

ENERGY SUPPLY AND DEMAND

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Summary

The industrialization process in China is undergoing rapid development. As a result, the success of future economic growth requires a great deal of energy consumption. But the structure of energy production and consumption must be optimized. It is the only path for realizing sustainable development, to establish the clean and sustained systems of energy supply and consumption. The leading ideas in China's energy strategy are as follows: utilizing overseas and home resources and playing these two markets; guaranteeing supply and rationalizing consumption; improving structure and raising efficiency; avoiding and curing pollution, protecting environment, and generally gearing the energy supply and demand system towards sustainable development. The development strategies of China's energy industry are the following sides: using electricity as the power and coal as the main energy source; positively exploiting oil and natural gas; devoting major efforts to developing hydro-power and nuclear power; expanding new energy and renewable energy strategically, and speeding up the construction of the rural energy infrastructure and electrification. By 2010, energy supply should meet the needs of national economic development; the energy system of sustainable utilization must be established step by step. Energy technology and equipment should reach or approach an advanced international level, and energy exploitation and environment protection should be coordinated.

1. Introduction

1.1. Energy and Sustainable Development

Energy is the basis for all human activity. Its exploitation and utilization has promoted social development and global economic prosperity. On the other hand, it can do a great deal of damage to the natural environment on which the existence of humankind relies.

In China, the industrialization process is at a stage of very rapid development. As a result, the success of future economic growth depends on a great deal on energy consumption. While the growth of primary energy demand is met by fossil energy, the pressure on China's environment become ever greater. The energy industry has to face the dual pressures of developing the economy and protecting the environment. Only by insisting on harmonious developmental policies of exploitation and protection, can sustainable development be realized.

1.2. History, Present Situation and Future of Energy Supply and Demand

The production and consumption of primary energy in China is increasing rapidly. In 1949, the output was 23.74 million tons of coal equivalent (Tce) and in 1997 it amounted to 1319.89 million Tce, an annual growth rate of 8.7%. Consumption in 1949 was only 23.97 million Tce but by 1997 it amounted to 1420 million Tce, an 8.8% annual growth rate (see Table 1).

With the discovery of oil and natural gas, there have been outstanding changes in the structure of China's energy production and consumption. In 1997, 19.7% of primary energy total output and 20.8% of primary energy consumption was shared by oil and natural gas, compared to only 1.3% and 3.4% in 1952. The proportion of coal in primary energy supply reduces every year.

Today, China's industries are taking off, with an annual growth rate of GNP of about 8%. Therefore, energy demand will rise continuously. In addition, due to the needs of sustainable development and environmental protection, the structure of energy production and consumption must be optimized. The only path of realizing sustainable development is to establish a clean and sustainable system of energy supply and consumption.

2. The General Situations and Features of Energy Resources

The total quantities of energy resources in China are enormous. Proven coal deposits occupy second place in the world; oil ranks eleventh; natural gas is fourteenth; hydropower occupies first place. Solar energy ranks second. Nuclear power, biomass, marine energy, wind energy and geothermal energy are relatively plentiful as well.

Year	1949	1952	1960	1965	1970	1975	1980	1985	1990	1995	1997
Output	23.7	48.7	296.4	188.2	309.9	487.5	637.4	855.5	1039.2	1290.3	1319.9
Consumption	24.0	47.0	301.9	189.0	292.9	454.3	602.8	766.8	987.0	1311.8	1420.0

Source: China Statistical yearbook 1998

Table1. Energy production and consumption over the years in China (million Tce)

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Owing to the vast land and sea areas, complete stratum and manifold sedimentary types, the energy resources in China have the following features.

2.1. A Complete Variety and Considerable Total Quantity

China's energy resources are complete. The proven routine energy reserves, including coal, oil, natural gas, hydro power (converting 1000 kWh into 0.35 Tce within one hundred years) and so on, add up to 191.8 billion Tce (1990). It is estimated that the proven non-renewable energy reserves except for uranium amount to about 11% of the world's reserves and rank third. Calculating energy reserves by unit territory area, the energy resources per square kilometer is about 1.6 times the world average. China is therefore one of the countries with relatively rich energy resources in the world. In addition, there are rich renewable energy sources such as hydropower, wind energy, solar energy, biomass energy, etc. (see Table 2, Table 3).

Energy types	Quantity	Converted into billion Tce	Proportion (%)
Coal	4500 billion tons	3214.35	88.5
Oil	94 billion tons	134.42	3.7
Natural gas	38,000 billion m ³	50.54	1.39
Hydro-power	5290,000 kWh	232.66	6.41
Total		3631.97	100

Source: Status and Development Strategy of China's Resources edited by He Xiwu, Yao Jianhua, etc.

Table 2. Breakdown of energy reserves in China

Energy types	Quantity (million Tce)	Proportion (%)
Solar energy	396,421.37	99.43
Wind energy	80.15	0.02
Geothermal energy	2000	0.5
Tidal energy	23.58	0.01
Biomass energy	175.69	0.04
Total	398,700.79	100

Sources: Status and Development Strategy of China's Resources edited by He Xiwu, Yao Jianhua, etc.

Note: the ratio of being converted into Tce: per ton coal = 0.714 Tce; per ton oil = 1.43 Tce; per km³ natural gas = 1.33 Tce; 1000 kWh hydro-power = 0.35 Tce within one hundred years

Table 3. Potential renewable energy reserves and their proportions.

2.2. Per Capita Quantities of Energy Resources less than the World Average

China has a very large population of more than 1.2 billion and this number will probably reach 1.5 billion by the 2020s. As a result, per capita quantities of energy resources is 230 tons and only 51% of the world average, coal less than one half, oil less than one-eighth, natural gas less than one-twentieth, and hydropower about two-thirds.

2.3. The Irrational Structure

The energy structure in China uses coal as the primary energy source, representing 88.5% of total supply. Hydropower supplies 6.41%, and oil and natural gas 5.09%. The proportion of energy supply coming from oil and gas is very much less than the world average (25.3%).

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