Research on Energy Issues In China

Jiang Zemin

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Speech at a Meeting with Experts Attending a Forum on "Reflections on Energy Issues in China"

Jiang Zemin with experts attending a forum on "Reflections on Energy Issues in China" on April 9, 2008.

Most of you participating in today's forum are experts on energy issues, including a number of my former classmates and colleagues, as well as the Party secretary and president of my alma mater, Shanghai Jiao Tong University. This forum presents a rare opportunity for you to carry out academic exchanges on a topic of common interest, and I wish to express my sincere thanks for your attendance. We have just heard reports from Comrade Ma Dexiu; Li Jinghai, vice president of the Chinese Academy of Sciences; Du Xiangwan, vice president of the Chinese Academy of Engineering; and Comrade Zhang Guobao on how the academic world views my article, "Reflections on Energy Issues in China." It now seems that most of the opinions expressed in it have been met with general acceptance, although of course there may also be some differing views.

It took nearly six months to write this article, during which time I invited a number of experts to discuss it with me on fifteen separate occasions; Ma Fucai, Ning Jizhe, Zhou Dadi, Han Wenke, and other comrades also helped with specific work on it, and I accordingly convey my thanks to all of them.

I. ORIGINS OF THE ARTICLE

Why did I write this article? Its origins can be traced back to when I was studying in the Soviet Union. My tutor, M. I. Trehov, published a book on energy conservation at machinery manufacturing plants, and after returning to China, I translated it into Chinese in my spare time. However, as a result of the Cultural Revolution and other reasons, my translation was not published at that time.

While serving as director of the power plant at the First Automotive Works (FAW) in Changchun, my work directly concerned energy issues. This was a time when I integrated theory with practice and began to study and think about energy and energy conservation. Later, while working in Shanghai, I was appointed a professor at Shanghai Jiao Tong University and published "Trends in Energy Development and Important Energy Conservation Measures" in the *Journal of Shanghai Jiao Tong University* in 1989. This article chiefly reviewed the history of worldwide energy development, forecast its future course, and drew on my experience with FAW to set forth a number of energy conservation measures.

During the last 20 years, the field of energy resources has undergone tremendous change, but the goal of energy conservation has not, and the basic nature of energy conservation in organizations remains the same. Therefore, some of the thinking and methods I advanced in that article are still worth revisiting. Last year, when the *Journal of Shanghai Jiao Tong University* solicited another article from me, I thought about the importance of energy issues and decided to update the article I had published by adding a survey of my views on energy issues that have emerged since then. This resulted in the article "Reflections on Energy Issues in China," published in the *Journal of Shanghai Jiao Tong University* before the 2008 anniversary of the university's founding.

II. THE GREAT IMPORTANCE OF ENERGY ISSUES

Energy is the food of industry and the lifeblood of the national economy. Energy issues not only represent major economic and social problems; they also involve critical diplomatic, environmental, and security issues. In the 1970s, oil crises twice led to global economic recessions. Since the beginning of this century, the continuing climb in oil prices has had a significant effect on the global economy, especially on oil-importing countries. Today, energy security is increasingly a global issue, and all major countries now view solving energy issues as an important aspect of their national strategy and common policy.

China is in a period of accelerating industrialization and urbanization, and its energy demands are constantly growing. However, the country's per capita energy resources are fewer than the world average; its energy efficiency is not high; the main energy resource China consumes is coal; there is great pressure on the ecosystem; and the energy resource structure still requires further optimization. Together, these facts dictate that the demand for energy will continue to outstrip supply and that contradictions in the structure of energy resources will persist for a considerable time to come. Given that the assurance of a steady supply of energy is a strategic issue confronting our country's development, we must accord energy an important place in our country's overall development strategy and focus on it unequivocally.

III. FOCUSING ON RESEARCH INTO ENERGY ISSUES

It is possible that within the next 10 to 20 years China will become the world's largest energy consumption and supply system; therefore, we must seriously consider which energy strategy to implement and which energy

technology to choose. In this article I argue that we must pursue a new, distinctively Chinese, energy development path, and I discuss developing and using coal, natural gas, and oil, as well as new and renewable energy sources such as hydro, thermal, nuclear, wind, and solar power. The general line of thought is that we need to be steadfast in our conservation of energy, use it efficiently, diversify development, keep the environment clean, be technology-driven, and pursue international cooperation in order to establish a system of energy production, distribution, and consumption that is highly efficient, uses advanced technology, produces few pollutants, has minimal impact on the ecosystem, and provides a steady and secure energy supply.

Of course, these explorations are still in the preliminary stages, and many problems still need thorough investigation. For example, to optimize the structure of energy sources, we must further research the clean use of coal, press ahead with the development of new and renewable energy sources, and optimize the electricity supply system. To make scientific progress in the field of energy, we must further research, develop, and utilize advanced technology, for example by prospecting for new oil and gas resources, using energy cleanly and efficiently, and developing advanced new energy sources for the future. To conserve energy, we must further research how to advance conservation technology, improve energy conservation management, and raise energy efficiency across the board. To ensure energy security, we must research how to make good use of domestic and foreign energy resources, implement energy diversification, strengthen energy forecasting and early warnings, and increase our ability to respond to emergency situations to ensure a steady supply of energy.

IV. STRESSING RESEARCH INTO ENERGY POLICIES

Sound energy policy is an important requirement for the implementation of an energy strategy. Conversely, the lack of good policies makes it very difficult to implement such a strategy, no matter how good it is. In the article I advance a number of suggestions: widening the application of new energy technology and products, stressing resource conservation and environmental protection, actively adopting measures to address climate change, making major energy facilities more future-oriented, increasing funding through a variety of channels for energy exploitation and technology innovation, creating a reasonable mechanism for setting prices for energy resources, and improving the system and mechanisms for energy

management. Of course, energy policies cannot be improved overnight. The task requires us to proceed based on an understanding of China's realities, draw on foreign experience, emancipate our minds, keep up with the times, and constantly explore new thinking, mechanisms, and methods for developing and managing energy.

All of you gathered here are experts in the energy field, and I hope you continue to study energy issues deeply and generate valuable research results. Academics, the government, and enterprises need to interact continually to cooperate with one another, pool their collective wisdom, join their efforts, find practical applications for more research results, and thereby promote the sound development of our country's energy cause.

Reflections on Energy Issues in China*

Jiang Zemin addressing experts attending a forum on "Reflections on Energy Issues in China" on April 9, 2008.

*Originally published in the *Journal of Shanghai Jiao Tong University*, No. 3, 2008.

Energy is a vital material foundation for the existence and development of humankind and is currently a focal point in international politics, economics, military affairs, and diplomacy. Energy security is indispensable to China's sustained and rapid economic and social development. As economic globalization increases and the pace of China's modernization accelerates, the way in which we understand energy development trends, which energy development strategy we select, and which policies and measures we adopt are all extremely important issues requiring serious consideration.

I. SIGNIFICANCE OF ENERGY ISSUES

Human use of energy has evolved from the firewood era to the coal era, and on to the oil and gas era. As total energy consumption has continued to grow, so too the energy structure has continually changed (see Figures 1 and 2). The onset of each energy era has brought with it huge increases in the productive forces, greatly boosting the world's economic and social development. At the same time, growth in energy consumption, especially fossil fuel consumption, constraints of the energy supply on economic and social development, and the impact of energy consumption on the environment have become more pronounced.

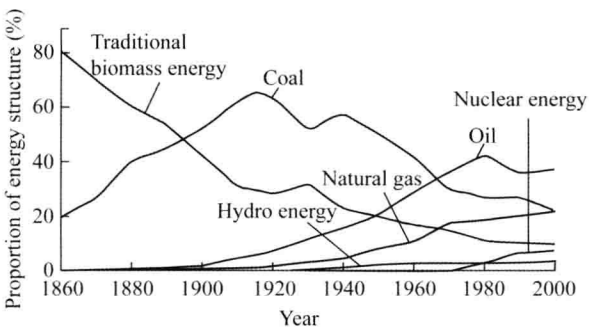

Figure 1 Changes in the world's energy resource structure since 1860[1]

[1]Gilbert Jenkins, *Oil Economists' Handbook*, 5th edition, Elsevier Applied Science, London, 1989, and World Energy Council, *Global Energy Perspectives to 2050 and Beyond*, World Energy Council, London, 1995.

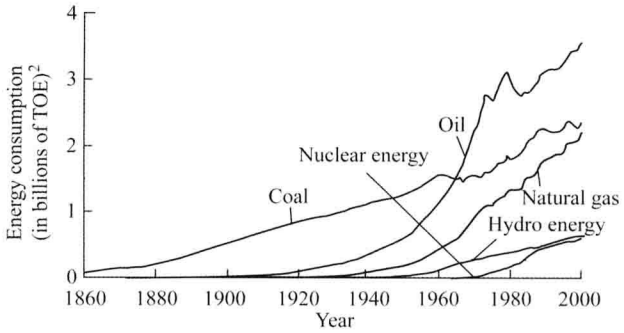

Figure 2 Changes in the world's energy consumption since 1860 [1]

From the perspective of modern economic and social development, the importance of energy issues primarily manifests itself in the following four ways.

1. Energy as a material base for modern economic and social development

Modern economic and social development is based on a high level of material, cultural, and ethical progress. Achieving this high level of material progress requires a huge expansion of the productive forces, as well as modern agricultural, industrial, transportation, and logistics systems and living and service facilities—all of which depend on energy. In modern society the proportion of energy consumed in food production for sustaining life has significantly dropped, whereas industrial production, daily life, and transportation services have become major areas of energy consumption. The development course of developed countries indicates that the energy consumption of a country during the early and middle stages of industrialization typically experiences a period of rapid growth, with an energy consumption elasticity coefficient[2] greater than 1. During the late

[2]The energy consumption elasticity coefficient reflects the relationship between economic growth and an increase in energy consumption. It is defined as the ratio between the increased rate of energy consumption and the growth rate of the national economy. The formula is as follows: energy consumption elasticity coefficient equals average annual growth rate of energy consumption divided by average annual growth rate of the national economy.

stage of industrialization, or the post-industrial stage, energy consumption generally undergoes a period of slow growth, with an energy consumption elasticity coefficient less than 1. History further demonstrates that when the per capita GDP of a country or region reaches a certain level, the energy consumed for food, clothing, housing, transportation, and daily necessities will rise, and on average people will consume significantly more energy in their daily lives. It is fair to say that without an adequate energy supply to sustain it, no modern society or civilization would be possible.

2. Energy as a major constraint on economic and social development

Since the 1950s, China's energy industry has steadily grown and developed. In particular, since adoption of the reform and opening up policy, the country's energy supply capacity has constantly grown, which in turn contributed to sustained and rapid economic growth. However, in the course of this economic development, energy shortages became an acute problem. Generally, once the scale of investment in fixed assets expanded and economic development accelerated, shortages emerged in the supply of coal, electricity, oil, and transportation, resulting in a bottleneck restricting economic and social development. Toward the end of the 1990s, due to progress in the market-oriented reform of the energy sector, further opening up of the energy industry to the outside world, and rising investment, coal and electricity output increased enormously—as did oil and natural gas imports—thus greatly alleviating the constraints the energy supply had imposed on economic and social development. Since the beginning of the twenty-first century, however, further changes have occurred in energy supply and demand. The acceleration of industrialization and urbanization, coupled with the overdevelopment of energy-intensive industries, has driven energy demand to historic highs (see Figure 3), causing the constraints energy imposes on economic and social development to increase again. China, as a developing country with a huge population, is still a long way from attaining a relatively high level of modernization. As the economy and society continue to develop and people's living standards constantly improve, energy demand will continue to grow, and constraints arising from the imbalance between energy supply and demand and energy-related environmental issues will persist.

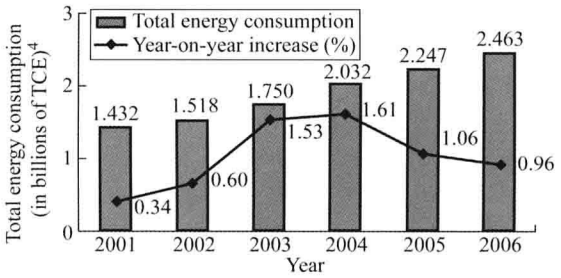

Figure 3 Increase in China's energy consumption since 2001 [2]

3. Energy security as a vital element in economic and national security

Oil security is the most important factor in energy security. The two global oil crises in the 1970s led to economic slowdowns in the leading developed countries and fluctuations in the global economy. Since the beginning of the twenty-first century, oil prices have continued to climb (see Figure 4), and at the beginning of 2008, the price of crude oil futures exceeded $100 per barrel. The increase in oil prices has exerted a considerable influence on the global economy, especially on the economies of countries heavily dependent on oil imports. In some countries inflated oil prices have even triggered social unrest. As the history of industrialization shows, developed countries used great quantities of foreign energy resources in addition to domestic resources in the course of their industrialization. Even today, many developed countries still rely heavily on

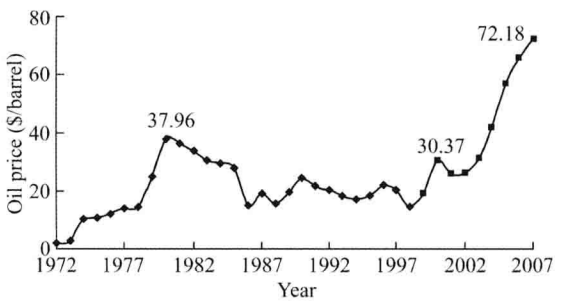

Figure 4 The upward trend of oil prices in the international market[3]

[3]Energy Information Administration, U.S. Department of Energy.