Debating Energy Security in China: Ideas and Policy Options

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Introduction

This article seeks to identify and analyze Chinese debates on the country's energy security situation and means for addressing the associated challenges. We do so keeping in mind that energy has become a standard organizing prism through which academics, policy makers and media commentators discuss China's foreign policy decisions and future choices. It is also useful to bear in mind that given the stage of China's economic and social development in the early 21st century, short of a dramatic reduction in China's reliance on external fossil energy supply, the question of "Who Will Fuel China?" is set to remain attractive for observers both in and outside the country. Thus far, though, efforts aimed at promoting understanding between Chinese and foreign international relations scholars frequently end up with reinforcing perceptions of nation-state level competition for access to fossil energy out of geostrategic considerations. With some, but limited risk of oversimplification, foreign (not restricted to Western) research agendas are predisposed to focus on disseminating the geopolitical motives behind China's sourcing of fossil fuels from foreign lands through trade and investment, assessing Chinese energy companies' performance in

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corporate social responsibility, especially in those societies where local regulatory mechanisms and their enforcement are not strong enough to sufficiently impact investor behavior. In contrast, Chinese participants in such discussions tend to favor stressing win-win cooperation between China and the rest of the world, with the undertone being that the country's right to energy supplies should override less materialistic concerns that foreign observers raise.

This article approaches the topic by adopting the conceptual position that considerations of energy security must take into a far richer range of considerations than geopolitical analysis to meet the mission of international policy research (Zha, 2016). Indeed, "energy insecurity is a myth." Furthermore, "the cult of energy insecurity," i.e., "the erroneous belief that national security requires ambitious and vigilant foreign policy measures to assure adequate access to energy" results from commonly held exaggerations about threats, material and ideational (Cohen & Kirshner, 2012: 145).

In the case of China, ever since the country made the turn-around to reconnect with the capitalist world economic system, there have been no known incidents of deliberate disruption to the flow of energy commodities to its borders. According to statistics compiled by British Petroleum (BP), China in 2014 remained the world's largest energy consumer and accounted for 23% of global energy consumption and 61% of net global energy growth. Still, according to projections by BP, China's share of the global energy demand will rise from 22% to 26% in 2035, while its growth contributes 36% of the world's net increase (BP, 2015a). In the world of commodities trade, security (or assurance) of demand is an essential prerequisite for bringing supplies to the market and gives the buyer bargaining power as well. In other words, China is an integral component of the demand-supply dynamics, not the singularly insecure party.

By trying to map domestic debates on energy security in China, we hope to contribute to the efforts aimed at narrowing the apparent conceptual gaps between Chinese and foreign observers who share a common interest in appraising the energy-security nexus in China's interactions with the rest of the world. On this basis, we argue that there are better prospects for enhanced

collaboration in world energy governance and reduced risk of miscalculation in the overall security management between China and other nations of the world.

After a brief discussion of the fundamental patterns of the energy situation in China, this article outlines three main narratives in the domestic debates in the processes of policy formation related to energy security. It further elaborates the differences among these three narratives and, to varying degrees, policy implications of them by examining three specific policy cases, namely, maritime energy transit and access, land energy transit and nuclear energy.

Patterns in China's Energy Landscape

At the outset, it is useful to remind ourselves of some salient features in China's energy situation because Chinese articulations about the country's energy security have to be tested against the material challenges facing the county in a structural manner. The following list is not meant to be exhaustive, but can help indicate the broad and historical contexts of Chinese energy policies, both domestic and international.

First, like most other countries, China seeks to ensure a secure supply of energy for its economic development at financial costs commensurate with changes in aggregate national and per-capita income, while simultaneously addressing environmental and other concerns associated with energy consumption. Energy was first incorporated as a separate issue area in the Sixth Five-Year Plan (1981-1985), the country's overall economic policy instrument, placing emphasis on energy investment and efficiency enhancement programs (Levine, Liu & Sinton: 1992).

Second, China's energy resource endowment presents a profound material challenge to the pursuit of the twin goals of meeting overall demand and adjusting the country's energy mix in the direction of a low-carbon economy. China is rich in coal resources but poor in hydrocarbons (oil and natural gas). According to BP, in 2014, China's proven coal reserves stood at 12.8% of world total. But, the same numbers for oil and natural gas was 1.1% and 1.8%, respectively (BP, 2015b). The country's

geographical distribution of coal reserves — centered in northern and western parts of the country and thousands of kilometers away from population and industrial centers — makes coal extraction and transportation a constant constraint on energy development. China's coal mines are primarily underground ones, making safety maintenance an additional premium, so much so that the central government consistently retained a separate bureau for handling coal mining safety, even when separating project management from industry regulation has been the norm since the 1990s (He & Song, 2012, Shi, 2009).

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Coal accounts for 66% of China's total primary energy consumption, as of 2014. Hydropower is generally viewed as the most realistic option for reduction of coal use. Yet, competition for water consumption for agricultural and residential use, on top of increasing fluctuation in levels of rain fall, places a limit on the reliability of hydropower. For example, in 2010, total hydropower output only reached 23% of the industry's gross total installed generation capacity. Some Chinese assessments claim that 65% of the country's hydropower potential awaits developments (Chang, Liu & Zhou, 2010). But such estimation is based on theoretical projections. Future developments in China's hydropower industry have factored in an increasing milieu of social and natural limitations (Zha, 2015). The development of China's renewable forms of energy — such as solar and wind — has received extensive commentary but has its future still conditioned by competition with coal-fired power at the commercial level. As such, dependence on coal — regardless of the associated human, environmental and ecological costs — is inevitably going to be the predominant share of China's total energy mix, at least for decades to come.

Third, trade has since the 1950s been a key and pragmatic component of Chinese pursuit to develop its own energy as well as of its overall economic development. In the 1950s and 1960s, China bartered with the Soviet Union in exchange for assistance in developing its oil industry. For three decades before

the normalization of diplomatic ties between Beijing and Tokyo in 1972, China also actively sought to export coal and other raw materials to Japan in exchange for steel, industrial facilities and technology (Soeya, 1998). In the early 1980s, China pursued a policy of exporting crude oil and oil products to its capitalist Asian neighboring countries (Barnett, 1981). So much so that oil played an indispensable role in China's total export structure until the early 1990s (Chow, 1992).

Fourth, along with trade, China entered into numerous programs and projects in energy technological cooperation and collaboration with the industrialized West (Zha & Hu, 2007a, Zha & Lai, 2016). In China, international development agencies such as the World Bank and Asian Development Bank funded hundreds of projects that "helped accelerate the development of large-scale efficient coal power plants, hydropower, state-of-the-art technologies for controlling power-plant emissions, and international-best practice environmental assessments of energy projects" (Martinot, 2001: 581). The pattern of such interactions is that China sought foreign inputs to increase its energy production, treated energy as an ordinary commodity of export and along the way worked to improve the technological and managerial knowhow of its own energy companies.

To be sure, China is by no means unique in having to deal with a complex set of energy policy challenges, which change with the passage of time. It is nevertheless useful to bear them in mind as we continue to appraise the China factor in the international energy security landscapes. Equally significant for outside observers of China is to put into context scholarly Chinese assessments about the country's energy security, to which we turn to in the next section.

Mainstream Chinese Narratives about Energy Security

The popularity of "energy security" as a study in contemporary China — as a subject matter pertinent to the country's international relations — is a fairly recent phenomenon. For the first two decades, after the founding of the People's Republic, Chinese concerns

about access to key commodities abroad centered on food, not oil (Barnett, 1981). Success in mega projects like the Daqing Oilfield, which made the country self-sufficient in oil in 1964, contributed to a sense of overall security. As a net exporter of oil, China used it to pursue a gradual improvement of its overall international relations in the 1970s (Woodard, 1980). The country's turn to a net oil importing status in 1993 led to continual interest in discussion about a loss of access to external supply, and by extension, concerns about "energy security." Since then, voluminous amounts of literature has been produced to address the topic (Zhao, 2014).

It must be said that attempts to classify Chinese perceptions about the country's energy security can be a daunting task. To begin with, the background of commentators is too diverse to make meaningful cross references, as more often than not, each author brings his or her own knowledge-bias in addition to competing professional and/or institutional interests into the discussion. Second, the most easily accessible material in Chinese about the history of international energy — even if one limits that to oil and gas alone — is in the form of translated works by foreign authors. This is so, in part because of the relatively short history of China interacting with the rest of the world in energy trade, exploration and production and transportation, and in part because Chinese practitioners in those areas seldom write for a general audience. Frequently, observations about international/global energy dynamics are based on a weak knowledge foundation of how external changes affect China. Third, truly meaningful reference to how a foreign country relates to China in energy ought to include a broad spectrum of activities: exchanges in energy science, technologies (for energy processing and final use), ideas about energy policies, in addition to trade in energy commodities. Nevertheless, too often, international studies scholars mistake viewing access to the common sources of oil as constituting the totality of inter-state economic and political interactions.

With that caveat in mind, the rest of the section is to be a rough sketch of the scope of opinions in Chinese articulations about energy security. For the sake of clarity in categorization, we group the views into those of nationalists, globalists and realists.

In the nationalist stream, scholars see energy as an important physical base of economic development, social progress and the construction of a modern civilization. The notion of "civilization" has a particular resonance with the country/nation's purpose in the world. For these theorists, energy is viewed as a strategic material and major element of a country's security, which links national and foreign security policies (Li & Qi, 2009). Accordingly, China must stand guard against mal-intention on the part of established big powers, which are assumed to have a built-in interest in keeping aspiring nations from rising further.

Nationalists commenting on energy issues usually have professions outside the energy industry and many of them operate independently. Popular media outlets offer a convenient platform for these commentators to air their opinions. Yet, sometimes the energy industry media also finds it useful to include such voices. For example, in a management journal published by the China National Petroleum Corporation (CNPC), Wu Guangyi, then a researcher of the Chinese Academy of Social Sciences (CASS), maintained that the sudden fluctuation of world oil prices in 2008 was a result of changing preferences of big power relations. Wu put the blame for the "energy crisis" squarely on the United States: its Middle East policy, macroeconomic policies and the subprime crisis of the day. Furthermore, there was no force to prevent or stop the United States from acting unilaterally (Wu, 2008). One way to understand paucity of such rhetoric is to note that 2008 was the year of Beijing Olympics, an occasion that the entire Chinese nation was told to value as a marker of China gaining more respect in the world as a civilization.

Another example is Xu Xiaojie, a former international market analyst and now a researcher with CASS, who claims that the relation between energy and national security is subtle but significant. Xu emphasizes that "energy security is national security." He identified crude oil as a strategic commodity that is indispensable for core functions of modern economic systems and national defense. Therefore, any state has to identify the main risks to its oil supplies and assess the likelihood of the occurrence of events that can interfere with the uninterrupted supply of oil at

acceptable prices. The extent to which such risks can be reduced depends on their nature and the means required in order to effectively deal with them. The assessment of such risks depends on a range of variables, such as the oil import dependence ratio, the oil intensity of the economy as well as the total level of imports, the security and diversity of transit routes, the diversity of sources of supply, the risks to supplier countries and the risks of natural disasters (Xu, 2005).

According to the nationalist thinking, China's energy vulnerabilities then do not come from access to coal, since China is the world's largest producer of coal and can almost meet its entire demand from national resources, at least in the medium term. Rather, in addition to an increasing dependence ratio on oil imports (in 2014, 65% of Chinese oil consumption came through imports), increased emphasis on gas as a source of energy for domestic and industrial needs poses risks for China. In the gas trade, supply issues arise due to the persistence of major price differences between world regions and transport infrastructure factors (pipelines and LNG terminals). To hedge against volatility in imported gas prices, one strategy is to establish a natural gas trading hub in China, part of the rationale being prevention against foreign refusal to sell to the Chinese market (Tong, Zeng & Fang, 2014).

The globalist stream would choose not to see energy access as a competition between countries. As economists of international trade would offer testimony to, the end price of manufactured products also embody energy flows (Li, Xi, Guo & Li, 2010). A study by the Energy Research Institute, affiliated with the National Development and Reform Commission, uses the full life cycle assessment method to calculate, compare and analyze the embodied energy and carbon emissions in 46 major export products. Amongst its policy recommendations, the report argues that China must further promote nationwide energy conservation and emission reduction, reduce the pressure exerted by economic growth on energy consumption and the environment and win more space for sustainable economic growth (Liu, Zhuang, et al., 2008).

The notion of "peak oil" is particularly attractive to Chinese globalists. Chinese "peak oil" theorists argue that China must take

the arrival of a world oil crunch seriously, both on the home front and internationally. China must work with other nations of the world in order to increase the level of technological sophistication in exploration, extraction processing and down-stream petrochemical industries (Feng, Li & Pang, 2008). Awareness of a peak in production has extended to coal as well. To Lin Boqiang, an energy economist based in Xiamen University and a prolific contributor to China's energy industry as well as popular media, China's coal is not inexhaustible. The current high coal consumption growth in China is unsustainable, in terms of both coal resources and increasing emissions. China must consider, among other measures, establishment of a coal reserve (Lin & Liu, 2010).

Commitment to energy efficiency is another feature of policy thinking that stems from the globalist advocacy about limits to energy availability. Indeed, China has implemented a series of energy efficiency measures, which target both the industry and individual consumption (Kong, Lu & Wu, 2012).

Over the past decade or so, the notion of "environmental stakeholders" has slowly but persistently taken hold in the Chinese society. A coalition of diverse interests and voices successfully campaigned to stop large hydropower projects such as those on the Nujiang River, also known as the Salween River south of China's border with Myanmar (Li, Liu & Li, 2012, Xie, 2011). This was a major setback for China's state-owned hydropower corporations and their government regulators. It is also a challenge to those ultra-nationalists who would prefer referring to the notion of absolute sovereignty in response to international criticism of Chinese dam construction on those rivers that flow into China's neighboring countries. China's environmental activists belong to the globalist stream. Granted, these campaigns are targeting energy projects that have more direct domestic impacts as well as those with cross-border implications. But the message is clear: Chinese energy policy, beginning with the project level, must not use pursuit of economic growth as its sole justification. In other words, Chinese energy development and energy use policy must adopt global norms of environmentally sustainable growth (Zha, 2015).

As is true of other countries, in China, nationalist, globalist

and realist streams of arguments compete for attention. Yet, there appears to be a level of convergence among them. Convergence can be seen in the notion that China's energy companies must learn to be both *Da* (big, as in reserve holdings and geographical scope of operations) and *Qiang* (strong, as in industry and corporate level competitiveness with the world's oil and gas majors). There is almost no challenge to government policy preference for having Chinese-owned energy companies dominate the whole energy industry chain. This, meanwhile, should not be understood as seeking self-reliance. Both *zou chu qu* (investing abroad) and *qing jin lai* (accepting foreign investment in China's energy industries) are seen as justifiable policy choices. To the degree they diverge, the globalist stream tends to stress working within the established international oil/energy market structures abroad, demonstrating sensitivity towards international concerns about Chinese pursuit of energy supply, while also improving efficiency at home. The nationalist stream, like that of realists, tends to stress that energy is an industry pillar of the nation and it is the country's state-owned corporations that should remain the primary agents to safeguard the nation's energy security.

China's energy policy making, as can be expected, seems to be a compromise among the paths advocated by those who give more weight to realist thinking and others more globalist. Nationalist sentiments can still be discerned but do not seem to be the overriding ones. The following section goes over a number of key issue areas China handles in its international energy ties.

China's energy policy can be a compromise of nationalist, globalist and realistic perceptions.

China Accesses Foreign Energy: the Maritime Domain

It is commonplace for observations about China's international energy transport security concerns to be exclusively limited to oil and gas. As a matter of fact, for China, transit concerns cover the entire range of energy products.

Coal is not only the bulk of fossil energy supply in China, it is

also a commodity, which China is increasingly relying on imported sources of supply to meet domestic demand. China has a long history in engaging in international coal trade, mostly as a net exporter. Its coal trade attracted energy security attention in 2009, when the country became a net coal importer for the first time. The total tonnage of net import was less than half a percentage point of consumption for the same year, with 103 million tons of net import versus 2,958 million tons of total consumption (Lin, Liu & Yang, 2012). Yet, transport of coal from its major suppliers (Indonesia, Australia, Vietnam, South Africa and the United States) has to go by sea. By land routes, Chinese coal imports originate in Russia, Mongolia and North Korea, although the very market driver that led to a rise in coal imports was the high cost and logistical bottlenecks in moving domestic coal to ports along the eastern coast. One of the Chinese government's energy policy goals is to see a peak in coal consumption by 2030 or even earlier. Since 2013, along with the slow-down of the overall Chinese economy, China's coal imports have dropped. Still, the overall trend of turning to the international coal markets is unlikely going to change (Hao, Zhang, Liao & Wei, 2014).

Natural gas is another form of essential energy of which China is set to seek more imports. Gas is transported via either pipeline or LNG (liquefied natural gas) tankers. China became a net natural gas importer in 2007 (Higashi, 2009). Since then, China's gas imports have gradually increased. In 2014, China imported fuel from 17 countries, compared to 13 in 2013 and 12 in 2012. Central Asian states (Turkmenistan, Uzbekistan and Kazakhstan) and Myanmar, together with Russia (as contracted) as country sources of supply get a lot of attention in international discussions about China's gas import. But, when we look at the areas of growth in gas demand in China — coastal population and industrial centers — LNG import is no less significant for assuring supply.

Electricity transmission across national borders is another form of China's energy connectivity with its neighbors. In terms of electricity, China both exports to and imports from Vietnam, Thailand, Laos, Myanmar and Russia. Thus far, the amount of electricity transmitted is too small to make it feature as a major

topic in Chinese discussions about energy security. However, a rare exception can be found in an article by Jia Jianghua, a researcher in the North China Electric Power University. Jia argues that the creation and maintenance of cross-border electricity connections must factor into geopolitical considerations. In his eyes, the Chinese government should use diplomatic resources for fostering greater levels of cross-border electricity trade in order to protect Chinese electric power exporting companies' business interests and to guard against deliberate disruption of power supplies to China (Jia, 2009).

As such, China's energy policy makers and analysts have a full plate of energy forms and partners (state or not) to work with. Yet, as an "energy security" topic, it is the prospect of deliberate tampering of oil on route to China through maritime means that tends to galvanize Chinese imaginations.

Again, in factual terms, after 1971, China's interaction with the world oil markets has been remarkably trouble-free, at least in terms of transportation from and into China (Li & Leung, 2011). About the only event that might qualify as a cause for concern took place in 1993, when a US warship boarded the *Yinhe* (Milky Way), a Chinese freighter carrying what the US Central Intelligence Agency incorrectly claimed to be chemical weapon materials to Iran. That incident did lead to Chinese assessments of US meddling in China's economic ties in the Persian Gulf (Yi, 1994) but the nature of the incident had little to do with China accessing oil exported from the Middle East. US suspicion of China's role in Iran's pursuit of nuclear programs was the cause.

China's interaction with the world oil markets has been remarkably trouble-free.

For a while, the *Yinhe* incident seemed to lend credibility to the notion of *guo you guo yun* (Chinese-owned or flagged ships carrying oil bound for China). The idea is in part driven by fear that major naval powers would intercept China's maritime oil supply. China's sourcing of foreign oil began in Southeast Asia and gradually moved to the Middle East and Africa, the latter of which contributed to over 70% of China's oil imports. The prospect of

future increases in oil imported overland (from Russia and Central Asia) notwithstanding, China will have to continue to rely on maritime transport for the majority of its increasing oil imports. Realities of geography dictate that the overwhelming portion of foreign oil entering China must come by sea.

One advocate asserts that China should aim to transport 40-50 percent of its oil imports in tankers bearing Chinese flags, reaching 60-70 percent by 2020. This would entail more than 40 very large crude carriers (VLCCs) by 2010, each of which will be able to carry upwards of 1.5 million barrels of oil, in order to meet these goals (Luo, 2005).

Come the 2010s, the dream of achieving vertical integration of China's oil import process has therefore by and large dissipated. To begin with, servicing the international movement of oil involves insurance, coordination of port servicing along the routes, engineering of long-distance oil tankers and economics of scale of oil tanker size, among other industry essentials. Associated Chinese companies are not in a position to compete against established international peers in those regards. A second reason is that the international crude shipping industry has always had sufficient spare capacity to serve China as a final destination. Another cause is that the structure of commodities trade between Chinese and Middle Eastern/African markets has China supplying dry goods stored in containers to those markets. A Chinese-owned oil tanker fleet would have to settle for empty voyages to those destinations, thus reducing the appeal to the shipping industry. The Chinese maritime shipping industry's specialization in dry cargo trade is conducive to the composition of products and parts trade between China and the rest of the world, given China's role in the global chains of industrial processing and manufacturing (Xing, 2012).

The Straits of Malacca is often identified as a "choking point" of and for China in securing its oil/LNG supply from abroad. Among the solutions suggested for addressing the so-called Malacca Dilemma is for China to invest in the construction of Kra Canal, in southern Thailand. Theoretically, the canal — an idea floated for over a century already — would become a passageway that connects the Indian Ocean, Andaman Sea, and the Gulf of Siam

(Lau & Lee, 2015). Social-economic complexities in the Isthmus region of Thailand notwithstanding, what is to guarantee that the megaproject would not become yet another "choke point"?

Central to the attraction of arguments about peculiarly Chinese vulnerability in maritime oil transport is the worry about China's possible exposure to oil supply disruptions caused by a US Navy blockade in response to a conflict over Taiwan or other scenarios of China-US conflicts (Wu & Shen, 2006). It should be noted that some Chinese analysts instead view the so-called Malacca Dilemma as little else than sheer imagination. After all, why should China think of itself differently from most of other oil importing countries, which also rely on so many narrow straits for oil supply? Why would the navy of that US, or that any other imagined adversary, have to wait until a strait to prevent an oil/LNG tanker bound for China from reaching its planned destination? (Zha, 2006)

Over the years, in actual policy choice, China has been working with the littoral and user states of the Malacca Straits to ensure its navigational safety (Tong & Zhao, 2011). China is a contracting party to the first regional government-to-government agreement to promote and enhance cooperation against piracy and armed robbery in Asia. Under the agreement (finalized in 2006), countries collaborate in tracking reported piracy attacks and ensuring follow-up response by domestic marine law enforcement authorities. The geographical scope of activity covers the international watercourse stretching from the Indian Ocean, through the Strait of Malacca, to the South China Sea (Lee, 2013). It also appears that coastal states along the Malacca Straits view contributions from China and other user states, to enhance navigational safety and environmental protection in the straits, in a positive light (Khalid, 2009).

What role does access to oil and gas deposits in the seabed areas of the South China Sea and the East China Sea have? It is useful to note that in terms of estimations of hydrocarbon potential in the two seas, different sources vary greatly. Understandably, politics, both domestic and diplomatic, supports a predilection for optimistic assessments from the claimant states. Analysis by reputable scholars based in Australia, a non-claimant state, concludes that, "constraints on production mean that disputed 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." Furthermore, "escalating demand for imported hydrocarbons would instead reinforce the importance of sea-lane security to regional energy security" (Owen & Schofield, 2012). The same is true of the East China Sea region (Schofield & Townsend-Gault, 2011).

Still, the perception of the two Asian seas as potentially rich in hydrocarbon resources is difficult to dispel. For China, the offer of a compromise formula — shelve sovereignty disputes and pursue joint development — has been in place since the late 1970s. But China's offshore oil and gas development capacity was still nascent. Transfer of technology from abroad was essential for the sector to develop and grow (Oldham, et al., 1988). Progress in China's capacity has enabled the government to be proactive in pursuing joint development schemes. For example, in 2004, China, the Philippines and Vietnam entered into an agreement to collect, process and analyze seismic data in the South China Sea, including in the Spratly islands area where all three countries have overlapping claims. The scheme fell apart by the end of 2007, with few actual surveys conducted (Zha & Hu, 2007b). Over disputed areas in the East China Sea, in 2008, China and Japan announced an agreement to work towards a joint development endeavor but efforts have so far failed to materialize. The issue in question is territorial boundary delimitation, which involves far more complex set of considerations than accessing energy and/or mineral resources therein (Guo, 2008).

China Accesses Foreign Energy: Land-based Pipelines

As said in the earlier section of this article, land-based pipelines play an increasing role in China's access to foreign energy. The subjects of China's energy relations with Russia and Central Asian states have received extensive scrutiny. International observers tend to focus on such developments since 1991, the year the Soviet Union ceased to be a unitary state (for example, Eder, 2014). However, it is useful to bear in mind that Chinese pursuit of

economic linkages with its Central Asian neighbors began with rail and road links that date back to the mid-1980s.

In 1984, as Sino-Soviet rapprochement got under way, Chinese work began on construction of the first rail line directly linking Xinjiang and Soviet Central Asia. A railway line from Urumqi westward through the Ala Pass to Aqtoghay in Kazakhstan was opened in 1990. A year later, this project was expanded to become a "new Eurasian land bridge linking the Chinese coastal port of Lianyungang in northern Jiangsu to Rotterdam in the Netherlands, via Kazakhstan and Kuybyshev in southern Russia." (Garver, 2006)

Gains in technology through these rail and road projects offered a necessary precondition for China to pursue large oil and gas import projects from Central Asia. In 1997, China and Kazakhstan agreed on the construction of an oil pipeline (Dorian, 1997). 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. For the Kazaks, the project provides welcome economic diversification." (Yergin, et al, 1998).

Again, using Kazakhstan as an illustrative case, as it shares the land border with China, it took until 2009 for the pipeline to reach China. Interesting to note is that the pipeline was jointly developed by the China National Petroleum Corporation (CNPC) and the Kazakh oil company KazMunayGas, with each holding a 50% share. By 2014, the pipeline had yet to reach nominal capacity of 20 million tons per year.

Central Asian states have, by any measure, gone through a process of revolutionary change, especially in their natural gas industries and China is but one of the many enabling markets (Kolb, 2014). For China, though, such land-based energy access would not ensure absolute security either. In the process of securing Central Asian gas and oil, China brought on board state-owned companies of the respective countries as equal shareholders, offered and secured sovereign guarantees and provided development aid to those countries for development of their non-energy sectors. Yet, international competition does leave Central Asian energy-producing markets wide open for balancing their interests, both

economic and geopolitical.

Russia, as a source of energy supply, is a very different type of partner for China. Unlike the Central Asian states, Soviet/Russian oil/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. The history of China-Russia interactions in energy trade has received extensive attention in research, industry and political economy (Paik, 2012). It suffices to mention that, rhetoric of a comprehensive strategic partnership between the two countries aside, the capacity of Russia — Western sanctions in relation to its handling of the Ukraine situation since 2013 notwithstanding — as a supplier is conditioned by changes in the global energy markets as well. In the summer of 2014, China and Russia announced a multi-year gas supply arrangement that caught widespread international attention. But upon closer scrutiny, the deal amounted to a strategy — on the part of both sides — of hedging against future uncertainties (Jaffe, et al., 2015).

The Myanmar-China oil and gas pipelines make an excellent case for analyzing Chinese handling of perceived vulnerabilities of land-based energy transit. The 2009 decision to start constructing a pipeline to transport natural gas developed in Myanmar's west coast to southwestern China in part resulted from disappointing developments in India's efforts to import from the same source of gas through a transnational pipeline via Bangladesh (Lall, 2006). Myanmar, still under Western sanctions then, faced twin pressures from the consortium of developers (Korean, Indian, and Burmese companies) and the gas field to find a customer willing to commit to a long-term purchase contract. The southwestern Chinese provinces of Yunnan, Chongqing, and Guizhou can benefit from this pipeline by feeding gas to be produced from local fields too small to justify a pipeline. In short, there was a good measure of sound energy economic justification for the gas pipeline project (Zha, 2009).

An even more imaginative energy transit pipeline project, still under discussion, is the Pakistan-China's "energy corridor," running from Gwadar and Karachi in Pakistan to Kashgar in China's Xinjiang Uygur Autonomous Region. Though there appears to be more enthusiasm in Pakistani circles, for China the purported

benefit is to by-pass the Indian Ocean, where the Indian navy is seen to have a natural advantage over the Chinese (Liu & Li, 2006). On the one hand, China's land-based energy pipeline projects do appear to be comprehensively mapped out: each connects a major source of supply, while making it possible for the construction of domestic gas and oil fields that would otherwise be too small to justify a pipeline. On the other hand, as independent analysts have pointed out, the effectiveness of these land-based pipelines is grossly overstated (Leung, 2011). If the maritime route of energy transit is indeed a source of vulnerability — to naval blockade by a hostile force — then, the Myanmar-China oil pipeline as well as a Pakistan-China oil pipeline would in no way be less vulnerable. Oil to fill those lines will have to be transported from maritime sources. More to the point is that a land-based pipeline makes an easy target for deliberate attack, with or without war involving either or an unspecified third party.

Nuclear Energy: Growth, Safety, and International Cooperation

Arguably, for China to effectively address the environmental side effects in its current energy mix, it has to include rapid growth of nuclear power as an option. Chronic and widespread smog in major urban centers of the country, which is attributed to coal burning, offers a tangible justification for expanding nuclear power. After all, although nuclear power is not as "renewable" or "clean" as wind and solar power, its advantage lies in stability of power supply.

The country missed the first round of global development in nuclear energy in the 1970s. China's nuclear energy industry's relatively short history began only in the 1980s and realized its first commercial nuclear operation in 1991. By the end of 2007, when sustained rise in oil prices began to motivate a new round of investment interest in nuclear development worldwide, China had completed 11 units in six locations with a total generation capacity of 9GW. This accounted for only a fraction of total electricity generation capacity (1.7%) and total electricity generation (2.3%) (Xu, 2008).

The Fukushima Daichi nuclear power accident in Japan in March 2011 did lead 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 by the end of 2020 to those projects approved prior to the accident in Japan. By 2020, China is expected to have an installed capacity of 70 million kwh of nuclear power, contingent upon reaching the goal of 40 million kwh in 2015, with enhanced safety standards. China's nuclear industry observers have demonstrated strong interest in learning lessons from Japan's handling of the Fukushima accident (Zhou, 2011).

As of summer 2015, China remains a leader in the global revival of nuclear energy growth: of the 68 nuclear reactors under construction worldwide, 28 are located in China. This, in part, results from the government's financial incentives to the industry. In July 2013, the National Development and Reform Commission set a wholesale power price for all new nuclear power projects. The price is to be kept relatively stable but will be adjusted with technology advances and market factors. This tariff policy puts an end to the old practice of each reactor pricing its output based on investment costs and provides a predicable path for the nuclear power industry to continue growing.

China faces multiple vulnerabilities in its pursuit of nuclear energy.

China faces multiple vulnerabilities in its pursuit of nuclear energy, beginning with the inability to decide on a standard nuclear reactor design. China's choice of nuclear reactor for individual projects has been greatly influenced by international competition and domestic politics. Multiple international nuclear vendors push to maintain their respective niches in China, employing economic and diplomatic resources from abroad. Meanwhile, China's own nuclear reactor producers lobby for support towards their own, competing reactor designs. "Because of the high costs and potential profits involved, nuclear reactor choices in China have been driven not

just by technical considerations 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" (Ramana and Saikawa, 2011). Absence of a standard nuclear reactor design greatly enhances technological uncertainties in operational safety.

Other areas of vulnerability include an incomplete and weak nuclear regulatory system, inadequate nuclear workforce, lagging public participation and insufficient research and development capabilities. These and other structural weaknesses have led some analysts to question China's readiness to expand its nuclear power program (Zhou et al., 2011).

In its pursuit of nuclear energy development, China has sought international assistance. It joined the International Atomic Energy Agency (IAEA) in 1984, and two years later, IAEA built two centers in China to train Chinese personnel in nuclear power-plant operations. China also signed several bilateral nuclear cooperation agreements with countries such as Denmark, Switzerland, Finland and Norway on sharing nuclear technology and training programs. Between 1980 and 1987, over 100 Chinese delegations were dispatched overseas on fact-finding missions, preparing for its nuclear energy development (Gallagher, 1990). For the four decades, Chinese cooperation with the IAEA and its key members in civilian nuclear industry has greatly helped China to improve the policy and institutional aspects of its nuclear energy management (Mu, et al., 2015).

Granted, China's civilian nuclear industry is not without its share of domestic controversies. Especially after the Fukushima nuclear disaster, skepticism has arisen as to whether or not the country's civilian nuclear industry is sufficiently prepared to address concerns about safety. The industry itself, together with some local governments, make their case for further investment on the grounds of technology (including positive spill-over effects on scientific nuclear applications). Cooperation with other countries, including the United States which in 2006 approved Westinghouse to sell the AP1000 reactor design to China, offers a measure of confidence (Yuan, 2013).

All in all, civilian nuclear power is a source of energy the Chinese

society can ill afford to turn its back on. International cooperation, regardless of ideological inclinations on the part of policy researchers, has to be a component of the matrix.

Conclusion: Debating Energy Policy in the Chinese Context

In this article, we have demonstrated that in the Chinese context, energy security debates are diverse. Our survey of opinions tells us that all streams of thought, roughly categorized as realist, nationalist, and globalist, can be found in the ever-growing proliferation of literature. Our review of Chinese energy security policies — selected for the sake of engaging in discussions on topics more pertinent to International Relations inquiry about China and the rest of the world — indicates that pragmatism is what prevails in the end. Such pragmatism is rooted in tapping into domestic sources in order to meet supply demands while also engaging external actors as needed. There is little space for conceptually neat dichotomy of government vs. market and domestic vs. international in rationalizing policy choice to materialize.

China's energy security policies are prevailed by pragmatism.

It is, meanwhile, difficult to identify a stream of argument that either more perceptively interprets or more powerfully influences policymaking. This state of affairs can be attributed to the fact that energy, as a needed resource for the entire society, faces the twin broad stroke challenges of having to do whatever feasible to meet demands on the one hand and pursuing alternatives — in the direction of reducing negative impacts on human health and environment — at the same time. It does contribute to a growth of pluralism in policy advocacy.

Different and competing Chinese schools of thought on energy security are going to continue. But the argumentative strength of a particular school shall be conditioned by the multitude of factors influencing China's macro-economic fluctuations in general and energy economies in particular. Another factor is the scope and

depth of government engagement with the energy policy research communities.

In short, Chinese debates on energy security have become mixed with Chinese debates over security issues and sovereignty issues in disputed maritime claims along China's rim, especially in the East China Sea and the South China Sea. Adding to the mix have been China's sometimes harsh and sometimes more moderate reactions to changes in its external military security environments. It remains to be seen how the evolving security dynamics, especially that in the Asia Pacific region on the maritime front and in Central Asia, is going to feature into Chinese arguments and policy choices on its international energy ties down the road.

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