China

The People's Republic of China (Zhonghua Renim Gonheguo) with its capital city Peking (Beijing, 10.780.000, 1996) covers an area of 9.571.000 km². It can be seen as an emerging economy and has a population of almost 1,2 milliard inhabitants of which about 900 million are living in rural areas. In the last 20 years of China's remarkable transformation, moving from a planned economy to a market-based and less-planned economy, the country achieved an economic growth of 10 percent at an increase of energy consumption of only 5,3 percent.[1] In spite of China's successful energy savings, the country became the world second largest energy consumer with an overall consumption of 33,7 thousand billion (10^{15}) Btu in 2001.[2]

Figure 4-11 shows the map of China

Figure 1 - Map of China

Source: University of Texas Online Library http://www.lib.utexas.edu

[1] Energie Verwertungsagentur, China's New and Renewable Energy Situation

[2] EIA 2002.

China is a country, divided into several geographic regions: the almost 3.700 metres Tibetan plateau, bounded in the mostly mountainous area, the Mongolian tableland, the eastern highlands and the central plain. China proper consists of three huge river systems. The Yellow River (Huang He), 5.464 km long, the Yangtze River (Chang Jiang), the third-longest river in the world at 6.380 km and the Pearl River (Zhu Jiang) with a total length of 2.200 kilometres. China is the world's most populous country with about 1,2 milliard inhabitants of which more than 80 percent is living in the central area of the country. China comprises 22 provinces, five autonomous regions and four government-controlled municipalities. The country officially divides itself into 23 provinces, numbering Taiwan as its 23rd. Hong Kong became a special administrative region of China in 1997, and Macao achieved this status in 1999.

With China's entry into the World Trade Organization (WTO) in November 2001, the Chinese government made a number of specific commitments to trade and investment liberalization which, if fully implemented, will substantially open the Chinese economy to foreign firms. Despite moves toward privatisation, much of China's economy remains controlled by large State Owned Enterprises. The extremely fast economic growth of China allocated by a GDP growth of 8,0 percent in 2000 and a 7,1 percent growth in 2001. The International Energy Outlook 2002 (IEO 2002) states that energy-related emissions are projected to grow most rapidly in the People's Republic of China (in the following China).

International Finance Institutions and the Chinese Government are expecting one of the highest rate of growth per capita national income for the forecast period.[3] This could be seen in direct relation to China's previous successful attempt to electrify rural areas. China secured electricity access for almost 700 million people in two decades, enabling it to achieve an electrification rate of more than 98 percent in 2000. From 1985 to 2000, electricity generation in China increased by nearly 1000 TWh, 84 percent of it coal-fired, most of the rest hydroelectric. The electrification goal was part of China's poverty alleviation campaign in the mid-1980s. The plan focused on building basic infrastructure and on creating local enterprises. China's economy grew by an average annual 9.1% from 1985 to 2000. A key factor in China's successful electrification programme was the central government's determination and its ability to mobilise contributions at the local level. The electrification programme was backed with subsidies and low-interest loans. The programme also benefited from the very cheap domestic production of elements ranging from hydro generators down to light bulbs. China has avoided a trap into which many other nations have fallen: most Chinese customers pay their bills on time. If they do not, their connections are cut off.

Nevertheless this achievement dwarfs the efforts of any other developing country, but it conceals some serious shortcomings. China's transformation and distribution networks still need very large investment to meet modern standards. Electricity services are unreliable and of poor quality. Wiring and meters in homes and offices are undependable, even unsafe. Usage is low, especially in rural areas, where consumers tend to restrict their electricity use to lighting their homes.[4] This example shows that it is very important to involve the local level and strengthen the process of decentralisation also in the field of energy generation.

China's electric power industry mostly relies on oil, coal and natural gas in order to cover the estimated consumption of 1,1 million GWh in 2000. A 79,8 percent fossil fuel share, 18,9 percent hydropower as well as 1,3 percent nuclear power makes up the energy mix of the electricity sector. China is currently working on its largest project in the electricity sector, the

[3] IEO 2002: 163.

[4] IEA 2002: 11-15.

Three Gorges hydropower plant. When fully completed in 2009, it will consist of 26 units with an overall capacity of 18,2 GW. Another large hydropower project involves a series of dams on the upper portion of the Yellow River with a combined installed capacity of 15,8 GW.[5]

However, most of the major developments taking place in the nuclear power sector. Several nuclear projects are under construction while in May 2002 the first unit of the Lingao nuclear power plant in Guangdong province began commercial operation. Currently it has a capacity of 1 GW and will be enlarged to 2 GW by the end of 2003. An additional 600-MW generating unit at the Qinshan nuclear power plant in Zhejiang province began operation in February 2002, and another 600-MW unit at the same site is scheduled to begin delivering electricity in late 2002. A major issue for China's electric power industry is the distribution of generation among power plants. Therefore, China stated to create a unified national power grid and a modern power market in which plants sell power to the grid at market-determined rates.

China currently is the world's third largest oil consumer (behind the United States and Japan) with consumption totalled 1,75 milliard barrels in 2000. China's proven oil reserves are estimated at 24 milliard barrels. The residential production of 1,2 milliard barrels was insufficient to cover the consumption and therefore caused imports of 550 million barrels. China is expected to surpass Japan as the second largest world oil consumer within the next decade and reach a consumption level of 10,5 million bbl/d by 2020. In view of this expectation, China has been acquiring interests in exploration and production abroad. The states oil company holds oil concessions in Kazakhstan, Venezuela, Sudan, Iraq, Iran and Peru.

Historically, natural gas has not been a major fuel in China, but given China's domestic reserves of natural gas, which stood at 114 milliard cubic metres at the end of 2000, and the environmental benefits of using gas, China has embarked on a major expansion of its gas infrastructure. Natural gas currently accounts for 3 percent of total energy consumption in China, but consumption is expected to more than triple by 2010. One major hurdle for natural gas projects in China is the lack of a unified regulatory system as currently natural gas prices are governed by a patchwork of local regulations. Therefore the Chinese government is in the process of drafting a new legal framework for the natural gas sector.

Coal contributes over 63 percent of China's primary energy consumption making the country to the largest consumer as well as the largest producer of coal in the world. The country's consumption of 1,15 milliard tons in 2000 contributed a 25 percent share to world coal consumption. China's coal industry had a serious oversupply problem in recent years and government has begun implementing major reforms aimed at reducing production. Many small coal mines have been closed and the depressed local coal prices have started to recover. China also is increasingly seeking export markets for its coal as a way of dealing with its surplus production. According to the Chinese government, China's net coal exports for 2001 rose by 46 percent from the previous year. Japan and South Korea are the primary markets, while China is beginning to emerge it's exports to Australia. Lately, China has forced the interest in coal liquefaction technology and would like see liquid fuels, based on coal, as an substitute for some of its petroleum demand.

As a result of its mainly fossil energy sector, China suffers from major environmental problems. According to a report by the World Health Organization (WHO), seven of the

[5] EIA 2002.

world's ten most polluted cities are in China. The country's heavy use of unwashed coal leads to large emissions of sulphur dioxide and particulate matter. China also is important to any effort to curb emissions of greenhouse gases, as it is projected to experience the largest absolute growth in carbon dioxide emissions between now and the year 2020. China is a non-Annex I country under the United Nations Framework Convention on Climate Change, meaning that it has not agreed to binding targets for reduction of carbon dioxide emissions under the Kyoto Protocol. China has already a great potential in biomass, regarding several ways to generate and utilise biogas from municipal waste. Therefore it is important to push communication and co-operation platforms for further scientific research as well as for increased promotion and dissemination activities.
