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An Analysis on Chinese Primary Energy Consumption

Abstract: Energy is the material base for human activities, which is closely related to national economic security. Statistics show that there is a close positive correlation between GDP and energy consumption, GDP per capita and energy consumption per capita. In 2015, Chinese primary energy consumption reaches 3.014 billion tons of oil equivalent, which is the largest energy consuming country. The biggest feature of the primary energy consumption structure in China is that the proportion of coal is too high and the proportion of natural gas is too low, which is very irrational. But in recent years, China’s energy consumption has shown some positive changes with low increment and slow growth rates. The analysis shows that the Chinese energy consumption per capita is at a level comparable to its economic development.

Keywords: energy; consumption structure; China

1 Introduction

The history of human civilization is a process of learning to use energy, discover new energy resources and consume a great deal of energy. Energy is the material base of human activities, the motive force of economic development and social progress. Energy is closely related to national economic security and the core interest of all countries in the world, which is also the focus of the game of big powers. Statistics show that since 1850, there is a close positive correlation between GDP and energy consumption, GDP per capita and energy consumption per capita [1,2].

2 Total Energy Consumption in China

According to the National Bureau of statistics, the coal accounts for 69.8 %, oil 21.2 %, natural gas 2.5 % (oil and gas 23.7 %) in Chinese energy consumption struc-
ture in 2003. The coal accounts for 66 %, oil 18.4 %, natural gas 5.8 % (oil and gas 24.2 %) in Chinese energy consumption structure in 2013. The proportion of coal has declined slightly, and the proportion of oil and gas has increased slightly (Fig. 1). As China advances the energy supply and consumption revolution, it is expected that the proportion of oil and gas in Chinese energy consumption structure will continue to grow steadily.

![Fig. 1: The Chinese energy consumption structure from the year 2000–2013 (Data Source: National Bureau of Statistics Website [3])]()

Growing too fast is the most prominent problem of energy consumption in China. Its primary energy consumption surpasses the United States for the first time in 2009, which becomes the largest energy consuming country. The total primary energy consumption is 2322 MTOE, increasing by 1.5 times just in the past 9 years. The energy consumption in 2015 is 3014 MTOE, which increases by 692 MTOE compared to 2009 (Fig. 2). The annual rate of growth of energy consumption as high as 7.6 % from 2000 to 2015. At the same time, the proportion of energy consumption in China has also increased rapidly, which presents an obvious growth from 10.5 % in 2000 to 22.9 % in 2015 (Fig. 3). However, there is a turn point around 2013. The growth of energy consumption in China has slowed down significantly. In 2015, it is only 1.5 % higher than in 2014. The authors believe that this is the performance of new economic norm in the field of energy, and further attention is needed.
Fig. 2: Chinese energy consumption in China from 2000 to 2015 (Data sources: BP, 2016 [4])

Fig. 3: The proportion of Chinese energy consumption in the world from 2000 to 2015 (Data sources: BP, 2016 [4])
3 Features of Chinese Energy Consumption

The biggest features of the primary energy consumption structure in China is “one high, one low”, compared with the global and other typical countries in 2013. The “one high” refers to the consumption of coal in China accounting for 67 %, which is far higher than the global average of 30 %. The proportion of the United States is only 20 %, and India, a populous and developing country like China, is just 55 %. The “one low” refers to the proportion of natural gas in China accounting for just 5 %, which is far lower than the global average of 24 %. The proportion of natural gas in the United States is 30 %, and India is 8 % (Fig. 4). Therefore, the structure of primary energy consumption in China should be optimized urgently.

![Fig. 4: The primary energy consumption structures in 2013 (unit: MTOE) (Data sources: BP, 2016[4])](image)

But in recent years, Chinese energy consumption has shown some positive changes. One of them is that the annual increment of Chinese total primary energy consumption has declined from 210 million tons of standard coal per year from the year 2003–2011 to 130 million tons from the year 2012–2013 (Fig. 5). The growth of energy consumption has declined from the average of 8.1 % from the year 2003–2011 to 3.7 % from the 2012–2013 (Fig. 6).
The second positive change is that the proportion of non-fossil fuels in Chinese energy consumption has been on the rise in recent years, which is from 6.7% in 2006 to 10.1% in 2013 (Fig. 7). However, in the component of non-fossil energy, the controversial hydropower proportion is high, accounting for about 75%, and on the contrary, the inexhaustible wind power and solar energy are in low ratio.
In 2015, Chinese primary energy consumption reaches 3.014 billion tons of oil equivalent, which is the largest energy consuming country. However, from the energy consumption law, China’s energy consumption is in line with the stage of its economic development. The energy consumption per capita of China is 1.93 tons of oil equivalents in 2013 which is slightly higher than the world average of 1.8 tons. The biggest feature of the primary energy consumption structure in China is that the proportion of coal is too high and the proportion of natural gas is too low, which is very irrational. But in recent years, China’s energy consumption has shown some positive changes with low increment and slow growth rates.

It is predicted that natural gas would be the energy in 21 Century [6]. The reason why natural gas is favored is that natural gas has better environmental, social and economic benefits compared with other fossil fuels [7]. The greenhouse gas, mainly produced by fossil fuel consumption, will lead to a global average temperature rise by nearly 2 °C. The change would cause severe ecological environment destruction. In order to limit the greenhouse gas emission, Kyoto Protocol was published in 1997, which requires that developed countries shoulder their responsibility in reducing the carbon emissions from 2005, so do the developing countries from 2012. On November 12th, 2014, China and America issued the Joint Announcement on Climate Change, stating that the two countries should jointly deal with climate change [8]. Paris Protocol was approved by nearly 200 parties On December 12, 2015, which is a historic step for handling the global climate change. It is highly urgent for China to try every effort to enhance the energy utilization efficiency and encourage the more use of natural gas in the daily life.

**Fig. 7:** Percentage of non-fossil in Chinese energy consumption from 2006 to 2013 (data sources: China Energy Statistics Yearbook)
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References


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