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One Belt One Road and the Future of Chinese Energy Security

一帶一路與中國大陸能源安全的未來

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Abstract

The Belt and Road Initiative is China's latest economic development strategy, which seeks to connect China to the rest of Eurasia through infrastructure development and trade. While not a dedicated energy strategy, components of the initiative will play a role in meeting China's growing energy needs.

This paper examines the Belt and Road Initiative in the greater context of China's energy policy by comparing it to China's "going-out" strategy of the late 1990s. It assesses the impact that Belt and Road projects will have on China's energy security by first defining how China views its energy security and then analyzing how Belt and Road projects address China's energy security concerns.

This paper finds that the Belt and Road Initiative can be considered a successor to the "going-out" strategy. It also finds that China views energy security primarily through the lens of supply, and that Belt and Road projects such as port and pipeline construction contribute by ensuring reliability of transport.

Keywords: Chinese energy security, One Belt One Road, Belt and Road Initiative

摘要

一帶一路倡議是中國最近的經濟發展策略，其目的是透過基礎設施發展和貿易，將中國與歐亞大陸的其他國家連結在一起。儘管並非單純為了能源所規劃的策略，但是倡議的組成部分對中國提供日增的能源需求扮演了一個角色。

本論文透過與 1990 年代末中國走出去策略之比較，在中國能源需求的大架構下，檢驗一帶一路倡議。為評估一帶一路倡議對中國能源安全的影響，本論文首先界定中國對能源安全的見解，然後分析一帶一路計畫如何應對中國對能源安全的關切。

本論文發現一帶一路倡議可視為走出去策略的後續策略。此外，本論文也發現中國主要是透過供應的角度來觀察能源的安全，且一帶一路計畫（如，石油和天然氣管道的構築）確保了能源運輸的可靠性。

關鍵詞：中國大陸能源安全，一帶一路

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Acronyms and Abbreviations

Bbl – barrel (of oil)
Bcm – billion cubic meters (of natural gas)
CNOOC – China National Offshore Oil Company
CNPC – China National Petroleum Company
E&P – exploration and production
LNG – liquefied natural gas
NDRC – National Development and Reform Commission of the People's Republic of China
NOC – national oil companies: CNPC, Sinochem, CNOOC, and Sinopec
OBOR – One Belt One Road
SPR – Strategic Petroleum Reserve
Tcf – trillion cubic feet (of natural gas)

Chapter One: Introduction

1.1 Background and Motivations

In the almost four decades since China began its economic reforms, it has experienced unparalleled economic growth, making China a near-peer of the United States in terms of its economic influence. At first, Chinese plans for growth had an entirely domestic focus; during the Great Leap Forward, Chinese economic planners called upon the Chinese people to produce steel in makeshift backyard furnaces so that China might catch up to the West in steel production.[1] As China's economy began to liberalize in the late 1970s and early 1980s, there was an understanding that growth could only come with integration into the global economy, which culminated in China's entry into the World Trade Organization in 2001. Now that China has become one of the largest economies, and armed with the financial resources that come along with that success, it is in a position to leave its own mark on the global economy, and shape it to China's own benefit. This has become particularly critical in recent years, as its gross domestic product (GDP) growth rate has dipped from double digits to a still-impressive 6.7%.[2]

As with any other country, one of the main drivers for China's growth has been reliable access to energy. In order for China to sustain its current levels of GDP growth – as well as transition towards a consumption economy – it will need to ensure continued access to energy flows. Unexpected fluctuations in oil supplies, such as the ones faced by the West during the 1973 OPEC oil embargo, have proven to be disruptive to national economies. China has been a net importer of energy since the early 2000s and its need for foreign energy continues to grow year after year. One of the challenges that the government faces is

[1] June Teufel Dreyer, *China's Political System: Modernization and Tradition*, 8 ed. (Pearson, 2012), 99.
[2] Scott Cendrowski, "China's Gdp Growth Hits 6.7% for the Third Straight Quarter. What Are the Odds?," Fortune, http://fortune.com/2016/10/19/china-dp-growth/; ibid.

maintaining stable access to energy regardless of changes in the global situation so that it can maintain desired levels of growth.

China is unlikely to completely insulate itself from fluctuations in the global supply of energy in the immediate future, but there is much that it can do to ensure a steady flow of oil and gas into its borders. One way in which the Chinese leaders seek to both maintain economic growth and acquire energy is through the Belt and Road Initiative, a project that "aims to promote the connectivity of Asian, European and African continents and their adjacent seas," and further expand the linkages between China's economy and the rest of the world.[3] The Belt and Road Initiative, sometimes known as "One Belt One Road," is China's latest economic development strategy, which aims to connect China to the West, much as the ancient Silk Road connected China to Europe through central Asia. In 2013 President Xi Jinping announced the earliest incarnation of the initiative in a speech at Kazakhstan's Nazarbayev University. In this particular speech, Xi proposed a jointly built "economic belt along the Silk Road…benefitting the people of all countries along the route."[4] The five key points of this plan were increased policy communication, improved road connectivity, unimpeded trade, enhanced monetary circulation, and increased people-to-people understanding.[5] One month later, in a speech to the Indonesian Parliament, Xi proposed "a joint effort to build the Maritime Silk Road of the 21st century."[6] The five points that he emphasized in this speech are increased "trust and neighborliness, win-win cooperation, standing together, enhanced mutual understanding and friendship, and increased openness and inclusiveness."[7] The Belt and Road is not exclusively about energy, but energy is

[3] National Development and Reform Commission, Ministry of Foreign Affairs, and Ministry of Commerce, "Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road," (Beijing2015).
[4] Jinping Xi, "Promote Friendship between Our People and Work Together to Build a Bright Future."
[5] "Speech to Indonesian Parliament."; "Promote Friendship between Our People and Work Together to Build a Bright Future".
[6] "Speech to Indonesian Parliament".
[7] Ibid.

explicitly mentioned as being an area of focus, whether by improving energy infrastructure, ensuring the physical security of pipelines and transport routes, or creating "an integrated chain of energy and resource cooperation."[8]

1.2 Research Question

The two research questions that this paper will seek to answer are as follows:

Where does the Belt and Road Initiative fit in the context of China's energy policy? What impact will this initiative have on the future of China's energy security?

While the Belt and Road Initiative is not an energy-focused initiative, energy is prominently featured in official documents and in scholarly discussions about the Belt and Road. China's energy concerns are not new, and One Belt One Road is only China's most recent attempt to address these concerns. For the purposes of this thesis, "energy security" will refer to China's ability to maintain sufficient access to the global energy market.

Chapter 2 will cover the literature of energy security, along with a section explaining why oil is particularly important. Chapter 3 will provide an overview of China's energy policy through the "going-out" period, which will be followed by an overview of the Belt and Road Initiative in Chapter 4. Chapter 5 will look more specifically at China's energy security concept and how the Belt and Road Initiative addresses that concept.

1.3 Research Importance

Although China is able to produce some of its own oil, it has been a net importer of oil since 1993, and the gap between consumption and domestic production continues to grow with each passing year; in 2005 China was able to produce 3.52 million barrels of crude oil per day, but consumed approximately 6.75 million barrels per day, meaning that it had to

[8] National Development and Reform Commission, Ministry of Foreign Affairs, and Ministry of Commerce, "Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road."

import 3.23 million barrels per day to make up the difference.[9] China became a net importer of natural gas in 2006 and a net importer of coal in 2007.[10] In 2012, China became the world's largest energy consumer, "accounting for 11 percent of oil, 3.5 percent of natural gas, and nearly half of all coal consumption worldwide."[11] Although the lion's share of China's hydrocarbon consumption comes from coal, China is still heavily reliant on foreign oil; in 2015 oil imports increased to 7.4 million barrels/day, which is the highest figure in history.[12]

	Reserves/production ratio (R/P)	**Production**	**Consumption**	**Imports**
Oil	11.7	214.6 million tonnes (1.5% increase)	559.7 million tonnes (6.3% increase)	365.8 million tonnes (9.4% increase)
Natural gas	27.8	138.0 bcm (4.8% increase)	197.3 bcm (4.7% increase)	59.8 bcm (3.4% increase)

Table 1.1: A summary of Chinese oil and natural gas statistics in 2015 (2016 BP Statistical Review)

While renewable energy production has also grown, there are no signs that China's thirst for foreign energy will abate in the near future. China's success in managing its growing energy demands will be critical to its ability to maintain the health of its economy. Understanding how China views its energy needs will help outside observers interpret the direction of its energy policy, and it would be helpful to know what China hopes to achieve as a result of its significant investment into the Belt and Road Initiative

[9] Robert E Ebel, *China's Energy Future: The Middle Kingdom Seeks Its Place in the Sun* (Washington D.C.: CSIS Press, 2005), 11-12.
[10] Antje Nötzold, "Chinese Energy Policy and Its Implication for Global Supply Security," *The Journal of East Asian Affairs* 26, no. 1 (2012): 132.
[11] Ibid., 129.
[12] "Bp Statistical Review 2016," news release, 2016.

1.4 Research Limitations

A major limitation of this study will be a dependence on English-language sources due to the author's limited ability to read Chinese. Another limitation is the lack of access to sources that might provide insight as to the Chinese government's true, self-interested motivations behind One Belt One Road, or access to official blueprints covering the full scope of the Belt and Road Initiative. Official documents proclaim that the initiative is meant to be a win-win for all parties across various economic sectors, but it would be interesting to see its specific objectives with regards to energy.

This paper will rely on Chinese official documents that are available in English. In order to make effective use of official documents that are only available in Chinese, the author will rely on his adviser to identify relevant sections that the author can translate himself.[13] This should largely mitigate limitations of language. Without access to inside sources, this paper will have to rely on open-source information such as

1.5 Research Methodology and Approach

This paper will address the first question ("where does the Belt and Road Initiative fit in the context of China's energy policy?") by conducting a historical analysis of Chinese energy policy using both primary and secondary sources. It will compare the implementation of the "going-out" strategy to the Belt and Road Initiative, which is appropriate because they are both development strategies that have been promoted by the central government. China's energy policy of course covers everything from electricity generation to investing in renewable resources, but this paper will focus specifically on the part of China's energy policy related to acquiring energy resources.

[13] All translations were done by the author unless otherwise noted.

This paper will address the second question ("what impact will this have on the future of China's energy security?") by examining official documents and primary sources in light of existing energy security literature in order to argue that China maintains a particular view of energy security. It will then analyze the potential impact of Belt and Road projects against that concept. While some scholars have attempted to created quantitative models of energy security, they are not appropriate for this paper because their underlying assumptions about energy security do not match what this paper believes to be China's assumptions about energy security. Additionally, to the extent that these models match a particular view of energy security, they are better suited to tracking changes in energy security over time than they are predicting possible outcomes.

Chapter Two: Literature Review

2.1 One Belt One Road

The Belt and Road Initiative is a relatively recent development and many of the proposed projects are either in their preliminary phases or have yet to leave the drawing board. Therefore, much of the existing scholarly literature can only speculate about the possible results of One Belt One Road.

In March 2015, the National Development and Reform Commission, the Ministry of Foreign Affairs, and the Ministry of Commerce released the official action plan for the "Belt and Road Initiative."[14] While the published plan contains more specific points than Xi's speeches, Christopher Johnson of the Center for Strategic and International Studies (CSIS) describes OBOR as "more of a sweeping vision with a multitude of objectives than an operational blueprint," and adds that foreign officials have remarked that Beijing "has been slow to table specific proposals for cooperation and nobody seems in overall control."[15] However, he also concedes that Asian demand for infrastructure "makes it likely that OBOR, though certainly running into painful obstacles now and again, will come out the other end with some modicum of success."[16]

Zhao Minghao, writing more specifically about One Belt One Road's impact on relations between China and the European Union (EU), draws similar conclusions. Similar to Johnson, Zhao identifies a number of potential challenges to One Belt One Road's success, such as suspicion from regional powers about China's true motivations behind One Belt One Road a lack of Chinese knowledge, experience, and capacity "in dealing with the governmental and non-governmental actors in Central Asia, South Asia, and the Middle East,"

[14] For clarity, it should be noted that "One Belt" refers to the overland Silk Road Economic Belt and "One Road" refers to the proposed new Maritime Silk Road.
[15] Christopher K. Johnson, "President Xi Jinping's "Belt and Road" Initiative," (Center for Strategic & International Studies, 2016), vi.
[16] Ibid., 23.

as well as the broader problem of "synergizing China's governmental and civilian power."[17] Given the geopolitical and geo-economic challenges facing the EU, Zhao believes that the EU will engage with One Belt One Road in order to give itself the flexibility it needs to stabilize its relations with Russia and also gain the leverage it needs to "reshape international rules regarding trade and investments."[18]

Irina Pop delves deeper into the issue of regional rivalries as a potential stumbling block for widespread implementation of One Belt One Road. The major players she points to are Russia, the United States, Japan, and India. Although Russia is a major economic partner with China through its membership in the Shanghai Cooperation Organization (SCO), Pop argues that Russia may see China's proposed projects in Central Asia as a push into an area that Russia has traditionally considered as its own backyard. Despite the fact that the two countries have established cooperative frameworks, Pop argues, "Russia is not an easy partner to work with, as its actions can be unpredictable and could undermine China's confidence in Russia."[19] Like Russia, India also feels that OBOR encroaches on its traditional sphere of influence; it sees the maritime component as a "string of pearls" meant to encircle it.[20]

For its part, Chinese leadership has done much to portray One Belt One Road as something that other nations should embrace. In his analysis of Chinese views and commentary on One Belt One Road, Michael Swaine notes that Chinese officials and observers focus heavily on the benefits that other nations stand to gain by taking part in One Belt One Road; he quotes a Chinese official who describes One Belt One Road as "an offer of a ride on China's economic express train. [OBOR] is a public product for the good of the

[17] Minghao Zhao, "China's New Silk Road Initiative," *Istituto Affari Internazionali* 15, no. 37 (2015).
[18] Ibid., 10.
[19] Irinia Pop, "Strengths and Challenges of China's "One Belt, One Road" Initiative," (London: Centre for Geopolitics & Security in Realism Studies, 2016), 9.
[20] Ibid., 10.

whole world."[21] Indeed, much of the Chinese commentary that Swaine paints OBOR in an altruistic light – as a service that China is generously providing to Eurasia. In this regard, it is also frequently contrasted with the American Marshall Plan, and the Bretton Woods system that followed, "which practically ensured the absolute dominance of the U.S. currency. But China does not want that."[22]

Not all commentators share this rosy view of Chinese intentions: Swaine identifies a number of non-authoritative Chinese commentators who see possible ulterior motives behind One Belt One Road, such as "shaping the perceptions of other powers so that they 'do not make trouble for China.'"[23] Nor are all commentators as quick to accept that One Belt One Road will be an obvious success: some wonder whether "the Chinese approach" to economic development will necessarily work in other countries.[24] Swaine himself feels as though Chinese commentators fail to see the true breadth of obstacles that One Belt One Road faces, whether glossing over the poverty in some of the region and the "limited experience in undertaking huge infrastructure projects", or the potential "political and cultural 'blowback' that could harm China's image or increase instability and heighten geopolitical tensions."[25]

With regards to One Belt One Road's impact on energy policy, Lu Ruquan, an employee of China's National Petroleum Corporation (CNPC), writes that "[w]hen analyzing OBOR, the oil and gas industry is a strategic industry that no one can exclude."[26] He points out that Xi Jinping's decision to announce the One Belt One Road framework in Kazakhstan was a deliberate one, given that China has important strategic (read: oil) interests in Kazakhstan. He explains that Chinese oil companies have in effect been laying the

[21] Michael Swaine, "Chinese Views and Commentary on the "One Belt, One Road" Initiative," *China Leadership Monitor* 47 (2015): 10.
[22] Ibid., 11.
[23] Ibid., 14-15.
[24] Ibid., 12.
[25] Ibid., 15.
[26] Ruquan Lu, ""One Belt, One Road": China and the "Oil Roads"," *China Oil & Gas* 3 (2016). 7.

groundwork for One Belt One Road in Kazakhstan and Central Asia over the last decade, with more than USD 40 billion of investments in "exploration and production, transportation by pipelines, refining, marketing, engineering services, and international trade."[27] He lays an image of "oil roads", with China and Russia as two key points, the six Central Asian countries as footholds, and the five South Asian countries – namely Myanmar, Bangladesh, India, Pakistan, and Afghanistan – as upgrade points; the Middle East and Africa are relegated to "outskirts and important substitutes."[28] Lu emphasizes that Russia must be included because it has the world's largest gas reserve and the 8th largest oil reserve, and that the Central Asian countries are important either as suppliers of oil or as vital transit countries for oil and gas pipelines.

2.2 Energy Security

The concept of "energy security" is a relatively recent one. Generally speaking, it refers to the importance of energy policy as a facet of national security. Since the end of the Cold War, national power has been "associated with economic dynamism and the cultivation of technological innovation." [29] It is not enough for a state to have a large standing army if it is not "balanced by a strong and vibrant economy."[30] While oil has been considered a critical natural resource since the early 20th century, when the British Empire began using oil to fuel its ships, the developed world's dependence on oil would not become truly apparent until 1973, the year that the Organization of Petroleum-Exporting Countries (OPEC) cut off all petroleum exports to the United States and cut back on its exports to other countries in

[27] Ibid.
[28] Ibid., 10.
[29] Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict* (New York: Henry Holt, 2002), 7.
[30] Ibid.

response to American support for Israel in the 1973 Yom Kippur War.[31] Klare explains that "[f]rom this time on, oil was seen not only as an essential military commodity but also as a prerequisite for global economic stability."[32]

In order to decrease their vulnerability to future oil shocks, oil-importing countries such as the United States began searching for more secure petroleum deposits and established safeguards such as the Strategic Petroleum Reserve. When the Iranian Revolution of 1979 replaced the pro-American Shah with an anti-American government, the United States experienced a second oil shock, which prompted President Jimmy Carter to declare that any attempts to restrict the flow of oil in the Persian Gulf "will be repelled by any means necessary, including military force," a stance known as the Carter Doctrine.[33] The forcefulness of the Carter Doctrine indicates that the United States views continued access to oil as a matter of national security, and this claim is strengthened by the frequency with which terrorist organizations have called for attacks on energy infrastructure. One al-Qaeda spokesman referred to oil as "the provision line and the feeding artery of the life of the crusader nation."[34] Daniel Yergin argues that for terrorists "the energy system looms as an all too obvious target for disrupting both the economy and society."[35]

Much of the literature on energy security begins by mentioning the lack of a universal definition of energy security. This paper will group the field of energy security scholarship as being divided into two primary schools of thought: a more traditional concept that prioritizes access to and acquisition of raw energy supplies, and a more comprehensive one that includes factors less directly related to supply such as environmental impact or sustainability.

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[31] Ibid.
[32] Ibid.
[33] Ibid., 33.
[34] Gal Luft, "A Crude Threat," *The Baltimore Sun*, 6 April 2004.
[35] Daniel Yergin, "Energy Security and Markets," in *Energy & Security: Strategies for a World in Transition*, ed. Jan H. Kalicki and David L. Goldwyn (Washington D.C.: Woodrow Wilson Center Press, 2013), 81.

This division maps closely to how Wei et al. identify the overall concept of energy security as being split between the energy economic security aspect (supply safety) and the ecological environmental safety aspect (using safely).[36] Their explanation of energy security will be mentioned first because it is unique in that rather than trying to prioritize one aspect over the other, they link the two. They argue that states transition from one to the other as they develop; a state must first be able to meet its basic energy needs before it can move on to other concerns.

Wei et al. define what they call "energy economic security" as "the stability of normal demand of energy supply which meets the country's survival and development."[37] They use two benchmarks to measure supply safety: that the state has sustained access to energy without serious shortage ("serious" meaning that the supply shortage gap is "less than 7% of the previous year's important volume), and that oil prices are not unbearably high.[38] Unfortunately they do not specify how high oil prices would have to be in order to qualify as unbearable. According to their explanation, states prioritize supply safety when they are industrializing because rapid economic growth requires consistent access to energy. At the same time, lack of development means that the state is limited in its ability to respond to energy emergencies, nor has there been an opportunity to establish buffers such as a strategic reserve.

As states mature and industrialization runs its course, the country has expanded its industrial capacity, built up reserves, and economic growth is not quite as pressing because productivity and quality of life are both high. Wei et al. believe that only when these conditions are met will people will focus not only on maintaining supply, but also on ensuring that energy usage does not threaten the environment or humanity.

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[36] *Energy Economics: Modeling and Empirical Analysis in China*, (CRC Press, 2010), 220.
[37] Ibid.
[38] Ibid.

Wei et al. take care to note that the primary focus of energy security can change as the international situation changes: as scholars like Klare and Yergin have argued, energy (and oil in particular) is a strategic good during wartime, and so nations have no choice but to prioritize security of supply when at war.

2.2.1 Traditional Concept

When the primary focus of energy security is security of supply, insecurity results from reduced supply, whether because prices climb or because of political instability. While there are varying explanations of energy security even within this view, the most commonly mentioned factors are physical supply and the market price of energy. Political instability is considered a factor that negatively affects both, and is also frequently mentioned.

Cherp and Jewell provide a broad overview of three primary perspectives of energy security, all of which seem to fall under the traditional concept. They label these the "sovereignty" perspective, the "robustness" perspective, and the "resilience" perspective. [39] They define the central question of the sovereignty perspective as "who controls energy resources and through which mechanisms?"[40] This perspective is the oldest of the three and can be said to have come into being when the British Navy switched from domestic coal to imported oil in the early 20th century. Oil was a critical resource during the first half of the 20th-century because of its use as a primary fuel for the military. After the Second World War, oil became important in the industrialized war not only as fuel but also for "food production, health care, manufacturing, heating, and energy generation," but most industrialized countries could not produce enough oil for their own use, especially when former oil-producing

[39] Aleh Cherp and Jessica Jewell, "The Three Perspectives on Energy Security: Intellectual History, Disciplinary Roots and the Potential for Integration," *Current Opinion in Environmental Sustainability* 3 (2011).
[40] Ibid., 3.

colonies became newly independent states.[41] The primary threats under this perspective are intentional, such as embargoes or the "malevolent exercise of market power", but these risks can be minimized by "casting military, political and/or economic control over energy systems" through alliances, deals, or military action.[42]

This thinking is in line with the view of the International Energy Agency, which in its 2008 World Energy Outlook stated that a key energy challenge of the modern era is "securing the supply of reliable and affordable energy."[43] Maria-Floriana Popescu takes a more pessimistic view of energy security, defining it as "the overlap between economic security, national security and the environment's security."[44] She argues that the importance of energy to the economy, and the way the economy "links the degrees of dependence, interdependence, and subordination of states" means that "competition for control and distribution of hydrocarbons" will only grow in intensity.[45] While this view is borderline zero-sum, the emphasis on naked competition over access seems to fit with the sovereignty perspective.

Cherp and Jewell's robustness perspective differs from the sovereignty perspective in that it is primarily concerned about "vulnerabilities of energy systems to factors other than politically motivated disruptions to access to oil and gas."[46] It introduces the idea of globally limited energy resources, whether in terms of actual physical limits or in terms of other constraints on energy consumption such as climate change. Under this perspective, threats are not directed, but instead occur naturally. These threats include "growth in demand, scarcity of resources, aging of infrastructure, technical failures, or extreme natural events," and can be

[41] Ibid., 1.
[42] Ibid., 5.
[43] International Energy Agency, *World Energy Outlook 2008* (Paris, France: International Energy Agency, 2008).
[44] Maria-Floriana Popescu, "The Economics and Finance of Energy Security," *Procedia Economics and Finance* 27 (2015): 467.
[45] Ibid., 472.
[46] Cherp and Jewell, "The Three Perspectives on Energy Security: Intellectual History, Disciplinary Roots and the Potential for Integration," 4.

managed by "upgrading infrastructure, switching to more abundant energy sources, adopting safer technologies, and managing demand growth."[47]

The resilience perspective is the newest of the three. Cherp and Jewell explain that this perspective developed after many countries de-regulated their energy supplies in the 1980s and 1990s, under the belief that "markets can deliver energy more efficiently and ensure necessary investment in energy infrastructure while the diversity of market actors guarantee[s] security of supply."[48] This commodification of energy products brought economic analyses to the forefront of energy security studies, shifting the focus from physical availability to the market price of energy itself. A related idea introduced during this period was that of diversifying risk. This idea came from risk analysis in investment portfolios, and posits "risks of failures of energy systems can be minimized by applying the mean-variance portfolio theory (MVP) in order to diversify among energy options with different risk profiles (as reflected in their price history)."[49] The threats that this perspective focuses on are considered inherently unpredictable and uncontrollable, such as unforeseen economic crises or booms, political regime change, or climate fluctuation. Because the resilience perspective sees threats as being unpredictable, it seeks to protect against them by "spreading risks and preparing for surprises."[50]

Andreas Löschel et al. refer to the IEA's claim that energy insecurity "stems from the welfare impact of either the physical unavailability of energy or prices that are not competitive or overly volatile,"[51] and attempt to expand on that definition but only to the extent that they want to operationalize "competitive" and "overly volatile". They are still

[47] Ibid., 6.
[48] Ibid., 4.
[49] Ibid., 5.
[50] Ibid., 7.
[51] Andreas Löschel, Ulf Moslener, and Dirk T.G. Rübbelke, "Indicators of Energy Security in Industrialized Countries," *Energy Policy* 38 (2009): 1665.

operating under the assumption that energy security is primarily about maintaining security of energy supply. Their contribution is a distinction between what they term "ex-post indicators" that explain energy-related economic frictions in the past, and "ex-ante indicators" which attempt to forecast potential causes of economic friction. One interesting finding is that factoring political risk of supplier countries can skew projections about energy security, which aligns with the idea of threat as put forth under the resilience perspective.

Daniel Yergin on more than one occasion combines features of Cherp and Jewell's three perspectives. He defines energy security simply as "the availability of sufficient supplies at affordable prices."[52] In 2006 he proposed four principles that policy-makers should attempt to abide by when thinking about energy security, a list which had grown to ten principles by 2013 (bolded items appeared on both lists):[53]

1. **Diversification**
2. The importance of the United States in the global oil market
3. **The need for a domestic security margin** (either spare capacity or emergency stocks)
4. **The role of resilient and well-functioning energy markets**
5. The importance of building relationships with exporting nations
6. The need for cooperative relations among importing nations
7. **The importance of high-quality information** (to prevent speculation and panic)
8. The importance of a robust domestic industry
9. The role of research and development
10. The importance of planning for disruptions

These principles are based on Yergin's recognition of the fact that there is only oil global oil market that determines prices, but that there are also a number of suppliers within that market of varying degrees of reliability. While he does not quantify what it means to meet these principles, they provide an easily understood framework for the traditional concept of energy security.

[52] Yergin, "Energy Security and Markets," 74.
[53] Ibid.; "Ensuring Energy Security," *Foreign Affairs* 85, no. 2 (2006): 75-80.

The focus on supply naturally means that threats to a nation's energy supply are threats to a nation's energy security. Philip Andrews-Speed classifies these threats into two categories based on the scope of their impact: global events and local events.[54] Five types of events exist under the global event category: policy discontinuities, fundamental discontinuities, force majeure disruption, export disruption, and embargo disruption. Policy discontinuity refers to "sudden and unpredictable" changes in price that come as a result of OPEC decisions to adjust output levels.[55] Fundamental discontinuity refers to "a long-term failure to invest in production, transportation or processing capacity [that] could result in an absolute shortage of supply of energy with respect to the global demand."[56] It stands to reason that this type of disruption would significantly impact the global economy for a period of years, as energy-importing countries struggle to cut back on their own energy consumption waiting for new infrastructure to be built. The next three disruptions are slightly more political in nature: *force majeure* disruptions are disruptions as a result of civil or interstate conflict involving exporting nations, or even trade route blockages. Export disruptions involve exporting nations deciding to cut back on exports, and embargo disruptions occur when importing nations embargo a specific exporting state.

Local events that can threaten a nation's energy security are embargo disruptions, logistical disruptions, and local market disruptions. Embargos can be general embargos of a specific importing state by the global community, or embargos by a specific oil exporter or even an oil transit state. A general embargo would be most damaging, but is unlikely due to difficulties in coordinating such an effort. A specific embargo is far more likely, and Andrews-Speed adds that embargos involving pipelines are far more meaningful than

[54] Philip Andrews-Speed, *Energy Policy and Regulation in the People's Republic of China*, ed. Thomas W. Wälde, International Energy and Resources Law and Policy Series (The Netherlands: Kluwer Law International, 2004), 337.
[55] Ibid.
[56] Ibid., 338.

maritime embargos because "[s]hips can be diverted, but pipelines are immovable."[57] Logistical disruptions can be accidental or deliberate (terrorism), and tend to be endemic over long distances, but are generally short-lived and can be mitigated. The final type of local disruption is the local market disruption, which occurs within a state. This type of disruption can result from government mismanagement or monopolist suppliers.[58]

In summary, the core of what I define as the traditional energy security concept is narrowly focused on threats to supply. Strictly speaking, it does not have to be about petroleum, even if petroleum seems to be a frequent focus of the literature. These principles are equally applicable to other resources such as natural gas or coal; shocks to the supply of any energy resource can be equally disruptive depending on a country's fuel mix.

2.2.2 Comprehensive Concept

In recent years, the concept of energy security has expanded to reflect what Lynne Chester calls its "polysemic" nature, which is to say that it is more multi-faceted than the traditional concept. She criticizes the traditional understanding of energy security as having an "almost overwhelming focus…on securing supplies of primary energy sources and geopolitics."[59] She speaks more favorably of broader concepts of energy security, arguing that "energy markets need to be considered through a multi-dimensional lens" which "include[s] notions such as adequacy of capacity to meet demand, affordability, and sustainability."[60] While Chester does not attempt to propose a fully fleshed out framework of her own, she notes that broader definitions of energy security tend to include three additional

[57] Ibid.
[58] As of this writing in Venezuela, "[o]nce one of the world's premier oil exporters," is facing gasoline shortages. Clifford Krauss, "Venezuela Staves Off Default, but Low Oil Prices Pose a Threat," The New York Times, https://www.nytimes.com/2017/04/12/business/venezuela-oil-debt-payment.html.
[59] Lynne Chester, "Conceptualising Energy Security and Making Explicit Its Polysemic Nature," *Energy Policy* 38 (2009)., 887.
[60] Ibid., 892.

dimensions of adequacy of capacity, affordability, and sustainability whereas market-centric definitions focus solely on availability.[61]

David von Hippel et al. view energy security as an issue that has many overlaps with the concept of sustainability. Their framework adds five components to the traditional supply-focused concept of energy security: "environment, technology, demand-side management, social and cultural factors, and post-Cold War international relations."[62] They argue that:

> A nation-state is energy secure to the degree that fuel and energy services are available to ensure: (a) survival of the nation, (b) protection of national welfare, and (c) minimization of risks associated with supply and use of fuel and energy services…Energy policies must address the domestic and international (regional and global) implications of each of [the five aforementioned] dimensions.[63]

They provide a handful of useful metrics for the six dimensions (energy supply plus the five dimensions they identify) as well as interpretations of each metric's impact on a state's energy security. They intend for policymakers to use these metrics to compare possible courses of action and ultimately assist in the formulation of energy security policy.

Benjamin Sovacool and Ishani Mukherjee propose an even more expansive framework of energy security. Their framework covers five dimensions of availability, affordability, technology development, sustainability, and regulation, and these dimensions are then broken into an additional twenty components. From these five dimensions and twenty components, they list close to 400 indicators that policymakers and scholars can use to "analyze, measure, track, and compare national performance on energy security."[64] They then use this framework to evaluate the energy security performance of 18 countries (to

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[61] Ibid., 891.
[62] David von Hippel et al., "Energy Security and Sustainability in Northeast Asia," ibid.39: 6723.
[63] Ibid., 6724.
[64] Benjamin K Sovacool and Ishani Mukherjee, "Conceptualizing and Measuring Energy Security: A Synthesized Approach," *Energy* 36, no. 5343-5355 (2011): 5344.

include China) over the period from 1990 to 2010. After completing their evaluation, they conclude that energy security "is more multifaceted than many policymakers or even scholars may realize," and suggest that future analyses "must extend beyond traditional themes such as security of fossil fuel supplies and the efficacy of energy markets."[65]

2.2.3 Petroleum

When discussing energy security, special attention must be paid to petroleum. Of the various types of energy available, petroleum is unique in its importance to the global economy, and is the most frequently mentioned in the literature. Von Hippel et al. provide five reasons why petroleum is important in a way that coal or liquid natural gas are not: it is the dominant fuel in primary energy supply; much of it comes from the Middle East, which remains politically very unstable; oil supply and prices are heavily influenced by political decisions of both buyers and sellers; key sectors such as transportation, petrochemicals, and agriculture have no reliable substitutes for oil; and the continued sensitivity of oil prices to speculation, manipulation by suppliers, and currency values.[66] The IEA states simply that petroleum "is the world's most vital source of energy and will remain so for many years to come."[67] In similar fashion, Michael T. Klare argues that petroleum is "utterly essential to sustain the international sinews of globalization – the planes, trains, trucks, and ships that carry goods and people from one region of the planet to another."[68] He cites projects from the United States Department of Energy which state that "world energy output must increase by 57 percent over the next quarter century," and ominously warns that if this target cannot be

[65] Benjamin K. Sovacool et al., "Evaluating Energy Security Performance from 1990 to 2010 for Eighteen Countries," ibid.: 5852.
[66] von Hippel et al., "Energy Security and Sustainability in Northeast Asia," 6720.
[67] International Energy Agency, *World Energy Outlook 2008*, 37.
[68] Michael T. Klare, *Rising Powers, Shrinking Planet* (New York: Henry Holt, 2008), 11.

met, “the world economy will fall into recession or depression, the globalization project will fail, and the planet could descend into chaos.”[69]

Over the years there has been much debate about the status of the global supply of oil. In 2001, Klare took a more skeptical stance, assuming that global consumption of oil would likely increase, but that remaining un-extracted petroleum would be more difficult to extract, creating an effective decline in oil supplies.[70] By 2008, he would take an even more pessimistic view, in light of Department of Energy projections showing that oil consumption would outstrip oil production, as well as the looming decrease in the availability of so-called “easy oil.” [71] He predicts that barring some sort of global cataclysm that reduces energy usage worldwide, “severe shortages are inevitable.”[72]

Not everyone is this gloomy about oil supplies. Richard Newell and Stuart Iler believe that “[c]oncerns about the physical availability of global oil resources are [therefore] largely misplaced.”[73] They point to projections of increasing production from OPEC, which would raise OPEC’s share of production from 40% in 2010 to 45 or even 50% over the next two decades.[74] They also believe that by tapping into supplies of less easily accessible oil, “North America has the potential to significantly increase its oil production over the next several decades.”[75] They note that the United States production of petroleum “now stands at its highest level in 20 years” as a result of the application of techniques such as “enhanced oil recovery and horizontal drilling or hydraulic fracturing technology,” even as petroleum

[69] Ibid.
[70] Ibid.
[71] Ibid. 37.
[72] Ibid., 41.
[73] Richard G. Newell and Stuart Iler, "The Global Energy Outlook," in *Energy & Security: Strategies for a World in Transition*, ed. Jan H. Klalicki and David L. Goldwyn (Washington D.C.: Woodrow Wilson Center Press, 2013), 54.
[74] Ibid.
[75] Ibid., 57.

consumption has generally flattened.[76] In fact, they claim that if both these trends continue to hold true, North America could achieve net self-sufficiency in oil by 2035.[77] Yergin cites the 44 percent increase in US oil production between 2008 and mid-2013 as a cause for optimism about oil supply; he is primarily concerned about political instability in the Middle East disrupting oil prices.[78]

It should be noted that these predictions were all made at different times. It is also worth noting here that oil prices are not monolithic; there are in fact a variety of different benchmarks based on different types of liquid crude oil, and variations in pricing across these benchmarks reflects concerns such as difficulties in transporting oil from refineries to markets.[79] One benchmark is the price of West Texas Intermediate (WTI), which is a "blend of several U.S. domestic streams of light sweet crude oil."[80] In December 2001, the price of WTI was approximately $19/barrel, and had climbed to roughly $133/barrel by June of 2008.[81] The local high in 2013 was $106/barrel in the month of August. Since then the price of oil has plummeted, and WTI currently costs roughly $45/barrel.[82] Of course, oil prices have proven to be extremely unpredictable, and because most countries must buy oil on the open market, they must find ways to weather this volatility.

[76] Ibid.
[77] Ibid.
[78] Daniel Yergin, "Energy Security and Markets," ibid., ed. Jan H. Kalicki and David L. Goldwyn, 71.
[79] U.S. Energy Information Administration, "Wti-Brent Crude Oil Price Spread Has Reached Unseen Levels," U.S. Energy Information Administration, http://www.eia.gov/todayinenergy/detail.php?id=290.
[80] CME Group, "Light Sweet Crude Oil (Wti) Futures and Options."
[81] U.S. Energy Information Administration, "Cushing, Ok Wti Spot Price (Monthly)."
[82] Ethan Lou, "Oil Falls as Stronger Dollar Outweighs Opec Deal Optimism," Reuters, http://www.reuters.com/article/us-global-oil-idUSKBN13C04L.

Chapter 3: Overview of Chinese Energy Policy

This chapter will provide important background on the subject of Chinese energy policy by identifying key players in the energy sector and walking through the history of Chinese energy policy through the "going-out" period. It will then introduce the Belt and Road Initiative, focusing specifically on projects that are relevant to China's energy sector.

3.1 Actors

The Chinese energy sector contains a mix of official government organizations and state-owned enterprises (SOEs). In the interest of clarity, this section will briefly go over the main actors that still exist today. The current major governing bodies are the State Council, the National Energy Commission (NEC), the National Energy Administration (NEA), the National Development and Reform Commission (NDRC), the State Assets Supervision and Administrative Commission (SASAC), the Ministry of Commerce (MOFCOM), and the Ministry of Land and Natural Resources (MLNR).[83]

China has three state oil companies and five state oil trading companies. The state oil companies are the China National Petroleum Corporation (CNPC), the China Petroleum and Chemical Corporation (Sinopec), and the China National Offshore Oil Corporation (CNOOC); the state oil trading companies are the China National Chemicals Import and Export Corporation (Sinochem), ChinaOil, Unipec, Zhuhai Zhenrong Oil Trading Company, and CNOOC-Sinopec United International Trading Ltd.[84] Of the five oil trading companies, ChinaOil, Unipec, and CNOOC-Sinopec are joint ventures between Sinochem/CNPC,

[83] Kang Wu, *Energy Economy in China* (Singapore: World Scientific Publishing Co. Pte. Ltd., 2013).
[84] Ibid.

Sinochem/Sinopec, and CNOOC/Sinopec respectively.[85] The three state oil companies and Sinochem are often collectively referred to as the four national oil companies (NOCs).[86]

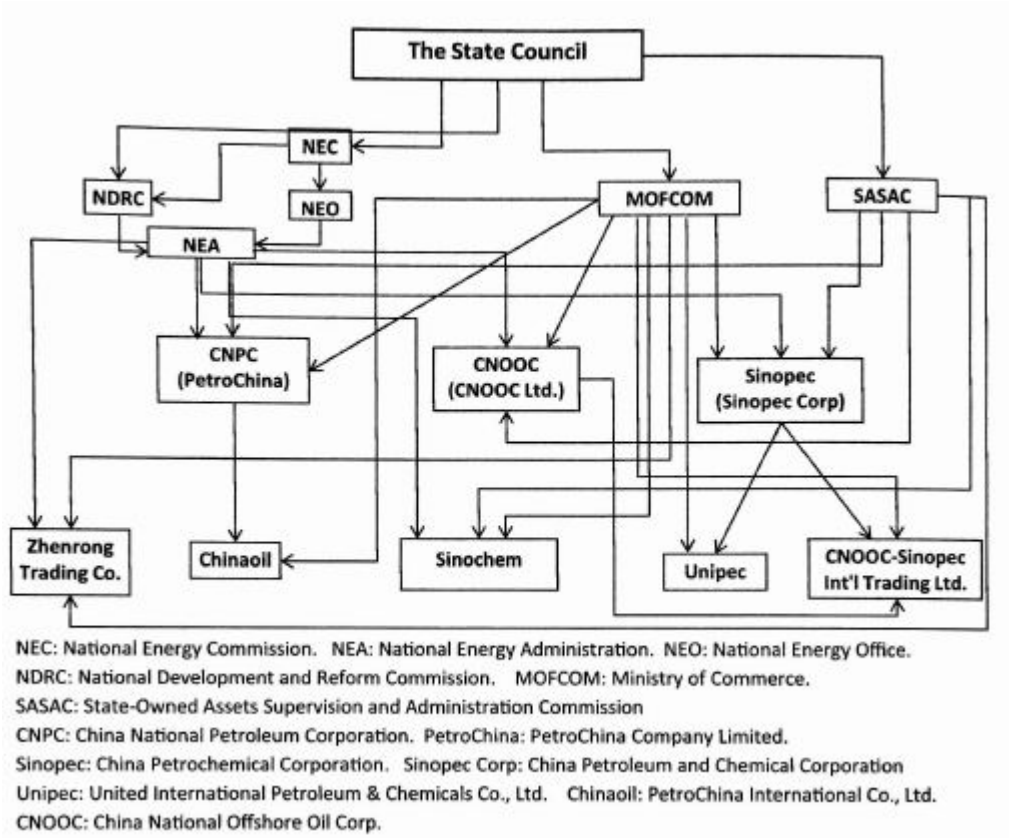

Figure 3.1: An organizational chart of the Chinese petroleum industry in 2011 (Wu 2013)

There are a handful of other actors not directly involved with energy policy that nonetheless play important roles in facilitating energy policy overseas. These include the Ministry of Foreign Affairs (MOFA) and the various state policy banks (Export-Import Bank of China, China Development Bank, and Agricultural Development Bank).

[85] ChinaOil, as a joint venture of Sinochem and CNPC, focuses on the import/export of crude oil. Unipec, as a joint venture of Sinochem and Sinopec, focuses on the international trade of refined products. Michal Meidan, *The Structure of China's Oil Industry* (Oxford Institute for Energy Studies, 2016), 11.

[86] Although they are technically referred to as national **oil** companies, the NOCs handle other forms of energy such as natural gas as well.

3.1.1 Foreign Policy Apparatus

The importance of energy to the Chinese government is evidenced by the fact that it is willing to use its foreign policy arm to directly support NOCs overseas: energy scholar Bo Kong calls this "petroleum diplomacy."

The three types of petroleum diplomacy are diplomacy in pursuit of security of supply, security of transportation, and cooperative security.[87] Diplomacy in pursuit of security of supply is the most important, involving maintaining friendly relations with oil-exporting countries.[88] This is the type of petroleum diplomacy that China has most frequently engaged in, to great success. As the Chinese government began to increase support for the going-out strategy, it increased the frequency of high-level visits to oil-exporting countries in Africa and Latin America. President Hu Jintao's visits to Egypt, Gabon, and Algeria in 2004 all resulted in the signing of petroleum agreements, as did his visits to Morocco, Nigeria, and Kenya in April 2006.[89] Later in 2006, Premier Wen Jiabao also traveled to Africa and facilitated agreements with Egypt, the Republic of Congo, and Angola as well.[90]

This type of diplomacy also includes China's involvement in multilateral organizations such as the Shanghai Cooperation Organization (SCO), through which China has actively promoted energy and petroleum cooperation in Central Asia.[91] Positive diplomatic relations pave the way for China's NOCs to sign agreements in each target country, which makes NOCs more competitive, and which facilitated the implementation of the "going-out" strategy (to be discussed in Section 3.2.2).

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[87] While Kong includes diplomacy in pursuit of cooperative security as one of the three, I do not believe that it is as impactful as the other two types.

[88] Some scholars argue that close ties with oil-exporting countries are not as helpful as they seem, either because "special relationships" with oil-exporting states are "useless during a crisis," or because bilateral relationships involving oil can leave the oil-importing state vulnerable to blackmail. Erica S. Downs, "The Chinese Energy Security Debate," *The China Quarterly*, no. 177 (2004): 38.

[89] Bo Kong, *China's International Petroleum Policy*, ed. David L. Goldwyn and Jan H. Kalicki, Energy and Security (Praegar Security International, 2010), 124.

[90] Ibid., 125.

[91] Ibid., 127.

Diplomacy in pursuit of security of transportation involves countries that "patrol or are situated along a transportation corridor."[92] Transportation corridors can be SLOCs or oil/gas pipeline pathways. China's use of diplomacy to promote pipeline projects, whether in partnership with Russia, Kazakhstan, or other countries, falls under this type of diplomacy. The case of the Central Asia-China pipeline connecting China to Turkmenistan shows the importance of diplomacy in pursuit of security of transportation matters because the pipeline must pass through Uzbekistan and Kazakhstan on its way to China.[93] The relationship between transportation and energy security will be described in further detail in Chapter 5.

3.1.2 State Policy Banks

China's state policy banks are another key source of the government aid that has helped Chinese NOCs compete for investment opportunities in the global market. The preeminent Chinese state policy bank is the Export-Import Bank of China (Eximbank), whose mandate is to:

> facilitate the export and import of Chinese mechanical and electronic products, complete sets of equipment and new- and high-tech products, assist Chinese companies with comparative advantages in their offshore project contracting and outbound investment, and promote international economic cooperation and trade.[94]

Like its counterparts the China Development Bank (CDB) and the Agricultural Development Bank, Eximbank is a "policy bank" in that its sole purpose is to "take over lending in support of government policy objectives…free[ing] the commercial banks from pressure to undertake politically popular projects."[95] As such, Eximbank is the primary source of Chinese

[92] Ibid., 119.
[93] Wu, *Energy Economy in China*, 188.
[94] The Export-Import Bank of China, http://english.eximbank.gov.cn/en/.
[95] Barry Naughton, *The Chinese Economy* (Cambridge: The MIT Press, 2007), 457.

concessional loans to developing countries such as Angola.[96] Kong argues that the considerable amount of support that NOCs have received from state-owned banks in recent years reflects the importance that the Chinese leadership has placed on the "going-out" strategy. For example, in the early 1990s, the NOCs struggled to receive loans at favorable rates from Eximbank, but in the early 2000s, both Eximbank and the CDB launched initiatives making NOCs "eligible for receiving preferential loan credit from these state policy banks when making overseas acquisitions."[97] NOCs and the state policy banks work in tandem to secure so-called "loans for oil", with NOCs offering their expertise and state banks providing financial backing: between the months of January and September of 2009, Chinese policy banks offered $54 billion in loans to oil-rich countries.[98] Between 2009 and 2010, the CDB alone extended nearly $65 billion worth of credit to both foreign energy companies and government entities.[99]

Paul Hubbard uses a number of Chinese-language sources to explain how Eximbank provides concessional loans. He identifies the life cycle of a concessional loan as follows:

1. The government of the borrowing country submits an application to the China Eximbank.
2. The China Eximbank reports the evaluation to the Ministry of Commerce.
3. The Chinese government signs a framework agreement with the borrowing country.
4. The borrowing government signs a project agreement with the China Eximbank.
5. According to the contractual terms, the Chinese contractors and exporters invoice the foreign executing agency requesting payment.
6. The foreign executing agency submits the invoice and progress report to the borrowing country government.
7. The foreign government submits a drawing application, invoice, and progress report to the China Eximbank.
8. The China Eximbank then disburses the funds to the exporter.

[96] Paul Hubbard, "Chinese Concessional Loans," in *China into Africa*, ed. Robert I. Rotberg (Washington, D.C.: Brookings Institution Press, 2009).
[97] Kong, *China's International Petroleum Policy*, 68.
[98] Ibid., 69.
[99] Meidan, *The Structure of China's Oil Industry*, 45.

9. The foreign government pays interest and fees and loan repayments to the China Eximbank.[100]

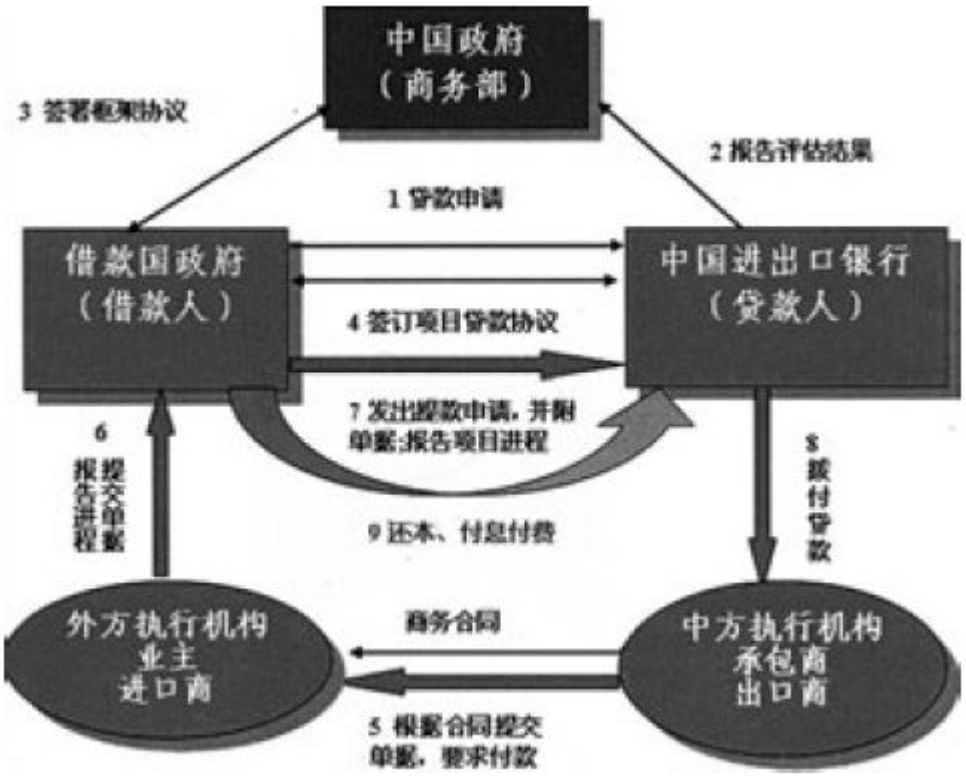

Figure 3.2: The lifecycle of a Chinese concessional loan (Hubbard 2009)

It should be noted that according to this process, China is not necessarily on the hook for the full amount of aid that it pledges insofar as the amount of aid that it actually disburses depends on the cost of the projects that are proposed, approved, and completed; the amount that China pledges is more of an upper limit than a realistic goal. Michal Meidan, looking at the China Development Bank, sees a similar pattern: the host nation opens an account with CDB, and an energy-backed loan (EBL) is "secured by revenue earned from deliveries of oil

[100] Hubbard, "Chinese Concessional Loans," 219.

or natural gas to a Chinese oil company."[101] The Chinese company then deposits payment into the host nation's CDB account, allowing CDB to withdraw anything it is owed.[102][103]

Chuan Chen et al. refer to this structure as the "Angola mode" used for countries "unable to provide adequate financial guarantees to back their loan commitments."[104] Echoing Hubbard's explanation of Chinese concessional loans, Chen et al. explain that after a framework agreement for infrastructure investment is signed, the recipient government awards the contract to a Chinese construction firm to be paid for by Eximbank credit.[105] What makes the Angola model distinct from other Eximbank concessional loans is that the recipient government also awards a Chinese petroleum company "the rights to begin production of the oil or other natural resources that will constitute repayment of the loan."[106] Yun Sun also notes that there is an additional component of Chinese assistance that is "essentially 'tied aid'…Beijing requires that infrastructure construction and other contracts favor Chinese service providers."[107]

The importance of policy banks can be seen by their alleged impact on NOCs. There is some debate as to whether state policy bank support actually helps NOCs. One way to see the importance of policy banks is bErica Downs argues that there is a perception that NOCs are handicapped by their status as relative latecomers in the international oil business, lacking the experience of more established international oil companies (IOCs).[108] As a result,

[101] Meidan, *The Structure of China's Oil Industry*, 45.
[102] Ibid.
[103] According to the English-language website for China Eximbank, "China Eximbank is the only bank designated by the Chinese government to implement [preferential] facilities." The Export-Import Bank of China.
[104] Chuan Chen et al., "China's Emerging Role in Africa," *Gridlines*, no. 42 (2008): 2.
[105] Ibid.
[106] Some of these other resources include "iron, bauxite, and cocoa." Ibid.
[107] Yun Sun, "Africa in China's Foreign Policy," (John L. Thornton China Center and African Growth Initiative, 2014).
[108] Erica S. Downs, "Who's Afraid of China's Oil Companies," in *Energy Security*, ed. Carlos Pascual and Jonathan Elkind (Washington D.C.: The Brookings Institution, 2010), 93.

concessional loans are a tool by which the central government can help make up for some of the lack of experience.

State entities can also benefit NOCs by smoothing relationships between China and the government of the target country, especially where local energy companies are state-owned. By linking oil investment to investment in other sectors of the local economy, these governments hope to develop their infrastructure and diversify away from extractive industries. Turkmenistan and Angola are two examples of countries in which Chinese loans may have paved the way for NOCs to sign production-sharing agreements.[109] Sun notes, "in 2006, this approach probably helped Chinese oil companies win the exploitation rights to multiple oil blocks through $4 billion in loans."[110] Michal Meidan argues that CDB-provided EBLs helped NOCs acquire overseas assets, and "were the first truly effective mechanism for advancing China's energy security, by earmarking set volumes of oil to China."[111] He identifies CDB loans as contributing to successful acquisitions in Brazil, Ecuador, Venezuela, Turkmenistan, and Russia, among others.[112] However, he also argues that EBLs are not the preferred funding source for NOCs; they do not protect against political risk, they do not always protect against price fluctuations in the open market, and in the event that borrowers renege on the original contract, "CDB [has] limited recourse to recover oil or revenues."[113]

On the other hand, such financial backing can be ineffectual or even counterproductive. A proposed deal with Nigeria that would have provided $2.5 billion from China Eximbank fell short despite the fact that Nigeria "offered preferential rights to oil exploration and production blocks to foreign companies that promise to invest in the

[109] Ibid., 94.
[110] Sun, "Africa in China's Foreign Policy," 8.
[111] Meidan, *The Structure of China's Oil Industry*, 46.
[112] Ibid.
[113] Ibid.

country's energy and transportation sectors."[114] One example of this can be seen in CNOOC Ltd.'s ultimately unsuccessful bid to purchase Unocal for $18.5 billion.[115] Unable to fund this bid itself, it lined up a $7 billion loan from its parent company as well as a $6 billion loan from the Industrial and Commercial Bank of China.[116] CNOOC's bid for Unocal failed in part due to American perceptions that CNOOC was in effect receiving subsidies from the Chinese government that Chevron would not be able to match.[117] CNPC's attempt to purchase Russia's Slavneft in 2002 faced similar opposition from Russian lawmakers.[118]

3.2 History of Chinese Energy Policy

3.2.1 Self-Sufficiency Period (1949-1993)

The newly formed People's Republic of China was predominantly rural and relied mainly on coal for energy production: coal accounted for 96% of energy production and 94% of energy consumption in 1950s China.[119] Mao Zedong's decision in the early 1950s to industrialize China carved out a small place for oil in China's energy mix. The importance of oil as a strategic resource became clear when China's participation in the Korean War led to the Coordinating Committee for Multilateral Export Controls (COCOM) declaring an oil embargo on China, and forced China to rely on its communist allies for oil exports.[120] In response, Mao created the Ministry of Petroleum (MPI) to manage and coordinate the "production, transportation, and marketing of oil," which marked the beginning of China's

[114] Downs, "Who's Afraid of China's Oil Companies," 93-94.
[115] "China Oil Firm in Unocal Bid War," BBC, http://news.bbc.co.uk/2/hi/business/4121830.stm.
[116] "Who's Afraid of China's Oil Companies," 91.
[117] Although the bid failed, it was revealed afterwards that had CNOOC been prepared to offer a slightly higher bid, Unocal shareholders might have agreed to CNOOC's offer. Elizabeth Douglass, "Unocal Says It Favored Cnooc Bid," The Los Angeles Times, http://articles.latimes.com/2005/jul/26/business/fi-unocal26.
[118] Kong, *China's International Petroleum Policy*, 106.
[119] Meidan, *The Structure of China's Oil Industry*, 3.
[120] Ibid., 4.

push for energy security through self-sufficiency.[121] Like the rest of the Chinese economy at the time, the energy sector fell under a "command-and-control governance system," which refers to the central government controlling "all decisions over the entire production chain," as well as setting supply and demand targets for local petroleum administrative bureaus (PABs) to meet.[122] This model was developed and refined at the first of China's oilfields, the Daqing oilfield. The Daqing PAB controlled not only the core oil business, but also other ancillary services such as infrastructure and social services for workers.[123] Of the 260,000 employees of the Daqing PAB, "only 40 per cent worked in the core oil business[es]" of extraction, transportation, refining, marketing, and R&D.[124] The discovery of other oil fields soon followed, and by 1963, China had become self-sufficient and a net exporter of oil.[125]

With Deng Xiaoping's ascent to power in 1978, China began the slow transition from a command to a market economy. Energy consumption naturally grew with the economy, but energy production failed to keep pace. 1980 saw the first drop in petroleum production growth rate, which spurred the central government to reform the petroleum industry.[126] The central government began by switching to the contract responsibility model, where it would set an annual petroleum production target for the Ministry of Petroleum Industry (MPI); excess oil could be exported or sold to the domestic market, with revenues could be put towards purchasing foreign technology or exploration and production (E&P) investment at home.[127] The central government also established a two-tiered pricing system for oil sales: oil production up to the annual quota would be sold at a price point set by the government, but excess oil could be exported at international market prices, giving NOCs an additional

[121] Ibid.
[122] Kong, *China's International Petroleum Policy*, 8-9.
[123] Meidan, *The Structure of China's Oil Industry*, 4.
[124] Ibid.
[125] Kong, *China's International Petroleum Policy*, 8-9.
[126] Ibid., 9.
[127] Ibid., 10-11.

incentive to increase production.[128] These reforms were able to temporarily reverse the drop in petroleum production, but the mid-1980s were a difficult period for the petroleum industry overall because of the maturation of existing oil fields, increased labor costs, and pricing distortions between "upstream output and downstream products" which "allowed refineries to profit at the expense of oilfields."[129] Government-directed improvements in energy efficiency were able to reduce energy consumption, but double-digit inflation meant that further reforms would not be implemented until 1990.[130]

Beginning in 1990 the State Planning Commission (SPC) began to raise prices for the in-plan petroleum output while increasing the volume of petroleum that could be sold at that price.[131] In 1994 the State Council abolished the contract responsibility model and allowed Chinese oil companies to retain their profits.[132] By 1998, reforms had progressed such that oil prices were somewhat aligned with world prices. The State Development and Planning Commission (SDPC) classified Chinese domestic crude oil into four categories and priced them against four international benchmarks, with each price being determined by the benchmark price plus an additional premium to account for transportation cost and price differentials.[133] Starting in 2001, the SDPC linked domestic oil prices to "weighted average oil product prices of the Singapore, Rotterdam, and New York oil markets"; a system that remains in use today.[134]

The decentralization of petroleum production occurred concurrently with the decentralization of petroleum pricing. Back in the 1950s, when China had a command

[128] Meidan, *The Structure of China's Oil Industry*, 9.
[129] Ibid.
[130] Some in the Chinese government believed that inflation would lead to social instability, and these fears appeared to come true with the Tiananmen student protests in 1989. Kong, *China's International Petroleum Policy*, 11.
[131] Ibid., 12.
[132] Ibid.
[133] The SPDC is the successor to the SPC. Ibid.
[134] Ibid.

economy, the energy industry was modeled after the Soviet system and consisted of a single ministry (the Ministry of Fuel Industry) with a handful of bureaus underneath it.[135] The SPC sat between various economic ministries and the State Council, and directed national economic development.[136] By 1955, the Ministry of Fuel Industry had been disbanded and replaced with the MPI, the Ministry of Coal Industry (MCI), and the Ministry of Electric Power (MEP).[137]

The next thirty years would be marked by the periodic disbandment and consolidation of ministries, until the creation of the first NOC in 1982. CNOOC was established under the MPI in order to manage offshore E&P as well as coordinate with foreign oil companies.[138] It was given "general bureau" rank, making it beneath a "full ministry" but above a regular bureau.[139] The State Council then created Sinopec in 1983 by grouping "refining and petrochemical assets from the MPI, together with chemical enterprises from the Ministry of Chemical Industry and synthetic fiber manufacturing from the Ministry of Textile Industry."[140] In 1988, the remaining administrative portions of MPI itself were restructured to become CNPC, making it responsible for "formulating national quality standards for the oil industry and devising policy for environmental protection," as well as "the right to oversee international cooperation in developing China's onshore oil and natural gas."[141] Both Sinopec and CNPC retained the political rank of their predecessors as ministries.

The creation of the NOCs did not represent a full move towards decentralization, and the NOCs themselves stumbled through their early years. They continued to be managed by the State Council while also performing the administrative functions of their predecessors.

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[135] Meidan, *The Structure of China's Oil Industry*, 10.
[136] Ibid.
[137] Ibid., 11.
[138] Kong, *China's International Petroleum Policy*, 13.
[139] Meidan, *The Structure of China's Oil Industry*, 11.
[140] Kong, *China's International Petroleum Policy*, 13.
[141] Ibid.

Kong states that they were "not only market participants but also market regulators."[142] Nor were the NOCs vertically integrated in the style of Western corporations. Instead, each focused on a single area of petroleum production: CNPC on onshore upstream production, CNOOC on offshore upstream production, Sinopec on downstream refining, and Sinochem on oil trading.[143] This lack of vertical integration meant that the NOCs were unevenly affected by price volatilities in the oil market and less competitive than their Western counterparts. Quotas and prices were still set by the central government, and the administrative shuffling within the energy industry had not yet resolved organizational redundancy.

3.2.2 "Going-out" (1993-2013)

The first NOC to develop an overseas strategy was CNPC. Prior to full decentralization, CNPC was having the most difficulty dealing with the concurrent crises of declining petroleum prices, maturing oil wells, and depleted petroleum reserves.[144] In 1991 CNPC was still responsible for crafting onshore sector policies, and proposed a three-pronged strategy that would maintain China's petroleum supply and make CNPC's operations profitable. The first prong of the strategy was the development of immature oilfields in Western China while increasing natural gas development. The second prong was the diversification and specialization of its subsidiaries, with savings and profits reinvested into additional E&P operations. The third prong was the promotion of the development of domestic resources with the help of foreign capital and technology while turning to the international market in order to keep up with growing domestic demand. Overseas expansion was appealing for a number of reasons. For one, seismic surveys suggested that China had

[142] Ibid., 14.
[143] Ibid.
[144] Ibid., 33.

relatively poor reserves when compared to the Middle East, South America, the former Soviet Union, and even the United States.[145] Not only would it be easier to find new oilfields, lower production costs abroad meant that even with international shipping costs, "exploring and producing oil abroad was still competitive in comparison to domestic production."[146]

One of the most important factors contributing to overseas expansion was China becoming a net petroleum importer in 1993. In response, the CNPC president Wang Tao suggested that CNPC should actively be "going-out" to aggressively engage in overseas E&P in order to make up for the growing shortfall in domestic production.[147] This unleashed a wave of small but successful overseas projects that paved the way for other Chinese firms to expand overseas. The central government did not block these early projects, but was unwilling to provide tax incentives or streamline the lengthy approval procedures.[148] As the volume of Chinese petroleum imports increased, the central government finally took notice, and then-President Jiang Zemin gave his official blessing to CNPC's "going-out" strategy.[149] With its inclusion in the Tenth Five-Year Plan (2001-2006), the "going-out" strategy had gone from a CNPC initiative to "an overarching national strategy for China's petroleum sector."[150]

China's NOCs began looking abroad by searching for opportunities to invest in E&P. The first successful overseas investment was made by CNPC, which purchased 22 million cubic meters of an Albertan oil sands project in 1993.[151] Unfortunately for the NOCs, international oil companies (IOCs) had a head start in overseas investment, and "dominated the international petroleum market in terms of capital, technology, and management

[145] Ibid., 39.
[146] Ibid., 40.
[147] Ibid., 41.
[148] Meidan, *The Structure of China's Oil Industry*, 20.
[149] Kong, *China's International Petroleum Policy*, 45.
[150] Ibid., 47.
[151] Meidan, *The Structure of China's Oil Industry*, 19.

experience," meaning that the NOCs were left with acquisitions that the IOCs considered undesirable.[152] As the NOCs (and CNPC in particular) began to gain experience investing overseas and Chinese oil imports continued to climb, Beijing allowed the size and quantity of overseas investments to increase as well. In June 1997 alone, CNPC signed $5.6 billion worth of oil contracts in Kazakhstan, Venezuela, and Iraq, with investments in Kazakhstan reaching $9 billion by the end of the year.[153]

After this initial period of expansion in 1997, there was a brief hiatus in acquisitions from 1998 until 2000. The Asian Financial Crisis of 1997 led to a decline in oil prices, which prompted a shift from overseas investment back to direct purchases.[154] This was also when China moved to properly restructure the petroleum industry. CNPC and Sinopec were restructured into fully integrated oil companies with both upstream (exploration and production) and downstream (refining petroleum products) portfolios, a regional focus (northern/southern China), "integrated production, distribution, refining, and sales networks," and trading rights.[155] The central government's decision to fully decentralize oil prices and link domestic oil prices with international market prices was followed by a push for NOCs to list their core assets on stock markets, which "significantly enhanced the economic power of CNPC, Sinopec, and CNOOC."[156] The various agencies directing the petroleum sector were restructured as well. The two goals of this restructuring were to reduce government expenditure by reducing the number of agencies and to separate the corporations from the regulating bodies that made policy.[157] The restructuring effort was successful in that it streamlined the energy sector, but by reducing the number of government ministries and the

[152] Kong, *China's International Petroleum Policy*, 63.
[153] Meidan, *The Structure of China's Oil Industry*, 25.
[154] Kong, *China's International Petroleum Policy*, 63.
[155] Ibid., 15.
[156] Meidan, *The Structure of China's Oil Industry*, 19-20.
[157] Ibid., 26.

number of officials in those ministries, regulatory bodies such as the State Economic and Trade Commission (SETC) and the State Development and Planning Commission (SDPC) became more dependent on the technical expertise contained within the NOCs when attempting to formulate policy.[158]

The NOCs were able to use this newfound political and economic weight to pursue overseas investments with renewed vigor. Bolstered by increased support from the central government, in 2004 the central government encouraged the policy banks to offer "direct capital contributions" and "subsidies associated with the official aid programmes [sic]" to companies that engaged in "preferential projects."[159] The State Council finally began offering export tax rebates, financial assistance, and foreign exchange assistance, among other incentives.[160] Chinese support was not merely economic, but political as well. The Ministry of Commerce and the Ministry of Foreign Affairs created catalogues to help Chinese companies decide what industries to invest in, while embassies conducted feasibility studies in their host countries.[161] This was topped off by high-level bilateral visits, involving senior officials up to then-President Hu Jintao.[162]

This multi-pronged approach led to an explosion in overseas investment. Prior to 2000, Chinese NOCs invested in fewer than 10 total overseas projects, but invested in at least 20 each year after 2000.[163] By March 2009, the total number of overseas investments had climbed to 208 projects across 47 countries, the majority of which were in Africa, Asia, and the Middle East, reaching a total of over $60 billion worth of investments by September

[158] Ibid.
[159] Ibid., 41.
[160] Ibid., 42.
[161] Ibid.
[162] Ibid.
[163] Kong, *China's International Petroleum Policy*, 64.

2009.[164] The global financial crisis of 2008-2009 slowed the pace of foreign investments because the sharp decline in oil prices made direct purchases of oil more attractive than long-term investments. Even so, in 2009 China continued to sign bilateral agreements, such as a $25 billion loan to two Russian energy companies for twenty years of access to oil[165] and a $10 billion loan to Brazil for 100 million barrels of crude oil a day.[166]

In pursuing overseas investments, China's NOCs frequently seek what is called "equity oil." The term refers to oil acquired overseas and shipped directly back to China rather than being sold on the open market. The amount of oil produced and shipped back as equity oil is determined by the NOC; the equity oil option is provided to the concession owner as a guarantee on investment, but the owner can also choose to sell it on the open market as well. Senior officials in both the oil industry and the central government have publicly expressed a preference for equity oil over other types of oil supply. A 2004 report headed by the Development and Research Center of the State Council advocated that "securing equity oil should be the major operation mode" of overseas expansion.[167] Downs argues this preference stems from a fear that China could one day lose access to the world oil market, and would only be able to acquire oil by ordering NOCs to ship foreign oil back to China.[168] Chinese oil analysts have revealed that "the target of Chinese oil companies' internationalization is to ensure that overseas equity oil and gas production will account for between one-third and one-half of China's total oil and gas imports."[169] In fact, China's

[164] Ibid., 64-67.
[165] Robin Paxton and Vladimir Soldatkin, "China lends Russia $25 billion to get 20 years of oil," *Reuters.com*, February 17, 2009, http://uk.reuters.com/article/2009/02/17/uk-russia-china-oil-sb-idUKTRE51G3S620090217 in Zhang Jian, "China's Energy Security: Prospects, Challenges, and Opportunities," (Washington D.C.: The Brookings Institution, 2011), 19.
[166] Associated Press, "Brazil to supply crude to China - in return for $US10b loan," *Sydney Morning Herald*, February 20, 2009, http://www.smh.com.au/business/world-business/brazil-to-supply-crude-to-china--in-return-for-us10b-loan-20090220-8cuv.html in ibid.
[167] Kong, *China's International Petroleum Policy*, 93.
[168] Downs, "Who's Afraid of China's Oil Companies," 82.
[169] Kong, *China's International Petroleum Policy*, 92-93.

NOCs have fallen short of this goal: equity oil made up only 26.10% of China's total oil imports in 2007.[170]

3.2.3 Understanding Changes to China's Energy Policy

Updates to China's energy policies are revealed through official documents such as the Five-Year Plans, which cover a variety of topics related to China's economic and social development. Important topics, such as energy, often have their own supplements to the Five-Year Plans. These will go into greater detail about a given topic, and can contain updates to existing policies. The 12th Five-Year Plan for Energy Development focuses primarily on domestic goals for China's energy sector and sets targets for energy usage. It also contains a section about deepening international cooperation for energy, stating that China will "further the implementation of the 'going-out' strategy," by "continuing to improve overseas oil and gas development cooperation."[171]

The most recent edition of China's Five-Year Plans is the 13th Five-Year Economic and Social Plan, published in 2016. This edition has a domestic focus, from setting updated energy usage targets to promoting alternative sources of energy. It mentions that China will "strengthen efforts to build trans-regional core energy transportation networks," "accelerate the construction of strategic land corridors for importing oil and gas," and "make progress in building oil and gas storage facilities and strengthen capacity for oil and gas storage…"[172]

The 13th Five-Year Plan for Energy Development (*Nengyuan Fazhan "Shisan Wu" Guihua*) does not mention the "going-out" strategy by name, but refers to "making full use of

[170] Ibid., 93.
[171] Central Committee of the Communist Party of China, "Nengyuan Fazhan "Shier Wu" Guihua (能源發展"十二五"規劃)," (Beijing: Central Committee of the Communist Party of China, 2013), Chapter 3, Section 9.
[172] "The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China (2016-2020)," (Beijing: Central Compilation & Translation Press, 2016), Chapter 30, Section 2.

two markets and two resources;"[173] a phrase that dates back to CNPC's original proposal for international expansion in 1993.[174] In the same paragraph, the plan draws a link between the "going-out" strategy and the Belt and Road Initiative, stating that China should "seize the great opportunity of 'the Belt and Road' construction, promote energy infrastructure interoperability, increase the capacity of international cooperation, [and] actively participate in global energy governance."[175] Finally, the section titled "Developing Trends" (*fazhan qushi*), links the Belt and Road with energy security, stating:

> The further implementation of "The Belt and Road" construction and international cooperation capacity, the promotion of a wider-range energy field, higher-level and deeper blending, are all conducive to strengthening international energy cooperation in all aspects and the formation of a new energy security pattern under open conditions.[176]

From these passages, we can infer that the Belt and Road Initiative at a minimum shares the "going-out" strategy's focus on addressing China's energy issues, but might be intended as a spiritual successor to "going-out" as well. If this is in fact the case, there may be deeper similarities between the two. The next chapter will examine the Belt and Road Initiative in greater detail and identify selected projects that are relevant to China's energy policy.

[173] The 13th Five-Year Plan for Energy Development is the only one with page numbers included as part of the original document. "Nengyuan Fazhan "Shisan Wu" Guihua (能源發展“十三五”規劃)," (Beijing: Central Committee of the Communist Party of China, 2016), 39.
[174] "[CNPC President] Wang Tao summed up CNPC's transnational operations strategy as one that utilizes 'two types of resources, two types of capital, and two types of markets' both at home and abroad." Kong, *China's International Petroleum Policy*, 41.
[175] Translation done using Baidu translate, with minor edits by author. Central Committee of the Communist Party of China, "Nengyuan Fazhan "Shisan Wu" Guihua (能源發展“十三五”規劃)," 39.
[176] Translation done using Baidu translate, with minor edits by author. Ibid., 7.

Chapter 4: The Belt and Road Initiative

This chapter will provide an understanding of the Belt and Road Initiative so that it can be compared to the "going-out" strategy. It will also identify projects under the Belt and Road that have an energy focus, breaking them up by economic corridors. Finally, this chapter will compare the Belt and Road Initiative with the "going-out" strategy in order to identify shared features between the two.

4.1 Overview of "The Belt and Road"

The "Belt and Road Initiative" ("一帶一路") is China's current national development strategy, which aims to deepen China's integration with the world economy. It is not so much a detailed plan as it is a loose bundle of vaguely-defined policy objectives.

In his earliest speech introducing One Belt One Road, President Xi Jinping proposed "an economic belt along the Silk Road" that would connect China first to Central Asia, and then to Europe.[177] In comparing this proposal to the ancient Silk Road, Xi invoked the image of "a steady stream of envoys, caravans, travelers, scholars and artisans traveling between the East and West."[178] A month later, Xi invoked a similar image in Indonesia, this time proposing greater connectivity by building "the Maritime Silk Road of the 21st century."[179] These speeches marked the unveiling of the One Belt One Road initiative and kicked off a series of announcements regarding projects that would fall under its umbrella. Even before the National Development and Reform Commission (NDRC), Ministry of Foreign Affairs,

[177] Xi, "Promote Friendship between Our People and Work Together to Build a Bright Future".
[178] Ibid.
[179] "Speech to Indonesian Parliament".

and Ministry of Commerce released their joint "Vision and Actions" plan in March 2015, China established the Asian Infrastructure Investment Bank (AIIB) and the Silk Road Fund to finance OBOR projects and had also begun drafting memorandums for cooperation with countries such as Thailand.[180]

The "Vision and Actions" plan provides a broad outline of China's plans and goals for OBOR and provides more information than Xi's initial speeches, but does not provide much in the way of specific details. The aim of One Belt One Road is to:

> Promote the connectivity of Asian, European and African continents and their adjacent seas, establish and strengthen partnerships among the countries along the Belt and Road, set up all-dimensional, multi-tiered and composite connectivity networks, and realize diversified, independent, balanced and sustainable development in these countries.[181]

As introduced in Xi's early speeches, One Belt One Road is composed of both the Silk Road Economic Belt on land and the 21st-Century Maritime Silk Road on sea:

> The 21st-Century Maritime Silk Road is designed to go from China's coast to Europe through the South China Sea and the Indian Ocean in one route, and from China's coast through the South China Sea to the South Pacific in the other. On land, the Initiative will focus on jointly building a new **Eurasian Land Bridge** and developing **China-Mongolia-Russia**, **China-Central Asia-West Asia** and **China-Indochina Peninsula** economic corridors…At sea…the **China-Pakistan Economic Corridor** and the **Bangladesh-China-India-Myanmar Economic Corridor** are closely related to the Belt and Road Initiative…"[182] (*emphasis added*)

The "Cooperation Priorities" put forth in the "Visions and Actions" plan were essentially identical to the ones put forth in Xi Jinping's initial announcement in 2013, only updated to include more specific policy points: policy coordination, facilities connectivity, unimpeded trade, financial integration, and people-to-people bond.[183] It is in some these

[180] Shaohui Tian, "Chronology of China's Belt and Roat Initiative," Xinhuanet, http://news.xinhuanet.com/english/2015-03/28/c_134105435.htm.
[181] National Development and Reform Commission, Ministry of Foreign Affairs, and Ministry of Commerce, "Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road."
[182] See Appendix A for a map of the Belt and Road Initiative and the associated economic corridors. Ibid.
[183] Ibid.

policy points that the relationship between One Belt One Road and China's energy policy first becomes apparent. Under "facilities connectivity", the plan states that "[w]e should promote cooperation in the connectivity of energy infrastructure, work in concert to ensure the security of oil and gas pipelines and other transport routes…"[184] In the next section titled "unimpeded trade", the plan also encourages:

> "[C]ooperation in the exploration and development of coal, oil, gas, metal minerals and other conventional energy sources…cooperation in the processing and conversion of energy and resources at or near places where they are exploited, so as to create an integrated industrial chain of energy and resource cooperation."[185]

The "Vision and Actions" plan also looks at how One Belt One Road will affect different parts of China. It mentions infrastructure improvements for various regions, which range from logistical hubs for pipelines and railways to port and airport construction. Even so, these plans are framed more as recommendations than concrete proposals.

The other major official document that covers One Belt One Road is the recently released "Building the Belt and Road" document published by the Office of the Leading Group for the Belt and Road Initiative. This document is in some ways an updated version of the "Vision and Actions" plan in that it restates objectives from the "Vision and Actions" plan while also mentioning projects that are either in progress, nearing completion, or operational. It elaborates on the "six corridors" listed in the "Vision and Actions" plan and also identifies five routes that China intends to focus on (three overland and two maritime). The land routes are:

> from Northwest China and Northeast China to Europe and the Baltic Sea via Central Asia and Russia; one from Northwest China to the Persian Gulf and

[184] Ibid.
[185] Ibid.

> the Mediterranean Sea, passing through Central Asia and West Asia; and one from Southwest China through the Indochina Peninsula to the Indian Ocean.[186]

The two maritime routes both start in Chinese coastal port cities and cross through the South China Sea; one "passes through the Malacca Strait, and reaches the Indian Ocean, extending to Europe," while the other "extends to the South Pacific."[187] "Building the Belt and Road" also explicitly defines "rail, highways, seagoing transport, aviation, pipelines, and aerospace integrated information network" as the "six means of communication" to be targeted when pursuing infrastructure development.[188] The five cooperation priorities listed in "Vision and Actions" (policy coordination, facilities connectivity, unimpeded trade, financial integration, people-to-people bond) are updated to:

1. Promoting connectivity of infrastructure and facilities
2. Enhancing economic and trade cooperation
3. Expanding production capacity and investment cooperation
4. Expanding financial cooperation
5. Strengthening cooperation on ecological and environmental protection
6. Promoting orderly maritime cooperation
7. Strengthening cooperation and exchanges in cultural, social and other fields[189]

Each of these items is further broken down, and the points relevant to energy will be discussed in Section 4.2.

According to SASAC, as of May 2017, 47 Chinese state-owned enterprises are working on 1,676 projects in countries taking part in One Belt One Road.[190] Neither the "Vision and Actions" plan nor the "Building the Belt and Road" document cover

[186] Office of the Leading Group for the Belt and Road Initiative, *Building the Belt and Road: Concept, Practice and China's Contribution*, First ed. (Beijing: Foreign Languages Press Co. Ltd, 2017), 9-10.
[187] Ibid., 10.
[188] Ibid., 10-11.
[189] Ibid.
[190] State-owned Assets Supervision and Administration Commission of the State Council, "Guoxinban Zhongyang Qiye Canyu "Yidai Yilu" Gongjian Qingkuang Fabuhui Shi Lu (國家辦中央企業參與"一帶一路"共建情況發布會實錄)," (Beijing2017).

the full array of projects that fall under One Belt One Road; if such a document exists, it does not appear to be publicly available.[191] Some projects are mentioned directly in "Building the Belt and Road," and others are featured in publications by Xinhua, the Chinese state media outlet. However, projects listed in official documents tend to be ones appear to be successful, and in some cases their "progress" may be overstated.[192] More comprehensive lists can be found in secondary compilations, but even these are not necessarily complete due to the sheer number of projects under One Belt One Road's umbrella. That said, projects of greater importance will receive greater attention, and will likely be properly accounted for in both official documents and secondary sources.

4.2 Energy-Related Components of the Belt and Road Initiative

The China-Pakistan Economic Corridor, the China-Central Asia-West Economic Corridor, the Bangladesh-China-India-Myanmar Economic Corridor, and the China-Mongolia-Russia Economic Corridor are the components of the Belt and Road Initiative that will have the greatest impact on China's energy security. While there are certainly projects across all six corridors that are in some way related to energy, this paper will ignore projects intended to provide energy to the partner country (i.e. hydropower and transmission line projects) and focus on those projects relevant to China.

The section of "Building the Belt and Road" titled "Enhancing Transport" discusses how China has signed bilateral and multilateral agreements facilitating transportation,

[191] The leaking of a "master plan" for the China-Pakistan Economic Corridor suggests that an overall document could exist.

[192] For example, "Building the Belt and Road," published in May 2017, states that construction has started on Line D of China-Central Asia Gas Pipeline, but "The Central Asia-China Gas Pipeline Network: Line D(ead)," published in March 2017 reports that the pipeline has been "indefinitely suspended." Casey Michel, "The Central Asia-China Gas Pipeline Network: Line D(Ead)," The Diplomat, http://thediplomat.com/2017/03/the-central-asia-china-gas-pipeline-network-line-dead/.

opening “356 international transport routes running through 73 land ports” as well as signing “38 bilateral or regional ocean shipment agreements with 47 B&R [Belt and Road] countries.”[193] Similarly, “Promoting Relevant Projects” names railways, ports, and tunnels that China has contributed to, in order to “create a transport infrastructure network connecting the sub-regions in Asia and linking Asia, Africa and Europe as well.”[194] The cooperation priority “Promoting Orderly Maritime Cooperation” has the sub-section “Cooperation on Connectivity” which also discusses how China has contributed to the development of ports, particularly the Gwadar Port in Pakistan and the Port of Hambantota in Sri Lanka.[195] The most obviously relevant sub-section is “Connecting Energy Facilities.” Here it states “China is active in cooperating with relevant countries to promote their energy connectivity, build oil, gas and power infrastructure, maintain the safe operation of energy resources among countries and regions.”[196] According to this section, the China-Russia Oil Pipeline and the China-Central Asia Pipelines A/B/C are all operational, with work having started on eight of sixteen projects in the China-Pakistan Economic Corridor.[197]

4.2.1 China-Pakistan Economic Corridor

The China-Pakistan Economic Corridor (CPEC) is one of the six economic corridors that One Belt One Road promises to develop, and the crown jewel of CPEC is the city of Gwadar, in the Pakistani province of Balochistan. As a port city on the Indian Ocean, Gwadar is intended to be “a hub of connectivity for the [China-Pakistan Economic] Corridor, and an

[193] Office of the Leading Group for the Belt and Road Initiative, *Building the Belt and Road: Concept, Practice and China's Contribution*, 20-21.
[194] Ibid., 22.
[195] Ibid., 39.
[196] Ibid., 22.
[197] Ibid.

indispensable interchange for the Silk Route [sic]."[198] Back in 2015, President Xi pledged that China would invest $46 billion into Pakistan's infrastructure, most of which would be allocated towards CPEC and the construction of roads, rails, and pipelines connecting Gwadar to Kashgar in Xinjiang.[199] The port became operational in November 2016,[200] and as of December 2016, China has pledged to contribute a total of $9.7 billion USD (1 trillion Pakistani Rupee) for the construction of more than 1250 kilometers of roadway through Balochistan.[201]

Other energy-related projects in Gwadar include the planned construction of both an oil pipeline and a gas pipeline, as well as the construction of an LNG (liquefied natural gas) terminal. The 700-kilometer gas pipeline and refinery would be geared more towards Pakistan's domestic use, connecting Gwadar to the Pakistani city of Nawabshah, but could potentially be extended in the future.[202] The Pakistani state construction company Frontier Works Organization will oversee the planning and construction of an oil pipeline linking Gwadar to western China. Furthermore, it is reported that Huanqiu Contracting and Engineering Corporation has expressed an interest in building an oil refinery in Gwadar.[203]

198 "Gwadar Port City," Pakistan-China Institute
China Radio International, http://www.cpecinfo.com/gwadar-port-city.
199 Jack Detsch, "China's Grand Plan for Pakistan's Infrastructure," The Diplomat, www.thediplomat.com/2015/04/chinas-grand-plan-for-pakistans-infrastructure/.
200 "'Today Marks Dawn of New Era': Cpec Dreams Come True as Gwadar Port Goes Operational," Dawn, https://www.dawn.com/news/1296098.
201 Syed Irfan Raza, "China to Finance Three More Road Projects under Cpec," Dawn, https://www.dawn.com/news/1304619.
202 "Gwadar-Nawabshah Pipeline, Lng Terminals: All Projects Will Be Completed on Time, Says Official," The Express Tribune, https://tribune.com.pk/story/1101858/gwadar-nawabshah-pipeline-lng-terminals-all-projects-will-be-completed-on-time-says-official/.
203 Zafar Bhutta, "Pakistan Working on Gwadar-China Oil Pipeline," The Express Tribune, https://tribune.com.pk/story/1140506/crude-export-pakistan-working-gwadar-china-oil-pipeline/.

4.2.2 China-Central Asia-West Asia Economic Corridor

The China-Central Asia-West Asia Economic Corridor is notable for its pipelines. The China-Central Asia Gas Pipeline actually consists of four pipelines, three of which were completed even before One Belt One Road was announced.[204] When the first three lines begin operating at capacity, they will allow China to import 55 billion cubic meters (bcm) a year from Central Asia (primarily Turkmenistan), and the completion of the fourth line will boost the total throughput of the pipeline system to 85 bcm.[205]

4.2.3 Bangladesh-China-India-Myanmar Economic Corridor

The Bangladesh-China-India-Myanmar Economic Corridor (BCIM) has received much less media attention than the others. Like the China-Central Asia Gas Pipeline, the BCIM predates One Belt One Road, but discussions have stalled since December 2014.[206] While little progress has been made overall, China has made some progress in Myanmar. Its biggest priorities there have been the completion of twin gas and oil pipelines running from Myanmar to Kunming and the development of Kyaukpyu Port in Myanmar. The China-Myanmar oil and gas pipelines were completed in 2014 and run from the port of Kyaukpyu to the city of Kunming.[207] The gas pipeline accounted for roughly 5% of China's natural gas imports in 2016,[208] and when the oil pipeline reaches full capacity it will be able to supply

[204] "Flow of Natural Gas from Central Asia," CNPC, http://www.cnpc.com.cn/en/FlowofnaturalgasfromCentralAsia/FlowofnaturalgasfromCentralAsia2.shtml.
[205] Ibid.
[206] Sutirtho Patranobis, "India, China to Resume Stalled Dialogue on Corridor with Myanmar, Bangladesh," Hindustan Times, http://www.hindustantimes.com/india-news/india-china-to-resume-stalled-dialogue-on-corridor-with-myanmar-bangladesh/story-e0NS1tHwKQCaOWmQwGp5tJ.html.
[207] "China Opens Delayed Myanmar Oil Pipeline to Get Mideast Crude Faster," Bloomberg, https://www.bloomberg.com/news/articles/2017-04-11/china-opens-delayed-myanmar-oil-link-to-get-mideast-crude-faster.
[208] Ibid.

roughly 6% of China's crude oil imports.[209] A consortium of Chinese companies also won a bid to build another deep-sea port in Kyaukpyu, which would facilitate future oil shipments.[210]

4.2.4 China-Mongolia-Russia Economic Corridor

An economic corridor that has also received a comparatively low amount of attention is the China-Mongolia-Russia Economic Corridor. China, Mongolia, and Russia did not sign a trilateral economic agreement formalizing the corridor until June of 2016.[211] The agreement covers 32 projects, thirteen of which are related "transportation infrastructure" such as railways and highways, and only one of which has to do with energy.[212] While not included in the trilateral agreement, an important energy project in this region is what is referred to in the "Building the Belt and Road" document as the "China-Russia Oil Pipeline." Russia began sending China oil through the Eastern Siberia-Pacific Ocean (ESPO) pipeline in 2011.[213] The offshoot carrying oil from the ESPO pipeline to China has an annual capacity of 15 million tons, and a second spur (expected to be completed in 2018) would double that to a total of 30 million tons per year.[214] China has also made long-term plans to import Russian natural gas through pipelines. Construction on the first pipeline began as part of a $400 billion deal for 38 bcm of Russian natural gas each year, and this pipeline is expected to come online at the

[209] Lucy Hornby, "China and Myanmar Open Long-Delayed Oil Pipeline," Financial Times, https://www.ft.com/content/21d5f650-1e6a-11e7-a454-ab04428977f9.
[210] Aung Hla Tun and Timothy Mclaughlin, "China's Citic Wins Projects to Develop Myanmar Economic Zone," Reuters, http://www.reuters.com/article/myanmar-citic-project-idUSL3N14K1D720151231.
[211] Peter Bittner, "China, Russia, Mongolia Sign Long-Awaited Economic Partnership Agreement," The Diplomat, http://thediplomat.com/2016/06/china-russia-mongolia-sign-long-awaited-economic-partnership-agreement/.
[212] Dulguun Bayarsaikhan, "Over 30 Projects Lined up for Trilateral Economic Corridor," The UB Post, http://theubpost.mn/2016/06/29/over-30-projects-lined-up-for-trilateral-economic-corridor/.
[213] Albing Guo, "Cnpc to Start Laying Second China-Russia Oil Pipeline in June," Bloomberg, https://www.bloomberg.com/news/articles/2016-05-12/cnpc-to-start-laying-second-china-russia-oil-pipeline-in-june-io48uk3h.
[214] Aizhu Chen, "China to Complete Russia Oil, Gas Pipeline Sections by End-2018: Vice Governor," Reuters, http://www.reuters.com/article/us-china-silkroad-russia-pipelines-idUSKBN18819I.

end of 2018.[215] Plans are being floated for a second pipeline that would carry 30bcm per year from West Siberia over 30 years.[216]

4.3 Comparing "Going-out" and the "Belt and Road Initiative"

Section 3.2.3 identified a link between the "going-out" strategy and the Belt and Road Initiative in that both share the common goal of addressing China's perceived energy needs. Both strategies also share features such as funding mechanisms and a pattern of delayed announcement.

In Chapter 3, this paper showed that at its core, "going-out" was an energy strategy, though it did later expand to include other industries. Likewise, statements by high-level officials suggest that the Belt and Road is also an energy strategy at heart. At the June 2017 Cross-Strait CEO summit, Zhang Yansheng stated that the core of the Belt and Road Initiative is "West-West Cooperation" (referring to western China and western Asia) because of western Asia's abundant oil resources.[217] Zhang is the current Secretary-General of the Academic Committee of the National Development and Reform Commission, the body responsible for "formulating and implementing strategies of national economic and social development," making his statements about the Belt and Road highly authoritative.[218]

The defining features of both the "going-out" and the Belt and Road (overseas investment and infrastructure development respectively) were foreshadowed even before the policy was officially announced. CNPC began pursuing overseas investments in 1993, but

[215] Ibid.
[216] Guo, "Cnpc to Start Laying Second China-Russia Oil Pipeline in June".
[217] Xiulan Chen, "Zhuoyan Nengyuan Zhangwo Lu Pao Dailu Xixihezuo (著眼能源掌握 陸拋帶路西西合作)," China Times, http://www.chinatimes.com/newspapers/20170603000739-260309.
[218] "National Development and Reform Commission (Ndrc)," National Development and Reform Commission of the People's Republic of China, http://en.ndrc.gov.cn/mfndrc/.

"going-out" did not receive government blessing until 1997, and was not established as an official strategy until the publication of the Tenth Five-Year Plan in 2001. In the case of "going-out," the Chinese central government identified that "China's petroleum import dependence had already become a permanent feature of the Chinese petroleum economy," so it was willing to adopt a strategy that CNPC had already begun implementing.[219] Kong emphasizes that the development of "going-out" was a "cumulative and reiterative output" based on how the NOCs responded to the challenges that they faced, with the government merely incorporating it into official documents *post hoc*.[220]

Likewise, this chapter has shown that some of the projects that China considers to be a part of One Belt One Road, such as the ESPO pipeline, predate even the informal announcements made by President Xi in 2013. On the other hand, the China-Kazakhstan oil pipeline, completed in 2009, is not mentioned in Belt and Road documents.[221] CNPC maintains a hand in a number of the pipeline projects under One Belt One Road, but the extent to which CNPC and other NOCs may have influenced the development of the One Belt One Road concept is unclear.

Like the "going-out" strategy, One Belt One Road may also be making use of concessional loans. For example, leaked plans for the China-Pakistan Economic Corridor reveal that China will provide loans to Pakistan's agricultural sector through the China Development Bank and "actively strive to utilize [Chinese] national special funds as the discount interest for the loans of agricultural foreign investment."[222] Much as Chinese investments under "going-out" were part of a multifaceted approach involving the cooperation of state banks and backing from the central government, the leaked plan

[219] Kong, *China's International Petroleum Policy*, 46.
[220] Ibid., 60.
[221] Shaofeng Chen, "Has China's Foreign Energy Quest Enhanced Its Energy Security?," *The China Quarterly*, no. 207 (2011): 610.
[222] Khurram Husain, "Exclusive: Cpec Master Plan Revealed," Dawn, https://www.dawn.com/news/1333101.

recommends that "[i]nternational business cooperation with Pakistan should be conducted mainly with the government as a support, the banks as intermediary agents and enterprises as the mainstay," which is to say that although Chinese companies will be able to count on some degree of government assistance and financing, they will ultimately be responsible for their own investments.[223]

It is clear that state-owned banks continue to play a role in financing Chinese projects. In 2016, China Development Bank held $110 billion in outstanding loans to countries under One Belt One Road.[224] At the recent Belt and Road Summit, China announced that it would contribute 100 billion RMB ($14.5 billion) to the Silk Road Fund, 250 billion RMB ($36.2 billion) in "special lending schemes" to the China Development Bank, and 130 billion RMB ($18.9 billion) to Eximbank to "support co-operation on infrastructure, industry capacity and financing."[225] China also leads the multilateral Asian Infrastructure Investment Bank (AIIB), which has made roughly $1.7 billion in loans for nine projects related to One Belt One Road.[226] From this we can see another way in which the Belt and Road represents a continuation of the "going-out" strategy.

Where the two strategies differ is in their specific energy focuses. Under the "going-out" strategy, the NOCs prioritized equity oil, while the Belt and Road Initiative seems to prioritize infrastructure projects. The importance of this distinction will be explained in further detail in the next chapter.

[223] Ibid.
[224] Gabriel Wildau and Nan Ma, "China New 'Silk Road' Investment Falls in 2016," Financial Times, https://www.ft.com/content/156da902-354f-11e7-bce4-9023f8c0fd2e.
[225] Charles Clover, Sherry Fei Ju, and Lucy Hornby, "China's Xi Hails Belt and Road as 'Project of the Century'," Financial Times, https://www.ft.com/content/88d584a2-385e-11e7-821a-6027b8a20f23.
[226] Ibid.

Chapter 5: China's Energy Security

This chapter will argue that China views its energy security primarily through the lens of security of supply and that its primary concern in the Belt and Road period is ensuring that it can reliably transport energy purchased abroad back to China, as opposed to emphasizing diversity or affordability. It will also show how the energy-related Belt and Road projects identified in the last chapter contribute to China being able to reliably transport energy.

5.1 China's Energy Security Concept

China's perception of its energy security seems to best fall under what was described in Chapter 2 as the "traditional energy security" concept, focused primarily on ensuring the supply of and access to energy. A survey of 312 Chinese respondents found that along 16 dimensions of energy security, almost half considered having "a secure supply of coal, gas, oil, and/or uranium" as either the first or second most important dimension.[227]

It is only natural for China to be most concerned about having an adequate supply of energy resources. As the previous chapter suggested, China has traditionally been most concerned about oil in particular, although natural gas is of growing importance as well. According to data provided by the China Statistical Yearbook, China's fuel mix in 2014 was 64% coal, 18.1% crude oil, 5.9% natural gas, and 12% other energy.[228] According to these same statistics, China produced roughly 3.9 billion tons of coal and consumed roughly 4.1 billion tons, meaning that China produced roughly 94% of the coal that it burned in 2014. [229] On the other hand, China used 518 million tons of crude oil, but produced less than half that

[227] Results reproduced in Appendix B. Benjamin K Sovacool and Vlado Vivoda, "A Comparison of Chinese, Indian, and Japanese Perceptions of Energy Security," *Asian Survey* 52, no. 5 (2012): 960.
[228] See Appendix C. *China Statistical Yearbook 2016*, China Statistical Yearbook (China Statistics Press, 2016), 9-2.
[229] Ibid., 9-5.

amount at 211 million tons.[230] In 2016, China's crude oil imports hit record highs,[231] while crude oil output dropped to the lowest levels since May 2009.[232] China is slightly more self-sufficient with regard to natural gas, only importing 30% of its consumed natural gas in 2015, but this is expected to climb to 40% by 2035.[233] In order for China to feel secure with regard to its energy, it must address its inability to be self-sufficient in oil and gas.

Bo Kong identifies three components of China's energy insecurity: cyclical, structural, and institutional security.[234] Of these, the first two are components that the Belt and Road is able to address. Cyclical insecurity refers to the recurring power shortages that continue to plague China. From 1978-1996, power shortages were caused by insufficient production as China built up its electrical infrastructure. The Asian financial crisis of 1997 led to a decline in energy usage, and the central government banned the construction of new power plants in response.[235] When the economy recovered more quickly than expected, there was again a shortage of production capacity, which created another period of electricity shortages.[236]

Kong believes that China's structural insecurity comes as a result of excessive coal consumption. In order to reduce coal consumption, China has increased its share of oil, gas, and renewable sources of energy.[237] In 2005, 72.4% of China's energy consumption came from coal, which dropped to 64% in 2015, while oil grew from 17.8% to 18.1% and natural

[230] Oil is generally measured in barrels, but the China Statistical Yearbook uses tens of thousands of tons. Ibid., 9-4.
[231] Adam Rose and Aizhu Chen, "Amid Global Price Rout, China Crude Oil Imports Hit Record," Reuters, http://www.reuters.com/article/us-china-economy-trade-crude-idUSKCN0UR0DU20160113.
[232] Meng Meng, "China October Crude Oil Output Drops to Lowest since May 2009," Reuters, http://www.reuters.com/article/us-china-economy-crude-output-idUSKBN1390GD.
[233] "Bp Energy Outlook 2017 Edition," news release, 2017.
[234] Bo Kong, "An Anatomy of China's Energy Insecurity and Its Strategies," (Springfield, VA: Pacific Northwest Center for Global Security, 2005), 2.
[235] Shunkun Yu, Lisha Zhou, and Chen Li, "China Wrestles with Power Shortages," Power Magazine, http://www.powermag.com/china-wrestles-with-power-shortages/?pagenum=1.
[236] Ibid.
[237] Kong, "An Anatomy of China's Energy Insecurity and Its Strategies," 7.

gas grew from 2.4% to 5.9%.[238] Kong considers oil to be the "principal element of China's structural energy insecurity" because it "bears the brunt of substitutes for coal" and is uniquely important for economic development for as a military commodity.[239]

China's desire to reduce its coal consumption is only one of the reasons that China's thirst for foreign oil will continue to grow. In order for China to maintain the high economic growth rates that it has become accustomed to, its oil supply must grow as well. One study conducted in 2004 estimated that for China's economy to maintain a growth rate of greater than 7%, its oil supply would need to grow by at least 4%, but between 1990 and 2003, domestic oil production grew by an average rate of 1.57% per year.[240] The GDP growth target has since dropped slightly to 6.7%, but between 2014 and 2015 oil production increased by an even lower 1.5%.[241]

Digging deeper into China's concerns about its energy supply, three pressing issues are affordability, diversity, and transport reliability.[242]

5.1.1 Affordability

Affordability refers to the degree to which China can purchase energy without placing an undue burden on its economic development. Given that China needs to import so much energy already, higher energy costs mean that there is less money available for development and thus represents a security challenge because it can "undermine the country's sustained

[238] *China Statistical Yearbook 2016*, 9-2.
[239] "An Anatomy of China's Energy Insecurity and Its Strategies," 7.
[240] Ibid., 8.
[241] "Bp Statistical Review 2016," 10.
[242] Adapted from "An Anatomy of China's Energy Insecurity and Its Strategies."

rapid growth, which is vital for stability of the Chinese system – stability in economic, social, and even political terms."[243]

Chinese officials have estimated that "for every increase of 10 dollars per barrel of oil," China's GDP growth rate will decrease by 1%.[244] It has also been estimated that a similar increase in the price of oil increases the consumer price index by 0.4%, which leads to higher inflation.[245] Some scholars suggest that affordability of energy is important because it can affect social and political stability. Kong argues that high inflation "can induce students to take to the street, thus threatening political stability."[246] Erica Downs goes even further and cites a number of Chinese economists who have drawn a link between inflation resulting from high energy prices and the 1989 Tiananmen Square demonstrations, and argues that the Chinese government is particularly sensitive to the heightened possibility of future domestic unrest brought on by higher oil prices.[247]

Two ways that China can ensure affordability of energy are through equity oil and the creation of a strategic petroleum reserve. As explained in Section 3.2.2, the term "equity oil" refers to oil that is acquired overseas and shipped directly back to China, typically as repayment for Chinese concessional loans. Equity oil's efficacy in ensuring affordability is situational; the price of equity oil it is not necessarily always more affordable than market oil, but it will be less volatile, so it is guaranteed to provide some degree of economic stability. The impact of a strategic petroleum reserve on affordability will be explained in Section 5.2.

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[243] Ibid., 19.

[244] Liao Hong and Chen Yun, (Tebie cehua: duiyi zhanzheng, zhongguo jingji sunshi you duoda?) ("Special Report: What is the magnitude of Chinese Economic Losses Resulting from the Iraq War?"), People Daily Online , available at http://past.people.com.cn/GB/jinji/31/179/20030225/930064.html in ibid.

[245] Fu Yongming, "Guoji Shiyou Jiage Dui Woguo Jingji De Yingxiang [Impacts of International Petroleum Prices on the Chinese Economy]," *Jiage Yuekan [Prices Monthly]*, no. 4 (2005): 11 in *China's International Petroleum Policy*, 46.

[246] "An Anatomy of China's Energy Insecurity and Its Strategies," 19.

[247] Downs, "The Chinese Energy Security Debate," 31.

5.1.2 Diversity

Issues of diversity and transport reliability can negatively impact affordability. Diversity refers to the number of sources that China can import oil from. Diversity could refer to both diversity of sources and diversity of transport methods, but I will limit its definition here to simply diversity of sources, as diversity of transport methods is more meaningful when folded into transport reliability.

China has thus far been able to import enough oil to meet its domestic needs, but is heavily reliant on a small handful of countries; half of its oil imports in 2014 came from four countries.[248]

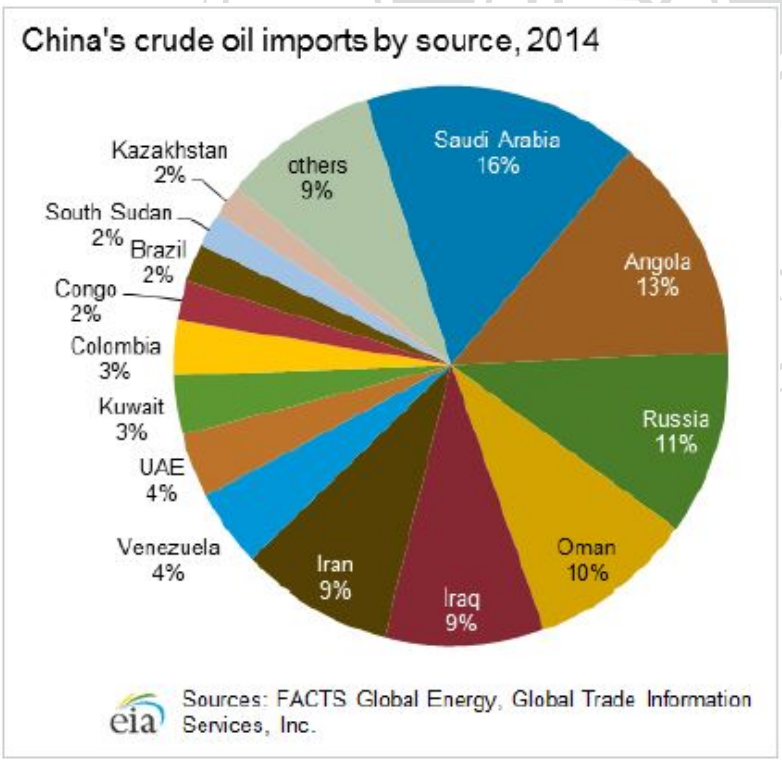

Figure 5.1: China's crude oil imports by source (EIA 2015)

[248] U.S. Energy Information Administration, "China," U.S. Energy Information Administration, https://www.eia.gov/beta/international/analysis.cfm?iso=CHN.

The totality of China's oil imports come from about 30 countries whereas the United States imports its oil from over 60 countries.[249]

China is even more limited in its source diversity when importing natural gas. The figure below shows the sources of China's liquefied natural gas imports; more than half of its LNG comes from two countries (Qatar and Australia).

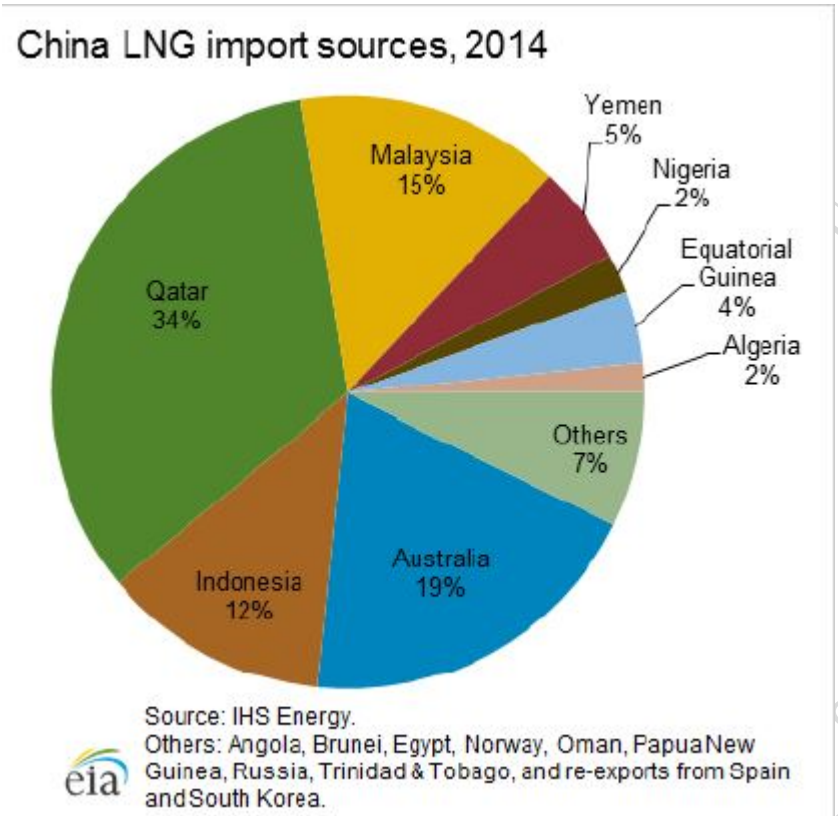

Figure 5.2: China's LNG imports by source (EIA 2015)

With regards to natural gas imported via pipelines, China is almost totally dependent on Turkmenistan, which provided 82% of its pipeline gas in 2015.[250]

China's lack of source diversity is problematic because it is heavily reliant on a handful of countries for the majority of its energy needs; lack of diversity means that disruptions to exports from those countries will have a disproportionate effect on China. China imports most of its oil from the conflict-prone Middle East and West Africa, which

[249] *Energy Economics: Modeling and Empirical Analysis in China*, 221.
[250] "Bp Statistical Review 2016," 28.

adds an additional layer of risk.[251] Addressing the problem of limited diversity is relatively straightforward: China needs to seek out other suppliers of energy.

5.1.3 Transport Reliability

Transport reliability refers to whether energy resources can be reliably transported to China once purchased. The problem of China's dependence on African and Middle Eastern oil is further compounded by the paucity of routes that this oil can travel through; nearly 77% of its oil imports flow through the narrow Strait of Malacca.[252] The Strait of Malacca links the Indian and Pacific Oceans and may very well be the most important shipping lane in the world. In 2013, approximately 15.2 million barrels of oil (bbl) – roughly 27% of the world's oil maritime trade – passed through the Strait of Malacca each day.[253]

The United States, as a global naval power, has long used its navy to maintain open access to sea lines of communication (SLOC) such as the Strait of Malacca. While this has been hugely beneficial to free trade and the global economy, it is also concerning to Chinese leaders, who fear that the United States could someday use its control of the Strait of Malacca to contain China by cutting off its oil supply. Downs notes that while some scholars argue that "the Chinese goal of secure oil supply lines can be more easily and cheaply satisfied by 'free riding' on American protection of the communication lines," Chinese energy scholars tend view China's dependence on American security as a vulnerability.[254] Top Chinese

[251] In 2014, 52% of China's oil imports came from the Middle East and 22% came from West Africa. "China".
[252] ZhongXiang Zhang, "Why Are the Stakes So High?: Misconceptions and Misunderstandings in China's Global Quest for Energy Security," in *Rebalancing and Sustaining Growth in China*, ed. Huw Mckay and Song Ligang (ANU Press, 2012), 335.
[253] U.S. Energy Information Administration, "World Oil Transit Chokepoints," U.S. Energy Information Administration, https://www.eia.gov/beta/international/regions-topics.cfm?RegionTopicID=WOTC.
[254] Downs, "The Chinese Energy Security Debate," 32.

leaders have agreed with this latter view; then-President Hu Jintao declared in 2003 that new strategies would be needed in order for China to overcome the "Malacca Dilemma."[255]

Nor are threats to Chinese transport necessarily state-directed. The Strait of Malacca is only 1.5 miles wide at its narrowest point, making it a natural bottleneck.[256] The sheer volume of ships that transit through the Strait increases the possibility of accidents that could lead to closure and force ships to take longer routes to their destinations; such a rerouting would force ships to travel an additional 994 miles, straining already-tight shipping capacity.[257] There are also concerns that terrorism or piracy could either close the Strait, or simply raise shipping costs, both of which would lead to increased oil prices.[258]

Pipelines are one method by which China hopes to bypass the Strait of Malacca. Chinese energy analysts have argued that pipeline oil is "less vulnerable to disruption by the United States than oil arriving by tanker."[259] During the Twelfth Five-Year Plan (2011-2015), China planned to nearly double the total length of its oil and gas pipelines from fifty thousand kilometers to ninety thousand kilometers.[260] While the actual effectiveness of oil pipelines is a contentious topic[261], China views pipelines as preferable to maritime shipping.[262]

5.2 Addressing China's Energy Security Challenges

[255] "Nengyuan Anquan Zaoyu "Maliuji Kunju" Zhong Ri Han Nengfou Xieshou? (能源安全遭遇"馬六甲困局"中日韓能否攜手？)," People's Daily, http://www.people.com.cn/GB/guoji/14549/2570978.html; ibid.
[256] U.S. Energy Information Administration, "World Oil Transit Chokepoints".
[257] Kong, "An Anatomy of China's Energy Insecurity and Its Strategies," 20.
[258] Ibid., 18.
[259] Downs, "The Chinese Energy Security Debate," 36.
[260] Andrew S. Erickson and Gabriel Collins, "China's Oil Security Pipe Dream," *Naval War College Review* 63, no. 2 (2010): 90.
[261] A number of scholars make the case that should the United States ever seek to cut off China's oil imports, destroying China's oil pipelines would not be significantly more difficult than blockading the Strait of Malacca (see Downs, 2004; Erickson, 2010; Leung, 2010)
[262] Guy Leung argues that the cost of diverting maritime shipping is negligible when compared to the greater per barrel cost of pipeline oil. Guy C.K. Leung, "China's Energy Security: Perception and Reality," *Energy Policy*, no. 39 (2010): 1334.

What can China do to address its energy security challenges? Kent Calder proposes five strategic options:

1. Geographical diversification of its energy supplies;
2. Increasing energy efficiency;
3. Diversifying its reliance on oil toward nuclear power, hydroelectric power, and natural gas, the supply of which is less susceptible to sea-lane interdiction;
4. Reducing reliance on international majors, while conversely increasing the share of energy imports flowing through Chinese owned or controlled intermediaries; and
5. Developing the military capability to independently protect Chinese energy supplies.[263]

Calder develops this list based on the observation that "China is simultaneously pursuing all of these strategies simultaneously [*sic*]," but does not actually draw on official documents.

China began formulating strategies for its petroleum security in late 2002 and 2003. The State Economic and Trade Commission (SETC) and the State Development Planning Commission (later the NDRC) crafted a joint proposal of six strategies: the creation of a state petroleum fund, the reinstitution of the State Energy Commission, the development of a domestic oil tanker fleet and blue water navy, the development of a petroleum conservation plan, the creation of three flagship oil companies, and the restructuring of China's energy consumption system.[264] The NDRC also drafted its own recommendations, adding an additional five strategies: the conducting of petroleum diplomacy, the development of renewable energy sources, the adoption of futures contracts to hedge against price volatility, the improvement of petroleum efficiency, and the strengthening of the petrochemical industry.[265]

Kong references four official documents since 2000 that he sees as clearly "point[ing] to a clear contour and parameter" of China's petroleum policy, noting that there is not a

[263] Kent E Calder, "Coping with Energy Insecurity: China's Response in Global Perspective," *East Asia* 23, no. 3 (2006): 54.
[264] Kong, *China's International Petroleum Policy*, 56-57.
[265] Ibid., 57.

singular document covering this topic.[266] From these documents he identifies six strategies as being the "six pillars of China's international petroleum policy":

1. To implement the going-out strategy,
2. To carry out the diversification strategy,
3. To build globally competitive flagship oil companies,
4. To conduct petroleum diplomacy,
5. To build a domestic oil tanker fleet and expand the Chinese Air Force and the Chinese Navy, and
6. To set up a national petroleum investment fund.[267]

I will modify this list by replacing the national petroleum investment fund with the creation of a strategic petroleum reserve (SPR).[268] In the following sections, I will explain how some of these strategies align with China's identified energy security concerns.

Much has been said in this paper about the going-out strategy, the diversification strategy, petroleum diplomacy, and the growth of China's NOCs as globally competitive oil companies. The growth of China's NOCs has gone hand-in-hand with the implementation of the going-out strategy.[269] Meanwhile, the pursuit of overseas expansion at the heart of the going-out strategy has promoted the ongoing diversification of China's oil supply.[270]

The need for reliability of transport extends to the next strategy that Kong identifies, "building a domestic oil tanker fleet and expanding China's blue water navy."[271] An oft-cited

[266] The four documents are the Tenth Five-Year Plan (2000), the Special Energy Plan for the Tenth Five-Year Plan, the NDRC and the SETC's joint proposal for China's petroleum strategies (2002), and the NDRC's Nine-Point Strategy (2003). Ibid.
[267] Ibid., 57-58.
[268] Although Kong includes the petroleum investment fund as a strategy, he neglects to explain why he considers it important, whereas China's need for a strategic petroleum reserve appears frequently in the academic literature, which is why I consider it a more important strategy.
[269] There is scholarly debate about the actual effectiveness of equity oil with regards to Chinese energy security. Erica Downs argues that not only do Chinese oil companies "have a history of overpaying for equity positions," equity oil does not protect against price volatility. Downs, "The Chinese Energy Security Debate," 35.
[270] Shaofeng Chen notes that as China has diversified, it has begun to rely on countries threatened by domestic unrest or in disputes with the United States, which presents additional challenges to China's energy security. Bo Kong writes that in the aftermath of the American invasion of Iraq in 2003, Chinese analysts worried about the impact that the invasion would have on China's efforts to import Iraqi oil. Shaofeng Chen, "Has China's Foreign Energy Quest Enhanced Its Energy Security?," ibid., no. 207 (2011): 624. Kong, *China's International Petroleum Policy*, 53-55.
[271] *China's International Petroleum Policy*, 61.

figure is that foreign tankers carry roughly 90% of China's maritime oil imports.[272] Back in 2007, Chinese government planners announced an effort to build more than 90 "supertankers", with a target for 50% of oil imports to be carried on Chinese-owned tankers.[273] Yang Baohe, the principal naval architect at the Marine Design & Research Institute of China, said that the planned construction "is all about national energy security…[we] have to be able to use our own ships to transport oil."[274] This stands in contrast to the prevailing view that "if you can pay the price, you will get the ship and the oil."[275] As with equity oil, China's insistence on owning the tankers used to import oil reflects a deep-seated suspicion of the global market, and a fear that it could lose access to oil or tankers on the open market.[276]

China is similarly suspicious that the United States could close the Strait of Malacca, which in part motivates its desire to modernize and expand the reach of its navy and air force. The idea is that if China has a modern air force and navy that is capable of projecting force out past its coastal waters, it will be able to protect the SLOCs and thus its oil imports.[277] The continued pursuit of this can be seen in China's 2015 Defense White Paper *China's Military Strategy*, which states that the People's Liberation Army Navy (PLAN) will "gradually shift its focus from 'offshore waters defense' to the combination of 'offshore waters defense' with

[272] *Energy Economics: Modeling and Empirical Analysis in China*, 222.; *China's International Petroleum Policy*, 56.; Bernard D. Cole, *Sea Lanes and Pipelines: Energy Security in Asia* (Praeger Security International, 2008), 81.
[273] David Lague, "China Begins Expanding Its Supertanker Fleet," The New York Times, http://www.nytimes.com/2007/05/16/business/worldbusiness/16iht-tanker.4.5739529.html?pagewanted=all.
[274] Ibid.
[275] Sam Bateman, maritime security expert at Nanyang Technical University in Singapore, as quoted in ibid.
[276] Alvin Yao identifies China's energy security policy since the mid-1990s as being "more 'mercantilist' than 'liberal' in that it emphasizes self-sufficiency, exploration, transportation security, trade protectionism, and state directives and assistance." Yuanming Alvin Yao, "China's Oil Strategy and Its Implications for U.S.-China Relations," *Issues & Studies* 42, no. 3 (2006): 177.
[277] Kong, *China's International Petroleum Policy*, 56.

'open seas protection', and build a combined, multi-functional and efficient marine combat force structure."[278]

The last strategy in China's petroleum policy is the creation of a strategic petroleum reserve (SPR). China has recognized the need for an SPR since the mid-1990s, after studying the U.S. strategic petroleum reserve.[279] The first serious proposals for an SPR appeared in the joint SDPC-SETC oil security strategy, as well as in the Tenth Five-Year Plan.[280] Erica Downs goes so far as to call it "the most effective way to prevent the political use of oil as a weapon and to minimize the impact of supply disruption."[281] Having an SPR makes a country less vulnerable to major short-term disruptions in the oil market, and can be considered an "insurance policy" against such disruptions."[282] In the event of a major disruption, oil stores can be released from the SPR to moderate the shock of a sharp decline in supply. While an SPR cannot be used indefinitely, it can at least ensure the short-term affordability of oil in the domestic market.

When China's SPR was first proposed, there was debate about whether or not an SPR should be established, due to concerns about the affordability of an SPR, and questions about where the money would come from.[283] Ultimately, the central government agreed to provide both the $1.6 billion needed for construction costs as well as funding for the oil to fill it, although the NOCs also agreed to contribute equity oil as well.[284] The SPR was originally placed under the control of the State Strategic Petroleum Reserves Office in 2003[285], but is

[278] Philip Andrews-Speed and Christopher Len, "The Future of the Us Security Umbrella for Sea Lines of Communication (Slocs) between the Middle East and Southeast Asia, and the Future Role of China," (Singapore: National University of Singapore, 2016), 8.
[279] Meidan, *The Structure of China's Oil Industry*, 40.
[280] Downs, "The Chinese Energy Security Debate," 25.
[281] Ibid., 33.
[282] Yergin, "Energy Security and Markets," 76.
[283] Downs, "The Chinese Energy Security Debate," 33-34.
[284] Meidan, *The Structure of China's Oil Industry*, 41.
[285] Kong, "An Anatomy of China's Energy Insecurity and Its Strategies," 43.

now administered by the National Petroleum Reserve Center.[286] Construction of the SPR has proceeded in three phases: the construction of Phase I lasted from 2004 until 2008, and the facilities constructed have a total capacity of 103 million barrels.[287] Phase II was originally intended to be completed by 2012/2013 with a capacity of 169 million barrels.[288] According to the 13th Five-Year Plan, China now expects to complete Phase II and start work on Phase III by 2020.[289] Some analysts believe that China has taken advantage of low oil prices since early 2015 to accelerate the filling of its existing SPR capacity, and that these purchases are behind the recent spike in China's oil imports.[290] China's goal appears to be an SPR capable of holding at least 90 days' worth of net oil imports by 2020,[291] which would put it in compliance with the International Energy Agency's requirement that its member-states maintain oil stocks equivalent to at least 90 days of net oil imports.[292] Given that China imported roughly 9.2 million barrels per day in March 2017, the combined capacity of the facilities completed under Phase I and Phase II of China's SPR account for roughly 30 days' worth of net oil import volume.[293]

[286] Wu, *Energy Economy in China*, 203.
[287] Ibid.
[288] Ibid.
[289] Central Committee of the Communist Party of China, "The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China (2016-2020)," Chapter 30, Section 3.
[290] Jing Yang and Dan Murtaugh, "Oil Bulls Beware Because China's Almost Done Amassing Crude," Bloomberg, https://www.bloomberg.com/news/articles/2016-06-30/oil-bulls-beware-because-china-s-almost-done-amassing-crude.
[291] U.S. Energy Information Administration, "China".
[292] International Energy Agency (IEA) 2010a, *IEA Response System for Oil Supply Emergencies 2010*, International Energy Agency, Paris, http://www.iea.org/publications/free_new_ Desc.asp?PUBS_ID=1912 in Andrew B. Kennedy, "China's Petroleum Predicament: Challenges and Opportunities in Beijing's Search for Energy Security," in *Rising China: Global Challenges and Opportunities*, ed. Jane Golley and Ligang Song (ANU Press, 2011), 130.
[293] If we believe that China's recent spike in oil imports is in fact part of an effort to fill its SPR, then China most likely has greater than 30 days worth of net oil imports stored in its SPR. Aizhu Chen and Meng Meng, "Update 2-China Crude Oil Imports Shatter Record, Top U.S. Intake," Reuters, http://www.reuters.com/article/china-economy-trade-crude-idUSL3N1HK1DG.

5.3 The Impact of "Belt and Road" Projects on China's Energy Security

The common feature of the energy-related projects under the Belt and Road Initiative is that they primarily contribute to the reliability with which China can transport energy resources from abroad back to China.

Some projects are purely about transport. By providing an alternate route for maritime shipping that would otherwise transit through the Strait of Malacca, Gwadar has the potential to greatly improve China's perception of its transport reliability. The proposed Dubai-Gwadar-Urumqi oil route would be 3,600 kilometers, as compared to the current 10,000-kilometer Dubai-Shanghai-Urumqi route.[294] One study estimates that the construction of an oil pipeline connecting Gwadar with western China would increase the proportion of pipeline imports from 12.25% to 20.07%, and reduce China's reliance on the Strait of Malacca by 11%.[295] However, this pipeline would not improve affordability. The cost to transport a barrel of oil 1000 kilometers to China by ship is cheaper than the equivalent journey through a pipeline ($0.163 by tanker and $0.793 by pipeline),[296] so the per-barrel cost of the combined maritime-pipeline route through Gwadar would be greater than a purely maritime route, but it would reduce the transit time by a factor of 5.[297]

Like the planned pipeline from Gwadar, China-Myanmar oil and gas pipelines allow China to reduce the total transit time of Middle East oil, though not as dramatically and again

[294] Bhutta, "Pakistan Working on Gwadar-China Oil Pipeline".
[295] F. Shaikh et al., "Prospects of Pakistan-China Energy and Economic Corridor," *Renewable & Sustainable Energy Reviews* 59 (2016): 261.
[296] More recent cost estimates could not be found. Gabriel B. Collins and Andrew S. Erickson, "Tanking Up: The Commercial and Strategic Significance of China's Growing Tanker Fleet," *Geopolitics of Energy* 29(8) (August 2007) in Cole, *Sea Lanes and Pipelines: Energy Security in Asia*, 1.
[297] The purely maritime route takes 32 days whereas the proposed pipeline would cut the journey down to 6 days. It is unclear whether there are significant benefits to be gained from the amount of saved time. Shaikh et al., "Prospects of Pakistan-China Energy and Economic Corridor," 258.

at the expense of a greater cost per barrel.[298] That said, the advantage of the China-Myanmar pipeline is that it is already completed and begun operating. Neither Pakistan nor Myanmar produce their own oil or gas, but both provide China with a means of bypassing the Strait of Malacca so that oil and gas from China's existing suppliers in the Middle East and Africa can be delivered directly to inland locations in western China.

Central Asia and Russia not only provide China with energy resources, but also do so in a way that enhances transport reliability. Russia is perhaps China's most important energy partner; in 2016, it overtook Saudi Arabia to become China's primary crude oil supplier, shipping roughly 1.05 million bpd to China.[299] Importing more Russian oil improves China's perception of transport reliability at the expense of diversity.[300] China will become more dependent on Russian oil, but if this oil arrives via pipeline, China will be able to avoid the Strait of Malacca.

The improved sense of transport reliability, overall supply, and affordability provided by the China-Central Asia Gas Pipeline also comes at the cost of diversity. The completion of Line D would provide more capacity than China actually needs at the moment: in 2015 China imported roughly 59.8 bcm of natural gas through pipelines and as liquefied natural gas (LNG).[301] As it stands, more than half of China's natural gas imports come in the form of pipeline gas from Central Asia (33.6 bcm vs. 26.2 bcm of LNG), and upwards of 80% of its pipeline gas comes from Turkmenistan.[302] It should be mentioned that diversity suffers only when looking at pipelines that connect to energy exporters; pipelines that connect to ports can

[298] The combined maritime-pipeline route is only a day faster for Middle East imports. Switching from a purely maritime route to a combined maritime-pipeline route would actually be slower for African oil imports. Ibid.
[299] Aizhu Chen and Meng Meng, "Russia Beats Saudi Arabia as China's Top Crude Oil Supplier in 2016," Reuters, http://www.reuters.com/article/us-china-economy-trade-crude-idUSKBN1570VJ.
[300] This is not true of natural gas; in 2015 largest supplier of pipeline gas to China was Turkmenistan and the largest suppliers of LNG were Australia and Qatar. "Bp Statistical Review 2016," 28.
[301] Ibid., 29.
[302] Ibid., 28.

have a positive impact on diversity because they are open to oil and LNG tankers from any country.

Oil and gas pipelines differ in how they impact affordability. Maritime shipping is undoubtedly the most cost-effective way to deliver oil from one location to another, and the best way to move the vast volumes of oil that China requires. For example, the completed spur of the ESPO pipeline can deliver 15 million tons of oil to China each year, or 41,000 tons a day. A Suezmax tanker, like the ones that deliver oil to the Myanmar-China pipeline, can carry more than three times that amount of oil in a single trip (140,000 tons).[303]

Oil and natural gas differ in difficulty of transport, which has implications for affordability depending on the chosen mode of transportation. Cooling natural gas to its shippable liquid form is an extremely energy-intensive process, and LNG must be re-gasified at a purpose-built LNG terminal before it can be distributed via local pipelines. Another factor that would make LNG shipping more expensive than oil shipping is the difficulty and cost associated with manufacturing LNG tankers; an LNG carrier with a capacity of 138,000 cubic meters would cost roughly $150-160 million, twice the cost of a Very Large Crude Carrier (VLCC) capable of carrying "four to five times as much energy."[304] The low cost associated with shipping oil is likely supported by economies of scale as well: in 2016 oil tankers made up roughly 27.9% of the global maritime shipping fleet, while gas carriers of all kinds (to include LNG, liquid petroleum gas, and others) made up a mere 3% of the global fleet.[305] Therefore, in the absence of definite figures comparing the cost of transporting maritime LNG and pipeline natural gas to China, it is reasonable to assume that gas pipelines contribute to both transport reliability and affordability.

[303] "China Opens Delayed Myanmar Oil Pipeline to Get Mideast Crude Faster".
[304] Cole, *Sea Lanes and Pipelines: Energy Security in Asia*, 80.
[305] United Nations Conference on Trade and Development, *Review of Maritime Transport 2016* (United Nations, 2016), 31.

In transitioning from the "going-out" strategy to One Belt One Road, China has shifted from prioritizing affordability (in the form of equity oil) to prioritizing transport reliability. The overseas expansion efforts of China's NOCs led to jointly-developed oil fields from which China could extract equity oil, but such projects have fallen by the wayside under the Belt and Road Initiative. Gabriel Collins and Andrew Erickson first identified the possibility of such a shift back in 2007: they argued that protecting "midstream" assets such as tankers only requires that China develop "robust naval and aviation capabilities," whereas attempting to protect "upstream" assets such as oilfields would require the deployment of ground forces to locations overseas.[306] This shift has occurred within the bounds of the "traditional" energy security concept in that China is still trying to ensure security of supply, but instead of securing the source of energy, it is now focused on securing energy routes.

[306] Andrew S. Erickson and Gabriel Collins, "China's Maritime Evolution: Military and Commercial Factors," *Pacific Focus* XXII, no. 2 (2007): 57.

Chapter 6: Conclusion

China's One Belt One Road Initiative has been picking up speed at a time when the United States and Europe are reassessing their own roles in the global arena; the European Union is still trying to find a way forward post-Brexit, while President Trump's withdrawal from the Trans-Pacific Partnership means that the United States will be paring down its involvement in East and Southeast Asia. China has gone out of its way in insisting that it hopes to create "a big family of harmonious co-existence" and that the benefits of the initiative will be shared by all.[307] While it is still too early to tell whether or not the Belt and Road Initiative will be able to meet these lofty global aspirations, it appears that it is at least on the right track to address China's domestic energy issues.

The questions that this paper sought to answer were: "where does the Belt and Road Initiative fit in the context of China's energy policy?" and "what impact will this initiative have on the future of China's energy security?" Official documents show that the Belt and Road is intended to be a follow-up to the "going-out" strategy: energy appears to be a central component of both strategies. Like the "going-out" strategy, the Belt and Road Initiative enjoys the backing of the central government, state-run banks, and Chinese companies, which echoes how the central government supported national oil companies through the use of concessional loans in the late 1990s and early 2000s.

This paper also argues that China views its energy security primarily through the lens of ensuring continued access to energy supplies. This is evidenced by the vigor with which China pursued energy resources abroad after it became a net importer of oil and gas, and by the strategies that China developed for its petroleum security during the early 2000s. During the "going-out" era China sought to gain control over upstream energy assets, but under the

[307] Jinping Xi, "Work Together to Build the Silk Road Economic Belt and the 21st Century Maritime Silk Road," http://news.xinhuanet.com/english/2017-05/14/c_136282982.htm.

Belt and Road Initiative China has shifted its focus to the midstream by controlling the means by which energy resources are transported back to China. Rather than simply pursuing equity oil, China now wants to construct pipelines and build up its tanker fleet.

6.1 Implications

China has made progress in addressing its energy security, but there are limits to a supply-focused approach. Given that China is already a net importer of both oil and gas and that the rate of consumption for both is growing faster than the rate of production, China's dependence on imported energy will only grow deeper as time goes on. Its successes in acquiring equity oil, in signing long-term agreements for oil and gas, and in building pipelines that can bypass the Strait of Malacca are still only stopgap solutions at best. They are certainly appropriate courses of action within the bounds of the "traditional" energy security concept described in this paper, but at the core of this concept is the idea that China has enough supply to meet its domestic demand. Another way that China can align supply with demand is by finding ways to reduce the demand for foreign energy. While there are contexts in which oil is irreplaceable, such as for transportation or for military use, the growth of China's renewable energy sector seems to indicate that China is looking for ways to diversify its overall fuel mix so that it can minimize the need for oil and natural gas.

Some scholars have argued that China's fear of the "Malacca dilemma" is overblown and that China does not need to worry about a foreign power cutting off its access to the Strait of Malacca. However, China's perception of a threat is more important than the actual existence of said threat, because China will act to address any perceived vulnerability in its energy security. In the context of One Belt One Road, this is evidenced by China's willingness to invest in building up a domestic tanker fleet and pipeline construction, even

though this is less cost-effective than relying on the system of chartered oil tankers and maritime oil currently in use.

Looking beyond One Belt One Road, what else might China do to address its perceived vulnerability in the Strait of Malacca? An optimistic take on this is that China might be amenable to taking on a greater role in keeping the sea lanes of communication open. A more negative outcome is that as China's navy and air force modernize, it may turn to force if it feels that its access to the Strait of Malacca is being threatened. China might also seek to expand its presence in Southeast Asia.

6.2 Avenues for Future Research

Despite being announced more than four years ago, One Belt One Road is still very much in its early stages. Future research will know if 1) One Belt One Road was successful overall, 2) if the energy-related projects were completed successfully, and 3) for those projects that were completed successfully, whether or not they had the intended impact. The leaking of the blueprint for the China-Pakistan Economic Corridor suggests that there are likely master plans for each of the corridors, and possibly even one covering the entirety of One Belt One Road. Such documents could provide invaluable insight as to the true intent behind One Belt One Road, and whether this paper has accurately inferred China's energy concerns and objectives. Future research will also be better able to determine whether concessional loans are still the primary means of funding overseas investment under One Belt One Road as they were under the "going-out" strategy. If so, this could be used to build on existing literature about the effectiveness of Chinese concessional loans.

Another topic for future research is whether or not China's national oil companies played a role in formulating One Belt One Road and the degree of involvement that they had

in doing so. As Chapter 3 explained, the "going-out" strategy was initiated by CNPC without much government support, and only after "going-out" began to show success did the central government adopt "going-out" as its own economic strategy. Perhaps projects that began before the official announcement of One Belt One Road (such as the ESPO and China-Central Asia pipelines) are analogous to CNPC's initial foreign investments, and only after they showed promise did the central government decide to push forward with One Belt One Road; this might explain why official documents mention them as falling under the Belt and Road umbrella.

On the issue of linkages between "going-out" and the Belt and Road, another issue worth exploring is the question of why China shifted its energy priorities away from affordability and equity oil. One possibility is that China felt secure in the amount of equity oil it owned, and another is that China no longer considered equity oil to be the most affordable option (as some scholarship has suggested). Additionally, while this paper argued that China's energy security priority is now transport reliability, it focused on pipelines and did not delve as deeply into the expansion of the Chinese tanker fleet, air force, and navy.

With that in the mind, the implications of this paper extend beyond Chinese energy security. If the Belt and Road Initiative in fact follows the "going-out" paradigm in that its public debut was delayed until Chinese leaders felt secure in its success, then from an outside perspective, China will achieve a veneer of infallibility in its foreign policy; all of its publicly-announced strategies will be successes. In the same vein, announcements about the direction of its foreign policy will be more credible to its prospective partners. On the other hand, policy-makers and researchers will have a difficult time predicting the direction and objectives of Chinese foreign policy.

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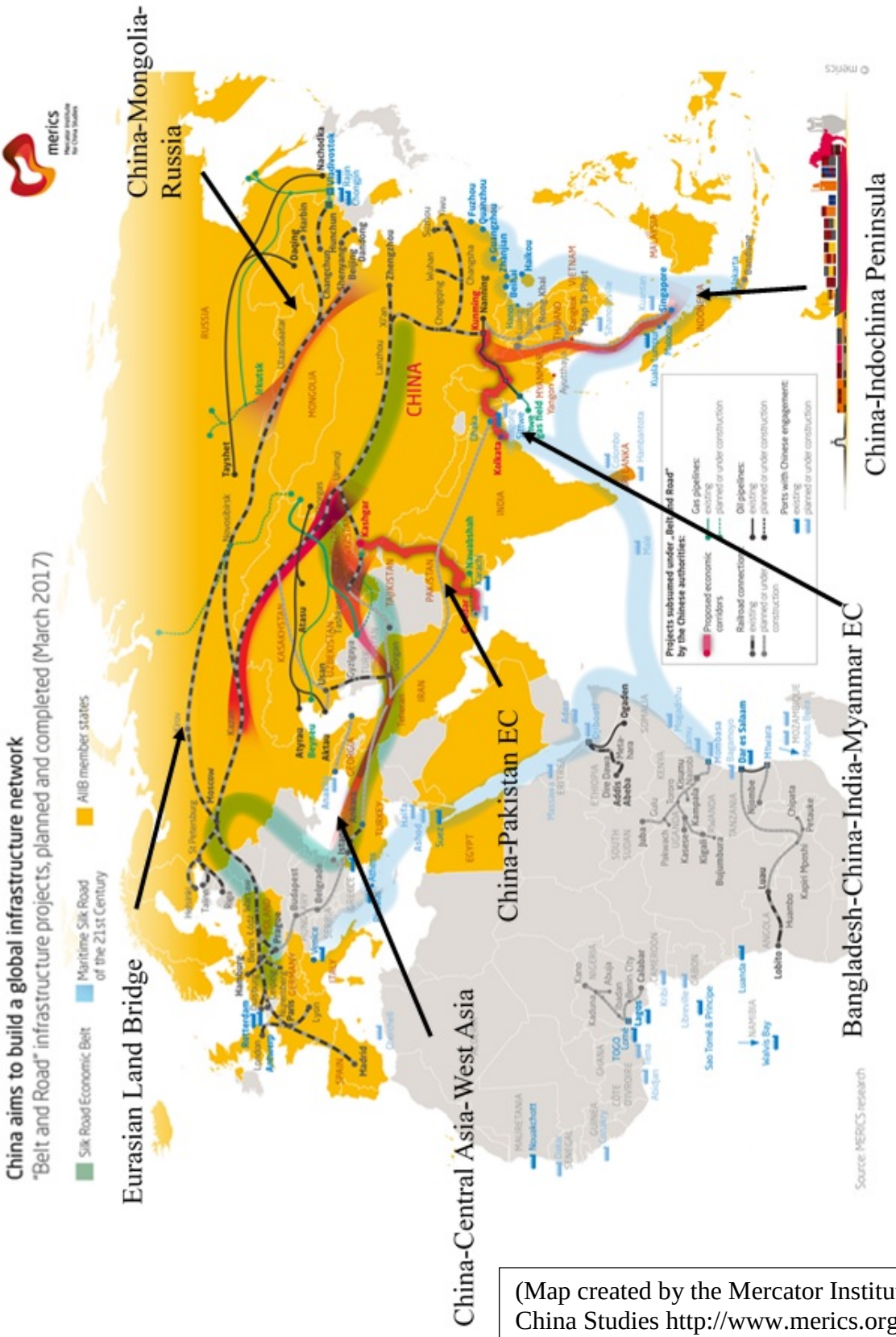
Appendices

Appendix A: Map of the Belt and Road Initiative Economic Corridors



(Map created by the Mercator Institute for China Studies http://www.merics.org/en/merics-analysis/china-mapping/china-mapping/)

Appendix B: Survey Results Showing Respondent Ranking of Energy Security Dimensions Across China, India, and Japan (Sovacool 2012)

Rankings for China (% of Respondents Ranking a Dimension First or Second in Importance)

Dimension	Mean (%)	Number	Standard Deviation
Have a secure supply of coal, gas, oil, and/or uranium	48	311	11.1
Promote trade in energy products, technologies, exports	15	310	9.9
Minimize depletion of domestically available energy fuels	33	308	7.7
Have stable, predictable, and clear price signals	13	306	8.2
Have affordably priced energy services	13	306	8.9
Have small-scale, decentralized energy systems	7	304	10.1
Have low energy intensity	16	305	8.3
Conduct R&D on new and innovative energy technologies	30	304	8.5
Assure equitable access to energy services to all of its citizens	13	306	9.2
Ensure transparency and participation in energy permitting, siting, and decision making	15	300	9.1
Inform consumers and promote social and community education about energy issues	17	299	8.9
Minimize the destruction of forests and the degradation of land and soil	21	298	8.8
Provide available and clean water	26	304	10.1
Minimize air pollution	28	308	11.2
Minimize the impact of climate change (i.e., adaptation)	18	304	12.3
Reduce greenhouse gas emission (i.e., mitigation)	17	306	10.4

Appendix C: Energy Data from the 2016 China Statistical Yearbook

9-1 Total Production of Energy and Its Composition

Year	Total Energy Production (10 000 tons of SCE)	As Percentage of Total Energy Production (%)			
		Coal	Crude Oil	Natural Gas	Primary Electricity and Other Energy
1978	62770	70.3	23.7	2.9	3.1
1980	63735	69.4	23.8	3.0	3.8
1985	85546	72.8	20.9	2.0	4.3
1990	103922	74.2	19.0	2.0	4.8
1991	104844	74.1	19.2	2.0	4.7
1992	107256	74.3	18.9	2.0	4.8
1993	111059	74.0	18.7	2.0	5.3
1994	118729	74.6	17.6	1.9	5.9
1995	129034	75.3	16.6	1.9	6.2
1996	133032	75.0	16.9	2.0	6.1
1997	133460	74.3	17.2	2.1	6.5
1998	129834	73.3	17.7	2.2	6.8
1999	131935	73.9	17.3	2.5	6.3
2000	138570	72.9	16.8	2.6	7.7
2001	147425	72.6	15.9	2.7	8.8
2002	156277	73.1	15.3	2.8	8.8
2003	178299	75.7	13.6	2.6	8.1
2004	206108	76.7	12.2	2.7	8.4
2005	229037	77.4	11.3	2.9	8.4
2006	244763	77.5	10.8	3.2	8.5
2007	264173	77.8	10.1	3.5	8.6
2008	277419	76.8	9.8	3.9	9.5
2009	286092	76.8	9.4	4.0	9.8
2010	312125	76.2	9.3	4.1	10.4
2011	340178	77.8	8.5	4.1	9.6
2012	351041	76.2	8.5	4.1	11.2
2013	358784	75.4	8.4	4.4	11.8
2014	361866	73.6	8.4	4.7	13.3
2015	362000	72.1	8.5	4.9	14.5

a) The coefficient for conversion of electric power into SCE (standard coal equivalent) is calculated on the basis of the data on average c
consumption in generating electric power in the same year. The same applies to the tables following.

9-2 Total Consumption of Energy and Its Composition

Year	Total Energy Consumption (10 000 tons of SCE)	As Percentage of Total Energy Consumption (%)			
		Coal	Crude Oil	Natural Gas	Primary Electricity and Other Energy
1978	57144	70.7	22.7	3.2	3.4
1980	60275	72.2	20.7	3.1	4.0
1985	76682	75.8	17.1	2.2	4.9
1990	98703	76.2	16.6	2.1	5.1
1991	103783	76.1	17.1	2.0	4.8
1992	109170	75.7	17.5	1.9	4.9
1993	115993	74.7	18.2	1.9	5.2
1994	122737	75.0	17.4	1.9	5.7
1995	131176	74.6	17.5	1.8	6.1
1996	135192	73.5	18.7	1.8	6.0
1997	135909	71.4	20.4	1.8	6.4
1998	136184	70.9	20.8	1.8	6.5
1999	140569	70.6	21.5	2.0	5.9
2000	146964	68.5	22.0	2.2	7.3
2001	155547	68.0	21.2	2.4	8.4
2002	169577	68.5	21.0	2.3	8.2
2003	197083	70.2	20.1	2.3	7.4
2004	230281	70.2	19.9	2.3	7.6
2005	261369	72.4	17.8	2.4	7.4
2006	286467	72.4	17.5	2.7	7.4
2007	311442	72.5	17.0	3.0	7.5
2008	320611	71.5	16.7	3.4	8.4
2009	336126	71.6	16.4	3.5	8.5
2010	360648	69.2	17.4	4.0	9.4
2011	387043	70.2	16.8	4.6	8.4
2012	402138	68.5	17.0	4.8	9.7
2013	416913	67.4	17.1	5.3	10.2
2014	425806	65.6	17.4	5.7	11.3
2015	430000	64.0	18.1	5.9	12.0

9-3 Overall Energy Balance Sheet

(10 000 tons of SCE)

Item	1990	1995	2000	2005	2010	2013	2014
Total Energy Available for Consumption	**96138**	**129535**	**144234**	**254619**	**365588**	**417415**	**426095**
Primary Energy Output	103922	129034	138570	229037	312125	358784	361866
Recovery of Energy		2312	3087	7452	8958		
Imports	1310	5456	14327	26823	57671	73420	77325
Exports (-)	5875	6776	9327	11257	8803	8005	8271
Stock Changes in the Year	-3219	-491	-2424	2564	-4363	-6784	-4825
Total Energy Consumption	**98703**	**131176**	**146964**	**261369**	**360648**	**416913**	**425806**
Consumption by Sector							
Agriculture, Forestry, Animal Husbandry, Fishery and Water Conservancy	4852	5505	4233	6860	7266	8055	8094
Industry	67578	96191	103014	187914	261377	291131	295686
Construction	1213	1335	2207	3486	5533	7017	7520
Transport, Storage and Post	4541	5863	11447	19136	27102	34819	36336
Wholesale and Retail Trades, Hotels and Catering Services	1247	2018	3251	5917	7847	10598	10873
Other Sectors	3473	4519	6118	10484	15052	19763	20084
Household Consumption	15799	15745	16695	27573	36470	45531	47212
Consumption by Usage							
End-use Consumption	94289	124252	140476	250877	337469	403814	413162
Industry	63239	89473	96871	177775	238652	278514	283420
Losses During the Process of Energy Conversion	2264	3634	2472	3882	14294	15994	17020
Coking	905		526	855	1595	2433	2731
Petroleum Refining	326		781	1273	1960	1899	2115
Recovery of Energy						13333	14578
Energy Losses	2150	3289	4016	6610	8885	10439	10201
Balance	**-2565**	**-1641**	**-2730**	**-6751**	**4940**	**502**	**289**

a) Electric power and heat are converted on the basis of equal caloric value. Therefore, losses during the process of energy conversion do not include losses in power generation and heating. Energy consumption of industry include that of village industry. The same applies to the tables following.

b) The refueling by Chinese ships and airplanes abroad is included in imports. The refueling by foreign ships and airplanes in China is included in exports.

9-4 Petroleum Balance Sheet

(10 000 tons)

Item	1990	1995	2000	2005	2010	2013	2014
Total Energy Available for Consumption	**11435.0**	**16072.7**	**22631.4**	**32539.1**	**44178.4**	**49993.9**	**51861.8**
Output	13830.6	15005.0	16300.0	18135.3	20301.4	20991.9	21142.9
Imports	755.6	3673.2	9748.5	17163.2	29437.2	34264.8	36179.6
Exports (-)	3110.4	2454.5	2172.1	2888.1	4079.0	4176.7	4213.9
Stock Changes in the Year	-40.8	-151.0	-1245.0	128.8	-1481.2	-1086.1	-1246.8
Total Energy Consumption	**11485.6**	**16064.9**	**22495.9**	**32547.0**	**44101.0**	**49970.6**	**51814.4**
Consumption by Sector							
Agriculture, Forestry, Animal Husbandry,							
Fishery and Water Conservancy	1033.6	1203.2	788.5	1451.7	1382.5	1650.3	1717.7
Industry	7321.6	9349.3	11248.5	14030.4	18555.0	17594.6	18217.5
Construction	327.3	242.8	840.6	1502.2	2483.1	3090.6	3311.9
Transport, Storage and Post							
	1683.2	2863.6	6399.0	10928.5	15079.3	18967.6	19546.9
Wholesale and Retail Trades,							
Hotels and Catering Services	77.6	333.9	247.0	375.6	481.0	565.4	563.2
Other Sectors	757.8	1390.3	1635.9	1974.2	2578.2	3349.7	3152.0
Non-production Consumption	284.5	682.0	1336.5	2284.4	3541.9	4752.4	5305.2
Consumption by Usage							
End-use Consumption	9304.7	13676.3	19950.1	29495.6	41243.4	47458.8	49134.0
Industry	5180.4	7095.5	8860.0	11107.5	15857.8	15235.4	15584.5
Intermediate Consumption							
(Consumed in Conversion)	1630.4	2230.0	2352.9	2896.0	2663.3	2295.7	2570.0
Power Generation	1234.4	1358.5	1178.2	1306.4	385.3	265.1	254.1
Heating	356.3	399.9	427.0	429.1	593.1	448.2	521.3
Gas Production	39.7	51.6	25.9	14.4			
Losses in Petroleum Refining	295.8	420.1	721.9	1146.1	1684.8	1582.4	1794.6
Other Losses	254.7	158.6	192.9	155.4	194.4	216.1	110.3
Balance	**-50.6**	**7.8**	**135.4**	**-7.9**	**77.4**	**23.3**	**47.4**

a) Data on output refer to the output of crude oil.

b) The refueling by Chinese ships and airplanes abroad is included in imports. The refueling by foreign ships and airplanes in China is included in exports.

9-5 Coal Balance Sheet

(10 000 tons)

Item	1990	1995	2000	2005	2010	2013	2014
Total Energy Available for Consumption	**102221.1**	**133461.7**	**131894.5**	**235507.7**	**355577.6**	**425014.8**	**411833.5**
Output	107988.3	136073.1	138418.5	236514.6	342844.7	397432.2	387391.9
Imports	200.3	163.5	217.9	2621.6	18306.9	32701.8	29122.0
Exports (-)	1729.0	2861.7	5506.5	7173.1	1910.6	750.8	574.2
Stock Changes in the Year	-4238.5	86.8	-1235.3	3544.6	-3663.4	-4368.4	-4106.2
Total Energy Consumption	**105523.0**	**137676.5**	**135689.7**	**243375.4**	**349008.3**	**424425.9**	**411613.5**
Consumption by Sector							
Agriculture,Forestry,Animal Husbandry,							
Fishery and Water Conservancy	2095.2	1856.7	1050.9	1801.7	2147.1	2450.6	2578.8
Industry	81090.9	117570.7	121806.7	224766.1	329728.5	403157.0	390497.4
Construction	437.6	439.8	536.8	603.6	730.6	811.4	913.6
Transport, Storage and Post							
	2160.9	1315.1	882.2	811.2	639.2	615.4	558.0
Wholesale and Retail Trades,							
Hotels and Catering Services	1058.3	977.4	1461.0	2626.7	3192.0	3966.2	3767.0
Other Sectors	1980.4	1986.7	1495.1	2727.3	3411.6	4135.6	4045.5
Household Consumption	16699.7	13530.1	8457.0	10039.0	9159.2	9289.8	9253.2
Consumption by Usage							
End-use Consumption	60205.9	66156.1	50511.0	86385.6	114825.7	119491.4	116043.8
Industry	35773.8	46050.3	36628.0	67776.3	95545.9	98222.5	94927.7
Intermediate Consumption							
(Consumed in Conversion)	41257.8	69487.6	81987.4	152207.7	222947.9	282355.3	272194.5
Power Generation	27204.3	44440.2	55811.2	103662.9	153742.5	195177.4	184525.3
Heating	2995.5	5887.3	8794.1	13542.0	17553.1	22709.5	22444.9
Coking	10697.6	18396.4	16496.4	33445.7	49950.4	62535.6	62893.9
Petroleum Refineries and Coal-to-liquids					213.4	459.3	650.3
Gas Production	360.4	763.7	960.0	1277.0	1040.1	845.6	948.4
Losses in Coal Washing and Dressing	4059.3	2032.8	3191.2	4782.1	11234.6	22579.2	23375.2
Balance	**-3302.0**	**-4214.8**	**-3795.1**	**-7867.8**	**6569.3**	**588.8**	**220.0**

a) Data on output refer to the output of raw coal.