



ENERGY SECURITY
PROGRAM



CHINA'S ENERGY HEDGING STRATEGY: LESS THAN MEETS THE EYE FOR RUSSIAN GAS PIPELINES

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China's energy needs have been a major factor shaping the global energy landscape in the 21st century. A significant contributor to rising global energy consumption and increasing prices over the last decade, the country is being actively courted by the world's largest oil and gas exporters as a pivotal growth market for the future. As part of this, policymakers and industry leaders have been closely monitoring the potential for growing strategic and energy ties between China and its producer neighbor, Russia. Indeed, Russia has identified China as a key strategic energy partner. According to the Russian State Energy Strategy (which sets out the country's energy policy), "creation of oil and gas industrial complexes in the east of the country that should allow the regions not only to become independent of outside energy and hasten their development but diversify exports flows to Asia-Pacific countries" has become an important pillar of Russia's energy policy.¹ The policy drove the landmark signing in May 2014 of a 30-year deal to export Russian pipeline gas to China through the Power of Siberia pipeline.

Russian commentators hailed the announcement as evidence that Russia is becoming more and more "China-oriented to positive geostrategic ends."² By the same token, the Sino-Russian gas deal was debated in the West as

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¹ Tatiana Mitrova, "Looking East Amid a Crisis to the West: Russia's Export Strategies," interview by Laura Schwartz, National Bureau of Asian Research (NBR), September 9, 2014.

² Mitrova, "Looking East Amid a Crisis to the West."

evidence that the two superpowers might challenge the international order in tandem or at least in support of each other.³ In particular, concerns mounted that Russia and China might expand their energy partnership and thereby drive an alternative to the Western-dominated global financial order or engage in defense cooperation that would make resolution of issues such as Russia's invasion of the Crimean Peninsula or China's territorial positions regarding the South China Sea increasingly difficult.

Many look at China's voracious appetite for energy and its desire to address environmental concerns by substituting natural gas for coal and conclude that Russia, if it moves quickly and is flexible enough on price, will be able to solidify energy trade with China on a scale that has strategic consequences. Worries abound that a deepening trade relationship could provide Russia with leverage over China similar to how natural gas trade between Russia and Europe has often curbed European criticism of and action toward Moscow. Our studies, and this commentary, suggest that this is not a foregone conclusion. Instead, China's growing energy relationship with Russia might be best understood as a hedging strategy to lock in multiple suppliers to reduce Chinese exposure to supply disruptions and to leverage cheaper energy imports. China's actions related to natural gas are typical consuming-country policies aimed at enhancing fungibility among natural gas imports and are motivated by a desire for greater energy security. Indeed, when faced with liquefied natural gas (LNG) prices that have exceeded \$20 per thousand cubic feet in recent years, China clearly has an interest in seeking alternative sources of supply from lower-cost providers.

Using the Rice World Gas Trade Model (RWGTM), we have constructed and examined multiple scenarios for the development of China's natural gas sector and

the implications for global natural gas markets.⁴ Several key findings stand out. First, we find that in no scenario does Russia capture an overwhelming proportion of China's gas demand. In all cases examined, Russia's share of the Northeast Asian natural gas market never rises above 9% by 2030 and in the next decade has difficulty exceeding 3%. It is useful to note in comparison that Russia supplies 27% of the European natural gas market and has a clearly dominant position in Eastern Europe, supplying over 90% of the gas consumed in Poland and several former Soviet countries. Second, we find that, contrary to common assumptions, China has flexibility to meet its future gas demand with a varied and diverse configuration of sources, with the ultimate outcome depending on the scenario. This suggests that the United States, to the extent that it is interested in minimizing Sino-Russian energy trade, can shape the emergence of a scenario in which China relies more extensively on domestic resources or on LNG from non-Russian sources.

Background: Commercial Potential for Russian Gas

From an economic perspective, the opportunities for Sino-Russian energy trade are huge. Russian natural gas resource potential is by far the largest in the world, and in eastern Russia there is no local demand, effectively stranding that resource unless Moscow can identify a foreign buyer. Enter China, which signed a deal with Russia in May 2014 for 38 billion cubic meters (bcm) of gas per year beginning in 2018. A second Sino-Russian accord was then signed (although it is a nonbinding memorandum) in November 2014 for an additional 30 bcm per year.

³ Gilbert Rozman, "Asia for the Asians: Why Chinese-Russian Friendship Is Here To Stay," *Foreign Affairs*, October 29, 2014.

⁴ The Baker Institute's RWGTM was developed by Kenneth B. Medlock III and Peter Hartley at Rice University using the MarketBuilder software platform provided through a research license with Deloitte Marketpoint, LLC. The architecture of the RWGTM, the data inputs, and modeled political dimensions are distinct to Rice University and its researchers. The model is used to evaluate how different geopolitical pressures, domestic policy frameworks, and market developments can influence the long-term evolution of regional and global gas markets and how those developments in turn influence geopolitics.

At the heart of China's apparent willingness to sign up for Russian supply is the simple fact that its demands are projected to increase significantly over the next couple of decades, fueled by a growing economy and over 1.2 billion people who are expected to ascend the income ladder. China is forecast to constitute 48% of the growth in global primary energy through 2020. In its *2014 Medium-Term Gas Market Report*, the International Energy Agency projected that Chinese demand for natural gas will nearly double by 2019 to 315 bcm, offsetting a slight slowdown of demand growth in other regions. Meeting these energy needs will continue to be a critical challenge for the Chinese government. At the same time, capturing new markets to compensate for stagnating demand in Europe, not to mention political complications from the Ukraine crisis and the subsequent impact of Western-led sanctions, is an imperative for Russia.

China has ambitions to dramatically expand the role of natural gas in its economy. At present, natural gas plays only a small role in the country's energy mix, but Beijing is targeting natural gas as a strategic way to upgrade the environmental performance of China's fuels for the power and commercial transport sectors. The country consumed 148 bcm of natural gas in 2012, making it the fourth-largest global consumer of natural gas. However, natural gas consumption only accounted for 5.9% of total primary energy consumption, much lower than the world average of 23.7%.⁵ During 2000–2012, China's natural gas consumption reached an average annual growth rate of 16.7%, which was almost double that of both oil and coal consumption (9.9% and 8.8%, respectively).

However, the extent to which China will rely on its own natural gas resources versus imports is uncertain. The country's unconventional natural gas resource base is considered to be extensive. Although estimates of Chinese shale gas potential are uncertain, preliminary studies show that the country may have more than 670 trillion cubic feet (tcf) of recoverable shale resources at

prices below \$12 per thousand cubic feet.⁶ Advanced Resources International estimates that Chinese shale gas resources are as high as 1,115 tcf of technically recoverable resources in place.⁷ Yet there are still considerable obstacles to the broad-scale development of Chinese shale, and growth in natural gas demand has, so far, been largely met by rising imports. China imported 51.9 bcm (or about 1.8 tcf or 5.0 billion cubic feet per day) of natural gas in 2013, an increase of 25.2% from the prior year, with dependency on foreign natural gas increasing to 32.1%.⁸ Currently, Russia has no real presence in the Chinese natural gas market.

Depending on China's growth path and the pace at which the country can develop its own domestic resources, China could become the world's largest importer of natural gas in the coming decades. Many pipeline and LNG suppliers are clearly targeting China for long-term sales, including suppliers in the Middle East, Australia, and Canada. Meanwhile, Russia is an obvious potential supplier due to its vast resource base, its geographic advantages, and China's alleged preference for piped gas over LNG shipped along international seas lanes, which are currently protected and dominated by the U.S. military.⁹

Despite their economic and strategic compatibilities, however, Russia and China have until recently been slow to consummate their energy relationship. The two have signed a large number of agreements regarding natural gas trade over the years, yet negotiations dragged and final agreements were often elusive. It was only in May 2014, at the height of Russia's confrontation with the West over Ukraine, that China agreed to a \$400 billion deal for delivery of 38 bcm per year of Russian natural

⁵ BP plc, "BP Statistical Review of World Energy 2014," June 2014.

⁶ See Kenneth B. Medlock III, "Estimating Global Shale Gas Development Costs," paper prepared for documentation of the Rice World Gas Trade Model for the U.S. Department of Energy, 2012, available upon request.

⁷ See U.S. Energy Information Administration, "Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States," June 2013, <http://www.eia.gov/analysis/studies/worldshalegas/pdf/overview.pdf>.

⁸ See BP plc, "BP Statistical Review of World Energy 2014."

⁹ ZhongXiang Zhang, "China's Energy Security, the Malacca Dilemma and Responses," *Energy Policy* 39, no. 11 (2011): 7612–15.

gas.¹⁰ A memorandum of understanding for a second pipeline was signed in November 2014 on the margins of the APEC meeting to much fanfare, but firm commitments have not yet been made.¹¹ Indeed, the recently changing price environment may signal a new market reality that could make an agreement on price elusive, and the deals are not without significant financial and geopolitical risks to either side. The first deal is scheduled to begin delivery in 2018, and if it proceeds as scheduled, Russia would be meeting about 12% of China's expected natural gas consumption by 2020.¹² If both deals reach final commitments, it would mean that Russia could be exporting to China over 68 bcm of natural gas per year by 2030, possibly accounting for approximately 20% of China's growing consumption by that time.¹³

Scenario Analysis of Global Natural Gas Markets

With this background in mind, we applied the Rice World Gas Trade Model to detail in greater depth how Russo-China gas trade might develop under several scenarios. At the core of this model is an attempt to quantify how geopolitics will affect gas markets, and in doing so offer insights into outlooks for regional supplies, demand, and pricing. Through rigorous application of the RWGTM, our scenario analysis highlights the commercial difficulty Russia will have in garnering significant gas market share in China, especially if China is able to develop successfully its

own large shale gas resources. Moreover, any concerted push by U.S. and Canadian LNG developers to target the Chinese market would have a deleterious impact on Russia's ability to maximize natural gas sales to China.

Under a business-as-usual scenario, the RWGTM projects that China's natural gas demand will rise to 12.4 tcf (332.3 bcm) by 2030, up from approximately 5.8 tcf in 2014, mainly in industrial and power sectors. China's LNG imports will derive from a wide variety of sources, including Australia, Qatar, Indonesia, United Arab Emirates, and Papua New Guinea. LNG exports from the United States emerge in 2016, but largely affect China by displacement of demand for other suppliers rather than direct sales, with U.S. cargoes destined for Asia landing primarily in Japan and South Korea. In this reference case, we project that Chinese domestic natural gas production (including shale) would reach approximately 45% of total Chinese needs by 2030. Thus, Russia's pipeline sales to China will find competitive pressures that make it difficult to get beyond the volumes in the May 2014 supply deal (38 bcm) in the coming ten to fifteen years.

Our scenario analysis found that China may meet its gas demand through a variety of sources. However, Russia's percentage of the Chinese gas market is at best only marginally higher than in the reference case scenario except in two cases. One is if the price of oil remains at \$50 a barrel. The other is if China fails to mobilize its shale industry sufficiently until after 2030. In the latter case, Russia's pipeline sales to China are roughly 20% higher, accounting for 13.1% of total Chinese natural gas needs, up from 10.7% in the reference case. This low China shale scenario represents the highest level of market share Russia achieves across all scenarios.

In a situation where the oil price is sustained at \$50 a barrel, investment in Chinese shale is hindered due to lower-cost natural gas supplies from abroad. Importantly, a major driver of sustained lower oil price is a lower upstream cost environment that triggers greater levels of investment in various places around the world. In this

¹⁰ See Morena Skalamera, "The Sino-Russian Gas Partnership: Explaining the 2014 Breakthrough," Harvard Kennedy School, Belfer Center, Paper, November 2014. http://belfercenter.ksg.harvard.edu/publication/24767/sinorussian_gas_partnership.html?breadcrumb=%2Fexperts%2F2840%2Fmorena_skalamera.

¹¹ See Meghan L. O'Sullivan, "New China-Russia Gas Pact Is No Big Deal," Bloomberg View, November 14, 2014. <http://www.bloombergvew.com/articles/2014-11-14/new-chinarussia-gas-pact-is-no-big-deal>.

¹² Some observers suspect that China might simply utilize the May agreement, in which it negotiated fairly low prices for the natural gas, to garner lower natural gas prices from its other suppliers.

¹³ Eric Yep, "New Russia-China Deal Could Further Hit Natural Gas Prices," *Wall Street Journal*, November 10, 2015, <http://www.wsj.com/articles/new-russia-china-deal-could-further-hit-natural-gas-prices-1415614816>. Note that the demand projections are taken from the Rice World Energy Demand Model, which is integrated with the RWGTM. Chinese demand is projected to be 6.9 tcf and 12.4 tcf in 2020 and 2030, respectively.

case, Russia grabs a slightly larger absolute volume of China's gas market at 1.5 tcf (42 bcm), but due to lower prices total demand in China is also higher, rising to 13.2 tcf (376 bcm) by 2030. As a result, Russia exports more but does not gain significant market share in China.

Another scenario, which envisions greater liberalization of the global natural gas market, sees greater indigenous supply development in Asia and elsewhere, resulting in an overall diversification of supply. This more competitive global marketplace significantly diminishes Russia's ability to sell more natural gas to China and, in fact, has by far the greatest impact on Russia's position in the global gas market. In this case, Russian gas exports to China are virtually unchanged, leaving Russia with less market share in China overall because lower prices drive demand slightly higher but allow China to meet that additional demand without increasing purchases from Moscow. Under this scenario, Russia also loses considerable market share in Europe as local natural gas production rises and higher levels of imports are available from other sources. Rising indigenous production allows Europe to reduce dramatically its imports from Russia, with the Russian market share falling to just over 16% by 2030. Thus, Russian expectations that the Chinese market will be the fail-safe for Moscow's problems elsewhere might be misplaced.

In yet another scenario, one in which there is a stable and open investment climate in the Middle East, Russian gas exports to China fall, but only marginally. If Middle East conflicts in Syria and between Iran and its neighbors are resolved, then deeper ties between Iran and India could emerge, Iraqi gas could flow toward Turkey and Europe, and Qatari gas could be redirected toward Asian countries, including China. Chinese domestic production falls slightly relative to the reference case, but so do imports from LNG sources outside the Middle East, while demand is slightly stimulated due to marginally lower prices. In sum,

the market responses to single perturbations are very dynamic, with many different markets being influenced significantly but not necessarily with large impacts on Russia-China trade.

There is one scenario, however, that demonstrates real risk for the competitiveness of Russian gas exports to China: a case in which there is a concerted push of U.S. and Canadian LNG into the global market. In this scenario, we model a future in which policies result in the overall volume of U.S. LNG exports exceeding what the market would pull on its own, perhaps due to security-of-supply preferences for North American natural gas. We find that an increase in U.S. LNG exports to 12 billion cubic feet per day reduces the commercial viability of Russian pipeline gas to China—a proverbial “crowding out” effect. In this case, Russia's total exports to Asia in 2030 are approximately 18% lower than in the business-as-usual case, with sales to China cut significantly. In other words, U.S. LNG export policy could have a material impact on thwarting Russo-China energy trade ties and needs to be considered in this light.

Conclusions and Policy Implications

Policymakers in Washington and elsewhere need not pay so much attention to hysterical predictions of a grand energy-based strategic alliance between China and Russia. Energy is only one dimension in the Sino-Russian relationship, but it is an important one. An examination of multiple scenarios of possible futures suggests that although the Sino-Russian gas relationship will undoubtedly grow, Russia will face difficulty in securing a share of the Chinese market so large that it is worthy of the West's worst fears. Under all the scenarios examined, Russia's market share will not likely be sufficient to provide Moscow with enormous political leverage over Beijing. Moreover, an expanding and increasingly competitive global LNG market will give Beijing more realistic alternatives to compensate for Russian gas in the unlikely instance that Moscow

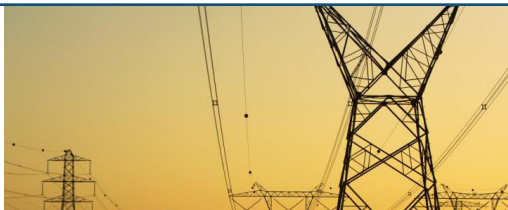
tries to use it as a political weapon. It is harder to judge whether the growing gas trade between the two countries will be the basis for a more strategic relationship or what absolute level of trade would be high enough to give Russia geo-economic leverage over the Chinese economy. However, the likely volumes of gas trade—while large in absolute amounts—will not demand a strategic meeting of the minds.

Meanwhile, U.S. and other policymakers concerned about growing ties between Russia and China should take note that their actions can help determine the extent of Sino-Russian gas trade. For instance, further liberalization of gas markets would help curb the growth of Russia's market share everywhere. Indeed, reforms that allow for the free flow of investment capital into Asian gas markets would result in a significant diversification of supply globally and lower prices overall. The potential for Chinese indigenous shale production also dampens Sino-Russian energy trade, which is an important counterpoint to the argument that the West has no interest in seeing China develop its own resources. Finally, the volumes of U.S. LNG on the global market have an impact on the extent of Chinese reliance on Russian gas. Additional factors in domains beyond Asia need to be considered before using this finding as a rationale for subsidizing or otherwise encouraging U.S. LNG volumes beyond what the market would bring.¹⁴ This finding, however, argues strongly in favor of Washington eliminating all political restraints on U.S. LNG exports, so that their volume can be maximized and their strategic and economic potential realized.

The strategic potential of U.S. LNG is not limited to curbing Sino-Russian energy trade but extends to U.S. relations with Asia more broadly. LNG exports may be viewed as an important way for the United States to support its allies, particularly Japan, which is struggling to meet post-Fukushima domestic economic and political challenges as well as address energy security concerns.

Moreover, should a deeper U.S. presence in the Asian energy market lead to LNG exports to China, the two countries might increasingly see themselves as having common interests. ~

¹⁴ Kenneth B. Medlock, Amy Myers Jaffe, and Meghan O'Sullivan, "The Global Gas Market, LNG Exports, and the Shifting U.S. Geopolitical Presence," *Energy Strategy Reviews* 5 (2014): 14–25.



BACKGROUND ON NBR'S ENERGY SECURITY PROGRAM

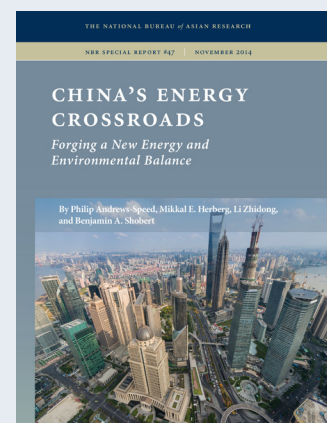
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NBR would like to thank the Asian Development Bank, Chevron, ConocoPhillips, ExxonMobil, and the Henry M. Jackson Foundation for their generous support of the 2014 Energy Security Program. We are also grateful to the Woodrow Wilson International Center for Scholars for cohosting the June workshop and to the Ronald Reagan Building and International Trade Center for cosponsoring that event.

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