Going Out:

The Globalization of the Chinese Nuclear Sector

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Abstract

Over the past decade, the Chinese government has aimed to further incorporate nuclear technology into its plan to meet China's growing energy needs, and the nation's major nuclear firms have acted enthusiastically to both secure the necessary resources for this expansion and promote Chinese technology within the nuclear-reactor market. This paper outlines the motivations and trends associated with each of these efforts. Following a description of the possible reasons behind this global expansion, both the private and state-controlled actors on the frontlines of this endeavor are introduced, and examples of cooperation between these groups are provided. Finally, this paper examines the methods by which these actors have sought to widen their shares of the uranium and nuclear-reactor markets. Because the Chinese government holds ownership over several of the major actors in this campaign to globalize, this section includes descriptions both of these actors' strategies and of the governmental support provided to these corporations. Further use of these tactics and sustained support from Beijing may swiftly propel China's nuclear companies to levels of prestige that are comparable to those of their American and French counterparts.

Introduction

Chinese companies have become well known for their vast expansion across the planet, and this growth continues at an impressive rate. China's nuclear companies are no exception to this rapid expansion. These corporations, like the Chinese government itself, are remarkably ambitious in their goals and have been met with substantial success in their quest to globalize. From purchasing uranium mines and mining companies around the world to signing multimillion-dollar supply contracts with corporations based in uranium-rich nations, China's nuclear companies have spared no effort to acquire the resources necessary for their survival, and they are working with both public and private partners in order to meet their uranium needs. In addition to procuring this precious resource around the globe, Chinese nuclear companies are eager to expand their shares in the intensely competitive nuclear-reactor market by seeking potential buyers abroad and engaging in other activities in hopes of gaining global recognition. Against the backdrop of a multitude of drivers, including following the Chinese government's enthusiastic Going Out policy, China's nuclear companies and their partners are utilizing a variety of

tactics in conjunction with heavy support from government agencies in order to become truly global players.

The Context and Drivers of Globalization

Fully understanding this international quest requires understanding the reasons behind it. The government's Going Out policy, which through various incentives has encouraged numerous companies across various sectors to invest overseas, no doubt drives the expansion of the nuclear sector. China's quest to secure an adequate supply of uranium is a major driver and is directly related to the Going Out policy, one of the main purposes of which is to procure resources for China's rising energy needs. Other goals related to this policy also drive nuclear companies and their partners, such as boosting their competitive edge abroad and increasing exports. Strengthening relations with foreign governments also seems to serve as a motive for expanding the Chinese nuclear sector's presence abroad and for increasing cooperation with foreign companies. Taken together, these drivers indicate that the global expansion of the nuclear sector satisfies both the desires of the state and individual companies.

China's growing presence in the global uranium and nuclear-reactor markets is closely linked to the Chinese government's Going Out policy, which has significantly increased the amount of Chinese outward foreign direct investment (OFDI) since the beginning of the twenty-first century. Encouraged by the nation's growing exports in the 1990s, China's State Council paved the way for the Going Out policy when it began incentivizing and significantly relaxing regulations on OFDI in 1997 through policies formulated by the Ministry of Finance, the State Economic and Trade Commission, and the Ministry of Foreign Trade and Economic Cooperation.[1] The Going Out policy was incorporated into China's economic plan in 2001 and established that increasing investment overseas would be a strategic component of the country's economic development moving into the new century.[2] In the first few years after the implementation of the policy, the regulatory arms of the government, seeking to spur OFDI, began making it easier for firms to access China's massive foreign exchange reserves, and agencies and state banks began jointly establishing special funds to provide credit for OFDI projects.[3] In order to further increase OFDI, state agencies have also expanded the number of incentives they offer to include credit support and special tax deductions.[4] Thus, the globalization of the Chinese nuclear sector is not an anomaly. Rather, it is partially the result of firms responding to an array of incentives that push them to expand abroad.

One of the most prominent issues that the Going Out policy and Chinese nuclear firms have strived to address through OFDI is that of China's growing need for uranium. Uranium is of course needed to supply China's burgeoning nuclear sector, which the government has requested produce 70 gigawatts of power by 2020 in order to meet about

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[1] Xiaomei Tan, "China's Overseas Investment in the Energy/Resources Sector: Its Scale, Drivers, Challenges and Implications," *Energy Economics* 36 (March 2013): 752, accessed April 7, 2015, ScienceDirect, http://www.sciencedirect.com.ezproxy.lib.ou.edu/science/article/pii/S0140988312003179.

[2] Huang Wenbin and Andreas Wilkes, *Analysis of China's Overseas Investment Policies*, report (2011), 9-10, accessed April 6, 2015, http://www.cifor.org/publications/pdf_files/WPapers/WP-79CIFOR.pdf.

[3] Ibid., 7, 11-12.

[4] Ibid., 13-14; Karl P. Sauvant and Victor Z. Chen, "China's Regulatory Framework for Outward Foreign Direct Investment," *China Economic Journal* 7, no. 1 (February 22, 2014): 17, 22, accessed March 31, 2015, http://ccsi.columbia.edu/files/2014/04/KPS_VC-Chinas-OFDI-framework-website-version-Feb23_2014.pdf.

5 percent of the nation's overall energy needs.[5] China's reactors consumed approximately 4,200 metric tons of uranium in 2012, and consumption is expected to grow with the increasing number of power plant projects planned by the country's nuclear firms.[6] Without an increased supply of this vital resource, China will simply not be able to sustain growth in its nuclear sector, and this could lead to serious problems for the nation's economic well-being.

The issue of the growing demand for uranium is compounded by the fact that many of China's own uranium deposits are of low quality or are not large in scale, which has prompted nuclear firms to expand abroad in order to find better quality product.[7] China's domestic uranium production reached around 1,500 metric tons in 2012, indicating that domestic production comprised only 36 percent of the amount of uranium required for China's reactors that year.[8] These statistics prove that China is heavily reliant on foreign uranium, and by expanding abroad, China's nuclear firms have been able to diversify their supply sources and take advantage of economies of scale as they acquire the resource from uranium-rich countries in Central Asia and Africa.[9] As the future of the nuclear sector depends on the procurement of adequate uranium supplies, expansion abroad has proven to be an absolutely essential tactic in order to provide China with the energy it requires to continue on its path of economic development.

Rising and falling competition within the global uranium market has also prompted China's nuclear firms to expand at a fairly rapid rate. The spot price of uranium has varied considerably since the beginning of the twenty-first century and experienced a general decline after the Fukushima Daiichi incident in March 2011.[10] After this disaster, several developed countries decided to either scale back or phase out their civil nuclear programs, leaving a void that Chinese companies were able to exploit as uranium prices fell.[11] Moreover, Central Asia is now a major supplier of uranium, and increased

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[5] Qiang Yang et al., "Nuclear Power Development in China and Uranium Demand Forecast: Based on Analysis of Global Current Situation," *Progress in Nuclear Energy* 53, no. 6 (August 2011): 742, accessed January 26, 2015, ScienceDirect, http://www.sciencedirect.com.ezproxy.lib.ou.edu/science/article/pii/S0149197010001411; Tamara Schell, *Governing Uranium in China*, report, March 17, 2014, accessed February 13, 2015, 7, http://pure.diis.dk/ws/files/104212/DIIS_Report_2014_3_final1703web_pdf.pdf.

[6] OECD Nuclear Energy Agency and the International Atomic Energy, *Uranium 2014: Resources, Production and Demand*, report, 2014, accessed February 4, 2015, 104, http://tinyurl.com/h4wvgm3.

[7] Eric Ng, "China in Race to Secure Overseas Uranium Supply," *South China Morning Post*, November 9, 2009, accessed March 9, 2015, http://www.scmp.com/article/697766/china-race-secure-overseas-uranium-supply; Yanjia Wang, Alun Gu, and Aling Zhang, "Recent Development of Energy Supply and Demand in China, and Energy Sector Prospects through 2030," *Energy Policy* 39, no. 11 (November 2011): 6753, accessed January 15, 2015, ScienceDirect, http://www.sciencedirect.com.ezproxy.lib.ou.edu/science/article/pii/S0301421510005240; Bo Yang, *China Nuclear Energy Development*, report, June 13, 2012, accessed March 8, 2015, 49, http://wenku.baidu.com/view/d1b05455f46527d3240ce078.html.

[8] "Uranium Production Figures, 2004-2014," *World Nuclear Association*, last modified July 2015, accessed January 31, 2015, http://www.world-nuclear.org/info/Facts-and-Figures/Uranium-production-figures/; Westpac and Bureau of Resources and Energy Economics, *China Resources Quarterly: Southern Summer/Northern Winter 2015*, report, February 2015, accessed February 23, 2015, 32, http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/crq/WESTPAC-IndustryScience-CRQ-201502.pdf; Westpac and Bureau of Resources and Energy Economics, *China Resources Quarterly: Southern Winter/Northern Summer 2013*, report, August 2013, accessed February 23, 2015, 32, http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/crq/westpacbree-crq-201308.pdf.

[9] Pascale Massot and Zhan-Ming Chen, "China and the Global Uranium Market: Prospects for Peaceful Coexistence," *The Scientific World Journal* 2013 (2013): 7, accessed February 15, 2015, doi: 10.1155/2013/672060, http://www.hindawi.com/journals/tswj/2013/672060/.

[10] OECD Nuclear Energy Agency and the International Atomic Energy Agency, *Uranium 2014*, 119-20.

[11] Xiang Li, "Nuke Companies Pursue Future Power Abroad," *China Daily*, November 3, 2012, accessed March 8, 2015, http://europe.chinadaily.com.cn/business/2012-11/03/content_15871980_2.htm.

competition between firms from Russia, India, and other Asian nations may have significantly spurred Chinese firms to gain access to this market quickly in order to secure the abundant resources available in the region.[12] The slowdown of developed nations' nuclear energy growth and intensifying competition within uranium hotspots like Central Asia have thus encouraged Chinese firms to increase their rates of expansion around the world.

In addition to the collection of uranium, China's nuclear firms are also expanding abroad in order to reap strategic assets, like increased brand recognition, that will boost their competitive edge against foreign companies. According to a 2012 presentation by Chinese nuclear expert Yang Bo, like with other firms engaged in foreign direct investment, popularizing brand names is important to Chinese nuclear companies.[13] Ma Yi, a nuclear expert at China Nuclear Power Engineering Company, a subsidiary of China National Nuclear Corporation (CNNC), stated in a 2015 interview that letting Chinese firms participate in the building of new plants abroad boosts the international competitiveness of Chinese nuclear technology.[14] Furthermore, in a January 2015 speech, Chinese Premier Li Keqiang said that the government would push Chinese nuclear firms to globalize in order to "improve their competitiveness and boost their presence overseas" while promoting Chinese technology.[15] Thus, the intent of Chinese firms and the Chinese government to expand the nuclear industry in order to increase its international recognition and competitiveness appears to be quite strong.

The example of the Hinkley C power plant project in the United Kingdom may demonstrate this desire. After Premier Li Keqiang and British Prime Minister David Cameron reached an agreement in June 2014 that allowed Chinese firms to invest in nuclear projects within the United Kingdom, Chinese state-owned firms CNNC and China General Nuclear Power Group (CGN) agreed to partner with French nuclear giants Areva and Électricité de France in the high-profile Hinkley C project.[16] Despite months of delays, a final agreement on the project was settled in October 2015.[17] The project has attracted a substantial amount of media attention in Great Britain and has been a way for Chinese nuclear companies to get more involved in foreign nuclear projects and gain recognition as globally competitive firms.

Chinese nuclear companies, like other firms taking part in the Going Out policy, are of course motivated by a desire to locate foreign markets for their products and

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[12] Massot and Chen, "China and the Global Uranium Market," 7.
[13] *China Nuclear Energy Development*, 7.
[14] Yao Yang, "China to Build Two Nuclear Power Plants in Argentina," *China Daily USA*, February 9, 2015, accessed February 9, 2015, http://usa.chinadaily.com.cn/world/2015-02/09/content_19524269.htm.
[15] David Stanway and Charlie Zhu, "China's Premier Urges Nuclear Firms to Boost Overseas Presence," *Reuters Africa*, January 16, 2015, accessed January 27, 2015, http://www.reuters.com/article/china-nuclear-idUSL3N0UV2JX20150116.
[16] "UK Government Paves Way for Chinese Nuclear Plant," *World Nuclear News*, June 18, 2014, accessed January 21, 2015, http://www.world-nuclear-news.org/NP-UK-government-paves-way-for-Chinese-nuclear-plant-18061401.html.
[17] Michael Stothard, "Areva Warns of Looming €4.9bn Full-year Loss as Writedowns Grow," *Financial Times*, February 23, 2015, accessed February 23, 2015, http://www.ft.com/intl/cms/s/0/b73fb548-bb3c-11e4-b95c-00144feab7de.html#axzz3xqdGNtKz; Tim Webb, "Nuclear Reactor Is Stalled by Costs Fallout," *The Times* (London), February 7, 2015, National ed., Business sec., accessed February 23, 2015, LexisNexis Academic, http://www.lexisnexis.com.ezproxy.lib.ou.edu/hottopics/lnacademic/; "Hinkley Point Nuclear Agreement Reached," *BBC News*, October 21, 2015, accessed January 6, 2016, http://www.bbc.com/news/business-34587650; Christopher Adams, "China to Take One-third Stake in Hinkley Nuclear Project," *Financial Times*, October 19, 2015, accessed March 8, 2016, http://www.ft.com/intl/cms/s/0/d96226f2-76a7-11e5-a95a-27d368e1ddf7.html#axzz42MaGBkIA.

technology.[18] Chinese nuclear firms have strived in recent years to promote their reactors, such as the CNP-300 and ACP1000 models. The Chinese government, through its various agencies and banks, such as the Export-Import Bank of China (China EximBank), has expressed its desire to promote Chinese nuclear technology by attaching certain benefits to partners who agree to use this technology. For example, as part of a February 2015 agreement between China and Argentina involving the construction of two nuclear reactors in the South American country, the parties agreed that CNNC would play a central role in negotiations to build the reactors and that China would provide financial support for the $12 billion project if Argentina agreed to use Chinese nuclear technology and equipment.[19] Thus, encouraging the sale of Chinese nuclear technology is a clear driver that has led China's nuclear firms and its government to use incentives to attract potential buyers.

Although it is not a driver that is explicitly related to the Going Out policy, strengthening China's cooperation with other nations may serve as yet another motivator for the expansion of China's nuclear firms. For example, the February 2015 deal between China and Argentina was part of a series of fifteen agreements signed between the two countries that month, providing evidence that China's desire to form closer strategic and commercial relationships with other nations may motivate the signing of nuclear technology export agreements.[20] Indeed, as he spoke of the slew of deals signed with the South American nation that month, Chinese President Xi Jinping stated that both China and Argentina were committed to strengthening cooperation in various fields and to the "sound and stable development of bilateral trade."[21] Thus, encouraging firms to share nuclear technology with other nations may serve as a profitable means of enhancing cooperation with foreign governments, particularly those thirsting for nuclear power.

The Actors

The story of this globalization involves numerous actors, including both private and state-owned companies. While private firms are actively involved in procuring uranium abroad, state-owned enterprises are the dominant actors in this expansion. Nuclear enterprises are of course at the forefront of activities like uranium procurement and reactor sales, but several non-nuclear companies, such as mining and financial firms, which have substantial experience in overseas mining and investment, are also motivated by some of the previously mentioned drivers and have become closely involved in securing uranium for China.

CNNC, the nation's largest nuclear firm, is owned by the state and is therefore extremely influential within the nuclear sector and a major player in the sector's global expansion.[22] According to Xu Yi-chong, a professor of politics and public policy at Griffith University, CNNC promotes an image of itself as the main voice within China's nuclear community and exercises a great deal of control over "R&D, engineering design,

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[18] Peter J. Buckley et al., "The Determinants of Chinese Outward Foreign Direct Investment," *Journal of International Business Studies* 38, no. 4 (July 2007): 511, accessed March 6, 2015, ABI/INFORM Complete, http://search.proquest.com/docview/197133808?accountid=12964.
[19] Yang, "China to Build."
[20] Ibid.
[21] Ibid.
[22] Richard Weitz, "China's Uranium Quest Part 2: The Turn to Foreign Markets," *China Brief* 11, no. 16 (2011): 12, accessed January 21, 2015, http://www.jamestown.org/programs/chinabrief/single/?tx_ttnews%5Btt_news%5D=38363&cHash=bcb603b403d4967dd357139d3c75e128#.VqFuwGD4vFI.

uranium exploration and mining, enrichment, fuel fabrication, reprocessing and waste disposal."[23] The company also cooperates extensively with entities outside of China, having established technology exchanges and trading agreements with over 40 countries.[24] Given that it is a massive entity with increasing influence in nuclear energy policy, CNNC and its numerous subsidiaries have been virtually destined to stand at the forefront of the Chinese nuclear sector's expansion abroad, in which they have participated both by obtaining uranium from various sources around the world and by attempting to sell nuclear technology in several nations.

Formerly known as China Guangdong Nuclear Power Group, CGN has played an equally prominent role in the globalization of China's nuclear sector. Significantly smaller than CNNC, this state-owned corporation changed its name in 2013 with the expressed goal of promoting "the coordinated development of nuclear power, uranium resources and non-nuclear clean energy," according to company spokesman Hu Guangyao.[25] In recent years, CGN has aimed to close the competitive gap between CNNC and itself, particularly by becoming increasingly aggressive in obtaining uranium from foreign sources.[26] When CGN was established in 1994, CNNC held 45 percent of the company, and it was not until 2012, when the State-Owned Assets Supervision and Advisory Commission (SASAC) increased its stake in CGN to 82 percent, that CNNC's vast holdings in the company dropped to a mere 8 percent.[27] After this extensive change in ownership, the relationship between CGN and CNNC changed dramatically as the two became competing entities in activities like foreign uranium procurement and reactor construction.[28] CGN and its subsidiaries have indeed acted enthusiastically to acquire enormous supply contracts and large mining projects across the globe.[29] Eager to diversify its operations and occupy a larger role in nuclear-related activities within China, CGN has made impressive efforts to globalize.

State Nuclear Power Technology Corporation (SNPTC), another state-owned nuclear firm, has also figured prominently into the story of the Chinese nuclear sector's global expansion. Established in 2007, this young company has been tasked by the government to engineer the Chinese-developed CAP1400 nuclear reactor using technology adopted from the AP1000, a model produced by American nuclear giant Westinghouse Electric Company.[30] As mentioned earlier, SNPTC, which merged with plant operator China Power Investment Corporation in May 2015 to form State Power Investment Corporation, is eager to expand its operations overseas and to sell its CAP1400 reactor to foreign buyers.[31] For example, the company signed a series of agreements with South Africa Nuclear Energy Corporation in 2014 that may eventually

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[23] "Nuclear Energy in China: Contested Regimes," *Energy* 33, no. 6 (August 2008): 1201, accessed January 16, 2015, ScienceDirect, http://www.sciencedirect.com.ezproxy.lib.ou.edu/science/article/pii/S0360544208000881.
[24] Schell, *Governing Uranium in China*, 25.
[25] "CGNPC Renamed to Reflect Expansion," *World Nuclear News*, May 15, 2013, accessed March 8, 2016, http://www.world-nuclear-news.org/C-CGNPC_renamed_to_reflect_expansion-1505134.html, quoted in Schell, *Governing Uranium in China*, 26.
[26] Schell, *Governing Uranium in China*, 26.
[27] Ibid., 27.
[28] Ibid.
[29] Ibid.
[30] "Corporate Profile," *SNPTC*, accessed April 27, 2015, http://www.snptc.com.cn/en/index.php?optionid=911.
[31] Ibid; "Chinese Nuclear Giant Officially Launched," *World Nuclear News*, July 16, 2015, accessed January 25, 2016, http://www.world-nuclear-news.org/C-Chinese-nuclear-giant-officially-launched-1607155.html.

lead to the purchase of CAP1400 reactors from China.[32] SNPTC also began talks with Westinghouse and the Turkish government in November 2014 on building the Mediterranean country's third nuclear power plant.[33] Thus, while SNPTC is not involved with foreign uranium procurement, the company is expanding its presence overseas and may soon become a major seller of advanced Chinese-designed nuclear reactors.

Through aiding the government in procuring uranium overseas, large state-owned enterprises outside of the nuclear sector are actively taking part in expanding China's presence abroad. For instance, in 2008 Sinosteel, known for its extensive mining and mineral trade operations both inside and outside China, began a uranium exploration partnership with CNNC, which was reportedly interested in the steelmaker because of its vast experience with metal trading and mining project investment in uranium-rich Australia.[34] Sinosteel has been engaged in uranium exploration and mining operations in Australia and Kyrgyzstan, projects that have all been associated with Australian corporations.[35] Serving as another example, China Railway Resource Company is the majority shareholder of Australian uranium explorer and miner RMA Energy through a subsidiary.[36] Due to their expertise in gathering natural resources abroad, these state-owned enterprises have made effective partners to Chinese nuclear firms in their global search for uranium.

A number of private firms have also helped supplement state-owned enterprises' overseas endeavors, investing in both uranium mines and mining companies. These companies mostly come from the energy and mining sectors, and there are also several property investment companies involved in uranium procurement operations throughout the world. Chinese mining and energy companies, as well as private investment firms, have purchased shares in several uranium mines and mining companies in countries like Namibia, Niger, and Canada. Moreover, these entities have also been active in launching numerous joint exploration ventures with foreign companies and other Chinese firms. While most of these private firms do not depend on uranium in order to fuel their primary operations, these companies are most likely attracted by the incentives offered as part of the Going Out policy and by the profits they are able to make through uranium sales. Whatever the reason for their participation, private firms are clearly playing an active role

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[32] *GlobalData—Events: South Africa Nuclear Energy Corporation*, *GlobalData*, December 16, 2015, accessed January 28, 2015, 1, LexisNexis Academic, http://www.lexisnexis.com/hottopics/lnacademic.

[33] "Turkey to Hold Talks with Westinghouse and SNPTC for Third Nuclear Plant," *Daily Sabah*, November 25, 2014, accessed February 2, 2015, http://www.dailysabah.com/energy/2014/11/25/turkey-to-hold-talks-with-westinghouse-and-snptc-for-third-nuclear-plant.

[34] Eric Ng, "Nuclear Uranium Increases Budget to Boost Reserves; Heavy Investment Planned to Meet Ambitious Energy Goal," *South China Morning Post* (Hong Kong), November 17, 2008, Business sec., accessed February 12, 2015, LexisNexis Academic, http://www.lexisnexis.com.ezproxy.lib.ou.edu/hottopics/lnacademic/.

[35] "Sinosteel and Monaro to Assess Kyrgyz Uranium Projects," *World Nuclear News*, February 5, 2008, accessed February 12, 2015, http://www.world-nuclear-news.org/ENF/Sinosteel_and_Monaro_to_assess_Kyrgyz_uranium_projects_050208.html; Cameron England, "Chinese Company Sinosteel to Buy Pepinnini Minerals' South Australian Uranium Project," *The Advertiser*, July 14, 2014, accessed January 31, 2015, http://www.adelaidenow.com.au/business/chinese-company-sinosteel-to-buy-pepinnini-minerals-south-australian-uranium-project/news-story/767b0024a2eb4d11fb1cae8c32848465?from=public_rss.

[36] RMA Energy Ltd., *RMA Energy Limited Annual Financial Report*, *RMA Energy Ltd.*, report, December 31, 2013, accessed February 7, 2015, 31, http://www.rmaenergy.com.au/annualreports/RMA_Financial_Report_2013.pdf; Sarah-Jane Tasker, "Green Lights for Chinese Investments," *The Australian*, November 6, 2009, accessed February 7, 2015, http://www.theaustralian.com.au/business/mining-energy/green-lights-for-chinese-investments/story-e6frg9df-1225794861013; "China Railway Has 50.27% of RMA Energy," *News Bites—Australian Stock Exchange*, November 12, 2009, accessed February 7, 2015, LexisNexis Academic, http://www.lexisnexis.com/hottopics/lnacademic.

in expanding China's presence abroad as the country struggles to locate adequate uranium supplies.

Tactics and State Support in China's Quest for Uranium

The uranium procurement data collected for this paper showcases the vigor with which Chinese nuclear firms and their partners have been globalizing. Such a campaign has required companies to use a variety of tactics in order to successfully carry out their objectives. Because the government has a vested interest in the globalization of nuclear firms and their Chinese partners, many state-owned entities, notably China's largest banks, play a central role in this process, contributing vital support to firms that are in search of uranium. Because the Chinese government owns several of the firms engaged in globalization, it is often difficult to separate the tactics that companies are able to utilize by themselves and the support they receive from the state to expand their operations abroad. Nevertheless, what can be noted for certain is that the tactics used and state support given in China's global search for uranium have been quite successful in increasing the nation's supply of the precious resource.

In recent years, China's largest state firms have been aggressively pursuing uranium supply agreements with an assortment of countries, a method that has been aided by diplomatic support on the part of China's leaders. For example, during a visit to Beijing in May 2008, Russian President Dmitri Medvedev issued a joint statement with President Hu Jintao calling for stronger cooperation between their nations in the nuclear sector, and during the same visit, China Nuclear Energy Industry Corporation, a subsidiary of CNNC, and Russian nuclear fuel exporter Techsnabexport signed a deal that guaranteed the sale of billions of dollars worth of low-enriched uranium to China from 2010 to 2021.[37] Similarly, during a visit to Uzbekistan in June 2010, President Hu stated that China and Uzbekistan needed to cooperate to develop uranium procurement projects.[38] During the same visit, CGN signed a deal with Uzbekistan's Navoi Mining & Metallurgy Combine for an undisclosed amount of uranium.[39] In yet another example, during a state visit by President Hu to Paris in November 2010, CGN and French nuclear giant Areva signed a long-term contract for 20,000 metric tons of uranium that were to be sent to China over the course of 10 years.[40] The involvement of President Hu in all of these examples, as well as the

[37] "Russia and China Sign Enrichment Plant Agreement," *World Nuclear News*, May 27, 2008, accessed February 15, 2015, http://www.world-nuclear-news.org/NP-Russia_and_China_sign_enrichment_plant_agreement-2705085.html; "China's Nuclear Fuel Cycle," *World Nuclear News*, last modified November 24, 2015, accessed January 31, 2015, http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/China--Nuclear-Fuel-Cycle/.

[38] "China, Uzbekistan Sign Accords on Gas, Uranium," *UzReport*, January 18, 2010, accessed January 30, 2015, http://news.uzreport.uz/news_4_e_76017.html.

[39] Ibid.

[40] "China: AREVA Signs Major Agreements with CGNPC and CNNC," *Areva*, November 4, 2010, accessed January 30, 2015, http://www.areva.com/EN/news-8601/china-areva-signs-major-agreements-with-cgnpc-and-cnnc.html.

involvement of top Chinese officials in other deals, proves the commitment of China's leaders to secure an adequate supply of uranium for China's growing nuclear sector, and the massive size of these deals also proves how essential this diplomatic support has been for nuclear companies seeking to form partnerships with foreign firms.

Aside from directly purchasing mass quantities of uranium from foreign enterprises, China's nuclear firms and their partners have widened their presence abroad by purchasing large stakes in joint-venture mines and mining companies, as well as by launching joint exploration ventures. Chinese companies have purchased both small and large stakes in various mines, with some even purchasing complete ownership of mines from competitors, as in the case of Sinosteel and the Crocker Well and Mount Victoria mines in Australia.[41] Chinese firms have also launched joint ventures with foreign companies, such as in the case of Afri-Sino Mining Resources Ltd., an exploration venture between Chinese entities, including China Uranium Corporation, and Zimbabwe Mining Development Corporation.[42] Lastly, Chinese firms have acquired stakes in foreign uranium mining companies, sometimes increasing their shares overtime, such as in the case of China Railway Resource Company's stake in Australia's RMA Energy, which increased 9 percent between 2009 and 2013.[43] These purchases and partnerships have ensured a diversified supply of uranium for Chinese firms and have spread these firms' presence throughout the world.

Cooperation with private firms is another strategy that has been employed by state-owned enterprises like CNNC in the search for uranium. Partnering with private companies provides financial benefits, giving state companies access to private funds that help meet the costs of establishing exploration and mining projects abroad.[44] For example, in 2007 CNNC and Century City International, a Hong Kong-based property investment company, signed an agreement to explore and develop uranium in eastern Mongolia.[45] Century City claimed an 80-percent stake in the joint venture but agreed to grant CNNC the power to underwrite the sale of any uranium produced by the venture.[46] Private firms also carry the benefit of being able to mine without attracting unwanted media attention in countries like Canada and Australia, where large state-owned Chinese companies are often seen as exploitative.[47] In

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[41] England, "Chinese Company Sinosteel to Buy."
[42] "Uranium Mine Ownership—Africa," *WISE Uranium Project*, last modified December 20, 2015, accessed January 31, 2015, http://www.wise-uranium.org/uoafr.html; Yi Zhang, *Recent Development of Uranium Industry in China*, report, June 4, 2012, accessed February 4, 2015, 26, https://www.unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/ws_IAEA_CYTED_UNECE_Oct12_Lisbon/21_Zhang.pdf.
[43] "China Railway Has 50.27% of RMA Energy;" RMA Energy Ltd., *RMA Energy Limited Annual Financial Report*, 59.
[44] Ng, "China in Race."
[45] "Century City Seeks Mongolian Uranium," *World Nuclear News*, August 14, 2007, accessed February 5, 2015, http://www.world-nuclear-news.org/newsarticle.aspx?id=13868&LangType=2057.
[46] Ibid.
[47] Ng, "China in Race."

Canada, low-profile private firms like Shaanxi-based miner Allway Minerals and Science Technology have already set up co-ventures with Canadian firms in order to explore for uranium in the northern part of the country.[48] Private firms therefore benefit from attracting little media attention and have proven to be indispensible partners for uranium-seeking state firms that are looking to share costs.

Chinese companies, whether public or private, have used a variety of creative tactics in order to convince foreign governments or mining companies to allow them to exploit uranium mines. For example, in 2007 Moukhtar Dzhakishev, the president of Kazakh state nuclear firm Kazatomprom, stated that the corporation was to receive equity in "Chinese nuclear fuel processing or electricity generation plants" in exchange for granting CGN and CNNC a 49-percent stake in a joint uranium mining venture created between the firms and the Kazakh corporation.[49] In 2008 Sinosteel signed a memorandum of understanding with Australian uranium miner Monaro Mining NL that allowed the Chinese steelmaker to receive up to 60 percent of any two of Manaro's mines in Kyrgyzstan upon completion of successful feasibility and developmental studies, which were to be funded by Sinosteel.[50] By appealing to the host country's technological needs, a need many Chinese companies have exploited in their overseas investments, CGN Uranium Resources Corporation, a subsidiary of CGN, helped fund a joint uranium exploration and mining venture with the Uzbekistan State Committee for Geology and Mineral Resources in 2009 by contributing Chinese mining equipment toward the effort.[51] Forming agreements such as these, which benefit foreign companies by providing them with either financial incentives or the tools necessary to exploit natural resources, have thus proven quite effective in granting Chinese firms opportunities abroad.

The tactic of acquiring uranium directly from the source through purchases of mines and mining companies has greatly increased China's control of the resource over the world, and companies have received extensive state financial support through special funds created by various government entities in order to carry out this strategy. Through these special investment funds, China's banks have been able to aid in the purchase of mines and mining companies. For instance, in 2011 the China-Africa Development Fund, which was launched in 2006 by state-owned China Development Bank in order to provide financial support for overseas investments in Africa, partnered with CGN to purchase British mining company Kalahari Minerals and its assets, including the sizeable

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[48] Ibid.

[49] "KazAtomProm Trumpets Its Plans as China Deal Progresses," *World Nuclear News*, November 20, 2007, accessed April 30, 2015, http://www.world-nuclear-news.org/newsarticle.aspx?id=14426&LangType=2057.

[50] Weitz, "China's Uranium Quest Part 2," 13.

[51] Ibid; "Uzbek-Chinese Uranium JV Nearly Doubles Charter Capital," *Interfax: Kazakhstan Mining Weekly*, April 1, 2013, accessed January 30, 2015, ABI/INFORM Complete, http://search.proquest.com.ezproxy.lib.ou.edu/docview/1326698272/abstract?accountid=12964.

Husab uranium project in Namibia.[52] These funds have thus made the purchase of even the most ambitious uranium projects possible for Chinese firms.

Chinese companies have also been able to access financial support through preferential loans from large state banks, which have been instrumental in funding foreign investment projects for Chinese companies engaged in the Going Out policy, including those obtaining uranium through the acquisition of mines and mining companies. For example, in 2011 China EximBank provided the government of Niger with a $99 million loan to fund the exploitation of the nation's Azelik uranium mine through a joint venture that was established by the Nigerien government and China Uranium Corporation in 2007.[53] The loan came with a five-year grace period and an interest rate of 2 percent.[54] The vast coffers of China's state banks and the enticing loans they are able to offer have thus been extraordinarily helpful in aiding the expansion of nuclear firms and their partners across the globe.

Other than financial support, the Chinese government has aided uranium-seeking firms significantly by easing the regulatory measures required to launch projects abroad. For example, in 2009 China's Ministry of Commerce (MOFCOM) took measures to relax and expedite the approval processes necessary for Chinese companies to launch mining and exploration projects abroad, reducing the multiple applications once needed for a OFDI project down to just one and significantly cutting the time needed to review firms' applications.[55] The same year, the State Administration of Foreign Exchange (SAFE), which regulates the use of China's vast foreign exchange reserves, announced that it would no longer require firms to seek SAFE approval for foreign exchange purchases once a project and the amount of foreign exchange involved were approved by MOFCOM and the National Development and Reform Commission (NDRC), which is tasked with maintaining and formulating policies for China's economic development.[56] In 2014 the NDRC released new rules that established approval requirements for central state-owned enterprises, such as CNNC and CGN, requiring that investments of less than $1 billion simply be filed with the central or provincial NDRC, rather than having to go through a longer approval process.[57]Collectively, these types of eased regulations

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[52] Wenbin and Wilkes, *Analysis of China's Overseas Investment Policies*, 13; Emma Rowley, "Uranium Miner Kalahari Agrees Takeover by Chinese," *The Telegraph*, December 8, 2011, accessed January 23, 2015, http://www.telegraph.co.uk/finance/newsbysector/industry/mining/8944951/Uranium-miner-Kalahari-agrees-takeover-by-Chinese.html; "The Chinese Companies Involved in the Takeover of Kalahari," *Dynabond Powertech Service*, May 30, 2012, accessed April 29, 2015, http://www.dynabondpowertech.com/en/nuclear-power-news/topic-of-the-month/30-topic-of-the-month/5848-the-chinese-companies-involved-in-the-takeover-of-kalahari.

[53] "Niger Secures $99 Mln China Loan for Uranium Mine," *Reuters*, April 1, 2011, accessed April 29, 2015, http://www.reuters.com/article/ozabs-niger-china-loan-idAFJOE7300M220110401.

[54] Ibid.

[55] Sauvant and Chen, "China's Regulatory Framework," 6.

[56] Ibid., 17.

[57] Jay Ze and Yawen Han, "Chinese Outbound Investments Made Easier under New NDRC Measures," *Eversheds*, June 24, 2014, accessed April 13, 2015, http://www.eversheds.com/global/en/what/articles/index.page?ArticleID=en/global/china/chinese-outbound-Investments240614.

are indispensable for the various public and private Chinese firms seeking uranium around the world, and, as intended, they could very well encourage further exploration and mining of the resource in future years.

Tactics and State Support in the Nuclear-Reactor Market

As part of their attempts to break into the global reactor market, Chinese nuclear firms have sought to utilize similar tactics in order to give themselves a competitive edge. Western firms have dominated the nuclear-reactor market for several years, a major obstacle for Chinese companies in their pursuit of global expansion. In securing foreign contracts for Chinese nuclear reactors, China's large state firms have pledged financial and technical support to foreign governments and companies with the backing of large state banks. At the same time, these firms have participated closely with big foreign players in order to become exposed to the global reactor market. Through persuasive measures and strategic partnerships, China's nuclear firms have the potential to make a name for themselves throughout the world.

The most prominent tactic used by China's nuclear firms has been the provision of financing to countries that have purchased or are planning to purchase Chinese nuclear technology or utilize the services of Chinese nuclear firms. For example, the K-2 and K-3 reactors, which are Chinese-developed ACP1000 reactors currently under construction by CNNC in Pakistan, are being partially financed through a $6.5 billion loan provided by China EximBank.[58] In November 2015, China agreed to provide 85 percent of the financing for the reactors planned as part of the Sino-Argentine nuclear agreement signed in February 2015.[59] Constructing nuclear reactors is an incredibly expensive process, and the governments of many developing countries do not have the available funds to launch such ambitious projects. China's nuclear firms, especially CNNC, have thus ensured their expansion by meeting this need.

The size of the loans offered by China to potential buyers is impressive enough, but the preferential nature of these loans most likely also helped secure deals for CNNC. For instance, in addition to issuing a loan to Pakistan for the K-2 and K-3 reactors, China EximBank decided to waive the insurance premium that was initially attached to the

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[58] "KANUPP-II and KANUPP-III—A Step Towards Ending Power Crisis," *Business Recorder*, May 29, 2014, accessed March 29, 2015, LexisNexis Academic, http://www.lexisnexis.com.ezproxy.lib.ou.edu/hottopics/lnacademic/; "Contracts for New Pakistan Reactors," *World Nuclear News*, September 10, 2013, accessed March 29, 2015, http://www.world-nuclear-news.org/NN-Contracts_for_new_Pakistan_reactors-1009134.html; Muhammad Arif, "Exim Bank of China Provides Funding for K-2, K-3 Nuclear Power Plants of Pakistan," *Nihao-Salam*, January 8, 2015, accessed March 22, 2015, http://www.nihao-salam.com/news-detail.php?id=NzI0NQ==; Shahbaz Rana, "Nuclear Power: China Promises $6.5b Cheap Loan for Two Plants," *The Express Tribune*, January 2, 2014, accessed March 23, 2015, LexisNexis Academic, http://www.lexisnexis.com/hottopics/lnacademic; "Nuclear Power: A Viable Option For Electricity Generation," Pakistan Atomic Energy Commission, accessed March 8, 2016, http://www.paec.gov.pk/NuclearPower/; "Expanding World of Nuclear Power Plants," *Pakistan Observer*, March 4, 2016, accessed March 8, 2016, http://pakobserver.net/2016/03/05/expanding-world-of-nuclear-power-plants/.

[59] Lan Lan and Emma Gonzalez, "Nuclear Company Signs Landmark Technology Agreement with Argentina," *China Daily—US Edition*, February 6, 2015, accessed February 6, 2015, LexisNexis Academic, http://www.lexisnexis.com/hottopics/lnacademic; Yang, "China to Build;" "Argentina and China Sign Two Reactor Construction Agreements," *World Nuclear News*, November 16, 2015, accessed January 6, 2016, http://www.world-nuclear-news.org/NN-Argentina-and-China-sign-two-reactor-construction-agreements-16111501.html.

loan.[60] In the case of the Chashma-3 and Chashma-4 reactors, based on the Chinese-developed CNP-300 design and currently under construction in Pakistan, the Chinese government pledged a $1.3 billion loan with an eight-year grace period.[61] The attachment of these benefits has thus eased the process of securing deals with the Pakistani government, and CNNC and other companies will most likely offer similar benefits in the future to developing countries that are interested in purchasing nuclear technology from China.

Chinese nuclear firms have also provided nonfinancial incentives to potential buyers. Constructing and maintaining nuclear reactors not only requires funds, but also natural resources and human capital, and Chinese companies have worked to supply potential buyers with both of these. For instance, in December 2014, SNPTC agreed to establish a training program with the South African Nuclear Energy Corporation (SANEC) to help develop a capable staff of South African nuclear engineers and technicians.[62] This, along with an agreement with the Industrial and Commercial Bank of China (ICBC) to fund nuclear projects in the African nation, is intended to precede the eventual launching of several projects in South Africa that will use SNPTC's new CAP1400 technology.[63] In an agreement signed with Argentina's Nucleoeléctrica in September 2014, CNNC and the ICBC agreed to help fund future nuclear projects in the South American country, and CNNC also agreed to provide enriched uranium and equipment for a planned reactor known as Atucha 3, which is to be based on Canadian technology.[64] Helping to develop the nuclear programs of these countries has thus been a convenient way for China's nuclear firms to gain partnerships with potential buyers.

In an attempt to gain footing in the competitive international reactor market, state firms have also sought alliances and strategic partnerships with the world's leading nuclear companies. French-firm Areva has been particularly active in forming such partnerships with China's nuclear giants.[65] For instance, in 2008 Areva formed an engineering venture with CGN to develop nuclear technology in China and in other nations.[66] In a 2012 interview, Bernard Bigot, the chairman of the French Alternative Energies and Atomic Energy Commission, stated that cooperation between Chinese and French nuclear companies ultimately makes it possible for firms from both countries to jointly bid for projects in other countries.[67] The Hinkley C project in Great Britain is an

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[60] Mehreen Zahra-Malik, "Exclusive: China Commits $6.5 Billion for Pakistani Nuclear Project," *Reuters*, December 24, 2013, accessed February 9, 2015, http://www.reuters.com/article/us-pakistan-china-nuclear-idUSBRE9BN06220131224.

[61] "PAEC—Chashma Nuclear Power Plant Expansion 680 MW - Southern Punjab," *World Market Intelligence News,* Dec 15, 2014, accessed January 27, 2015, ABI/INFORM Complete, http://search.proquest.com/docview/1636325291?accountid=12964; "Nuclear Power in Pakistan," *World Nuclear Association*, last modified August 2015, accessed January 31, 2015, http://www.world-nuclear.org/info/Country-Profiles/Countries-O-S/Pakistan/; "Nuclear Power: A Viable Option For Electricity Generation."

[62] *GlobalData—Events: South Africa Nuclear Energy Corporation*.

[63] Ibid.

[64] *Argentina Infrastructure Report - Q1 2015*, report, London: Business Monitor International, 2014, accessed January 27, 2015, 26, ABI/INFORM Complete, http://search.proquest.com.ezproxy.lib.ou.edu/docview/1617637367?rfr_id=info:xri/sid:primo; "Argentine Company to Construct, Operate Nuclear Power Plant," *BBC Monitoring Americas*, September 12, 2014, accessed February 9, 2015, ABI/INFORM Complete, http://search.proquest.com/docview/1561447404?accountid=12964.

[65] Li, "Nuke Companies Pursue Future Power Abroad," 3.

[66] "Nuclear Power in China," *World Nuclear News*, last modified January 6, 2016, accessed January 18, 2015, http://www.world-nuclear.org/info/country-profiles/countries-a-f/china--nuclear-power/.

[67] Li, "Nuke Companies Pursue Future Power Abroad," 3.

example of this. Indeed, in a market where players like Areva and Westinghouse have dominated for years, China's nuclear firms have found partnerships with these corporations to be very effective in expanding their presence abroad.

Conclusion

If the expansion of China's nuclear corporations continues at its current rate, the general public may soon come to recognize names like CNNC and CGN. This expansion embodies the goal of China's Going Out policy, as these nuclear firms are not only planning to meet the energy needs necessary to prolong the nation's rapid economic growth, but they are also working to increase their presence and prestige throughout the world. In a market that is deeply competitive, these firms, with the support of the government, have aimed to increase their advantages by conducting a quest for uranium and buyers that is impressive in its scope. While state-owned nuclear firms lead the way in this quest, public and private firms from other sectors have also aided immensely in procuring uranium and have acted as valuable partners. Together, these companies have aggressively sought to purchase massive supplies of uranium and to claim ownership over uranium mines and several of the companies that operate these mines. The support of government agencies has been absolutely vital to these operations and is closely intertwined with the tactics used by individual firms in their international uranium pursuits. The same is true in the global nuclear-reactor market, where the Chinese government has a vested interest in exporting nuclear technology and has helped its nuclear companies secure buyers by offering immense financial and technical support. Looking to the future, China's nuclear firms will continue to push their agenda for global expansion, and if they continue to receive support from the Chinese government and other Chinese firms, these companies may experience serious gains that will earn them international prestige.

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