

**Energy and Environmental Problems behind China's High Economic Growth  
– A Comprehensive Study of Medium- and Long-term Problems, Measures and  
International Cooperation**

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**<Topics of Concern and Aims of Research >**

During the past two decades, China's GDP has increased by 6.3 times. This achievement, however, has given rise to problems of net energy imports, environmental pollution and ecological destruction at home, cross-border pollution, and mounting carbon dioxide (CO<sub>2</sub>) emissions. Looking at the future, the Chinese government set up a target of quadrupling the size of its GDP in 2000 by the year 2020. However, it is possible that this target may have the effect of worsening the issues of energy security, domestic and regional environment, and global warming, which already are giving cause for concern. This study is designed to clarify the present shape of energy-related and environmental problems lurking behind China's high growth, and then to assess what self-help domestic efforts and international cooperation will be necessary in order to minimize the impacts of these problems.

**<Major Conclusions>**

1. Headlong slide to becoming a major net energy importer, and worsening environmental problems
  - Along with surging energy consumption, energy security issues, to which little attention was paid for three decades and a few years, have become conspicuous.
  - The domestic environment has deteriorated rapidly, with some 70% of urban population exposed to air pollution, 70% of seven major water systems heavily polluted, over 400 cities short of water, and 3,400 km<sup>2</sup> (equivalent to Japan's Tottori Prefecture) turning into desert every year.
  - Cross-border pollution, notably acid rain and sandstorms, have reached the Korean Peninsula and Japan.
  - Global environmental problems: China is the world's second-largest CO<sub>2</sub> producer after the U.S.
2. Future prospects for economy, energy and environment
  - To keep the GDP growth at an annual average of around 6% up to 2030 will not be impossible, but the strong likelihood is that such robust growth will aggravate energy and environmental problems.
  - In 2030 net oil imports may reach 600 million tons, a figure comparable to that in the U.S. today. A rise in energy security issues and significant impacts on the world energy market are very likely.
  - The domestic environment may become still worse, particularly air pollution, desertification, water and food shortages, etc.
  - Cross-border pollution may become more serious than ever.

- Outrunning the U.S., China is expected to become the world's largest CO<sub>2</sub> producer and is very likely to accept a reduction target by 2020.
3. Recommended action: a combination of self-help efforts and international cooperation is imperative.
- Energy and environmental problems originating from China should be solved by China primarily through its self-help efforts. As the problems stem from "system failures," the first step to be taken is system restructuring through creation, for example, of a Department of Energy, reestablishment of the environmental control system, administrative and social environment supervising system.
  - Secondly, international cooperation is also imperative, not only for China's own benefit but also for the world by holding to minimize cross-border pollution, food crisis and impacts on the world oil market. Not one-way assistant, win-win type mutual cooperation framework, capable of benefiting both parties visibly, such as the Clean Development Mechanism (CDM) should be very effective.

**<Summary>**

Since the late 1970s, China has unveiled "Reforms and Opening" policies and achieved a high economic growth of around 10% yearly. As a result, China became an economic power, with its nominal GDP ranking sixth in the world and its export values occupying seventh place in 2000. In addition, in 2001 China won the long-coveted sponsorship of the Beijing Olympic Games (2008), gained WTO membership, and initiated Free Trade Agreement talks with ASEAN. At the dawn of the new century, China with its huge population of 1.3 billion appeared to be having a good start as an international community member. But we should not allow ourselves to be too enraptured by such striking facts alone. Of greater importance is to clarify the various problems lurking in the shadow of the country's high growth that are capable of having adverse effects on sustainable development, then to sound the alarm and call for specific actions. Working from this viewpoint, the present research focuses on energy and environmental problems that could have particularly grave impacts.

In the past two decades, China's GDP has increased by 6.3 times. This achievement, however, has given rise to problems of net energy imports, environmental pollution and ecological destruction at home, cross-border pollution, and mounting carbon dioxide (CO<sub>2</sub>) emissions. Looking at the future, the Chinese government set up a target of quadrupling the size of its GDP in 2000 by the year 2020. However, it is possible that this target may have the effect of worsening the issues of energy security, domestic and regional environment, and global warming, which already are giving cause for concern. This study is designed to clarify the present shape of energy-related and environmental problems lurking behind China's high growth, and then to assess what self-help domestic efforts and international cooperation will be necessary in order to minimize the impacts of these problems.

### **1. Downslide to status of major net energy importer, worsening of environmental problems**

China realized oil self-sufficiency in the mid-1960s, and became a major oil-exporter in 1980s. However, after peaked with 36.0 million tons in 1985, net export of oil went down sharply, owing to the stagnation of production and rapid increase of demand. As a result, China fell into a net importer of oil in 1993, and just 7 years later in 2000, became a major oil importer with net imports over 69.6 million tons, ranked as the world's 7<sup>th</sup> largest importer behind the United States, Japan, Germany, Korean, France and Italy. The era of energy self-sufficiency and net export, which lasted nearly three decades, is gone; energy security has rapidly become an overt problem in the country. This is a problem hidden by China's high economic growth, with potentially huge implications for the international community.

Another problem of grave concern is the worsening environment. According to *Annual Report on the State of the Environment in China*, acute pollution problems and ecological destruction continued until 1996. In 1997 improvements were noted in some areas. From 1999 onward, the trend toward intensifying environmental pollution has been put under general control for the first time, but ecological destruction has remained a serious issue to date.

With respect to atmospheric environment, China is the world's largest pollutant emitter with SO<sub>2</sub> emission around 20 million tons every year. Of the urban population, 66% or about 240 million people are exposed to some form of air pollution. Acid rain pollutes more than 30% of Chinese territories and also reaches as far as the Korean Peninsula and Japan.

As for the water environment, the discharge of wastewater amount to as much as 43 billion tons yearly, polluting 90% of urban waters. 70% of rivers are also polluted, endangering the reproduction of fish and shellfish. As demonstrated by the disintegration of streams in the Yellow river (Huanghe), water shortages have become serious, particularly in the northern region; more than 400 cities out of 668 experience insufficient water supply, the water shortage amounts to 6 billion tons a year. In total China, the water shortage amounts to as much as 21.8 billion tons nationwide.

While sandstorms have caused damage to Japan, desertification poses a serious problem as well. 1.75 million km<sup>2</sup>, accounting for 18% of China's total land area, have already turned into deserts, and the areas of desertification are still expanding at the fast rate of 3,436 km<sup>2</sup> a year. In addition, arable lands are decreasing by 300 to 600 thousand hectares yearly and deterioration of soils is advancing. Natural grasslands are also disappearing by 650 to 700 thousand hectares a year, with 90% deteriorating in quality.

Worse, over the last 20 years, CO<sub>2</sub> emissions grew by 2.1 times, which caused China's share in the world total emissions to rise from 8.2% to 13.7%.

Environmental problems originating in China have thus already reached a state of crisis.

## **2. Future prospects for economy, energy and environment**

If the focus is directed on China's economic growth only, there are ample grounds for optimism regarding the country's future image. The GDP growth, though on a gradual decline from 10% or less during the 1990s, is still estimated at 6~9% from 2000 to 2010, 5~7% from 2010 to 2020 and 4~6% from 2020 to 2030. Economic growth will be driven mainly by technical advancement and increased productivity, which will be elicited by continued the Reform and Opening as well as China's entry to the WTO. The Chinese government's intention to quadruple the size of the GDP in 2000 by 2020 is not an unrealistic target.

However, the strong likelihood is that sustainable development will be jeopardized if the target is pursued in a conventional way with minor modifications only.

Jointly with the IEEJ, the author conducted a research project using an economy-energy-environment-integrated econometric model. This showed that, if GDP growth is kept at the 6% level in the years up to 2030, primary energy demand will increase from 0.85 billion tons in 1999 to 2.4 billion tons in 2030, but output increases will remain at 1.7 billion tons due to resource restraints. In such a case, oil and natural gas would consequently end in net imports of 570 million tons and 140 million tons, respectively. Energy imports would involve some \$253 billion, of which the ratio to total export values would rise to 10%. These could further aggravate energy security issues, such as the security of import resources, the ability to guard transportation and the ability to finance incurred costs.

At the same time, a further advance in environmental deterioration is very likely. Energy-attributable SO<sub>2</sub> emissions (upper limits of emissions) and CO<sub>2</sub> emissions alike would double by 2020, and reach 40 million tons and 1.6 billion tons (carbon equivalent), respectively. These levels would be unacceptable not only by China but also by the international community.

In addition, as the water demand is approaching 800 billion tons, the maximum level of water resources available in China, water shortages in the northern areas are worsening. If this phenomenon interacts with advancing desertification, disappearing arable lands and grasslands, degeneration of functions, etc., it can bring about the formidable risk of precipitating food shortages. This is a fear which cannot be disregarded.

## **3. For sustainable development**

The energy and environmental problems originated from China must be resolved firstly by Chinese themselves mainly through their own efforts. As pointed out by the author (1999) as well as the Environment and Development Research Center of China's Social Science Academy (2001), the core of these problems stems neither from the high growth nor the inherent restraints on developing countries, but from "system failures." They include inconsistent energy supply

and demand policy measures, a poorly functioning environmental control system, lack of supervising ability at both administrative and citizen levels, low and inconsistent environmental consciousness, etc. Therefore, the first step toward problem-solving should be system restructuring – namely, creation of a Department of Energy as the government office responsible for all energy affairs, innovation of environmental control and administrative systems, and reforms of the political system to help citizens upgrade their supervising ability.

Secondly, international cooperation is imperative – not only for the interests of China but also for the world by holding to minimize cross-border pollution, food crisis and impacts on the world oil market. Not one-way assistant, win-win type mutual cooperation framework, capable of benefiting both parties visibly, such as the Clean Development Mechanism (CDM) should be very effective.

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