

# China's Energy Security Dilemma

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*China's "economic miracle" and its energy dilemma stem from the Chinese Communist Party's (CCP) 30 year old policy to achieve "wealth for country first" ("国富优先"). Beijing has bundled economic development, energy, science & technology-related policies as matters of national security. As a result, China's current sense of energy and economic insecurity may be analyzed as a product of its decades-long off-balanced policies towards development.*

China's development policy of "wealth for country first" contributed to the country's economic miracle, but it could take another decade to remedy the market failures that these narrowly guided policies generated. Examples of market failures include: negative externalities to the environment and energy security, and wealth distributional concerns such as equity of opportunity and equality of outcomes.

Under its 12th Five-Year period (2011-2016), Chinese leaders have placed a premium on boosting the efficiency of China's energy/environmental sectors and providing effective results on equity issues, i.e., "wealth for people first" [民富优先].<sup>1</sup>

Beijing seems to have realized the damages caused by its "wealth for country first" policy and shifted track to align with a new banner – "inclusive growth" [包容性增长].<sup>2</sup>

The issue with achieving "wealth for people first," however, is it will take energy resources.

This paper focuses on understanding China's energy dilemma through its supply-side and demand-side challenges. China's sense of energy vulnerability is rooted more in internal challenges than its sense of external threats like the United States. In other words, as long as incentives for GDP growth outweigh incentives to achieve energy/ environmental objectives,

no amount of rules and regulations can mitigate China's demand-side challenges and increase Beijing's supply-side security.

If China continues to lack capacity to balance growth and energy consumption, contentions in the East and the South China Seas will likely increase. More than ever, Beijing will view this "Maritime Silk Road" as China's closest, most secure source of energy in the long-run. Therefore, activities that threaten Chinese energy interests in these areas will likely be viewed as infringing on China's national security.

## THE DRAGON AWAKES

In the 1970s, Chinese leaders realized that self-sufficiency in energy is not enough to achieve national security. The key to national security is energy security.<sup>3</sup> When China became a net importer of crude oil in 1993, some China watchers argued that the country's quest for energy security would be a catalyst to an all-out resource war,<sup>4</sup> while others argued that China's energy insecurity would make it behave more like a responsible state.<sup>5</sup>

China achieved "wealth for the country" at great costs. Beijing is now grappling with a sharp learning curve on how to govern a lop-sided country in terms of wealth, development and energy distribution. China is also learning how to manage relations with other nations over resources under its newfound power.

For China, supply-side energy security involves securing transport routes and overcoming choke points at sea, diversifying its energy mix, strengthening its petroleum storage capacity, and managing foreign relations. As for China's demand-side security, its economic development-centric policies, increased standard of living, urbanization, and population growth are all contributing factors to enlarging its demand for energy.<sup>6</sup>

## THE DILEMMA

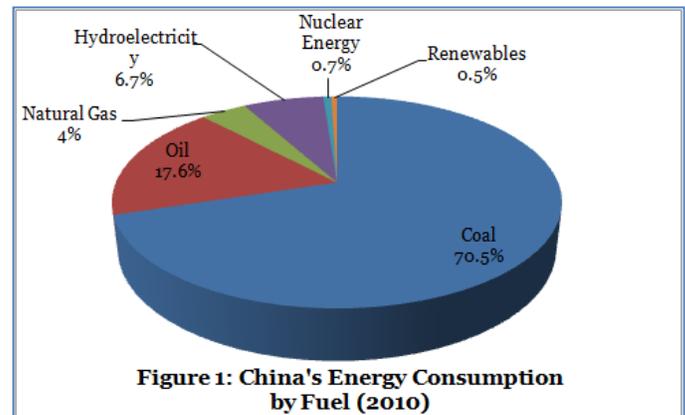
China's growing sense of energy insecurity stems from the country's lop-sided energy mix, runaway growth, and military expansion. In 2010, the Chinese energy portfolio consisted of coal, oil, hydroelectricity, natural gas, nuclear and renewable energy (i.e., geothermal, solar and wind).<sup>7</sup> Among those, coal (70.5 percent), oil (17.6 percent), and hydroelectricity (6.7 percent) ranked top three in the country's energy consumption.<sup>8</sup> China's energy mix and the CCP's obsession over economic growth appear to drive China's energy insecurity and form the core of Beijing's dilemma.

### Supply-Side Challenges

On petroleum, China faces the dilemma of having to balance its growing energy needs with relations with: 1) the West; 2) oil producing countries; 3) countries in the Asia-Pacific region, namely stakeholders in the South China Sea and the East Sea. Furthermore, China's lack of a strategic petroleum reserve (SPR) capacity is another source of insecurity, as the country has little ability to counter fluctuations in the international oil market.

As for coal and renewable industries, China currently faces bottlenecks in 1) coal transportation, 2) technology, and 3) complimentary infrastructures. Without resolving these factors, China's 12<sup>th</sup> Five-Year

plan cannot be effective and/or efficient for policy implementation.



Source: BP Statistical Review (2011)

### Balancing Western and Foreign Relations

When China became a net energy importer in 1998,<sup>9</sup> due to rapid economic growth coupled with domestic oil production stagnation and lack of SPR, it was forced to venture into the Middle East, Africa, and other nations for oil.<sup>10</sup> 46 percent of China's crude oil imports come from the Middle East and 22 percent comes from Africa.<sup>11</sup> Rising tensions in these regions may strengthen Beijing's perception that energy resources available in the South and the East China Seas could become China's most reliable energy resources.<sup>12</sup>

With Beijing's "going out" policy [走出去战略], China will increasingly look to invest in countries with abundant natural resources.<sup>13</sup> As a result, China's rise as the new competitor on the international energy market could spark tension with the United States and other stakeholders.

For example, China is Venezuela's second largest trading partner, and the China-Venezuela energy partnership occupies a significant component in this bilateral relationship.<sup>14</sup> As China's interests expand in crude oil production and oil exports in

Venezuela, Beijing's relations with the United States are likely to become more complex as it competes with the United States over Venezuelan oil supplies, i.e., Venezuela currently exports 2/3 of its oil supply to the United States.

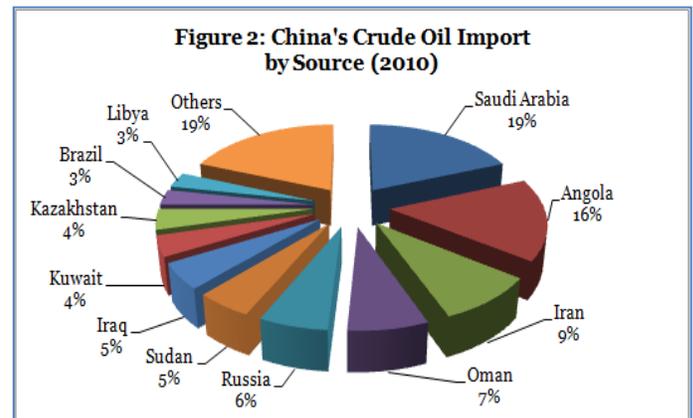
As for energy relations with Iran, based on U.S. Energy Information Agency data, China imported 9 percent Iranian crude oil in 2010. With tensions rising between Iran and the West, there were debates in the Chinese media over whether the People's Liberation Army (PLA) should support Iran in the event of a U.S. attack.

Interestingly, according to a Chinese analyst, Russia's interest in Iran outweighs China's. Accordingly, while China benefits from Iranian oil, there is no need for PLA involvement in Iran other than to provide arms sales and to offer moral support.<sup>15</sup> However, in light of China's 2010 energy shortages, can China really do without the 9 percent of Iranian oil?<sup>16</sup>

Like any rational actor, China is constantly looking to diversify its energy sources and secure stable energy partners. In light of rising tensions in the Middle East, if Beijing decides to gradually decrease oil imports from this region, its alternatives are: Latin America, i.e., Venezuela, Brazil; North America, i.e., the United States and Canada<sup>17</sup>; Central Asia, i.e., Turkmenistan, Kazakhstan, and Uzbekistan; Africa, i.e., Angola and Sudan; and Russia.

Whether or not conflicts will erupt between China and the United States over any of the above-mentioned sources,<sup>18</sup> Beijing is poised to increase its energy investments regardless of the political backlashes.<sup>19</sup> While China seeks alternate oil resources, these sources are too far away.

There is a popular Chinese saying: "Water from afar cannot put out a fire close at hand" [远水救



Source: U.S. Energy Information Agency (2011)

不了近火]. It means a slow remedy cannot meet an urgency. In the context of China's energy security, with Chinese energy imports coming from various continents of the world and cross-countries, transporting and building adequate infrastructures takes time, making it difficult to quickly resolve China's current energy issues.

From Beijing's perspective, the closest, and the most secure oil & gas resources in the long-run should lie within the East and the South China Seas.

### *Balancing Interests in the Maritime Silk Road and Relations with Regional Stakeholders*

China's supply-side energy security involves securing transport routes and choke points at sea, diversifying its energy mix, strengthening its petroleum storage capacity, and managing foreign relations.

As China grows, its energy interests will expand. In light of rising geopolitical tensions in the Middle East and Africa, in order to further strengthen its oil supply chains, Chinese oil companies and the PLA may become more assertive with regard to protecting China's Maritime Silk Road, i.e., the South and East China seas.

In the East China Sea, disputes center on the overlapping exclusive economic zone between China and Japan. The East China Sea is estimated to hold nearly 17.5 trillion cubic feet of natural gas and it could hold 20 million

barrels of oil.<sup>20</sup> Thus, the right to develop natural resources in the area is the main cause of tension.

Interestingly, with both China and Japan alarmed at one another's military build-ups,<sup>21</sup> the possibility of China-Japan renegotiation over East China Sea demarcations seems unlikely. However, one Chinese media source speculated that the possible renegotiation might be a smoke screen to advance each party's own interests not pertaining to resources in the East China Sea.<sup>22</sup>

Turning to the South China Sea, certain PLA activities have been interpreted in the Chinese media as Beijing sending clear signals to Vietnam and the Philippines that it is prepared to defend China's claims in the South China Sea.<sup>23</sup>

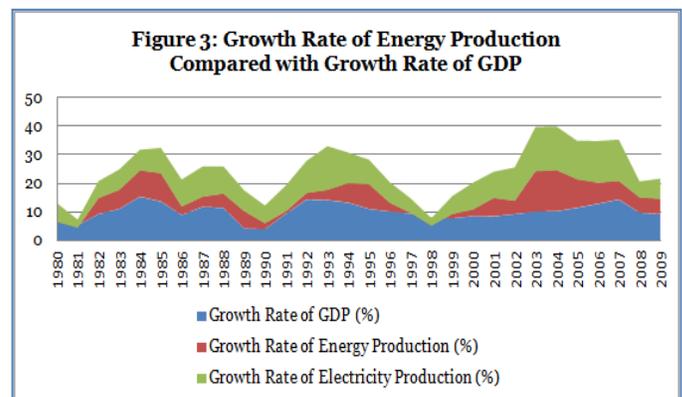
Not only is the South China Sea abundant in natural resources, it also leads to The Strait of Malacca – one of the world's most strategic chokepoints, second to The Strait of Hormuz. The Malacca Strait is a narrow channel that is considered to be the shortest transport route between the Persian Gulf and East Asia, and oil shipments through the Strait mainly supply China and Indonesia.<sup>24</sup>

Approximately 50,000 vessels and 15 million barrels of oil and petroleum products are transported via the Malacca Strait per day.<sup>25</sup> In order to increase the security of oil transports, alternatives have been proposed and enacted. For example, the construction of a China-Burma oil pipeline.<sup>26</sup>

### *Lack of Strategic Petroleum Reserves (SPR)*

In 2000, China relied on less than 30 percent imported oil, but by 2009 China's reliance on imported oil reached over 50 percent. As a result, strengthening SPR capacity became China's top priority in managing energy security.

In 2007, China's National Development and Reform Commission (NDRC) announced the official construction of SPR. In order to strengthen the SPR construction and management system, China plans to complete a three-phase construction within 15 years.<sup>27</sup> The goal is to reach the international standard of 90 day storage capacity by 2020.<sup>28</sup>



Source: *China Energy Statistical Yearbook 2010*

According to China's State Bureau of Material Reserves under the NDRC, China reached 30 day SPR capacity in March 2011.<sup>29</sup> The country's phase I SPR construction is located along its eastern coastal region. Under phase I, four separate SPRs were completed in Zhejiang, Zhoushan and Zhenhai, Liaoning Dalian, and Huangdao Shandong.<sup>30</sup>

Phase II SPR construction began in September 2010; possible locations for the eight SPRs include: Zhanjiang, Huizhou, Guangdong, Gansu Lanzhou, Jintan, Jinzhou, Liaoning, and Tianjin.<sup>31</sup>

Phase III is currently under review as China's provincial governments bid to be selected as one of the SPR locations; possible locations include: Chongqing Wanzhou District, Hainan Province, and in Caofeidian [曹妃甸], Hebei province.<sup>32</sup>

Looking ahead, China will continue to be vulnerable when it comes to crude oil supply. Given that China's price elasticity for crude oil is perfectly inelastic from 1970-2008 (see Table 1) meaning changes in oil prices have a relatively small effect on the quantity of oil demanded. This behavior highlights China's lack of alternatives to cushion international oil prices and its dependence on imported oil.

**Table 1: Demand for crude oil**

	Oil Consumption Percent Growth Per Capita	Real GDP Percent Growth Per Capita	Price Elasticity	
			Short-run	Long-run
China	3.6	8.6	0.001	0.005
Japan	-1.0	8.1	-0.071	-0.357
United States	-0.7	2.0	-0.061	-0.453

Source: OPEC Energy Review<sup>33</sup>

### *Natural Gas: Domestic Price Reforms and Balancing Relations with Russia and Central Asian Countries*

Natural gas is playing a bigger role in China's 12<sup>th</sup> Five-Year period. By 2015, Beijing aims to increase natural gas supply to 8 percent, a 4 percent increase from its 2010 target.<sup>34</sup>

While Beijing doubles its natural gas supply from 2010 and increased liquefied natural gas imports to 10.7 million metric tons – about a 30 percent rise – complications associated with this move are twofold: First, China's wholesale

suppliers lose out in the current system on profiting from natural gas imports.<sup>35</sup>

Second, while China gets cozy with Turkmenistan, Kazakhstan, and Uzbekistan on securing gas supplies, and appears to have an upper hand in price negotiations with Moscow on gas,<sup>36</sup> Beijing's relations with Russia might be strained as it decreases Gazprom's sphere of influence in Central Asia by cutting Russia out as the middle-man.

### *Coal Transportation Reached Bottleneck*

In 2008, 79 percent of China's electricity production came from coal and 17 percent came from hydro-electric power.<sup>37</sup> Because oil only represents 1 percent of the country's electricity production, coal is still the most stable source for Chinese power. The issue with coal for power is logistical: transportation of coal from less developed regions to more developed regions of China. Moreover, the Chinese railway has bottlenecked for coal transport.

For example, transportation via rail is a crucial component in less developed areas like Shanxi and Inner Mongolia. As China's top coal production provinces, efficiency in transporting coal to the Eastern region could cut costs for consumers.

Currently, 80 percent of China's coal for power is transported via railway.<sup>38</sup> The problem is that about 45 percent of total railway use is for coal transport, but only two railways are dedicated solely to coal transportation.<sup>39</sup> The rest of coal is transported via a rail system that also accommodates passengers and other cargo.

Recognizing issues with coal transports, China's 12<sup>th</sup> Five-Year plan offers little incentive for the government/coal industry to

increase transportation efficiency because profit for coal power is steadily decreasing.

Looking forward, China's coal transportation may remain inefficient because of: 1) high priorities given to passenger rail expansions,<sup>40</sup> 2) reducing coal consumption through coal caps and higher electricity price for end consumers,<sup>41</sup> and 3) the fact that coal production already hit record high in 2011 in Shanxi and Inner Mongolia.<sup>42</sup>

### *The Renewable Industry: Technology and Infrastructure Reached Bottleneck*

Despite booming activities in the renewable energy industry, the thrust of China's energy policy is still focused on developing clean coal technology (liquefied and gasified), off-shore oil exploration, hydro, and nuclear power.<sup>43</sup>

Currently, new energy sources (i.e., geothermal, solar, and wind) only occupy 0.5 percent of China's total domestic energy consumption, while nuclear energy represented 0.7 percent of China's total energy consumption in 2010.<sup>44</sup>

Despite laying claim to such a small percentage of China's domestic renewable energy consumption, China's clean energy industry is thriving. For example, its wind power market and installation capacity is growing rapidly and is second in the world in terms of installation capacity.<sup>45</sup> Although China is making great leaps towards expanding non-fossil fuel resources, the country's grid infrastructures are unable to keep up well enough to complement its installation capacity.

With Beijing's aim to hit 100GW wind power generation by 2020<sup>46</sup> coupled with inadequate grid interconnections and transmission costs,<sup>47</sup> it is hard to say exactly how much China's installed wind turbines will benefit its domestic consumers.

As for the electric vehicle industry, due to battery technology and infrastructure bottlenecks, electric cars are unable to compete with traditionally fueled vehicles. Due to technology issues, public vehicles have reported incidents of spontaneous combustion.<sup>48</sup> As for private electric vehicles, it is unlikely that the market will take off without proper infrastructure (i.e., and adequate amount of charging stations per number of vehicles owned) to compliment the level of targeted electric vehicles to be produced.

According to China's national mid- to long-term science and technology development planning guideline, for the period between 2006-2020, China's 863 Plan focuses on boosting developments of clean coal technology,<sup>49</sup> electric vehicles,<sup>50</sup> wind turbines (low wind speed),<sup>51</sup> and grid infrastructures. Ultimately, China's 12<sup>th</sup> Five-Year Plan still focuses on economic stimulation through subsidizing the electric auto industry, renewable sectors, and lending practices, etc. In the end, targets set to achieve GDP growth appear to trump energy governance and environmental management objectives.

### **Demand-Side Challenges**

#### *Growing Industries and the Building and Transportation Sectors*

China is faced with three major energy challenges. First, it consumes 48 percent of the world's share of coal<sup>52</sup> and powers itself with 71 percent coal. With 65 percent of its energy consumption going towards its industries,<sup>53</sup> coupled with the fact that its transportation and building (commercial and residential) sectors are poised to grow, powering and fueling the country will only become increasingly challenging for the CCP.

Since its 1978 economic reforms, China's contracted projects with foreign countries/territories increased from one to over 246,000 in 2011.<sup>54</sup> Consequently, China's rise in per-capita GDP, output of major industrial products, and commercial activities call for more energy. Couple these factors with real estate growth – with floor areas under construction increased by 33.4 billion square meters, new housing increased by 24.4, and completion of real estate is 14 percent higher than in 2010.<sup>55</sup> The people in China will likely desire more energy consuming items such as air conditioning, lighting, computers and home appliances.

The second challenge facing China's energy mix is its increased reliance on imported oil and its lack of strategic petroleum reserves (SPR). According to BP Statistical Review, China's oil consumption in 2010 occupied 17.6 percent of its energy mix and it will account for 42 percent of the world's oil demand by 2015.<sup>56</sup> Given that China's energy and electricity consumption fluctuates with its GDP growth, it is unlikely that the country will achieve energy security as long as it lacks capacity to balance growth and energy consumption/governance.

#### *Expansion of the Chinese People's Liberation Army (PLA)*

In addition to fueling civilian energy needs, the third challenge to China's energy security is its military expansion and its commitment towards escorting vessels and combating pirates at sea. China's energy insecurity will be exacerbated as additional energy is required to fuel the expansion of the PLA, PLAN, PLAAF, and military operations other than war.

Based on statistics from the Operations Department under the PLA General Staff Headquarters (GSH), since 2008, the Chinese military has organized 2.444 million

servicemen, 7.82 million militiamen and reservists, and dispatched more than 6,700 aircraft/sorties for military operations other than war.<sup>57</sup>

With increased military and non-military activities, it would be interesting to see whether fueling the PLA will trump feeding China's economic growth.

### **CAN CHINA ACHIEVE ENERGY SECURITY IN A HARMONIOUS WORLD?**

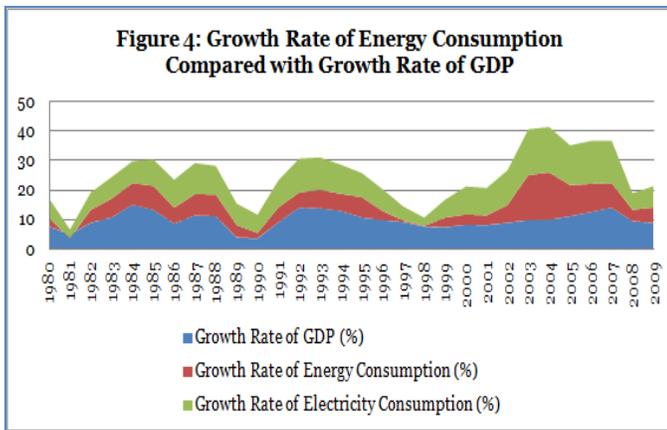
From Beijing's perspective, the existing international system may appear disadvantageous to its national development. However, Beijing needs to realize that its domestic challenges are more destabilizing to China than its perceived external threats.

In 2010, the southern and the eastern regions of China experienced serious energy shortages.<sup>58</sup> This should serve as wake up call to Beijing that, instead of investing towards more economic stimulation and military transformation, China's alternative domestic/foreign policies should be: 1) to provide incentives (i.e., subsidies/promotions) for energy/environmental management objectives that outweigh incentives for GDP growth, 2) to focus on building complimentary infrastructures i.e., railways, power grids, and charging stations, and 3) to slow the pace of military development and activities until the domestic energy situation is adequate.

### **CONCLUSION**

In terms of energy security, China acts just like any rational actor. Its energy policies will be driven to achieve security of supply, to manage demand, and to mitigate price effects. Yet the CCP appears slow to recognize that

energy/environmental policies should not be used as another tool for economic growth.



Source: *China energy Statistical Yearbook 2010*

With limited resources, Beijing has to balance economic and military growth to mitigate energy insecurity. And the Chinese people want a vibrant economy and secure energy/environmental/water supplies. According to a recent survey, Chinese citizens have high expectations for their local economy,<sup>59</sup> and energy users have attached high importance to energy/environment/ water securities.<sup>60</sup> In light of its current energy dilemmas, China may not be able to afford to rapidly develop both its economy and its military.

Furthermore, Beijing needs to balance the trade-off between *cheap* and *clean* energy, as well as tread carefully between ensuring *undisrupted oil supplies* and managing *foreign relations*. Issues related to energy supply, demand, and price will continue to take center stage for Chinese policy makers but they will not be the sole driver of foreign policy.

With a growing appetite for energy and with the world in recession, China has the opportunity to catch up on energy/environmental governance and build complimentary infrastructures. While rich

nations cut back on purchasing Chinese goods, the CCP should recalibrate its priorities with governance and build complimentary infrastructures to increase energy/policy efficiency, instead of obsessing over economic growth.

When it comes to energy security, the worst case scenario is if China, and other stakeholders, treat energy policies as a zero-sum game, because then only one winner takes all. Instead, the most advantageous strategy would be for all stakeholders to cooperate in order to minimize costs for all.

In the final analysis, it appears that China's sense of energy vulnerability is rooted more in internal challenges than its sense of external threats like the United States.

However, while Beijing recognizes its internal challenges and is bogged down by attempts to achieve energy efficiency, external interference that threatens China's sense of energy well-being, i.e., the East Sea and the South China Sea disputes, will likely be met with more assertive responses.

*Jenny Lin is a Researcher for Project 2049 Institute. The author gratefully acknowledges the edits contributed by Shane A. Pennington and Ali Dhanai. She likes to thank Dr. Richard Andres for his constructive feedback, and Mark Stokes for his suggestion in improving the section related to SPRs in China. She also would like to thank Russell Hsiao for his initial comments.*

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