

An Investigation and Study of the Terminal Energy Consumption in Beijing

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Abstract

With the 2008 Beijing Olympics' approaching, Beijing has increasingly become the focus of the world, simultaneously the energy problem is regarded as an urgent work, so the investigations and studies on the status of the terminal energy consumption in Beijing have some practical significance. This paper analyzed the structure of coal, oil, natural gas, electricity and other major energy consumption for nearly a decade in Beijing using the information of relevant researches and the published statistical data, and also analyzed the changing trends and characteristics of energy consumption in-depth, to provide some reference for the development of energy in Beijing.

Keywords: Beijing, Energy consumption, Investigation and study, Clean energy

1. Preface

On the way of rejuvenation in China, the energy industry, composed of oil, natural gas, coal, electricity, waterpower and new energy, is acting as a driving force. Along with the strategic position's increasing enhancement, energy resources determine the realization of Oriental power dream to some extent. Energy resource is an important material basis for the survival and development of human society, and also an important material basis for our comprehensively constructing the well-off society and speeding up the socialist modernization. Adhering to the basic national policy of saving resources, and accelerating the construction of a resource-saving and environment-friendly society, is a long-term strategic task and the current urgent task of our country.

Beijing, as the capital of China and the international metropolis, is our country's second-largest city of energy consumption, however, its energy structure is not reasonable, its electrification level is not high, the environment pollution is serious. At the same time, Beijing is about to hold the 2008 Olympic Games. With the proposal of slogan of the Green Olympic Games, Beijing is taking a series of measures to optimize its energy structure, to make sure realization of the "New Beijing, New Olympics" strategy, so as to make Beijing meet the worldwide friends with the best posture.

In order to have an in-depth understanding of Beijing energy structure, it is necessary to conduct the investigation and study of Beijing area's present situation of terminal energy consumption. The investigation and study of terminal energy consumption in Beijing is contributed to analyze the Beijing's trends and characteristic of the terminal energy consumption structure changes, and provide a theoretical basis of the development trends of Beijing area's terminal energy consumption.

This paper mainly uses the literature method to carry on the investigation and study, the data of investigation and study originates from "China Energy Statistical Yearbook" and "Beijing Statistical Yearbook." "China Energy Statistical Yearbook" is edited together by the industrial traffic Statistics Division of the State Statistical Bureau and the Energy Bureau of the State Development and Reform Commission, is an authoritative book full of reflection of China's energy construction, production, consumption, the balance of supply and demand. It has a large amount of information, strong authority, and integrity. "Beijing Statistical annual" is a year-on-year large-scale statistical data published book, it has really recorded Beijing's Municipal socio-economic and technology changes through a lot of data to help international public to understand and recognize Beijing, it's an important information tool. The above two annuals combine two characteristics of Beijing area and energy, and provide important data for smoothly progressing of investigations and studies.

2. The past 10 years' terminal energy consumption situation in Beijing

Make analysis on trends in the total energy consumption of Beijing, so as to draw the trends of total terminal energy consumption of Beijing, in Figure 1. From the total terminal energy consumption tendency chart of Beijing (Figure 1), we can see that during the period of 1997-2006, Beijing's region total terminal energy consumption has been growing rapidly. In 1997, the total final energy consumption of Beijing is 35.658 million tons of standard coal. The last three years of the "Ninth Five-Year" period, in Beijing, the growth rate of the terminal energy consumption was 4.02 percent. During the "10th Five-Year" period, the growth rate is 5.81 percent, which has 1.79 percentage points

over the "Ninth Five-Year" period. By 2006, the total terminal energy consumption of Beijing has reached 56.8221 million tons of standard coal.

Then make the analysis on the Beijing area's terminal energy consumption structure during 1997-2006, shown in Table 1, the table shows the consumption's quantities of the coal, the oil, the natural gas, the electricity and other energy every year and demonstrates the total energy consumption quantity per year, their units are unified into 10,000 tons of standard coal conversion.

Table 1 shows that during 1997-2006, Beijing's terminal energy consumption structure has been continuously optimized. The proportion of Coal, coke and other solid fuels pollution is declining in the total consumption, the proportion of coal fell from 41.46 percent in 1997 to 24.46% in 2006. With the rapid development of the country's economy, the continued improvement of people's living standard, the upgrading of the consumption structure, as well as more and more environmental control efforts, the energy consumption of electricity, oil, natural gas, and other high-quality resources have been rapidly growing, the proportion has been rising. In 2006, the consumption of the electricity, oil, and natural gas respectively are 18.81395 million tons of standard coal, 16.2763 million tons of standard coal, and 3.7789 million tons of standard coal, accounting respectively for the proportion of terminal energy consumption are 33.11%, 28.64%, 6.65%, Compared to 1997, they respectively rose 7.64 percentage points, 7.47 percentage points and 6.10 percentage points. Make the trend analysis on each primary energy variety in the past 10 years changes, it can be concluded that their changes of consumption are different, energy consumption development is directed to the quality-oriented, as is shown in Figure 2.

The consumption of energy is gradually to the quality-oriented development, clean energy's proportion is rising, represented at the following aspects:

(1) the terminal consumption of the coal grows in very few years, which shows a downward trend overall. In 2006, the terminal consumption of coal in Beijing is 13.9021 million tons of standard coal, accounting for 24.46% in the terminal energy consumption, less than 884,000 tons of standard coal in 1997, the ratio dropped by 17%. For nearly 10 years, only in 1998, 2001, 2003, Beijing's coal terminal consumption increased slightly than last years. In 2001, Beijing's terminal consumption of coal is 15.2655 million tons of standard coal, which increases by 6.16%, accounting for 37.05% in the total terminal energy consumption. In 2003, the Beijing's total terminal consumption of coal is 14.5903 million tons of standard coal, an increase of 9.09%, accounting for 32.17% of the total terminal energy consumption.

(2) the upward trend of the terminal electricity consumption is quite obvious year by year. In 1997, Beijing's terminal electricity consumption is 9.083733 million tons of standard coal. During the last 3 years of "Ninth Five-Year" period, the average growth rate arrived at 8.04 percentages. In 2005, the terminal electricity consumption is 17.19399 million tons of standard coal, 12 percent more than the ratio in 2004, accounted for 32.3 percent of the total consumption of energy, respectively increased by 0.55, 1.50 and 1.95 percentage points compared with 2004, 2003 and 2002. During the "10th Five-Year Plan" period, the average increase is 8.46%, exceeding the "Ninth Five-Year" period about 0.44 percentage points. In 2006, the terminal consumption of electricity in Beijing is 18.81395 million tons of standard coal, increased 9.72 percent than 2005, accounting for 33.1 percent of the total consumption of energy, increased 0.80 percentage points than 2005.

(3) the oil terminal consumption shows upward trend overall and an increasing momentum after declining slightly in 2003. In 1997, in Beijing, the terminal consumption of oil is 7.5515 million tons of standard coal, accounting for 21.18% of the total energy consumption. The last 3 years of the "Ninth Five-Year" period and the previous two years of the "10th Five-Year Plan" period, it has continued to rise, with an average annual growth rate of 7.43 percent. By 2002, the terminal consumption of oil has reached 10.8081 million tons of standard coal, and has 43.13 percent growth over 1997, accounting for 25.12 percent of the total consumption of terminal energy. In 2003, the terminal consumption of oil turned to negative growth, the total quantity only reached to 10.5187 million tons of standard coal, declining 2.68 percent over 2002, after that, the terminal consumption of oil grows rapidly. In 2006, Beijing's terminal consumption of oil is up to 16.2763 million tons of standard coal, growing 13 per cent over 2005, accounting for 28.64% of the total terminal energy consumption, respectively compared with 2005, it increased 1.59 percentage points and with 2004, increased 2.19 percentage points.

(4) the terminal consumption of natural gas has increased significantly. In 1997, Beijing's terminal consumption of natural gas was 197,900 tons of standard coal, accounting for the total energy consumption by 0.56%. In the last three years of the "Ninth Five-Year", it grew rapidly with an average annual growth rate of 52.75%. By 2000, the consumption of natural gas has reached 705,500 tons of standard coal, increased 256 percentage points over 1997. During the "10th Five-Year Plan" period, the average annual growth rate of natural gas remains 39.96 percent. In 2006 Beijing's terminal consumption of natural gas was 3.779 million tons of standard coal, growing 11.1 percent

over 2005, accounting for 6.65% of the total terminal consumption respectively compared with 2005, 2004 and 2003, it increased 0.26, 0.82 and 1.53 percents.

3. Analyze the characteristics of Beijing area's terminal energy consumption

From the energy terminal status and the change trend of Beijing, we may analyze the characteristics of terminal energy consumption, and get the following conclusions:

(1) Beijing's energy consumption growth rate has intensifying trend, but the level of consumption of output is declining.

In 1997, the total energy consumption of Beijing was 31.619250 million tons of standard coal, and in 2006 it reached to 56.8221 million tons of standard coal. From the growth rate of the total terminal energy consumption, since 1997, the total terminal energy consumption has an annual growth rate of 5.31%, the average annual growth is about 2.3516 million tons of standard coal. Although the total terminal energy consumption has been growing fast, the production value per unit consumption in Beijing was decreasing year by year (as shown in Figure 3). In 2006 Beijing area's GDP production value per unit consumption was 0.72 tons of standard coal consumption / million, drop off 6.6 percent compared to 2005, was lowest in the nation.

(2) The energy was mainly used for industrial production.

In 2006, in Beijing's terminal energy consumption, the terminal energy consumption in industrial accounted for 42.31 percent of the city's total energy consumption, and showed a higher proportion compared to the 20-40% of the developed countries, the proportion of industrial energy consumption in United States was 21.6 percent. To reduce the total energy consumption level of Beijing, the focus is on the control of energy consumption of industrial, particularly about oil processing, coking and nuclear fuel processing, chemical raw materials and chemical products, non-metallic mineral products industry, ferrous metals smelting and pressing industry, transportation equipment manufacturing, electricity, gas and water production and supply industry, in 2006 these six industries' total energy consumption accounted for 91.56 percent of the total consumption of industrial. To control the scale of development, structural adjustment and phase products of high energy consumption out, reduce product consumption and improve energy-saving rate, is the key to curb the excessive growth of energy consumption needs of Beijing.

(3) Coal is primary, which shows the declining trend, and the electricity surpasses year by year.

For a long time, influenced by the national resources and energy policy, before the year 2005, coal has been the dominant in Beijing's terminal energy structure. Although dropped from 41.47 percent in 1997 to 32.17 percent in 2003, it still has 1.37 percent points higher than the electricity consumption which ranks the second. In 2006, the consumption of coal accounted for 24.47 percent in the total terminal energy consumption. As early as 1998, the total coal consumption of all OECD countries was only 4.3%. In 2006, the United States' proportion of coal consumption is only 2.03 percent, far below Beijing's ratio. The coal oriented energy structure, is one of the main root of serious atmospheric pollution, it does not conform to Beijing's urban function and nature, but also affects our country's international image. Until 2004, Beijing has increases the intensity of the industrial structure adjustment, make the electricity consumption proportion slightly over the coal consumption, industrial industries, the tertiary industry and the lives of the residents of these three industries are fastest-growing.

4. Conclusion

The result showed that Beijing area's terminal energy consumption is developing toward the encouraging direction. On one hand, the output level of energy consumption is unceasingly declining, it is completely coinciding with our national policy that is to build a resource-conserving society, promoting the development of the national economy well and fast is not at the expense of large amount of resources; on the other hand, the proportion of electricity and other clean energy act as an upward trend, and coal and other primary energy showed a downward trend, so the energy structure has been continuously optimized to make a positive role in improving Beijing's air quality and the environmental standards.

"The 11th Five Year Plan Summary Beijing National economy And Social development in Beijing" has cleared out main development targets of Beijing in the next 5 year: to continue to maintain the capital's economic development steady and rapid, and on the basis of optimizing structure, improving the efficiency and reducing the resource consumption, the average annual GDP grows 9 percent, and annual GDP of per person will be doubled that of 2000 by 2010. With the implementation of a series of related policies and under the opportunity of the Green Olympic, Beijing will realize harmonious development of the economy, society and environment.

References

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Table 1. Beijing area's structure table of terminal energy consumption

Unit: Ten thousands tons of standard coal

year	coal	oil	natural gas	electricity	other	total
1997	1478.61	755.15	19.79	908.37	403.88	3565.80
1998	1521.33	742.71	31.21	953.14	409.74	3658.13
1999	1457.88	816.35	51.73	1029.10	378.41	3733.47
2000	1437.96	865.74	70.55	1145.61	493.94	4013.81
2001	1526.55	901.21	144.99	1187.63	359.72	4120.10
2002	1337.52	1080.81	200.48	1305.84	377.24	4301.90
2003	1459.06	1051.87	232.30	1397.11	394.95	4535.28
2004	1372.59	1279.12	281.96	1535.13	366.19	4834.99
2005	1371.03	1440.35	340.00	1719.40	452.29	5323.07
2006	1390.21	1627.63	377.89	1881.39	405.08	5682.21

Note: The data originates from "Beijing Statistical annual" and "Chinese Energy Statistical annual"

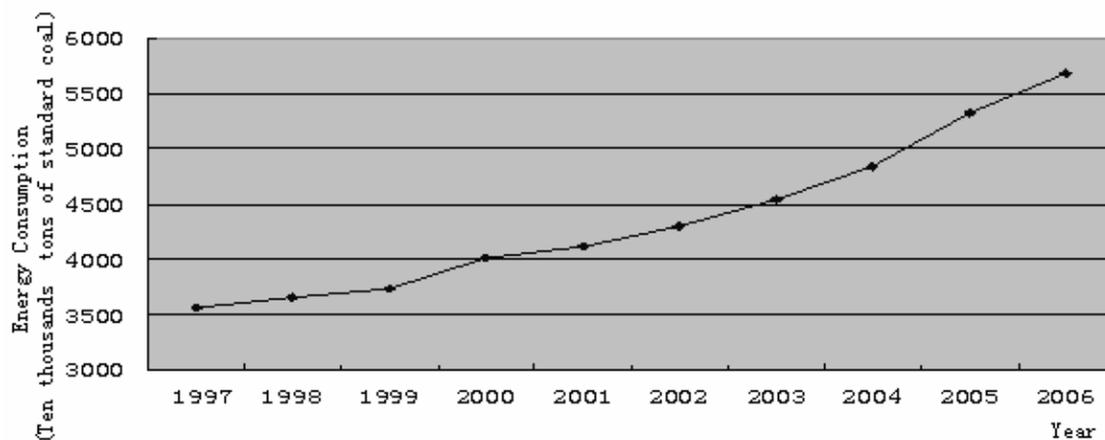


Figure 1. The total terminal energy consumption tendency chart of Beijing

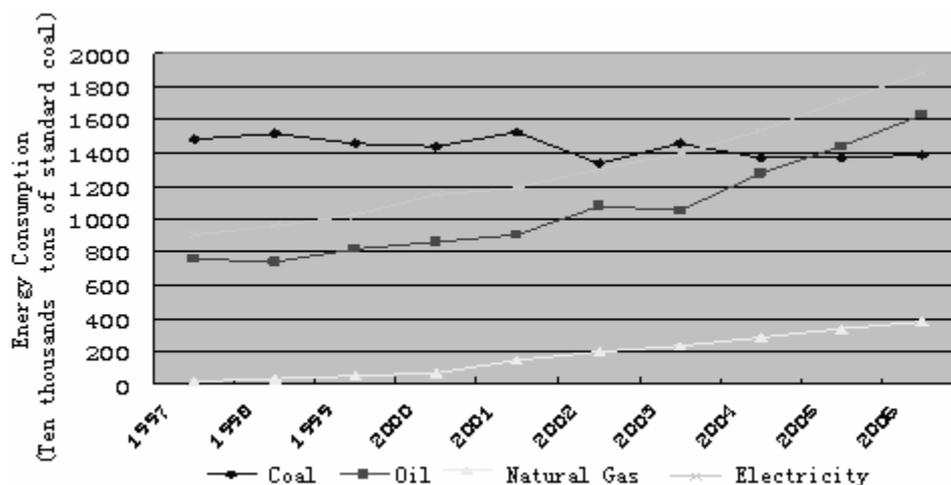


Figure 2. Beijing area's terminal energy structure chart

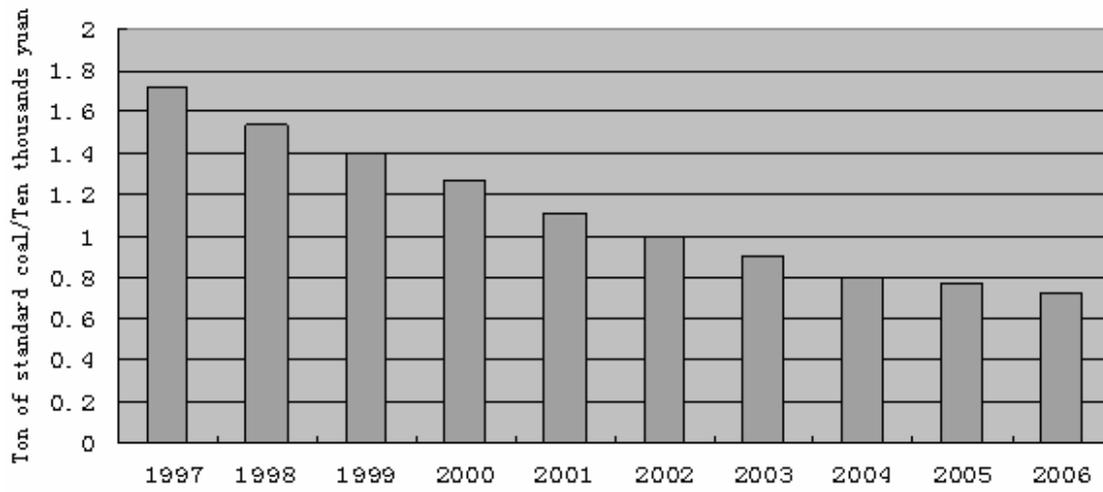


Figure 3. Beijing Area's tendency chart about production value per unit consumption of the terminal energy