

Energy Status and Policies in China

1. Present Energy Situation in China

It is well known that China is rich in energy resources, and it plays an important role in the world. The total proven traditional energy resources, including coal, oil, gas and hydraulic energy, are more than 800 billion tce; the remained recoverable reserves are about 140 billion tce, which are about 10% of the total proven traditional energy resources in the world. The coal is the main energy resource in China. It is about 85% of the total energy resource in China. However, oil and gas resources in China are in small percentage. China is the biggest country in population over the world. There are 1.3 billion people in China, more than 20% of the total population in the world. The average per capita energy resource in China is less than 50% of the average level in the world.

Through great efforts in the last 50 years of the last century, especially rapid development since China's reforming and opening to the world, the energy supply situation in China has been changed from shortage to basic balance. In general, energy supply meets the demand of social and economical development. The overview is as following:

1.1 Energy production and consumption has been increased rapidly. In 2002, the primary energy production reached 1.387 billion tce, including 1.38 billion coal, 167 million tone oil, 32 billion m³ gas, 1.65 billion MWh electricity. Solar, wind geothermal and other renewable energy have been developed more or less. The energy consumption reached 1.5 billion tce. The imported oil reached 75 million tones. China has become the second country in energy consumption and the third one in energy production in the world.

1.2 Energy consumption structure has been improved. The percentage of coal in energy consumption has been reduced from 76.2% in 1990 to 65% in 2002. The

percentage of oil, gas, hydro, nuclear, wind and solar etc. have been increased from 23.8% in 1990 to 35% in 2002. The rapid development of clean energy and the increase of percentage of high-grade energy have been played very important role in raising energy efficiency and improving environment in China.

1.3 Technology level in energy sector has been raised substantially. The coal industry has the capability to design, construct, equip and manage 10-million tones class open mines and large-scale underground mines. Oil industry has formed a complete system including R&D, exploration, surface construction and equipment. Power industry has entered into a new phase characterized as large generators, large power plants, large grids, super voltage and automation.

1.4 Market-orient reforming of the energy industry has been achieved new development. Coal enterprises have employed comprehensive reforming according to modern enterprise mode. Coal price is freely decided by market now. Coal production, transportation, and selling have been commercialized. A couple of years ago, Oil & gas industry was restructured into China National Petroleum Corporation (CNPC) and Sino Petrochemical Corporation (Sinopec). The two corporations employ new management structure that integrates exploration, refinery & processing and sale. And they have been successfully list in oversea stock markets. The price of their oil and petroleum products changes with the world markets. Management of generation and transmission of electricity have been separated in the electric power industry. Two grid corporations have been established, one is State Grid Corporation, and another is Southern China Grid Corporation. The generation capacity owned by the former State Power Corporation has been separated into 5 generation corporations. Through the reforming, China's energy industry has been evolved to more commercialized, and the effectiveness of market mechanism has become more and more obvious. Pricing and management structure are gradually closing to international practice. These changes provide a concrete foundation for further development of China's energy industry.

1.5 Energy saving has achieved great progress. Since 1980s, China has made a basic energy policy guideline, *Equal Emphasize to Energy Development and Energy-saving, and More Priority to Energy-saving*. Based on this guideline, a series of laws and regulations on energy-saving have been issued. Energy efficiency has been increased yearly, and the growth rate of energy consumption is much lower than the growth of domestic economy. During last 10 years, elasticity ratio of energy consumption was about 0.5, general energy consumption per 10 thousand yuan GDP had been decreased from 5.12 tce in 1991 to 2.5 tce in 2002. The average yearly energy saving is about 5%. The energy saving campaign has been very effective, it released the pressure of energy supply and negative impact to environment due to energy production and consumption.

China's energy development has achieved a great progress, however, there are still some problems. First, the energy structure is not reasonable. Energy supply is overly depended on coal. The percentage of directly using coal by end users is too high. Domestic oil supply is insufficient. Percentage of clean energy, such as gas, wind, solar, is low. The second is unbalance of the development inside energy sector. Coal mining has a big capacity, but the development of coal washing, briquettes, mixed coal, blending and coal water mixture are progressing slowly. The proven reserve of natural gas is increasing rapidly, but gas marketing is developed slowly. The structure of power generation, transmission and distribution is not matched properly. The construction of electricity grids falls behind the construction of power plants, per unit capacity average in most thermal power plants is small, resulting in low energy efficiency. The third is that energy technology level is not high enough. Especially the clean coal technology falls behind. The fourth is that energy efficiency, environment protection measures and energy comprehensive application in China have a big gap to the advanced level in the world. It cannot meet the needs of sustainable development.

2. China's Energy Policies

Chinese government has clearly announced a target of building a complete Xiao Kang (preliminary wealthy and healthy) society in China. Based on structure optimization and benefit increase, GDP in 2020 shall be doubled than it in 2000, comprehensive strengthens and capacity of competition shall be significant strengthened. Reliable energy supply is an important basis for achieving this target. The energy consumption of China in 2000 was 1.3 billion tce., while energy consumption per 10 thousand yuan GDP was 1.45 tce. Assuming the energy consumption will decrease 3.5-4% per year due to measures of structure adjustment, technology development and energy saving effectiveness, then the energy consumption per 10 thousand yuan GDP will be 0.67—0.71tce. In this case, the total energy consumption shall be about 2.2—2.5 billion tce in 2020, which will increase 0.9—1.2 billion tce than it was in 2000. Obviously, this is a great challenging task to strengthen construction of energy industry and increase energy efficiency in a long period for China.

It has been approved that the general policy guideline for energy development, *Equal Emphasize to Energy Development and Energy-saving, and More Priority to Energy-saving*, is correct and suitable for actual conditions in China. The strategically guiding principle of energy development of China is: under condition of energy safety to adjust and optimize present energy structure, to raise energy efficiency continuously, to strengthen development and use of new and renewable energy in large scale.

2.1 Energy Safety: From viewpoint of the character of energy resource in China, coal will still be the main energy resource in future. To ensure safety supply, a new way of coal use has to be developed, which means to realize clean, highly efficient and comprehensive use of coal. Meanwhile, it should be studied how to overcome the problem of oil supply shortage. Oil storage system shall be established gradually, and the development of oil alternative products shall be strengthened. In principle, the energy supply shall rely on domestic resources.

2.1 Optimization of Energy structure: Since general balance of energy supply and energy demand in China, the problem of energy structure appears more and more

obvious, which is that the share of clean energy is very small in energy sector. To optimize China's energy structure, the consumption of natural gas, hydro-power and other clean energy should be increased. The technologies of coal-washing, coal gasification, coal liquefaction etc. Should be introduced and disseminated, the direct use of coal by end users should be restricted. The present structure of energy industries shall be adjusted, and the general level of energy industry shall be improved.

2.3 Energy Efficiency: The core of energy saving is to raise energy efficiency. Efforts shall be made to increase the efficiency of each point in the chain of energy production, conversion and consumption, the adjustment for both industry structure and product structure shall be strengthened, new technologies shall be introduced and disseminated in a market-driven way, so as to keep energy efficiency increasing.

2.4 New and renewable Energies: It is a very important measure for sustainable development to harness new and renewable energies. Chinese government is going to issue favorable policies to develop new and renewable energy. The first of all, the hydro-power shall be developed in advance. It is planned that all feasible and environment-sound hydro-power stations shall be installed in about 20 years, the total capacity shall be about 250 GW. In the mean while, favorable policies to prompt development of wind, solar, geothermal, biogas and biomass etc. will be established. Renewable energy and new energy will contribute more than 20% of the total energy consumption in 20 years.

I would like to mention China's *Township Electrification By RE Program*. China is a big agricultural country in the world, and the rural population is about 70% of the total. Restricted by natural conditions, Straws of crops are still main energy resource in many rural areas. According to the statistics, 60% of energy for living in rural area are from straws and branches of wood, this is equivalent about 200 million tce. In fact, it is also a kind of renewable energy. To supply energy to rural area, Chinese government laid down a guiding principle, *to speed up commercialization of rural energy supply, disseminate energy saving stoves and coal briquettes, form energy*

supply and service system, develop small hydro, wind, solar, geothermal, biogas and biomass in accordance with local condition. Through efforts in past years, rural energy has been development greatly. In future, while commercialized energy is developed, it will still be a very important measure to develop renewable energy to meet energy demand in rural areas. Development of small hydro power, wind power, photovoltaic and biomass will be strengthened, in order to improve living condition and raise living standard of farmers.

Electrical power supply has been improved significantly. The shortage of power supply that existed many years has been basically released. However there are still many villages and households have no access to electricity supply due to many reasons. In accordance with a survey report, there were about 1000 townships, 20,000 villages, with 30 million people have no electricity supply till 2001. These villages and households are living in remote areas, and the communication is also poor. Their economic situations lay behind, and education level is low. It would be impossible to make electrification of their villages by themselves. It is not feasible to extend electricity grid. Chinese government started building stand-alone electricity generation facilities in the township locations without electricity supply in 2002, called as *Township Electrification by RE Program*. More than 600 RE electricity facilities were started to be installed in 2002, with total grant of 2.56 billion yuan, most of the facilities are PV stations, most of them have been put into operation. It is planed to put another 2 billion grant this year to set up more than 300 facilities in 2003. With experiences from the township program, Chinese government is preparing to make all households without access to electricity grid can be supplied with electricity as soon as possible.

China is a big developing country, and its energy demand will increase steadily along with economy development and improvement of living standard. Energy supply will be a long-term challenge for China. We will keep the general guiding principle: *relying energy supply on domestic resource, rationally developing and effectively*

using energy, increasing energy efficiency with great efforts, taking care of environment protection to develop our economy and society in a healthy and harmonious way.