy, the development market has started late, so the degree of commercialization is low and industrialization is weak. Since China's energy self-sufficiency cannot meet the needs of national economic and social development, we must implement a policy of opening up overseas energy channels and paying equal attention to internal energy conservation. Insufficient market experience hinders the efficient supply of products and services by the renewable energy industry, with widespread product quality issues and service issues. The lack of market regulations and the lack of industry standards have hampered demand growth [10]. The direct result of the improvement of energy utilization efficiency and the reduction of energy consumption is the reduction of coal transportation and pollution discharge. In order to solve the challenges facing China's energy economy, we must take technological innovation, management innovation and institutional innovation as means. We should focus on optimizing industrial structure, improve the quality of economic growth and adhere to the new road of industrialization. It is necessary to form an economical and efficient mode of production and consumption throughout the country, develop energy-saving economy and build a conservation-oriented society.

State support for renewable energy development has gradually increased. However, due to the

lack of mandatory renewable energy market security policy, there is no stable market demand. Renewable energy development lacks sustained market pull. Data mining process in energy economic analysis is generally composed of five main stages: determining the object of energy economic analysis, data preparation, data mining, result analysis and knowledge assimilation, as shown in Figure 2.

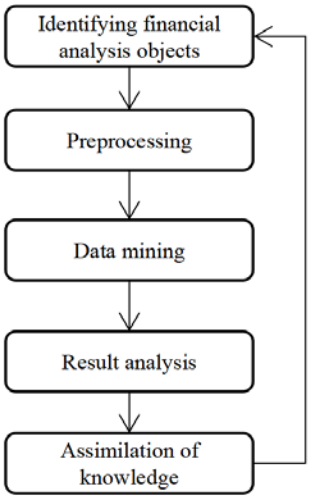

Fig. 2 Data mining process in energy economic analysis and management

In order to ensure the safety of the national economy, many developed countries have formulated relevant laws and regulations on energy supply and reserves. However, there are still many shortcomings in the current energy legislation in China. As the supply situation becomes increasingly tense, the energy supply work required for the development of the national economy has been placed in a prominent position in all work. It can be expressed by the energy consumption elasticity coefficient indicator, because the energy consumption elasticity coefficient can well reflect the relationship between energy consumption growth and economic growth. In the international energy market, China must gradually learn to take international cooperation action instead of acting alone. Such thinking will also help China achieve the strategic goal of globalization. In order to cope with the increasingly severe international energy security situation, we should actively learn from foreign energy legislation experience. To study and formulate laws and regulations concerning energy security and development strategy as soon as possible.

We should accelerate the reform of energy system. On the premise of ensuring the smooth implementation of the national energy strategy, we should promote China's energy market-oriented reform. Let market mechanism and government regulation play a role in the process of energy allocation. The unreasonable energy structure is largely related to our extensive economic growth mode and unreasonable industrial structure. Energy consumption also causes ecological damage and environmental pollution. While pursuing social progress and economic growth, we strive to achieve coordinated development of energy and the environment. It is necessary to strengthen the research and development of cutting-edge energy technologies, promote the development and application of advanced applicable energy technologies, and improve the manufacturing capabilities of major energy technologies and equipment. Due to the common needs of urbanization, consumption structure upgrading, transportation and infrastructure development. Heavy industry has shown a lot of room for development. These deep economic factors will inevitably require the rapid development of the raw material industry.

4. Conclusion

Energy security is an important manifestation of national economic security. China faces a series of problems and challenges in energy security. This requires the great attention of the entire country and puts it into action. The amount of energy resources consumed by human socio-economic development will gradually increase in the foreseeable future, while total energy reserves are

limited. The contradiction between the limited resources and the infinite demand is unavoidable, and energy security will always face threats. Product testing and quality certification system, establish a national quality monitoring system, and establish a sound market security mechanism. At the same time, a technical service system supporting the development of renewable energy industry has been formed. Energy security is a pressing problem facing the world, especially in China. We should raise our ideological awareness, attach great importance to this issue and find practical solutions. Waste use of energy will aggravate the crisis of energy shortage and weaken the energy base of sustainable development. No country can completely rely on its own resources to meet the needs of its own construction. China should make better use of the international market and foreign resources to solve China's resource shortage.

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