

ENERGY SECURITY AND ENERGY RISK MANAGEMENT

by Lifan Li

China is facing serious energy security issues. In recent years, China's energy structure has undergone major adjustments, while qualitative changes have taken place in the form of energy security. This raises a new question for China's political, diplomatic, military, technological, and industrial structures: How to safeguard China's energy security? This paper is intended to analyze approaches to energy imports and bottlenecks of energy development, and proposes that international cooperation, development of new energy sources and improvement in energy efficiency will contribute to resolving the energy crisis, and puts forward policy proposals to achieve China's strategy of peaceful development.

I. CURRENT SITUATIONS OF ENERGY DEVELOPMENT: A CASE STUDY FOR CHINA

Status Quo of China's Energy Supply and Demand

China's economic growth rate has far exceeded its available supply of energy. Especially in recent years, China's domestic oil yield continues to decline, creating a serious imbalance between supply and demand.

The Chinese economy has witnessed double-digit growth in the past two decades, which has driven the demand for oil. Economic growth and oil consumption are soaring. In 2002, China transcended Japan and emerged as the second largest energy consumer, following the United States. As China's demand for energy continues to grow, its domestic oil yield is failing to keep pace. According to recent statistics, China's oil consumption increased by over 55 percent from 1994 to 2000, but domestic oil yield increased by only 11 percent over the same period. From 2002 to 2011, China's oil consumption increased from 223.9 million tons to 458 million tons. From 2002 to 2011, China's oil consumption rate rose from 31 percent to 56 percent.¹ It can be said that in the

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foreseeable future, imbalance between oil supply and demand will continue to deteriorate.

In addition, the efficiency of the domestic oil industry is generally low. According to statistics provided by the American scholar Bernard D. Cole, refined oil costs USD 1.50 per barrel in China, and only USD 1.20 per barrel in Western countries. Such high cost partly results in energy waste in China. At the same time, natural gas consumption accounts for only 5 percent of total energy consumption in China, far below the global average of 15 percent.² There is great potential for clean energy in China, as well as economic pressures on energy policymakers to develop new energy structures.

China's Energy Import Channels

In order to ensure the security of its energy supply, China has expanded its overseas energy import channels. Its energy imports are primarily from the following regions:

Tier-1 regions: the Middle East. At present, 51 percent of China's oil imports come from the Middle East.³ This region carries inherent risks; the Palestinian-Israeli conflict and turmoil in Iraq, Afghanistan, Syria and other countries add to regional tensions. Despite the region's great strategic significance for China, the Middle East is a sphere of influence for the United States. Countries of the Middle East generally have few conflicts of interest with China, so China maintains favorable economic and political relations. But it cannot be ruled out that the United States could impose pressure on these countries and block China's energy export channels in the maritime space, including the Mediterranean Sea or the Arabian Gulf.

Tier-2 regions: Russia and Central Asia. In 1996, then Russian President Boris Yeltsin defined the Sino-Russian relation as a strategic partnership.⁴ In May 2014, President Vladimir Putin embraced this strategic cooperation, signing a 30-year contract for natural gas exports to China in the total amount of USD 400 billion.⁵ China's oil imports from Russia rely on rail transport at relatively low quantity. However, after a new natural gas pipeline is completed in 2019, it will become a major blood vessel feeding China's energy consumption.

Energy security cooperation between China and some Central Asian countries has also harvested some fruits. For example, China has signed a number of agreements with Kazakhstan. The China-Kazakhstan Oil Pipeline Project has been completed, estimated to achieve an annual oil supply of 10 million tons per year to China in the initial phase.⁶ Four natural gas pipelines between China and Central Asia have undergone groundbreaking and completion and are used for gas transmission.⁷

Other regions: Africa and South America. In recognition of its growing need for oil and gas, China has invested enormous amounts of money in oil exploitation in West Africa (Nigeria), South America (Venezuela) and other regions. Moreover, initial public offerings and joint exploitation of overseas energy projects have become important strategic components for Chinese energy companies in their quest to “go global.” However, the volume of oil produced by these investments remains relatively low.

In short, China’s oil imports face a series of important risks, such as political instability of oil-producing regions and intense competition from other countries, which will need to be mitigated in order to allow for increasing consumption.

Challenges for Energy Security. With the rapid development of the Chinese economy and faster pace of industrialization and urbanization, energy demand is ever-growing. Establishment of a stable, economical, clean, and safe energy supply system is faced with significant challenges in the following aspects:

Severe resource constraints and low energy efficiency. China’s relative lack of top-quality energy resources restricts improvements in supply capacity. Uneven distribution of energy resources also increases the difficulty of maintaining a steady supply. High rates of economic growth, inefficient energy structures, low levels of energy technology and equipment, and ineffective management result in energy consumption higher than average compared to other primary energy-consuming countries, further exacerbating the imbalance between energy supply and demand. Therefore, it will be difficult for China to meet its increasing consumption demand by relying solely on increasing its energy supply.

Coal-dominated energy consumption and environmental pressures. Coal is the main source of energy in China. Coal-dominated energy structures are entrenched and difficult to change over a short period of time. Coal production and consumption patterns have significant environmental impacts; coal consumption is not only the primary cause for coal-burning air pollution, but also a main source of China’s greenhouse gas emissions. In a global environment of increased political awareness of the dangers of exacerbating climate change, China’s reliance on coal also poses significant geopolitical and diplomatic challenges.

Imperfect market systems and weak emergency response capacity. The Chinese energy market system needs to be improved. Energy price mechanisms fail to fully reflect resource scarcity, supply-demand relationship, and environmental cost. Exploration and development priorities of energy resources should be further standardized, and supervision systems should be improved. Coal mines are overloaded with many work safety shortcomings, grid structures are unreasonable,

and oil reserve capacity is insufficient.⁸ Early warning emergency systems, which can respond effectively to energy supply disruptions and major incidents, need to be further improved and strengthened.

II. ENERGY SECURITY, CRISIS MANAGEMENT AND INTERNATIONAL EXPERIENCE

Misunderstandings of Differences in Connotations of Energy Crisis Management

It is generally believed that “energy crisis management” refers to a process in which various measures are taken to protect the stable energy supply of a country or region from disruptive threats, due to excessive growth in global demand, geopolitics, wars, natural disasters, terrorism, and other factors, with a view to promoting coordinated development of energy, economy and society.⁹ The most crucial and most basic tasks of energy crisis management are identification and potential research on factors that may trigger an energy crisis. However, there is little relevant public analysis of these factors. It is useful to categorize crisis-inclined factors into strategic factors and unexpected factors based on the far-reaching impact and duration of these factors on energy supply.

Energy crises can fall into two categories: (1) Strategic crisis and (2) Unexpected events. Crisis management can thus take two forms: Long-term strategic crisis management and short-term emergency management.

(1) Strategic crisis management. Factors like excessive growth in global or regional energy demand and geopolitical shifts in balances of power can impose long-term and far-reaching pressures on energy supply. Alleviation of such energy crises is only possible through breakthroughs in energy reserves, large-scale promotion of alternative energies resulting from major scientific and technological advances, or significant changes in global political and economic situations. On the whole, successful implementation of this type of risk mitigation cannot happen overnight.

(2) Emergency management. In addition to strategic factors, immediate factors like conflict (in particular, local wars), natural disasters and terrorism can impose short-term and regional pressures on energy supply. This further worsens the broadening gap between global energy demand and supply and creates structural challenges for regional and global distribution. These factors can be called “unexpected factors.” Such energy crises can be referred to as “energy-related unexpected events,” and their management process can be referred to as “emergency management for energy-related unexpected events.” These distinctions help define what kind of crisis management systems

and mechanisms can be most effective and help identify practical crisis management measures.

Understanding the Scope of Energy Crisis Management in International Comparative Studies

Reference to international experience is an important part of establishing China's energy crisis management system and improving its crisis management mechanisms. However, misunderstandings in the scope of energy crisis management currently exist in international comparative studies and must be understood in order to effectively address current challenges. The 1970s saw the first global oil crisis, and at that time, crisis management systems based on the oil industry became mainstream. Now, however, the scope of these systems must be broadened to fully address the wide range of energy crises that confront China and the rest of the world.

At the beginning of its economic reforms and period of "opening up," China witnessed accelerated development of light industry. A traditional understanding of the structural characteristics of light industry might imply that economic and social development raised slack energy demand. At the time, China was allowed to export coal, oil and others in return for a sizeable amount of foreign exchange. However, heavy and chemical industries have played a dominating role.

A substantial increase in dependence on foreign oil increased risks associated with oil-related unexpected events, while oil crisis management systems lagged far behind. At this time, China's net imports of coal start to appear. From the perspective of resource endowment, coal will dominate the domestic traditional energy supply in the long run. However, it is precisely because of relatively abundant coal resources that people do not feel pressured to identify a steady supply of non-coal resources, although coal-power disputes are common. In fact, from the perspective of the reserve-production ratio, the performance of Chinese coal is inferior to global oil in this indicator.

At the same time, asymmetry between regional distribution of coal resources and market demand greatly increases frequency of regional acute shortages of coal supply. Therefore, China's energy security is pertinent not only to oil supply, but also to stable and adequate supplies of multiple types of energy sources such as oil, natural gas, coal and traditional energy, and electricity and other secondary energy. In other words, it is necessary to establish energy crisis management systems and mechanisms that can profoundly reflect the features of China's full resource endowment.

Looking to the EU's Experience in Energy Security and Crisis Management

As a leading power in energy security strategy, China can learn from the EU's experience. Four key characteristics of the EU's approach can be adapted to Chinese strategy.

First, launching of regional cooperation and establishment of regional coordination mechanisms. The EU's energy security strategy is largely based on its highly integrated politics and economy. Compared with Europe, Asia demonstrates different conditions. For complex reasons, free trade zones have not been unveiled in Asia, and there is no possibility to achieve a high degree of integration in the short term. However, Asian countries have obvious common interests in the field of energy security. Regional powers such as China, Japan, India, and South Korea are generally dependent on oil imports and share international oil supply sources and transport routes. With these similarities in mind, energy security should be a potential domain for regional cooperation in Asia.

In pursuing regional cooperation, China and other Asian countries are advised to adapt to specific circumstances and consider regional energy situations in establishment of strategic oil reserves, joint development of oil resources in a third country, maintenance of oil transport waterway safety, unveiling of new transport channels, and collective dialogue with oil-rich countries. As a leader in the region, China has the political clout and resources to establish a regional coordination mechanism.

Second, introduction of advanced technologies and focus on development of green energy. Many EU members are industrialized countries. Development of advanced renewable energy technologies plays an important role in energy security. As a developing country, China should strengthen its research and development, but also take late-mover advantage and learn from the developed countries in relevant technical fields so as to achieve strategic energy security. In the field of energy conservation, China especially needs energy-saving transformation technologies of coal-fired boilers, industrial furnaces, motors, fans and other energy-using equipment, as well as new approaches to high energy-consuming industrial processes and technologies for reducing growing energy consumption. Development and utilization of technologies to adopt nuclear energy, solar energy, wind energy, biomass energy, and clean coal technology will also contribute to improved efficiency. Many EU countries have an edge for these technologies. Energy technology should become a new growth engine for China's cooperation with EU countries.

Third, promotion of energy security with environmental protection and pioneering efforts for sustainable energy. Since the late 1990s, a prominent feature of the EU's energy

strategy is promoting energy security with environmental protection. The EU quota of emission reduction commitments to the *Kyoto Protocol* is broken down to individual members. EU countries take a variety of measures to put into practice and convert environmental protection indicators to energy indicators, playing a crucial role in driving the development of alternative energy, especially renewable energy and improvement in energy efficiency.¹⁰

In recent years, China's laws and national indicators concerning energy efficiency and development of renewable energy have been enacted, but implementation has not progressed; implementation at the local and grassroots level is particularly ineffective. Meanwhile, the EU integrates environmental security and energy security, promotes energy security with environmental protection indicators and translates the EU-wide environmental indicators into energy targets and specific initiatives for all EU members. China is advised to conduct in-depth and intensive research on such successful methods and means, and use these for reference in accordance with national conditions.

Fourth, strengthening of governmental intervention and development of legal texts on energy security. The EU's experience proves that implementation of an energy security strategy should be backed by strong governmental intervention. Effective mandatory legislative measures and tax incentives are basic approaches to propelling the implementation of the EU energy strategy. Compared with the EU and EU members, China faces obstacles in its imperfect legal system in the field of energy security, unavailable financial and tax incentives and distorted governance structures. As for improvement on government intervention, the EU's existing laws and incentives, such as its energy tax policy, renewable energy power quota system and its variety of subsidy policies, can be adapted to the Chinese context with necessary modifications.

Expand import channels and pursue higher-impact trade relations.

The "Silk Road Economic Belt" and the "Maritime Silk Road" are two potential platforms for enacting improved policies and strategies. The "Belt and Road Initiative" is a development strategy and framework proposed by China that focuses on connectivity and cooperation among countries primarily in Asia and Europe, as well as Africa. The strategy underlines China's push to take a bigger role in global affairs and its need to export production capacity in areas of overproduction and invest in different industries in relevant countries. As China's demand for energy is on the rise, it must look to expand these energy import channels to support increased supply. Adjacent Central Asia and the relatively distant Middle East are logical first choices for China to expand its energy cooperation, both in terms of government-to-government relations and private

sector engagement.

As China's influence in the global energy market grows, it can be expected that the country will actively expand international energy trade, promote the complementary advantages of the international energy market and seek to keep the international energy market stable. According to World Trade Organization (WTO) rules and China's commitments to joining the WTO, China will improve fair trade policies, gradually reverse its too-high proportion of current crude oil spot trade, encourage long-term supply contracts with foreign companies, and promote diversification of trade channels. Other commitments include supporting domestic enterprises to make foreign direct investments and support international energy cooperation, taking part in offshore energy infrastructure construction, and achieving steady development of cooperation in terms of energy engineering and technical services.¹¹ In 2012, as an example of these efforts, a Chinese company invested approximately USD 10 billion in the Polish power industry in a major infrastructure modernization project, which includes plans to build coal power plants in the cities of Opole, Poznan, and Gdansk.

In short, constant expansion of China's energy supply and demand gap, continuously enhanced internationalization of the country's energy supply, and resource endowments prove that coal-dominated domestic energy supply diversification trends will see no fundamental reversal. To this end, it is of great significance to set up energy crisis management systems in line with China's national conditions (especially an emergency management system for energy-related unexpected events). This will promote sustained rapid growth of China's economy and stable development of society.

III. CONCLUSION: INTENSIFICATION OF INTERNATIONAL COOPERATION IN ENERGY SECTOR

China's development is inseparable from the world, and the world's prosperity calls for China's prosperity. With the deepening of economic globalization, China's energy development is becoming closely bound with the world's energy development.

China is an active participant in international energy cooperation. In terms of multilateral cooperation, China is a full member of the Asia-Pacific Economic Cooperation Energy Working Group; the Association of Southeast Asian Nations (ASEAN); China, Japan and South Korea (10+3) Energy Cooperation; International Energy Forum; World Energy Conference; and the Asia-Pacific Partnership on Clean Development and Climate; and is an observer of the Energy Charter Treaty. China maintains close contact with the International Energy Agency, Organization of Petroleum Exporting Countries and other inter-

national organizations.

In terms of bilateral cooperation, China has established energy dialogue and cooperation mechanisms with the United States, Japan, the European Union, Russia and many other energy-consuming and energy-producing countries.¹² In international energy cooperation, China not only shoulders broad international obligations, but also plays an active and constructive role.¹³ For example, the Sino-US Energy Cooperation Dialogue, a leading exchange platform for energy collaboration, has attracted U.S. Secretary of State John Kerry and China's State Councilor Yang Jiechi. In September 2009, the U.S.-China Energy Cooperation Program (ECP) was formally established. ECP currently consists of 44 member companies composing 10 working groups, covering areas of renewable energy, smart grid electricity, clean coal, energy-efficient buildings and design, clean transportation fuel, industrial energy efficiency, nuclear energy, energy finance and investment, distributed energy heating, and shale gas.

Therefore, it is necessary to take precautions and plan for improving laws, expanding international cooperation, optimizing the investment environment and boosting the global vision of development of domestic energy companies. The following policy proposals can promote China's leadership in an environment of increased global engagement.

First, China actively improves the laws and policies for opening up. China currently follows a number of applicable laws in this area, including the Law of the People's Republic of China on Sino-Foreign Joint Venture, Law of the People's Republic of China on Sino-Foreign Cooperative Enterprises, and Law of the People's Republic of China on Foreign-funded Enterprises, and strives to create a fair and open environment for foreign investment. In 2002, Provisions on Guiding the Direction of Foreign Investment was formulated. In 2004, Catalogue for the Guidance of Foreign Investment Industries and Catalogue of Competitive Industries for Foreign Investment in Central and Western Regions were amended so as to encourage foreign investment in energy and associated mining, production, supply and transportation segments; encourage investment in equipment manufacturing industry; and encourage foreign investment in energy sectors of central and western regions.¹⁴ The regulatory environment must continue to support energy sector improvements.

Second, China improves international cooperation in exploration and development of oil and gas resources. In 2001, the amended Regulations for Sino-Foreign Cooperation for Exploitation of Offshore Oil Resources and Regulations for Sino-Foreign Cooperation for Exploitation of Onshore Oil Resources were promulgated in China, with a view to protecting the legitimate rights and interests of foreign participants in oil exploitation. Foreign enterprises are encouraged

to cooperate in oil exploration and development domains such as oil and gas risk exploration, low-permeability oil and gas reservoirs (fields) and improvement in efficiency of old oil recovery. Foreign investment is encouraged in construction and operation of oil pipelines, oil reservoirs and single-use wharfs. Foreign firms are beginning to seek out partnerships; for example, in June 2012, Danish Maersk Group and Chinese Ningbo Port signed an agreement for joint investment in and operation of Ningbo Mei Long Wharf. Project assets totaled about USD 675 million. The Malaysian Senda Group has also announced its intention to expand its business operations in Weifang Port, in the eastern Chinese city of Shandong.

Third, China encourages foreign investment in exploration and development of unconventional energy resources. In 2000, China issued Opinions on Further Encouraging Foreign Investment in Exploration and Exploitation of Mineral Resources other than Oil and Gas to further deregulate the prospecting rights market and mining rights market for resources other than oil and gas. One year later, Australia's Golden Company Aus-China was the first mineral company to be invited into the Chinese market.¹⁵ Foreign investors are currently permitted to make risk explorations in the form of single proprietorship, or joint venture with a Chinese party. Preferential policies can grant foreign companies reduction of and exemptions from mineral resource compensation fees, levied on contracts signed after 2011 and assessed as one percent of the sales revenue from oil and gas production.¹⁶ These policies act as incentives to promote further investment and must be continued. One common incentive, for example, grants foreign investors a five-year exemption from mineral resource compensation fees, providing the foreign firm with financial advantages over local investors. Improving management resources and services for foreign investors in exploration and exploitation of resources other than oil and gas can also help promote long-term growth.


Fourth, China encourages foreign investment in operation of power plants and other energy facilities. China must encourage foreign investment in production and supply of electric power and coal gas. Opportunities for investment also exist in power generation driven by thermal energy (primarily for plants with unit capacity of at least 600,000 KW), clean coal combustion, cogeneration, hydropower, Chinese-held nuclear power, renewable energy and new energy alternatives. Foreign investment in technology and equipment manufacturing for thermal power, hydropower and nuclear power must also be encouraged, as well as investment in the construction and operation of coal pipeline transportation facilities. China has a strong power generation equipment industry, one that has created a number of the world's firsts. Foreign enterprises in this industry are

beginning to take root: In the field of thermal power, France's Alstom established Alstom Wuhan Boiler Co., Ltd. in the inland Chinese city of Wuhan; in the combustion field, joint venture companies exist with Harbin Electric Group and G.E. China, and Oriental Electric Group and Japan's Mitsubishi. China's energy markets offer great economic potential for foreign hydropower and wind power equipment giants, and as China opens up these markets, foreign firms are discovering the benefits.

Fifth, China further optimizes the broader business environment for foreign investment. Beyond sector-specific incentives, the national business environment can be improved to attract foreign investment. China must honor its relevant promises upon entry into the WTO. In terms of energy management, China has already canceled many administrative regulations and departmental rules that go against WTO rules.¹⁷ In accordance with WTO transparency requirements, China has broadened the scope of public geological data. China has taken steps to further strengthen issuance of energy policies, improve its energy data statistics system, promptly release energy statistics, and ensure open and transparent energy policies, statistical data, and information. For example, China's National Energy Administration recently released 2013 photovoltaic (PV) statistics, including information on the 741 grid-connected large PV power projects, mainly in the northwest region of China.¹⁸

China can also strengthen its diplomatic cooperation. China has already strengthened relationships with many developed countries with strong mining industries, including Australia and Canada. Bilateral trade between China and Australia reached USD 116 billion in 2013-2014, much of which has been invested in the field of natural and mineral resources.¹⁹ In 2012, the State Ministry of Land Resources and Tianjin municipal government jointly established a set of reforms known in English as the "Tianjin International Mining Financial Reform Base" to build a modern international mining financial services system, support innovation in the region and ultimately cultivate China's mineral exploration capital market.²⁰ This type of regional initiative has great potential to attract more foreign cooperation and investment and can be applied in other municipalities as well.

With the recent drop in international oil prices and severe turbulence in the Middle East, as well as diplomatic and energy price disputes between OPEC countries and Russia, international energy cooperation risks entering a dormancy period, preventing necessary development of new energy resources and innovation. China must set a clear and informed course to develop suitable energy policies that promote project cooperation for both domestic and global markets and reduce risks of energy sector crises and emergencies. China has already enhanced

communication and consultation with international actors and promoted a number of key cooperation projects in infrastructure connectivity, industrial investment, resource development, and economic and trade cooperation. It must continue to prioritize this cooperation in its energy strategies and take action to innovate in policies and partnerships where the conditions are right. 

NOTES

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