Debating China's Energy Security

Competing Thoughts and Policy Options

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Abstract: In China, debates on energy security are diverse and far beyond geopolitical analysis. Findings from the ever-expanding literature indicate two major schools of thought, namely the nationalist and globalist ones, while a pragmatic approach has been prevailing that integrates exploring domestic sources and engaging external actors when needed. The challenges of having to do whatever feasible to meet energy demands and at the same time, pursuing alternatives that reduce its negative impact on human health and environment, have led to growing pluralism in policy advocacy in China. While the two schools of thought on energy security will continue to compete against each other, the argumentative strength of each school shall be conditioned by many factors influencing China's macro-economic fluctuations in general and energy economies in particular. The Chinese government's energy policy-making is expected to reflect a dynamic balance between both schools.

Keywords: Energy security; Chinese economy; Energy transport route; Energy policy-making

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When asked the question “Who will fuel China?” foreign researchers usually focus their attention on geostrategic perceptions of fossil energy. They seem to be more interested in the geopolitical motive behind China’s sourcing of fossil fuels and how Chinese energy companies perform their corporate social responsibilities (CSRs) in a weak regulatory context. In contrast, Chinese scholars insist that debates on China’s energy security should address a far wider range of considerations beyond geopolitical analysis.¹ They believe that the common exaggerations on material and ideational threats to China will only result in a “cult of energy insecurity,” which enhances “the erroneous belief that national security requires ambitious and vigilant foreign policy measures to assure adequate access to energy.”²

By tracing the current trends of debates on China’s energy security, this article aims to fill the conceptual gap between Chinese and foreign observers in their appraisal of China’s energy-security nexus and recognize better prospects for enhanced collaboration between China and other stakeholders in world energy governance. After a brief review of China’s energy situation, two main Chinese narratives on the process of policy formulation with regard to energy security are outlined. The differences between these narratives are explained and implications are drawn by closely examining the three key factors to China’s energy security, namely, maritime energy access, land energy transit and development of nuclear energy.

China’s Energy Landscape in a Nutshell

China’s energy situation today manifests several salient features, and its domestic and international energy policies have to be tested in a structural manner against the material challenges facing the country.

First of all, like most countries in the world, China has been seeking a secure supply of energy to fuel its economic development at financial costs

¹Zha Daojiong, “Energy Security,” in M. Caballero-Anthony, ed., *An Introduction to Non-Traditional Security Studies: A Transnational Approach* (Los Angeles: Sage, 2016), pp. 134–153; see also Zha Daojiong and Hu Weixing, *Building a Neighborly Community: Post-Cold War China, Japan, and Southeast Asia* (Manchester: Manchester University Press, 2007).

²Danielle F. S. Cohen and Jonathan Kirshner, “The Cult of Energy Insecurity and Great Power Rivalry Across the Pacific,” in A. Goldstein and E. D. Mansfield, eds., *The Nexus of Economics, Security, and International Relations in East Asia* (Stanford: Stanford University Press, 2012), pp. 144–176.

commensurate with change in its aggregate national and per capita income. Energy security was first incorporated as a separate issue into the 6th Five-Year Plan (1981–1985), the country's overall economic policy instrument, where emphasis was placed on energy investment and efficiency improvement programs.³

Second, China's energy resource endowment poses a great challenge to the dual goals of meeting overall energy demand and shifting toward a low-carbon economy. China is rich in coal reserves yet poor in hydrocarbons (oil and natural gas). In 2014, China's proven coal reserves stood at 12.8 percent of the world total, while oil and natural gas reserves at only 1.1 percent and 1.8 percent respectively.⁴ Over the past decades, coal has accounted for most (e.g., 66 percent in 2014) of China's overall primary energy consumption. However, it is difficult for China to extract and transport coal, as extra coal reserves are found in northern and western parts of the country, thousands of kilometers away from inhabitants, but industrial centers are mainly located in eastern provinces. Besides, coal mines are primarily underground and thus relatively unsafe.⁵

Yet renewable energy such as solar, wind and hydropower can hardly provide a better option, either because of limited resources or due to the commercial competition of coal-fired power. For instance, hydropower generation is greatly hindered by the imbalanced layout of water resources in China as well as the increasingly limited water supply resulting from uncertain rainfall conditions, intense competition for irrigation among different regions, and surging water consumption in urban areas. As a result, China's total hydropower output in 2010 only managed to reach 23 percent of the gross total installed generation capacity while 65 percent of the country's hydropower potential remains untapped.⁶ Such waste and

³M. D. Levine, Liu F. and J. E. Sinton, "China's Energy System: Historical Evolution, Current Issues, and Prospects," *Annual Review of Energy and the Environment*, Vol. 17 (1992), pp. 405–435.

⁴"BP Statistical Review of World Energy," June 2015, <http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>.

⁵He Xueqiu and Song Li, "Status and Future Tasks of Coal Mining Safety in China," *Safety Science*, Vol. 50, No. 4 (2012), pp. 894–898.

⁶Chang Xiaolin *et al.*, "Hydropower in China at Present and Its Further Development" *Energy*, Vol. 35 (2010), pp. 4400–4046.

limits are aggravated by an increasing milieu of social and natural limitations.⁷ In this light, China is likely to be very dependent on coal regardless of its external costs, at least for the coming decades.

Third, trade has been a key pragmatic component of Chinese pursuit for energy security and overall economic development. During the 1950s and 1960s, China had bartered with the Soviet Union for assistance in developing its oil industry. Meanwhile, it had been exporting coal and other raw materials to Japan in exchange for steel, industrial facilities and technologies.⁸ Up to the early 1990s, crude oil and oil products had been an important part of China's total export to neighboring countries.⁹ After China became a net crude oil importer in 1993, however, its oil and LNG (liquefied natural gas) import has been surging year after year. In 2014, its degree of dependence on oil import reached nearly 60 percent and that on natural gas hit 32.2 percent.¹⁰

Fourth, along with trade, China and the West have been actively engaging in cooperation and collaboration on energy technologies.¹¹ In China, some international development agencies such as the World Bank and the

Since the late 1990s, China has been increasingly reliant on energy trade and international cooperation on energy technologies.

⁷Zha Daojiong, "A Political Ecology of Hydropower Development in China," in N. Matthews and K. Geheb, eds., *Hydropower Development in the Mekong Region: Political, Socio-Economic and Environmental Perspectives* (London: Routledge, 2015), pp. 32–53.

⁸Yoshihide Soeya, *Japan's Economic Diplomacy with China, 1945–1978* (Oxford: Clarendon Press, 1998).

⁹A. Doak Barnett, *China's Economy in Global Perspective* (Washington D.C.: The Brookings Institution, 1981). See also L. C. H. Chow, "The Changing Role of Oil in Chinese Exports since 1974," *The China Quarterly*, Vol. 131 (1992), pp. 750–765.

¹⁰"Baogao Cheng Zhongguo Qunian Shiyou Duiwai Yicundu Jiejin 60% [Report says China's Dependence on Oil Import Approached 60%]," *Xinhua News*, January 28, 2015, <http://news.xinhuanet.com/world/2015-01/28/c.1114168854.htm>.

¹¹Zha Daojiong and Hu Weixing, "Promoting Energy Partnership in Beijing and Washington," *Washington Quarterly*, Vol. 30, No. 44 (2007), pp. 105–115; Zha Daojiong and Lai Suet Yi, "China-EU Energy Governance: What Lessons to Be Drawn?" in F. Muller et al., eds., *Challenges of European External Energy Governance with Emerging Powers* (Surrey: Ashgate, 2016).

Asian Development Bank have funded hundreds of projects that “helped accelerate development of large-scale efficient coal power plants, hydro-power, state-of-the-art technologies for controlling power-plant emissions, and international best practice on environmental assessments of energy projects.”¹² In the meantime, China is seeking foreign inputs to increase its energy production and improve the technological and managerial expertise of its own energy companies.

In short, China's rising energy demands make it an ever more active player in the global demand-supply dynamics. In 2014, China remained the world's largest energy consumer (23 percent of global share) and accounted for 61 percent of net global energy growth. China's demand for global energy is expected to rise to 26 percent in 2035, while this growth contributes 36 percent of the world's net increase.¹³ When appraising the China factor in the international energy landscape, however, it is notable that China is by no means unique in dealing with a complex set of dynamic energy policy challenges, and international observers should not ignore assessments from Chinese scholars on China's energy security.

Major Chinese Narratives on Energy Security

The popularity of research on “energy security” in China as pertinent to the country's overall studies of international relations is a fairly recent phenomenon. For the first two decades after the establishment of the People's Republic, Chinese concerns over the access to key commodities abroad were concentrated on food, not oil.¹⁴ Success in mega projects like the Daqing oil fields, which made the country self-sufficient in oil in 1964, generated a sense of energy security. As a net oil exporter, China also enjoyed a gradual improvement of its overall relationship with the rest of the world in the 1970s.¹⁵ It was not until 1993 when China became a net oil importer with its

¹²Eric Martinot, “World Bank Energy Projects in China: Influences on Environmental Protection,” *Energy Policy*, Vol. 29, No. 8 (2001), pp. 581–594.

¹³“China's Energy Market in 2014,” BP Statistical Review 2015, <http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-china-insights.pdf>.

¹⁴A. Doak Barnett, *China's Economy in Global Perspective*.

¹⁵Kim Woodard, *The International Energy Relations of China* (Stanford: Stanford University Press, 1980).

economic take-off did the Chinese academia begin to pay attention to both China's limited access to external supply and its "energy security."¹⁶

It is difficult to classify Chinese perceptions on the country's energy security. The professional and institutional backgrounds of Chinese commentators are too diverse to make meaningful cross-references. Meanwhile, the most easily accessible materials written in Chinese on the history of international energy are in the form of translated works by foreign authors. This is basically due to the brief history of China's interaction with the rest of the world in energy trade, exploration, production and transportation, as well as to the fact that Chinese practitioners in those areas seldom write for a general readership. Frequently, observations about global energy dynamics are based on inadequate knowledge of the impact of external changes on China, and foreigners tend to simplify the study of energy security in the Chinese context to the issue of securing enough oil sources, neglecting key issues such as exchanges in energy science and technologies for refining purposes, ideas about energy policies, and trade in energy commodities.

Nevertheless, if examined from a broad perspective, the many views of Chinese scholars on the country's energy security can be roughly categorized into two schools: nationalist and globalist. The nationalist view sees energy as an important physical base for economic development, social progress and the rise of a modern civilization. The notion of "civilization" has a particular resonance with the nation's cause in the world. For these people, energy is viewed as a strategic resource and major element of a country's security, strongly linked to national and foreign security policies.¹⁷ Accordingly, China must stand on guard against malice by established big powers that are often regarded as having intent to curb the rise of aspiring nations.

Scholars of the nationalist school usually hold professions outside the energy industry, many of them even work independently. Popular media outlets offer a convenient platform for these commentators to air their opinions. Yet sometimes the energy industry media also find it useful to include such voices. One such example is Wu Guangyi's view

¹⁶Zhao Suisheng, ed., *China's Search for Energy Security: Domestic Sources and International Implications* (London: Routledge, 2012).

¹⁷Li Qiang and Qi Xingkang, "World Energy Structure and Choices of Chinese Energy Strategy," *Procedia Earth and Planetary Science*, Vol. 1, No. 1 (2009), pp. 1723–1729.

that the sudden fluctuation of the world oil price in 2008 was a result of changing preferences of big powers. He claimed that the United States was to be blamed for the "energy crisis," due to its erroneous Middle East policy and macro-economic policy as well as the subprime crisis of the day.¹⁸

Another example is Xu Yi-chong's claim that the relationship between energy and national security is subtle but significant. To him, energy security is part of "national security," and crude oil is identified as "a strategic commodity indispensable for core functions of modern economic system and national defense."¹⁹ A state is required to identify the main risks to its oil supplies and assess the likelihood of events that interfere with the steady supply of oil at acceptable prices, including its dependence on oil import, oil intensity (efficiency) of the economy, security and diversity of its oil supply and transport routes, among others.

The nationalist school believes that China's energy vulnerabilities in the mid-term will not derive from limited access to coal, but from increasing dependence on oil and natural gas imports. Apart from oil, recurring major price differences among world regions and transport infrastructure factors (pipelines and LNG terminals) seriously affect gas supply. Therefore, the nationalist school argues that, to hedge against volatility in imported gas prices, one possible strategy is to establish a natural gas trading hub in China to cope with foreign suppliers' refusal to sell gas to the Chinese markets.²⁰

The nationalist and globalist schools in China advocate contrasting policies to enhance the nation's energy security.

Unlike the nationalist school, the globalist view is not so much concerned about countries acting as competitors for energy access. Instead, they care more about energy conservation and emission reduction. As economists of

¹⁸Wu Guangyi, "Energy Crisis and Changes in Big Power Relations," *China Petroleum Enterprise* (August, 2008), pp. 101–103.

¹⁹Xu Yi-chong, "Nuclear Energy in China: Contested Regimes," *Energy*, Vol. 33, No. 8 (2008), pp. 1197–1205.

²⁰Tong Xiaoguang *et al.*, "Strategic Analysis on Establishing a Natural Gas Trading Hub in China," *Natural Gas Industry*, Vol. 1, No. 2 (2014), pp. 210–220.

international trade would attest, the end prices of manufactured products also embody energy flows.²¹ For example, a study by the Energy Research Institute, affiliated to the National Development and Reform Commission (NDRC), employs the full life cycle assessment to calculate, compare and analyze the embodied energy and carbon emissions in 46 major export products. Among its policy recommendations, the report suggests that China further promote nationwide energy conservation and emission reduction, minimize the pressure exerted by economic growth on energy consumption and the environment, and thus win more space for sustainable economic growth.²²

The notion of “peak oil” is particularly attractive to the globalist school. The “peak oil” theorists argue that China should take the possibility of a world oil crunch seriously and work with other nations to enhance technological sophistication in oil exploration and extraction, refining, and downstream petro-chemical industries.²³ Awareness of peaks in production has extended to coal as well. According to Lin Boqiang, an energy economist based in Xiamen University, China must consider, among other measures, the establishment of a coal reserve, because its current coal consumption is unsustainable in both coal resources and the massive emissions.²⁴

Strongly aware of limits to energy availability, globalist scholars are also committed to energy efficiency. Under their influence, China has implemented a series of measures to improve energy efficiency, which target both the industry and individual consumption.²⁵

China’s environmental activists doubtlessly belong to the globalist school. Over the past decade or so, the notion of “environmental stakeholders” has permeated the Chinese society. A coalition of diverse interests

²¹Liu Hongtao *et al.*, “Energy Embodied in International Trade of China: An Energy Input-Output Analysis,” *Energy Policy*, Vol. 38, No. 8 (2010), pp. 3957–3964.

²²Liu Qiang *et al.*, “The Energy Intensity of China’s Export Trade,” *China Economist*, Vol. 17 (November/December 2008), pp. 99–108.

²³Feng Lianying *et al.*, “China’s Oil Reserve Forecast and Analysis Based on Peak Oil Models,” *Energy Policy*, Vol. 36, No. 11 (2008), pp. 4149–4153.

²⁴Lin Boqiang and Liu Jianghua, “Estimating Coal Production Peak and Trends of Coal Imports in China,” *Energy Policy*, Vol. 38, No. 1 (2010), pp. 512–519.

²⁵Kong Xiangfei *et al.*, “A Review of Building Energy Efficiency in China During Eleventh Five-Year Plan Period,” *Energy Policy*, Vol. 41, No. 1 (2012), pp. 624–635.

and voices successfully campaigned to stop large hydropower projects such as those on the Nu River, also known as the Salween River traversing China's southern border to Myanmar.²⁶ This posed a major setback for China's state-owned hydropower corporations and their government regulators. It also challenged the ultra-nationalists who advocate absolute sovereignty amid international criticism of Chinese dam construction on those rivers that flow into China's neighboring countries. Although these campaigns tend to target the domestic impact rather than cross-border implications of the energy projects, the message is very clear: Chinese energy policy, beginning at the project level, must not confine its justification only to the pursuit of economic growth. In other words, policies for Chinese energy development and use must conform to global norms of environmentally sustainable growth.²⁷

The two schools of thought converge in the notion that China's energy companies must learn to be both *Da* (big, in terms of reserve holdings and geographical scope of operations) and *Qiang* (strong, in terms of industry- and corporate-level competitiveness with foreign oil and gas giants). There is almost no challenge to government policy preference for having Chinese state-owned energy companies dominate the whole energy industry chain. However, this should not be understood as seeking self-reliance. Both *zou chuqu* (reaching out abroad) and *qing jinlai* (introducing foreign investment into China's energy industries) are seen as justifiable policy choices. To the degree they diverge, the globalist school tends to stress working within the established international energy market structures, demonstrating sensitivity toward international concerns about China's pursuit of energy supply, while improving energy efficiency at home. By comparison, the nationalist school tends to view energy as a key industry of the nation to be safeguarded by state-owned corporations to ensure national energy security.

²⁶Li Wanxin *et al.*, "Getting Their Voices Heard: Three Cases of Public Participation in Environmental Protection in China," *Journal of Environmental Management*, Vol. 98 (2012), pp. 65–72; Xie Lei, "China's Environmental Activism in the Age of Globalization," *Asian Politics and Policy* (April 2011), <http://onlinelibrary.wiley.com/doi/10.1111/j.1943-0787.2011.01256.x/abstract>, pp. 207–224.

²⁷Zha Daojiong, "A Political Ecology of Hydropower Development in China," pp. 32–53.

So far, the Chinese government's energy policy-making seems to have reflected an optimal compromise between nationalist thinking and globalist thinking. The following sections will cover a number of key issues on China's international energy ties.

China's Access to Foreign Energy: Maritime Routes

Central to the argument over China's vulnerability in maritime energy transport is the possibility of U.S. naval blockade of China's overseas energy supply in times of acute security conflicts or strategic confrontation. The global school argues that, in history, there has been no case of deliberate disruption to the flow of energy supplies to Chinese borders, and China's energy policy-makers and analysts have had a good number of partners — either state or non-state — to work with. Yet, with regard to China's "energy security," it is primarily the prospect of deliberate tampering of maritime transport routes of oil to China that tends to galvanize the imaginations of those within the nationalist school.

One incident of such concern took place in July 1993, when the U.S. navy forced the Kuwait-bound Chinese freighter, the *Yinhe* (Milky Way), to stop in international waters of the Indian Ocean for three weeks, on (mis) allegation that it was carrying materials for chemical weapons to Iran. Though the crisis caused by the incident was soon resolved with joint diplomatic efforts of China and the United States, it led the Chinese to worry that major naval powers like the United States could meddle with China's economic ties in the Persian Gulf at their will.²⁸ As the Middle East and Africa are China's major sources of imported oil, it is natural that China has attached increasing importance to maintaining secure maritime transport routes in the West Pacific and the Indian Ocean.

China's energy security concerns are not confined to its access to foreign oil and gas, but it has been seeking secure transport routes for other energy forms. Take coal, the major fuel used in China, as an example: China had been self-sufficient in coal until 2009 when it became a net coal importer for the first time, and its total import of coal rose from 126 million

²⁸Yi Xiaoxiong, "China's U.S. Policy Conundrum in the 1990s: Balancing Autonomy and Interdependence," *Asian Survey*, Vol. 34, No. 8 (1994), pp. 675–691.

tons in 2009 to 204 million tons in 2015.²⁹ Although it imports some coal from Russia, Mongolia, and North Korea by land routes, most of the coal import comes by sea from major suppliers including Indonesia, Australia, South Africa, and the United States, making it an even more daunting task for China to secure all its maritime transport routes, especially through the Strait of Malacca.

Regional competition for energy, China's inadequate oil shipping capacity, and its fluctuating relationships with neighboring countries, all affect overseas energy supplies for China.

The Strait of Malacca is often identified as a "choking point" for China in securing its oil supply from abroad. Over the years, China has been working with the littoral and user states of the Strait to ensure its navigational safety.³⁰ As a contracting party to the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP), finalized in 2006, China has been working with other countries in tracking reported piracy attacks and ensuring follow-up response by domestic marine law enforcement authorities. The geographical scope of their activities covers the international watercourse

stretching from the Indian Ocean, through the Strait of Malacca, to the South China Sea.³¹

²⁹"Woguo 2009 Nian Shouci Chengwei Meitan Jing Jinkouguo [China Became Net Coal Importer for the First Time in 2009]," *Xinhua News* (January 22, 2010), http://news.xinhuanet.com/fortune/2010-01/22/content_12857804.htm; "2015 Nian Zhongguo Jinkou Mei Tongbi Jianshao Jin Sancheng [China's Coal Import Dropped by Nearly 30 Percent in 2015]," *Sina News* (January 14, 2016), <http://finance.sina.com.cn/roll/2016-01-14/doc-ixnqriz9608428.shtml>.

³⁰Tong Xiaoguang and Zhao Lin, "Rethinking China's Oil and Gas Security's Vulnerability Through the 'Strait of Malacca,'" *International Petroleum Economics* (November, 2011), pp. 17–22.

³¹Lee Yin Mui, "Enhancing Regional Cooperation in Fighting Piracy and Robbery Against Ships in Asia," in Zha Daojiong, ed., *Managing Regional Energy Vulnerabilities in East Asia* (London: Routledge, 2013), pp. 87–107.

Although China's engagement under ReCAAP is generally lauded by regional countries,³² it can hardly guarantee lasting and secure overseas energy supplies for the country, even in the absence of a naval blockade of its maritime transport routes by littoral powers.

Above all, as the regional economies grow, competition for energy sources is certain to intensify, which is seen not only in the growing disputes between China and some of its neighbors over oil and gas resources in the South China Sea and the East China Sea in recent years, but also in their rising dependence on energy imports from other parts of the world. As an Australian analyst concludes,

*... [D]isputed South China Sea oil and gas may only constitute a small part of the solution to Southeast Asia's growing energy security challenges, and does not have the capacity to reverse the trend of growing reliance on imports to the region ... escalating demand for imported hydrocarbons would instead reinforce the importance of sea-lane security to regional energy security.*³³

Besides, China still relies heavily on foreign oil and LNG shipping services. While they are strong in dry cargo shipping, China's shipping companies are not equipped to compete against established international peers to facilitate the global movement of oil and LNG, a complex process which entails insurance, coordination of port servicing along the routes, and engineering of long-distance oil/LNG tankers, among others.³⁴ This, to some extent, adds to China's vulnerability in maritime energy transport.

Finally, the fluctuations of relationships between China and some Southeast Asian countries also lead to uncertain effects of China's efforts to secure its maritime energy transport routes. Although it is believed that regional littoral powers will endeavor to safeguard free navigation routes in

³²Nazery Khalid, "With a Little Help from My Friends: Maritime Capacity-building Measures in the Straits of Malacca," *Contemporary Southeast Asia*, Vol. 31, No. 3 (2009), pp. 424–446.

³³Nick A. Owen and Clive H. Schofield, "Disputed South China Sea Hydrocarbons in Perspective," *Marine Policy*, Vol. 36, No. 3 (2012), pp. 809–822.

³⁴Xing Dan, "How to Make a Breakthrough for Chinese Oil Transportation Market," *China Ship Survey* (December, 2012), pp. 43–45.

the Pacific and Indian Oceans at usual times, there is lingering concern for China that its key maritime transport routes all pass through the Strait of Malacca under the common jurisdiction of Malaysia, Indonesia and Singapore.³⁵ Over the years, China has made many attempts to reduce its dependence on the Strait of Malacca, such as through construction of a Sino-Myanmar oil/gas pipeline and the Kra Canal in southern Thailand, which would connect the Indian Ocean, the Andaman Sea, and the Gulf of Siam.³⁶ But none can solve the choke-point dilemma for China's maritime energy transport for all.

China's Access to Foreign Energy: Land-Based Pipelines

In recent years, China has been increasingly dependent on land-based pipelines to access foreign sources of energy. China's energy relations with Russia and Central Asian states have received extensive scrutiny from international observers since 1991.³⁷ As a matter of fact, the Chinese pursuit of economic linkages with its Central Asian neighbors began with railway and highway connections dating back to the mid-1980s. In 1984, as Sino-Soviet rapprochement was under way, China launched its construction of the first rail line directly linking its Xinjiang Uyghur Autonomous Region with Soviet Central Asia. A railway from Urumqi, the provincial capital of Xinjiang, westward through the Ala Pass to Aqtoghay in Kazakhstan began operating in 1990. A year later, the railway was further expanded to a new Eurasian land bridge linking the Chinese coastal port of Lianyungang in northern Jiangsu Province to Rotterdam in the Netherlands, via Kazakhstan and Kuybyshev in southern Russia.³⁸

³⁵Wang Tao, "Jiemi Nanhai Nengyuan Zhizheng: Maliujia Bingfei Zhongguo Nengyuan Anquan Zhongyao Weixie [Decoding Energy Competition in the South China Sea: Malacca Doesn't Pose Grave Threat to China's Energy Security]," *Sinoergy Net* (July 15, 2014), <http://www.sinoergy.com/bianji1/5032/>.

³⁶Lau Cheng Yong and Jason W. C. Lee, "The Kra Isthmus Canal: A New Strategic Solution for China's Energy Consumption Scenario?," *Environmental Management*, Vol. 56 (2015), pp. 1–20.

³⁷Thomas S. Eder, *China-Russia Relations in Central Asia: Energy Policy, Beijing's New Assertiveness and 21st Century Geopolitic* (Berlin: Springer, 2014).

³⁸John W. Garver, "Development of China's Overland Transportation Links with Central, South-West and South Asia," *The China Quarterly*, Vol. 185 (2006), pp. 1–22.

From railway and highway projects, China gained much technology necessary for conducting large oil and gas import projects in Central Asia. In 1997, China and Kazakhstan agreed on the construction of an oil pipeline.³⁹ As oil historians would conclude, the China-Kazak pipeline project and oil fields result from a combination of “corporate ambitions of China’s national oil companies and the national security concerns of China’s political and military leadership.”⁴⁰ Nevertheless, it was only in 2009 that the pipeline finally reached China, and it has failed to reach the nominal transportation capacity of 20 million tons per year by as late as 2014.

For Central Asian states which have gone through many revolutionary changes, especially in their natural gas industries, China is but one of the many enabling markets.⁴¹ That would not ensure absolute security of land-based energy access for China. When reaching for Central Asian gas and oil, China has recognized state-owned companies of respective countries as equal shareholders, offered sovereign guarantees, and provided aid to develop non-energy sectors in certain countries. Yet international competition leaves plenty of room for energy-producing countries in Central Asia to balance their economic and geopolitical interests between China and other energy importers.

Russia, China’s key source of energy supply, is a different type of partner. Unlike those of Central Asian states, Russian oil and gas companies have a far greater level of financial and technological control over the pace of energy development and export routes in their own country. Thus, facing Western sanctions over its role in the Ukraine Crisis and the sliding energy prices in the international market, Russia has been increasingly active in its energy cooperation with China in the past few years. For instance, Russia announced with China a multi-year gas supply arrangement in the summer

³⁹James P. Dorian, “Central Asia and Xinjiang, China: Emerging Energy, Economic and Ethnic Relations,” *Central Asian Survey*, Vol. 16, No. 4 (1997), pp. 461–486.

⁴⁰Daniel Yergin *et al.*, “Fueling Asia’s Recovery,” *Foreign Affairs*, Vol. 77, No. 2 (1998), pp. 34–50.

⁴¹Robert W. Kolb, “The Natural Gas Revolution in Central Asia,” in Andre Dorsman *et al.*, eds., *Perspectives on Energy Risk* (Berlin: Springer, 2014).

of 2014, which, as many see it, amounts to a common strategy of hedging against future uncertainties.⁴²

Despite its efforts to build land-based pipelines through many Asian countries, China remains vulnerable in its accessibility to foreign energy.

The Sino-Myanmar oil/gas pipeline is another example of Chinese efforts to reduce its vulnerabilities in transportation of overseas energy. Myanmar, under Western sanctions then as well as dual pressure from the consortium of developers (Korean, Indian, and Burmese companies) and the gas field, was eager to find a customer willing to commit to a long-term purchase contract. Thus China's 2009 decision to start constructing a pipeline to transport natural gas from Myanmar's west coast to southwestern

China received warm welcome from the Myanmar government, and stood in contrast to India's failed attempt to import from the same source of gas through a transnational pipeline via Bangladesh.⁴³ Contrary to many Western observers' emphasis on the geopolitical implications of the Sino-Myanmar gas pipeline, the pipeline project is totally justifiable from the perspective of energy economics.⁴⁴

A new pipeline project of even greater importance is the Sino-Pakistan "energy corridor" which, still under discussion, is expected to run from Gwadar and Karachi in Pakistan to Kashgar in China's Xinjiang. A substantial step to enhance Sino-Pakistan economic ties as it is, the pipeline project is regarded by many Chinese as a way to bypass the Indian Ocean largely under the control of the Indian navy,⁴⁵ another Chinese effort to mitigate its over-dependence on the maritime transport routes.

⁴²Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation: The Reality and Implications* (Oxford: Oxford University Press, 2012).

⁴³Amy M. Jaffe *et al.*, "China's Energy Hedging Strategy: Less Than Meets the Eye for Russian Gas Pipelines," NBR report (February 9, 2015), http://nbr.org/downloads/pdfs/eta/ES.2015_ChinaHedgingStrategy.pdf.

⁴⁴Zha Daojiong, "Oil Pipeline from Myanmar to China: Competing Perspectives," RSIS report (July 24, 2009), <http://www.rsis.edu.sg/wp-content/uploads/2014/07/CO09074.pdf>.

⁴⁵Liu Bo and Li Ke, "Zhongba Nengyuan Zoulang: Gonglu, Tielu, Yihuoguangdao? [A Sino-Pakistan Energy Corridor: Road, Rail, or Pipeline?]," *21st Century Economic News* (February 24, 2006), p. 8.

Much to the relief of the national school, China's land-based energy pipeline projects appear to be comprehensively mapped out today, with each one connecting to a major source of supply. However, as some analysts correctly point out, the effectiveness of these land-based pipelines may be grossly overstated. If the maritime energy transport routes are vulnerable to naval blockade by a hostile force, they tend to argue, then the Sino-Myanmar and Sino-Pakistan oil pipelines are in no way less vulnerable to potential attacks by an unidentified third party along the thousands of miles of their passage.⁴⁶ Besides, as neither Myanmar nor Pakistan is a major oil producer, the oil purchased by China elsewhere has to be transported to both countries by sea first, making it necessary for China to take measures to safeguard the initial maritime transport routes. To the globalist school, such an approach creates a Sisyphean situation where more security measures have to be taken to consolidate, if not to justify, previous ones.

Nuclear Energy: The Ultimate Solution?

The globalist school maintains that for China to mitigate its concerns over energy transport routes and effectively address the environmental side effects in its current energy mix, the development of nuclear power may be the best option. Chronic and widespread smog in major urban centers of the country attributed to coal burning offers a tangible justification for the expanding use of nuclear energy. After all, though nuclear power is not as "renewable" or "clean" as wind and solar power, its advantage lies in the stability of supply.

China missed the first round of global development in nuclear energy in the 1970s. It was not until 1991 that China realized its first commercial nuclear operation in Jiaxing, Zhejiang Province. But the development of nuclear power was quite rapid afterwards. By the end of 2007, when sustained rise in oil prices began to spur a new round of investment interest in nuclear development worldwide, China had completed eleven units in six locations with a total generation capacity of 9 gigawatts (GW). Nevertheless, it accounted for only a fraction of China's

⁴⁶Guy C. K. Leung, "China's Energy Security: Perception and Reality," *Energy Policy*, Vol. 39, No. 3 (2011), pp. 1333–1334.

total electricity generation capacity (1.7 percent) and total electricity generation (2.3 percent).⁴⁷

Japan's Fukushima Daichi nuclear power accident following the earthquake in March 2011 led to a one-year halt in the "great leap" of constructing new nuclear power plants, in addition to a comprehensive review of nuclear power plants in operation. A year later, it became clear that China had limited its goal of nuclear power development to those projects approved prior to Japan's accident. By 2020, China was expected to have an installed capacity of 70 million kilowatt-hour (kWh) of nuclear power, contingent upon reaching the goal of 40 million kWh in 2015, with enhanced safety standards. China's nuclear industry observers also demonstrated strong interest in learning from the Japanese treatment of the

Fukushima accident.⁴⁸

Globalists in China
advocate working
with the
international society
in developing
nuclear power as a
sustainable energy
source.

By the summer of 2015, China's leading position in the global revival of nuclear energy development had become apparent: of the 68 nuclear reactors under construction worldwide, 28 are located in China, owing in part to the government's financial incentives to the industry. In July 2013, the NDRC set a wholesale power price for all new nuclear power projects. The price was to be kept relatively stable while adjustable based on technology advances and market factors.

This policy put an end to the old practice of pricing each reactor's output based on investment costs, and it provided a predictable path for the nuclear power industry to continue growing.

However, China faces multiple obstacles in its pursuit of nuclear energy, beginning with the inability to decide on a standard nuclear reactor design. As some American scholars noted,

Because of the high costs and potential profits involved, nuclear reactor choices in China have been driven not just by technical considerations

⁴⁷Xu Yi-chong, "Nuclear Energy in China: Contested Regimes," *Energy*, Vol. 33, No. 8 (2008), pp. 1197–1205.

⁴⁸Zhou Yun *et al.*, "Is China Ready for Its Nuclear Expansion?," *Energy Policy*, Vol. 39, No. 2 (2011), pp. 771–781.

*but also by foreign and trade policy objectives. All of these make it unlikely that China will standardize the reactor type it constructs in the near future.*⁴⁹

Indeed, China's choice of nuclear reactor for individual projects has been greatly influenced by international competition and domestic politics. Multiple international nuclear vendors strive to maintain their respective niches in China by employing economic and diplomatic resources from abroad. Meanwhile, China's own nuclear reactor producers lobby for support for their own competing reactor designs. Consequently, absence of a standard nuclear reactor design greatly aggravates technological uncertainties and undermines operational safety.

Other obstacles to China's development of nuclear energy include a weak nuclear regulatory system, inadequate nuclear workforce, lagging public participation, and insufficient research and development capabilities. These structural weaknesses have led many analysts of both the nationalist and globalist schools to question China's readiness to expand its nuclear power program.⁵⁰

In its pursuit of nuclear energy development, China has sought international assistance by joining the International Atomic Energy Agency (IAEA) in 1984. Within two years, IAEA built two centers in China to train Chinese personnel to carry out nuclear power-plant operations. China also signed several bilateral nuclear cooperation agreements with Denmark, Switzerland, Finland and Norway to gain access to nuclear technologies and training programs. Between 1980 and 1987, over 100 Chinese delegations were dispatched overseas on fact-finding missions and to engage in preparations for its nuclear energy development.⁵¹ For four decades, Chinese cooperation with the IAEA and its key members in the civilian nuclear

⁴⁹M. V. Ramana and Eri Saikawa, "Choosing a Standard Reactor: International Competition and Domestic Politics in Chinese Nuclear Policy," *Energy*, Vol. 36, No. 12 (2011), pp. 6779–6789.

⁵⁰Zhou Yun *et al.*, "Is China Ready for Its Nuclear Expansion?," pp. 771–781.

⁵¹Michael G. Gallagher, "Nuclear Power and Mainland China's Energy Future," *Issues and Studies*, Vol. 26, No. 12 (1990), pp. 100–120.

industry greatly helped China to improve the policy and institutional aspects of its nuclear energy management.⁵²

Amid domestic controversies over safety concerns of nuclear energy development as well as a potential over-dependence on foreign technologies, the nuclear energy industry, together with some local governments, make their case for further investment on related technologies, including positive spill-over effects on scientific nuclear applications. Cooperation with countries including the United States, which in 2006 approved Westinghouse to sell the AP1000 reactor design to China, also offers a measure of confidence.⁵³ To the globalist school and an increasing number of people of the nationalist school, civilian nuclear power is a source of energy that China cannot afford to turn its back on. International cooperation, regardless of ideological inclinations on the part of policy researchers, has to be a component of China's pursuit of safe and sustainable energy sources.

Conclusion

With regard to the domestic debate on China's energy security, it is difficult to identify a school of thought, either nationalist or globalist, to be more perceptively interpretative or more powerfully influential for China's energy policy-making. This can be attributed to the growing Chinese need for energy, which involves the challenges of having to do whatever feasible to meet demands and at the same time, pursuing alternatives that reduce negative impact on human health and environment. Pragmatism is what prevails in the end. When rationalizing policy choices, there is little room for simplified government-market or domestic-international conceptual dichotomies.

It can be predicted that the two major schools of thought will continue to compete against each other in China's public and official discourse on its energy policy-making. Yet the argumentative strength of a particular school shall be conditioned by many factors influencing China's macro-economic fluctuations in general and energy economies in particular. Another factor

⁵²Mu Ruimin *et al.*, "China's Approach to Nuclear Safety From the Perspective of Policy and Institutional System," *Energy Policy*, Vol. 76 (2015), pp. 161–172.

⁵³Yuan Jingdong, "China's Nuclear Industry After Fukushima: Study of Innovation and Technology in China," *Research Brief 2013-9* (January, 2013), pp. 53–56.

is the scope and depth of government engagement with the energy policy research communities. For the next few years, it remains to be seen how the evolving security dynamics in the Asia Pacific and Central Asia are going to impact the debates and policy choices of China in its pursuit of safe and sustainable energy.