



Energy Concern in China's Policy-Making Calculatios

From Self-reliance, Market-dependence to Green Energy

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Energy Concern in China's Policy-Making Calculation: From Self-reliance, Market-dependence to Green Energy

Li Xing* and Woodrow W. Clark

The paper intends to provide a framework of delineating the transformation of China's development policy from a socialist self-reliance approach (1949-1970s) to a market-oriented dependency (1970s-2008), then to an alternative sustainable path of socialism capitalism with a special focus on the green energy arena (2008- present). In the past decades China's growing energy dependence has become a major concern for its economic and security policymakers which are expanding to link with foreign policy objectives. Since energy concerns have become a top priority of national security and policy legitimacy, China needs to rethink its development strategy and integrate green and renewable energy in policy-making calculations aiming at alternative or renewable energy (green) and sustainable development. The current trend is very promising because due to China's new energy policy(s) it is leading the country and world to become a world leader in the research development, production and application of renewable energy.

I. Introduction: from self-reliance to dependency

The historical transformation from Maoist China to Dengist China since the end of the 1970s, contemporary China represents a sharp contrast as to the national policy objectives, political agenda, economic development, and more importantly development strategy. The Dengist China took the capitalist mode of economic development based on privatization of ownership and the means of production and distribution, to the marketization and allocation of resources including the total acceptance of economic inequities and political privileges. The basis of this capitalism put emphasis on market-oriented science and technology as the essential productive forces, along with the promotion of the interests of the privileged, professional and entrepreneur classes, to also include the commercialization of welfare and social security. The 1970s was the period in which western capitalism, promoted by the UK and USA became the norm for over three decades (Economist, 2009). More significantly and in connection of this paper, what China has witnessed in the past three decades is an economic growth path based on energy-consumption.

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During the socialist period, due to historical reasons, China took a development course with a commitment and goal by emphasizing human capacity, economic equality and balance, thereby mobilizing social and economic resources in pursuit of self-reliance development strategy. No matter how the socialist strategy is interpreted and assessed from today's perspective, it was historically the only option if China wanted to sustain its economic development, national security and maintain its independence. The strategy of self-reliance emphasized the primacy of internally-generated *independent* development not only at the national level, but also at the provincial, regional and local levels. The national five-year plans started under Mao continued. This internally-generated *independent* development was reflected in the institutional structure of each unit¹, where the multi-functions of party leadership, production planning, medical service and resource demand and supplier controls were closely integrated. Self-reliance under such a socio-economic structure in which politics - economics - service - and supply existed together at the unit level, created a sustainable society based on their own resources and needs and under the overall guidance of the state's five year plans.

The socialist China's choice of self-reliance and self-sufficiency development path was projected as a potential "ideological threat" by the capitalist bloc, because the central goal of the socialist politics with specific plans from the central government, were seen as an attempt to challenge the capitalist ideology of competition that would reduce costs but unfortunately also lead to an inequitable hierarchy in the world order. Seen from the interpretation of the world system theory, the socialist self-reliance and self-efficiency policy aimed at transforming the basic logic of capitalism. However in reality it was actually designed toward a nation-wide mobilization for industrialization for the purpose of catching up with the core advanced capitalism that reward people with money, no matter where the funds or by means the funds were acquired. This is because socialist states were still operated within the capitalist world economy, and the dynamics of capitalism was capable of distorting and limiting national economic planning, leading to the constraints of their policy options (Chase-Dunn, 1982, 1999). Nevertheless, such a socialist project based on self-reliance existed outside the US-led capitalist world economic system. In other words, it was merely an ideological challenge without being able to construct a sustainable alternative model (or paradigm based on recent historical evidence) to replace the capitalist system.

¹ A unit, in Chinese "*Dan Wei*," refers to any functional organization, for example, a ministry, a university, a company, a factory, etc. A "*Dan Wei*" was self-managed "mini-welfare state" combining supply, demand and welfare.

In addition, the Chinese self-reliance policy was also a response both to the internal constraints of socio-economic backwardness and the external pressure by the US-led economic blockage and trade embargo after WWII and the Korean War as well as from the failure of China's dependent relations with the Soviet Union since the Republic was founded in 1949. What should be pointed out here is that China's emphasis on self-reliance and independence in the Chinese energy industry was primarily derived from the lessons of the Sino-Soviet split in which China was deprived not only of the Soviet technicians and specialists that were helping China develop its industries, but also of around 50% of its oil supplies that were imported from the Soviet Union (Downs, 2000: 11-12). The discovery of Dajing² oil field at the end of 1950s was declared to mark the end of China's oil external dependence both for defense and civilian applications.

The post-Mao transformation of policy orientation from socialism to market-capitalism with its objectives, have their roots in the change of the regime's perceptions of the external environment of international political economy since the 1980s and especially due to the end of the Cold War in the early 1990s. The perceptions were generated from the conceptualization of international relations that, 1) the superpowers, including their respective alliances, were exhausted in their endless competition, leading to a situation where no major serious conflict was likely in the future. On the other hand, there would be the emergence of non-conventional security challenges; 2) economic development became the key objective for all nations and economic power thus emerged to become more important and relevant than traditional military strength. Thus soon, China had to face economic interdependence; 3) the post-Cold War US-based and controlled uni-polar order or American-centric new world order would likely remain for a period of time, yet unknown,. Therefore, China should, in the words of Deng, "observe calmly, secure our position, cope with affairs calmly, hide our capacities and bide our time"; and 4) there would be growing global competition for natural resources and energy security. It was this last area that became after the turn of the 21st Century China's unknown challenge and hence significant task (Clark and Isherwood, 2007).

Driven by the above strategic understanding, China has been pursuing a global foreign policy which was directed at creating a stable and peaceful environment for its economic growth through active engagement with the West and with the surrounding regions. China grasped opportunities for increasing international trade and foreign direct investment, and more importantly for securing the access to natural resources and energy supplies through its own international

² Dajing was the largest oil field in China, and it is located in Heilongjiang province. It was discovered in 1959 and the production started in 1960.

trade and investment in the resource-rich regions such as Africa, Latin America and Southeast Asia, and in recent years, Central Asia. China's global policy strategies under an active role of the state have been seen as effectively making it one of the "globalization's great winners" (Thøgersen and Østergaard, 2010).

China's remarkable achievement in economic growth was made possible by its growing involvement in the capitalist world system. But China remained in charge with caution and intense controls from the central government. In other words, China's economic growth is inseparable from its increasing dependence on global markets, with some estimates suggesting that more than 40% of its GNP is derived from international trade. In other words, China's rapid economic growth has been driven by exports with the assistance of foreign investments and joint-ventures which have dominated the most dynamic sectors of the economy. The market-driven growth encourages more concessions to induce capital flows and growth in unlimited possibilities of expansion and more structural changes to meet the demand of the overwhelming pursuit of external markets and resources. In addition, the integration with the world market is followed by over-dependence of the productive forces on the fluctuations of the world market. The most affected area is China's energy demand and supply.

II. The real predicament: energy-consumption-based economic growth

During the past three decades, China's GDP has enjoyed an average growth rate of 9-10%. Since 2002, China's energy consumption has been growing at a faster rate than its GDP growth. From 2000 to 2005, China's energy consumption rose by 60%, accounting for almost half of the growth in world energy consumption (Downs, 2006:1). In 2004 China contributed 4.4% of total world GDP, whereas China also consumed 30% of the world's iron ore, 31% of its coal, 27% of its steel and 25% of its aluminum. Between 2000 and 2003, China's share of the increase in global demand for aluminum, steel, nickel and copper was, respectively, 76%, 95%, 99% and 100%. On a global scale, an increase in the rise of personal car ownership alone could mean an extra billion cars on the road worldwide within the next 10 years. As a report by Chinese Academy of Social Sciences describes the mounting worldwide impact of China's resource consumption:

China is currently the world's third largest energy producer and the second largest energy consumer. In 2002, China accounted for 10% of total world energy use and is projected to account for 15% of global energy use by 2025. China is the world's largest coal producer accounting for 28% of world coal production and 26% of total consumption. China is the third largest consumer of oil and is estimated to have the world's sixth largest proven reserves of oil. China has roughly 9.4% of the world's installed electricity generation capacity (second only to the United States) and over the next three decades is predicted to be responsible for up to 25% of the increase in global electricity

generation. China emitted 10.6% of global carbon emission from fossil fuels in 1990 (second only to the United States) and 14.2% in 2003. This share is projected to rise to 22.2% by 2020 IEA, 2006). (CASS, 2006: 28)

This situation has given rise to problems of net energy imports, environmental pollution and ecological destruction, cross-border pollution, and mounting carbon dioxide (CO₂) emissions:

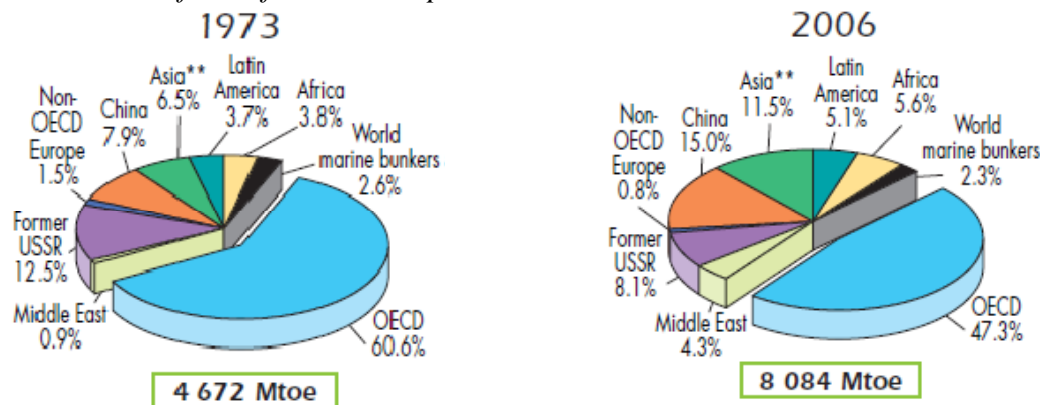
The domestic environment has deteriorated rapidly, with some 70% of urban population exposed to air pollution, 70% of seven major water systems heavily polluted, over 400 cities short of water, and 3,400 km² (equivalent to Japan's Tottori Prefecture) turning into desert every year. Cross-border pollution, notably acid rain and sandstorms, have reached the Korean Peninsula and Japan. Global environmental problems: China is the world's second-largest CO₂ producer after the U.S. (Li, Zhidong, 2003: 1)

China's escalating energy consumption is placing heavy pressure on the world's energy prices. Chinese energy demand has more than doubled during the past decade. According to the study of Konan and Jian (2008), China will consume about 41% of global coal consumption and 17% of global energy supply by 2050. Metal prices have increased sharply due to strong demand, particularly from China which has contributed 50% because of the increase in world consumption of the main metals (aluminum, copper, and steel) in recent years. Due to its rapid growth and rising share in the world economy, China is expected to retain its critical role in driving commodity market prices (*World Economic Outlook*, September 2006). China is willing to offer above world market prices for purchasing raw materials, which attributes great comparative advantages to the developing world.

Historically, the world has been already burdened by the high energy consumption by the West, particularly by the United State. Today China's growing appetite for international trade drives its mounting demand for resources to sustain its economic growth and to fuel its countless development projects. China has already become the world's largest importer of a range of commodities, from copper to steel and crude oil. The phenomenal rise of commodities prices worldwide in recent years is claimed to be attributed to China's growing import demand. Some even worried that there would not be enough resources in the world, for example gas and oil, to satisfy the ever increasing demand driven by China's economic growth. Furthermore, taking China's neighbour – India – into consideration with its population of 1 billion, it will add double pressures on the demand for the same resources.

After a short period of self-sufficiency in energy supply especially in petroleum, China became a net importer of petroleum in 1993 and it took only a few years before that China became the second largest oil importer and consumer after the United States in 2003. China's energy profile used to be heavily weighted towards fossil fuel technologies (petroleum and coal) at a time when reductions are urgently needed to stabilize global climate change. Based on the 2008 statistics from the International Energy Agency, the growth rate of China's energy consumption and its share of the global total final consumption are comparably much higher than the rest of the world.

Figure 1. *Shares of total final consumption 1973 and 2006*



Source: International Energy Agency (2008) *Key World Energy Statistics*, p. 30

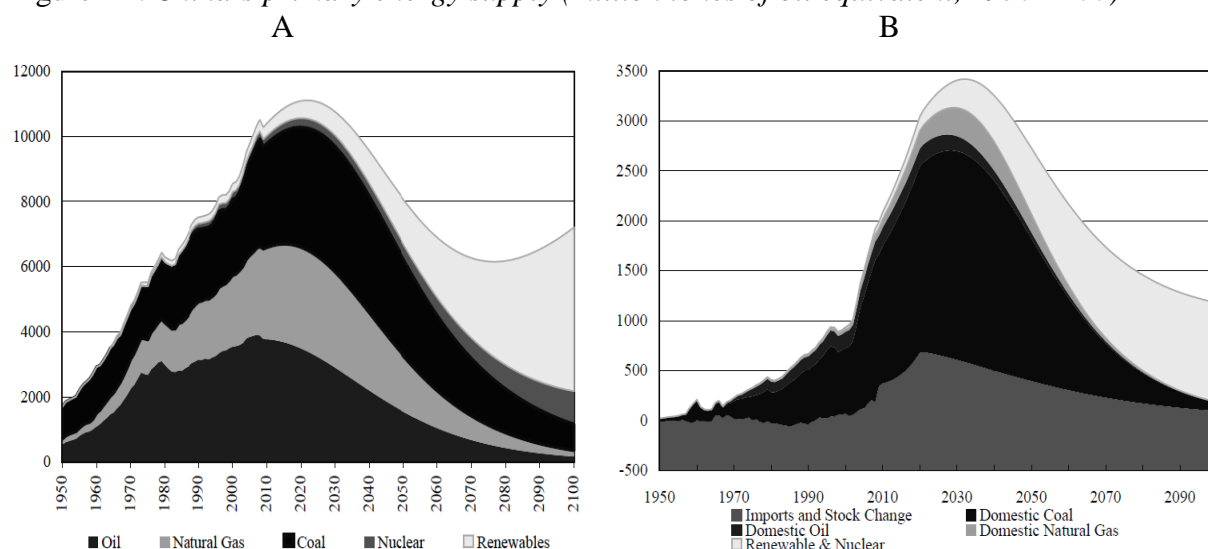
It is foreseeable that China's resource import of oil and gas will continue to increase if its targeted economic growth is to be maintained. The implication is therefore clear that not only global commodity price and international geopolitical power relations will be affected but also China's international politics, such as its foreign policy rationale, international aid objective, arms sale consideration and compulsory expansion of its long-range naval power projection capabilities, will be closely connected energy economic issues. The rise of China as a key actor in energy consumption is forcing the current international energy regime to adjust or modify its established rules of the capital market game. This is because the international energy regime "is influenced not only by economic, political, and social factors of resource-rich countries but also by international political factors, particularly change in the international balance of power, adjustment of relationships among countries and changes to international rules (Xu, 2007: 6).

However, one of the key challenging questions raised here is whether the global ecological system is on the verge of reaching the limit, and whether the expansion of global resource consumption is ecologically possible. The consequences facing China are very severe, and the Chinese growth model

would face a fundamental challenge because the peak of resource exhaustion and the imperativeness of ecological sustainability would impose severe limits to its future economic growth, hence fundamental social changes will be inevitable (Li, Mingqi, 2010).

Figure 2A. *World primary energy supply (million tonnes of oil equivalent, 1950-2100)*

Figure 2B. *China's primary energy supply (million tonnes of oil equivalent, 1950-2100)*



(Li, Minqi, 2010: 128, 130)

Figure 2A and 2B calculate and project the peak period of both the global and China's primary energy supply:

World oil production is projected to have peaked in 2008. World natural gas production is projected to peak in 2041. World coal production is projected to peak in 2029. Nuclear energy is projected to grow according to IEA's "Alternative Policy Scenario". Long-term potential of the renewable energies is assumed to be 500 EJ (12,000 million tonnes of oil equivalent). The world's total energy supply is projected to peak in 2029. (Li, Minqi, 2010:128)

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China's coal production is projected to peak in 2030, oil production to peak in 2016, and natural gas production to peak in 2046. China's long-term potential of nuclear and renewable energies is assumed to be 1,000 million tonnes of oil equivalent.... China's energy imports are assumed to keep growing from now to 2020 to sustain rapid economic growth. The Chinese economy is assumed to keep growing at an annual rate of 7.5 percent from 2010 to 2020. By 2020, China's energy imports are projected to grow to near 700 million tonnes of oil equivalent, comparable to the current US energy imports. After 2020, China's energy imports are assumed to stay at 8 percent of the rest of the world's total fossil fuels production. China's total energy supply is projected to peak in 2033. (Li, Minqi, 2010: 130-131)

Clark and Isherwood (2010) found this pattern in the study of Inner Mongolia Autonomous Region (IMAR) for the Asian Development Bank in 2007. IMAR is the second largest coal producing region in China and the use of renewable energy (solar and wind in particular) to transition from the environmental problems caused by coal, China needed to provide public policies in its next five year plan for sustainable development with the financial resources. Today, the IMAR is developing such renewable energy resources while controlling its coal production through advanced coal technologies that are “cleaner”.

III. The rise of China in the context of energy dependency

In order to keep the economic growth rate, China has to make the access to adequate energy supplies as a national priority and to a great extent a national *security* priority. China is perhaps one of the few countries that regard energy security as a vital component of their *national interests*. Currently China is “the world’s second largest consumer and third largest producer of primary energy. There is no sign that China’s energy consumption will slow down, on the contrary, it will steadily increase. Thus for energy consumption to keep pace with its targeted economic growth at a moderate rate of 8-9%, China will have to utilize every fuel source available including investment on renewable energy and the expansion of nuclear power. It is expected that China’s import of energy resources will increase at a steady rate particularly from Russian natural gas and Liquefied Natural Gas (LNG) shipped through Chinese seaports which are both difficult options (Clark and Isherwood, 2010).

China’s growing interest in resource-rich regions such as Africa, Latin America, Middle East, Central Asia and Southeast Asia is no doubt linked with its energy security consideration. How will the rapidly increasing demand for energy, raw materials, and other natural resources shape Chinese policies towards its international relations especially with resource-rich countries? Can China afford depending on global energy markets, either via exclusive bilateral deals, or direct investment in resource exploration in order to sustain its economic growth? What strategies will China use to secure its share of the global resource market? To find the answers to these questions, it is of importance to take an energy security approach to explore the geopolitical, economic, energy, and environmental implications behind China’s rapidly growing energy challenges and to understand the Chinese anxiety and concern with issues of energy security in attempting to search for new sources of energy supply. China’s economic and foreign policy behaviors are increasingly influenced by growing energy consideration. As the world’s second largest economy and trading nation, China’s hunter for energy and its global strategies for energy security have led to heavy debates and even in some cases have resulted in political conflict. China is predicted by some economist to be the number one economy and trading nation within the next decade. The West has been expecting that ideally,

China's energy vulnerability might drive it toward cooperation with rival oil consuming nations through participation in multilateral organizations and other forums. Since energy security is no doubt playing a more decisive role in Chinese foreign policy, Beijing's relations with both the existing major energy-consuming powers and energy-exporting countries will shape its motivation and justification on energy issues as well as on non-energy issues.

In recent years, China's "going-out" economic and foreign policy encouraged its National Oil Companies (NOCs) to try to acquire some western oil companies but still secure the control over the access to some overseas energy supplies including purchasing equity stakes in foreign oil companies. This strategy has been regarded as "mercantilist" in the West and particular in the United States where the attempt of a Chinese NOC to buy out the American oil corporation UNOCAL in 2005 triggered political backlash in the US Congress causing the final withdrawal of the Chinese company. The incident indicates the lack of trust of the US in China's energy diplomacy, because the Chinese move was interpreted as undermining American energy security.

In the studies of China's energy security with its economic and foreign policy, a number of geo-politically vital areas cannot be disassociated with China's efforts to maintain both energy security and good international relations within these regions and with the major western powers. China's energy diplomacy with the Middle East, Russia and Central Asia, the Asia-Pacific, Africa and Latin America are become a global topic, and Beijing's efforts toward greater energy security through multilateral organizations are discussed. It is still too early to predict whether the world is to witness the evidence supporting the liberal hypothesis that economic interdependence promotes international cooperation, or confirming the realist conviction that competition and power accumulation will eventually lead states to conflict and war as history has shown in the past. Energy demand is seemingly accelerating China's "peaceful" rise to global prominence, and moderating the conflictual aspects of Chinese foreign policy.

China has been struggling to develop and promote good relationships with under-developed regions which contain potential energy reserves, such as Africa and Latin America, through its unique international aid system linking development aid and trade with energy suppliers. Recently China has aimed to prepare for technological advances and changes of climatic circumstances which will bring maritime transport in the Arctic waters to make possible the linking of North Atlantic and the North Pacific into close commercial relations. It is expected that China will increasingly strengthen its political economy of international relations in the Arctic region and speed up its research through its

polar research bases in the Antarctica. In addition, China is adopting different policy strategies and objectives to different regions.

Africa and Latin America: Comparing with other regions in the world, these two regions are seen as relatively stable markets as energy suppliers. China's central policy objectives in Africa and in Latin America are stated clearly in its policy papers - *China's African Policy Paper* (2006) and *Latin American policy paper* (2008). The policy objectives are aimed at strengthening diplomatic and political ties with these two resource-rich regions while at the same time securing and diversifying energy supplies and other raw material resources including the opening of these region's commodity markets. Currently, China is one of the key investors in Africa and its trade and investment relations in Latin America are going to accelerate in the coming years. China's increasingly dynamic economic relations with these regions are seen by some western critiques as challenging the traditional ties between these regions and their historical colonial ties with the western powers. Intensification in China-African and China-Latin American trade relations also accelerated the "neo-colonialist" argument claiming that China's is imposing the regions with a renewed "colonial" relationship. However, despite the criticism on China's energy-oriented policy in its economic and political relations with the two regions, the Chinese style of approach and engagement especially its aid policy and practice has indeed a far-reaching long-term and permanent realignment of power relations in the conventional international aid system and has already changed the system in many ways (Opoku-Mensah, 2010).

Middle East and Central Asia: These two regions are world's most unstable energy markets. China has gradually emerged as one of the regions' main partners. China's emerging presence in the regions is seen as one of the major geopolitical changes in the aftermath of demise of the Soviet Union's and the consolidation of China's new power (Peyrouse, 2007). The two regions are now set to play a major part in China's energy policies and in the war against the separatists in China's northwestern region. The economic and political rise of Chinese has a great implication in the two regions in terms of the reinforcement of China's policy objectives and the reinforcement of the geopolitical alliance embedded in the strategic calculation of energy security. Currently the Iran-nuclear issue is testing China's foreign policy orientation in the context of its energy security consideration. China-Iran partnership has grown out of mutual need for products, ranging from arms and technology to consumer goods and China's soaring need for energy supplies (Dorraj and Currier: 2008, 70). Thus, it has been a painful foreign policy decision for China to lend support to the USA-led UN sanctions against Iran's nuclear program, fearing the grave consequence

that this might lead to loss of one of its major energy suppliers³. China is being torn between the imperative need for energy on the one hand and the US pressure on its role as “responsible stakeholder” and “strategic reassurance”.⁴

The enlarging discrepancy between energy demand and domestic supply is driving China to reply on a number internal and external policy choices in order to keep the planned growth rate, a tendency which makes it politically vulnerable to economic setbacks. Firstly, China has to put huge investments into discovering oil and natural gas resources in the Western part of the country despite the burdens of massive capital investment, high production costs, infrastructures, environment and geological risks. Secondly, China has to depend on unstable Persian Gulf areas and other crude oil suppliers in Africa and Central Asia where civil wars, geopolitical risks and socio-political conflicts are unavoidable. Even if the energy supply sources are secure, the transportation issue is becoming another headache for China. In the case of its neighbours, China can construct an oil and natural gas overland pipeline from Central Asian and Russia. Cross-land pipeline options were already put on the highest negotiation table between China, Russia and other Central Asian countries.

In connection with its rising energy import, the transport of energy products has been the lifeline of China’s economic development. China’s coastal line areas are the heart of its economic growth and the frontier of its international trade. China’s growing maritime ambitions which already boasts the world’s fourth largest merchant fleet, contributes 6.8% to global tonnage (UNCTAD, 2005). However, in the aftermath of 9.11, the security landscape of international trade and maritime transport changed significantly. The challenges facing global maritime security are increasingly of a nontraditional nature, such as terrorist acts against shipping, trafficking in weapons of mass destruction, armed pirate robbery as well as smuggling of people and arms. Pirates and Islamist terrorist groups have long operated in those water areas, including the Arabian Sea, the South China Sea, and in waters off the coast of western Africa. Since 2008, the Chinese government has dispatched warships to the waters off Somalia to protect Chinese vessels and crews from pirate attacks. The Chinese fleet would

³ According to data released by the General Administration Agency (GAC) Iran supplied 11.3 per cent of China’s energy consumption in 2009 (adapted from People’s Daily Online, 10 February 2010).

⁴ “Strategic reassurance”, coined by James Steinberg, Deputy Secretary of State in a conference sponsored by the Center for a New American Security, states that “China must reassure the rest of the world that its development and growing global role will not come at the expense of security and well-being of others.” Its implication can be seen as Obama Administration’s China-policy successor to the Bush Administration’s “responsible stakeholder” policy framework coined by former Deputy Secretary of State, Robert Zoellick, who is now the President of the World Bank.

join warships from the U.S., Denmark, Italy, Russia and other countries in patrolling the Gulf of Aden, which leads to the Suez Canal. Currently this is the quickest route from Asia to Europe and the Americas. This is a remarkable foreign policy change from a home-based passive defense to an offshore-based “preventive defense” which is directly linked and coordinated with the western developed nations for their collective energy security.

From an internal perspective, energy security has become the essential premise for China to achieve its national goal of quadrupling its gross domestic product (GDP) in 2020. There is a genuine consensus among Chinese leaders and scholars that energy has become a key strategic issue for China’s economic development, social stability, and national security and that the realization of China’s key national interests⁵ is highly dependent on the access to sufficient energy resources (Liu 2006, Zhang, 2006). China’s “market economy” has locked itself in a “tiger-riding dilemma”, i.e. any slow-down in economic growth would put the country in a risky situation, leading to social unrest and political illegitimacy (Li and Clark, 2009). China’s government fears that domestic energy shortage and rising energy cost could undermine the country’s economic growth and thus seriously jeopardize job creation. Beijing increasingly stakes its political legitimacy on economic performance and rising standards of living for its people. Consequently, the threat of economic stagnation due to energy shortage represents real risks of social instability, which could in turn threaten the continued political authority of the state and the Communist Party. Energy security is a basic strategic political concern for the leadership.

In fact, some scholars of energy politics point out that state-led pursuit of energy supplies is often seen as the source of international conflicts. However, behind it, other sources of conflict – nationalism, geo-political competition, competing territorial claims – are most likely to have been at the root-cause of those conflicts (Hogan in Constantin, 2005). One Chinese scholar of strategic studies clearly explains the reason why energy security has become a core component of China’s national interest:

With external trade accounting for almost 50 percent of China’s economy, China is now highly interdependent with a globalized market. This shift also includes hard social, political and geopolitical choices that deeply impact matters of national security. The more developed China becomes the greater its dependence grows not only on foreign trade but also on the resources to

⁵ China’s national interests are defined by the government as including sustained economic growth, the prevention of Taiwanese independence, China’s return to as a global power status, and the continuous leadership of the Chinese Communist Party (CCP). Today energy security is defined as a core part of China’s national interests.

fuel the economy. With these complex and expanding interests, risks to China's well-being has not lessened but has actually increased, making China's national security at once both stronger and more vulnerable. (Zhang, Wenmu, 2006)

China's sensitivity on the confluence of geo-politics and resource politics is also derived from the fact that historically China has been a weak sea power. One of China's key weaknesses through centuries of its development and into the modern age is its lack of a strong navy to safeguard its global interest and this is perhaps one of the major factors leading to China's massive investment on raising and modernizing its naval capabilities. China therefore has good reasons for acquiring an aircraft carrier to enable it to protect its national interests (Cole, 2006 and Nødskov 2008). China has territorial disputes in the South China Sea over the Spratly Islands with neighbouring countries and is also worried about the security of the major maritime transportation routes through China transports the majority of its foreign trade, as well as its oil imports upon which it is totally dependent. Based on the historical lessons, China has a clear understanding on the linkage between its energy security and international geo-politics, which is spelt out clearly by one scholar:

The history of capitalism and its spread globally have shown that it is often accompanied by cruel competition between nation states. Those countries that lose out are not necessarily economically or technologically underdeveloped or those with a low level of culture. Rather, they are most often those nations who forgo the need to apply their national strength to national defense and therefore do not possess sufficient strategic capability. (Zhang: 2006:17)

Today the rise of China is due in large part to its rapid emergence as a major force in world energy markets and energy geo-politics. Beijing's booming energy consumption and heavy investment for energy security have raised a new range of contentious issues between China and other world powers that are adding a new layer of issues to already complex and dynamic relationships. China's economic growth is supported by three primary pillars: 1) export-led growth; 2) real property growth; 3) government spending; and among them export has been the key engine driving its economic growth. The current global financial crisis (2008-2009) has already indicated the break-down of the first pillar because European and especially American consumers can no longer consume at the debt-supported levels as they had in the past. One of the perplexing questions is whether the sustainability of China's export oriented development strategy can be counted on to be sustainable and reliable into the future.

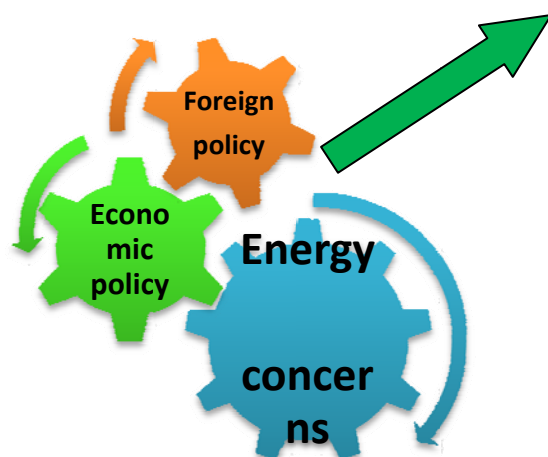
IV. Change of growth strategy and promoting sustainable energy

Energy and environmental problems in China should be resolved primarily through self-reliance efforts, but also through international cooperation. In order to diversify access to energy supplies and reduce dependency on certain exporters, China is taking many political and economic measures and providing economic aid to strengthen its cooperative relations with resource-rich countries (Tseng, 2008; Ziegler, 2006). However, the dynamic debates on energy security are still going on in China (Downs, 2004). Certain indications can be drawn from the debates, that many of China's analysts and policy-maker are not fully convinced of the benefits of reliance on world energy markets. The political consensus today is to move towards "green" (renewable energy power generation) and integrated energy infrastructure systems that are sustainable.

In addition, China has been alert at the soaring demand in global energy in recent years and at the possibilities of long-term global energy shortage. Hence, China's energy security will be one of the most important parts of its broader foreign policy in the years to come. The world will soon focus on China's new economic and energy policies, its energy market reform and its new strategies in meeting the political challenges of rising energy costs and environmental pollutions (Clark and Xing, 2003). Much global attention will be given on China's move towards technology development and innovation in generating clean coal, natural gas power along with new institutional developments. Chinese energy policies and each of China's steps and practices bear significant implication on greenhouse gas emissions and climate change.

Already being burdened with serious environmental problem and energy shortage, the on-going global economic downturn presents China with a historic opportunity to rethink its growth strategy to move towards a more stable and sustainable path. Today, a promising optimism is that China seems to be firmly committed to the creation of a largely self-sustaining innovation system as part of a knowledge-based economy of the future. China is sparing no effort to meet its *11th Five Year Plan (2006-2010)* energy-conservation goals, in which China will cut its per unit of GDP energy consumption by 20 percent from 2005 levels by the end of 2010.

Figure 3: China's on-going and future policies connected with energy concerns



China	\$34.6 billion
United States	\$18.6 billion
United Kingdom	\$11.2 billion
Rest of EU-27	\$10.8 billion
Spain	\$10.4 billion
Brazil	\$7.4 billion
Germany	\$4.3 billion
Canada	\$3.3 billion
Italy	\$2.6 billion
India	\$2.3 billion

(The Pew Charitable Trusts, 2010:7)

China's policy determination in clean and renewable energy can be clearly seen from its ambitious plan published in 2007 – "Middle and Long-term Development Plan of Renewable Energies", which was approved by the People's Congress in 2008 as *The Renewable Energy Law*. The new policy is determined at moving the country towards renewable energy in order to reduce energy consumption and cut the surging carbon dioxide emissions. The policy expects to derive 10% of China's energy supply from renewable by 2010 and 15% by 2020. To meet the 2020 goal the total expected investment will be two trillion Chinese yuan (US\$133.3 billion). If successful, by the end of 2010, China would emit 600 million tonnes less carbon dioxide a year, and by 2020 the annual reduction in carbon dioxide emissions would reach 1.2 billion tones. The target of this policy plan reflects another of China's policy concerns in coping with the challenges of climate change. The linkage of energy policy and climate change policy can be read from the policy document - *China's National Climate Change Programme 2007* prepared by one of China's key government institutions, the Development and Reform Commission. Some examples of China's successes can be seen in communities that are becoming sustainable (Wang and Li, 2009 and Kwan, 2009) .

Through the legal framework stipulated in the new laws, the Chinese government has set efficiency goals, imposed taxes and regulations designed to curb demand and reduce emissions of greenhouse gases. In addition, the government energy and environment institutions are imposed with defined guidelines and responsibilities. The new policy towards alternative energy is supported by financial incentives including direct subsidies and innovative

policy measures, tax-related incentives, custom duties, and pricing incentives. Some concrete policy incentives are: 1) connecting “intermittent”⁶ sources of electricity like wind or solar to the national grid; 2) connecting utilities mandated to open transmission lines to renewable generators, with ratepayers bearing part of the extra costs; 3) feed-in tariffs guaranteeing renewable energy producers a steady, high price for electricity so as to enable them to compete with coal producers; 4) tax breaks, preferential loans, and other financial incentives encouraging investors to support renewable ventures (ChinaFAQs, 2010).

It is likely that China will meet and even exceed its renewable energy development targets for 2020 with applying other alternative energies including hydro, wind, biomass, and solar PV power. It is expected that more than one-third of China’s households could be using solar hot water by 2020 if current targets and policies are continued (Martinot and Li, 2007). China expects the policy objectives to be reached through the integration of a number of relationships: the responsibility of the state and the obligation of the public, institutional promotion and market mechanism, current demand and long-term development, and domestic practice and international experience.

In recent years China has won the global recognition for its achievement in the development and application of alternative energy. China overtook the United States for the first time in 2009 in the race to invest in wind, solar and other sources of clean energy. American clean energy investments were \$18.6 billion last year which were a little more than half the Chinese total of \$34.6 billion. Just a few years ago, China’s investments in clean energy totaled just \$2.5 billion (*Los Angeles Times*, March 25, 2010). In recent years, it is increasingly recognized that China’s “green leap forward” policy has made it become the world’s largest makers of wind turbines and solar panels surpassing Western competitors in the race for alternative energy. As one of the key US newspapers points out:

China vaulted past competitors in Denmark, Germany, Spain and the United States last year to become the world’s largest maker of wind turbines, China has also leapfrogged the West in the last two years to emerge as the world’s largest manufacturer of solar panels. And the country is pushing equally hard to build nuclear reactors and the most efficient types of coal power plants. These efforts to dominate renewable energy technologies raise the prospect that the West may someday trade its dependence on oil from the Mideast for a reliance on solar panels, wind turbines and other gear manufactured in China. (*New York Times*, January 30, 2010)

⁶ It refers to energy-generation installations which are not state-owned.

Clean renewable energy strategy emphasizes a sustainable growth path based on equity is leading the transition to knowledge and information economy. When referring to China's alternative renewable energy policy, some studies have shown that China is facing both opportunities and challenges. The potential opportunities are plenty, such as solar energy, wind energy, biomass energy, small hydropower, geothermal energy, ocean energy, etc; whereas the challenges are apparent as well, such as the lack of coordination and policy consistency, weakness and incompleteness in incentive system, lack of innovation in regional policy, immature financial system for renewable energy projects and the limited investment in research and development of renewable energy (Zhang, Peidong, et al 2007). There is still a long way to go before China's renewable energy market becomes mature and socially and culturally embedded.

V. Conclusion remarks: challenges and optimism ahead

The objective of the paper aims at providing a framework of critically understanding China's transformation from a self-reliance development path to a "market-driven" dependent growth strategy. The paper's emphasis is on the economic and ecological consequence of China's insatiable demand for energy driven by the growth-based industrialization policy in the past decades. This paper argues that since the beginning of the 21st century, energy has become a key concern on the agenda of China's economic and foreign policy-making calculations. Among China's core national interests – securing energy resources, gaining market access and political recognition – energy security is the top priority. It is expected with the rapid economic development and the improvement of people's living standard, energy demand in China will unavoidably continue to increase, which will be inseparable with its environmental problems, such as the emission of sulfur dioxide and carbon dioxide. Above all, the western definition of "market-driven" economies in energy is questionable in China such that different definitions and meanings are need for "market" and therefore "capitalism".

Chinese policymakers understand the fact that due to a growing need for and even competition over energy resources and maritime transportation security, global resource-based competition and geo-territorial claims on sea areas and shelves will become harsh and could lead to armed confrontations. In order to understand the implication of the underlying dynamics of international political economy in resource-rich regions, it is of great importance to understand the source of international economic competition and conflict for access to energy and natural resources and to understand the interaction between individual national interests. The international geo-politics and geo-economics

in the acquisition and distribution of states' wealth and power are manifested in their respective country's economic and foreign policies.

China's soaring demand for energy in connection with its export-oriented economy poses a variety of new challenges for its economic and foreign policy. Hence the country will be more and more dependent on the purchase of natural resources abroad for sustaining its economic development. Any crisis to China's access to overseas resource and maritime shipping routes will have a negative impact on China's growth and trade-dependent economy. China will endeavour to protect the strategic areas concerning its national interest. It has no choice. In recent years China's energy diplomacy in the context of the political economy of global energy developments has drawn the attention of the West, especially in connection with the sensitive regions, such as the Middle East, Central Asia, Latin America and Africa. As one Chinese scholar bluntly states, "The determining factor shaping the rise and fall of a country ultimately is not just the size of its total economic volume but also the strategic ability of the country; that is, the ability to use national forces to achieve political goals" (Zhang, 2006: 22).

However, despite the above global reality described by this realist perception, China's deep sense of its energy insecurity and vulnerability is changing its development policy towards clean and renewable energy. China is accelerating R&D on renewable energy supply and advanced energy conservation-based techniques and products; it is making necessary structural changes in industrial and agricultural sectors moving to non-energy intensive industries. Furthermore, China is trying to rely primarily on domestic resources while strengthen mutually beneficial international energy cooperation. The optimism that China is presenting to the world is not groundless. China is not only one of the world's leading producers of renewable energy, but also is over-taking more developed countries in exploiting valuable economic opportunities, creating green-collar jobs and leading development of critical low carbon technologies. Such optimism in China's own "green revolution" is also confirmed by the front page of a recent report by Climate Group (2009), "As one of the world's major economic powers, China will have to be at the forefront of this journey. This report shows that it can be." Nevertheless, China still has a long way to meet its policy objectives on energy and environmental sustainability. Due to its size and population the consequences of failure in China's case are much more serious than many other counties. China should not be left struggling alone on the road to optimism; and the whole world must pay more attention to China. World peace and a sustainable planet depend on global harmony and collaboration beyond convention competition over supply and demand.

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