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Sino-Russian Gas and Oil Cooperation:

Entering into a New Era of Strategic Partnership?

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Since the publication of *Sino-Russian Oil and Gas Cooperation: The Reality and Implications* in August 2012, Sino-Russian energy cooperation has witnessed major breakthroughs during the period 2013–14, and the implications for the coming years will not be small. This paper aims at updating the breakthroughs and analysing the implications. I am hugely privileged to have been able to count on the advice, support, and encouragement of my OIES colleagues. My special thanks go to Bassam Fattouh, Jonathan Stern, and Chris Allsopp for their generosity and patience in commenting on the draft, which has significantly enhanced its quality. I also want to express sincere thanks to Tatiana Mitrova who made very useful comments on the final draft, to Lucy Hornby who gave solid help in restructuring and shortening the first draft, and to Colin Shek who helped update my understanding of the CNPC's WEP development scheme. My special thanks should go to Shamil Yenikeyeff, Mike Chen, and Ka-ho Yu who have made invaluable contributions to enhancing the research quality of this paper. I am also grateful to Catherine Gaunt for editing, and to Kate Teasdale for administrative support. Responsibility for all the views expressed and all the conclusions reached is solely mine.

Contents

Figures

Tables

Maps

1. Introduction

In 2014, Russia and China signed two major gas deals. The ink had barely dried on the first deal before oil prices began their sudden slide, eclipsing an agreement that will prove instrumental in lowering long-term gas prices in north Asia. Ironically Russia's dire financial situation, amidst sanctions in the wake of the Ukraine crisis, then paved the way for a further round of Sino-Russian oil and gas cooperation. The two agreements would dramatically alter the supply–demand balance in China and Asia, and directly threaten proposed LNG projects around the world.

The Power of Siberia (POS) contract was signed on 21 May 2014,[1] before oil prices had lost almost 50 per cent of their value and before sanctions imposed by the West began to take their toll on Russia. This historic US$400 bn deal envisages 38 bcm/y (or 27 mt/y in LNG volume) of pipeline gas supply from East Siberia to northern China's Bohai Bay gas market via the three north-eastern provinces – Heilongjiang, Jilin, and Liaoning – in China. The implementation of the 30-year supply deal will wipe out any possibility of sizeable LNG supply to the Bohai Bay gas market. Six months later, an MOU for the second, West Siberia or Altai, gas deal was signed on 9 November, and now the conversion of the MOU to a binding agreement is being pursued.[2] The Altai MOU's conversion into a binding agreement could have an even greater impact than the Power of Siberia deal as it will establish Russia as a swing supplier between Asia and Europe, protecting Russia from competition from other LNG supplies to China.[3]

What factors motivated both China and Russia to clinch these gas deals? For China, any further delay of the economic development of the three north-eastern provinces was not acceptable as the wealth gap between the coastal provinces and interior provinces, after three decades of the Open Door policy, continues to widen. Furthermore, the deterioration in air quality reminded the Chinese policy makers of the necessity of reducing China's heavy dependence on coal, and consequently the expansion of gas use became a matter of urgency. It is hoped that pipeline network construction in China's industrial zones in its north-eastern provinces – to enable gas imports from Russia's East Siberia – could serve a similar role to the part played by the construction of the West–East pipeline (WEP) corridor in the economic development of western China. Besides, as the world's largest energy importer, China has been very conscious of the vulnerabilities resulting from its growing dependency on seaborne oil and gas supplies; maximization of onshore pipeline-based oil and gas supply has thus become a top priority to ensure the security of energy supply.

In the case of Russia, the gas deal with China was also strategic as Russia became estranged from the West in the wake of the Ukraine crisis. Russia is a world leader in crude oil and natural gas production and exports. Between 2000 and 2010, the country's oil and gas exports rose significantly: oil by 70 per cent and gas by 15 per cent. In the same period, its annual production

[1] Louise Watt and Vladimir Isachenkov, 'China Signs 30-Year Deal for Russian Natural Gas', Associated Press, 21 May 2014. http://bigstory.ap.org/article/gazprom-china-russia-sign-30-year-gas-deal; Lucy Hornby, Jamil Anderlini, and Guy Chazan, 'Russia and China strengthen ties by striking $400 bn deal for gas', *Financial Times*, 22 May 2014.

[2] Argus, *FSU Energy*, 19 February 2015, p. 1.

[3] Bree Feng, 'Russia Uses Its Natural Gas to Play the China Card, Again', *New York Times* (Sinosphere), 25 September 2014, http://sinosphere.blogs.nytimes.com/2014/09/25/russia-uses-its-natural-gas-to-play-the-china-card-again/?_r=1.

of oil increased by more than half and exceeded 500 mt/y, while that of gas increased by 10 per cent. Revenues from oil and gas exports accounted for more than a quarter of Russia's GDP and a third of the national budget. In particular, fuel exports as a proportion of total exports have risen from 43 per cent in 1996 to 64 per cent in 2010, and to 70 per cent in 2012.[4] The growing role of energy export revenues in the Russian economy is set to continue and finding new markets is a top priority for Russia; Asia (and China in particular) has become the prime target for its exports.

China is set to be the battleground between the 'Pivot to Asia' policies of, on the one hand, Russia, and on the other, the USA and Canada, resulting in an invisible but fierce competition which will intensify in the coming years. This explains why Moscow aims at striking the Altai gas supply deal without further delay. The impacts on regional and global LNG trading of constructing two large-scale gas pipelines with a combined capacity of 68 bcm/y (48 mt/y) to China will be massive; for example, LNG producers' false expectation of boundless LNG appetite from Asia, particularly from China, will lead to the suspension of many expensive LNG projects. If implemented, this would wipe out 48 mt/y of LNG market and will serve as a wake-up call to potential LNG suppliers to China such as Australia, the USA and Canada, and East Africa.

The invisible competition between Russia and LNG developers (in particular US LNG promoters) aimed at carving out the lucrative Asian LNG market, has already started. Large-scale US LNG supply to Asia, which will form the basis of North Pacific Energy trading expansion in the coming years, will be the most threatening challenge for Russia's 'Pivot to Asia' policy. From Moscow's viewpoint, timing is critical for Altai route exports to penetrate China's gas market. If the Altai MOU is converted into a binding agreement in the foreseeable future, its impact on many LNG projects targeting Asian markets, in particular the Chinese LNG market, will be very significant.

Moscow's efforts to strengthen its oil and gas cooperation with China are set to intensify. A Russian scholar has pointed out that with the start of the Ukraine crisis and the first round of sanctions, Putin's 'Pivot to Asia' – announced in 2012 in his speech to Russia's National Assembly, when Russia held the presidency of the Asia–Pacific Economic Cooperation (APEC) meeting – is turning into a 'Pivot to China'.[5] However, American scholars have argued that 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. This contrasts with the view of many observers that Russia, if it moves quickly and is sufficiently flexible on price, will be able to solidify energy trade with China on a scale that has strategic consequences.[6]

The key question is whether Sino-Russian oil and gas cooperation will move to the strategic level. While there is no easy answer, there are two very important milestone indicators. The first is from the gas sector: the conversion of the Altai MOU into a binding agreement. The second is from the oil sector: the potential sale of Rosneft's 20 per cent equity to CNPC. The combination of both deals will be sufficiently powerful to upgrade Sino-Russian oil and gas cooperation to the strategic

[4] Tatiana Mitrova, 'Russia–Northeast Asia Energy Trade and Investment: Opportunities and Challenges', presented at 2014 North Pacific Dialogue in the Shale-Gas Era, organized by the East-West Centre and Korea Energy Economics Institute (KEEI), Honolulu, 13–15 August 2014; Tatiana Mitrova, 'The Political and Economic Importance of Gas in Russia', in James Henderson and Simon Pirani, eds., *The Russian Gas Matrix: How Markets are Driving Change*, Oxford: Oxford University Press, 2014, pp. 6–38.

[5] Alexander Gabuev, 'A "Soft Alliance"?: Russia–China Relations after the Ukraine Crisis', ECFR (European Council on Foreign Relations)/126, 10 February 2015, pp. 1–9.

[6] Amy M. Jaffe, Kenneth B. Medlock III, and Meghan L. O'Sullivan, 'China's Energy Hedging Strategy: Less than Meets the Eye for Russian Gas Pipelines', National Bureau of Asian Research, 9 February 2015, www.nbr.org/downloads/pdfs/eta/ES_2015_ChinaHedgingStrategy.pdf.

level. Here, 'strategic cooperation' is a term which, for Russians and Chinese, denotes a partnership which transcends commercial business. It involves not just the sale and purchase of energy, but mutual investment in resources and companies, and the tailoring of projects to the future plans of both parties in the energy sector. This is the relationship which had been intended between Russia and Europe and which, as a result of the Ukraine crisis, has been abandoned.[7]

This paper aims to explain the importance and implications of strengthened Sino-Russian oil and gas cooperation; it also tries to analyse whether this level of cooperation could move into the strategic level. Section Two will review the changing characteristics of Sino-Russian oil and gas relations, from symbolic and scratching-the-surface levels during the 2000s, to the meaningful and substantial levels seen in the 2010s, based on the two major crude supply deals in 2013 and the two major gas deals in 2014. Section Three explains the real capacity and the limits to Russia's oil and gas exports to China and the main drivers of Russia's 'Pivot to Asia' policy. Section Four aims at exploring China's domestic gas supply capacity in the coming decades, and at elaborating both the role of WEP corridor development for pipeline gas imports from the Central Asian republics and Russia, and the potential of LNG supply to the coastal provinces. As the role of the WEP corridor has never been properly examined, this section will focus on the WEP corridor as the conduit for pipeline gas from the Central Asian republics and Russia. Section Five will focus on price and financing factors, while Section Six will address the issue of multilateral gas cooperation in the north-east Asian region. Section Seven will discuss the implications of Sino-Russian gas deals for future LNG projects. The Summary will make its verdict on the key question as to whether Sino-Russian oil and gas cooperation is likely to move to a strategic level.

[7] Jonathan Stern, Simon Pirani, and Katja Yafimava, 'Does the Cancellation of South Stream Signal a Fundamental Reorientation of Russian Gas Export Strategy?', OIES Energy Comment, January 2015, www.oxfordenergy.org/2015/01/cancellation-south-stream-signal-fundamental-reorientation-russian-gas-export-policy/

2. Sino-Russian oil and gas deals[8]

It is no exaggeration to say that what the previous Chinese leadership (President Hu Jintao and Premier Wen Jiabao) achieved during their period of tenure has been dwarfed by the achievements of President Xi Jinping and Premier Li Keqiang's administration during the last 24 months. The scale of both the crude deals in 2013 and the gas deals in 2014 is massive in terms of trading volume, and gives an indication as to where Sino-Russian energy cooperation is heading.

2.1. The oil deal[9]

China's need to maximize its imports of crude from East Siberia laid the ground for strengthened oil cooperation between Russia and China. President Xi Jinping highlighted the importance of the Sino-Russian relationship by arriving in Russia on 22 March 2013 – his maiden overseas tour as president of China. At a press conference, Xi called Russia China's 'friendly neighbour', and said that the fact that he was visiting so soon after assuming the presidency was 'a testimony to the great importance China places on its relations with Russia.' He added that 'China–Russia relations have entered a new phase in which the two countries provide major development opportunities to each other.'[10]

Due to the decline of production from oil fields in three Chinese north-eastern provinces (Heilongjiang, Jilin, and Liaoning), particularly the decline of the Daqing field, crude supply from Russia to Heilongjiang became a top priority for China. Even though the rate of decline in Daqing production has slowed down (see Table 1), Chinese energy planners were anxious to maximize the volume of Russian imports, to ensure that Daqing production decline would be covered in a timely manner. In view of China's heavy dependence on oil imported by sea, pipeline supplies became a matter of urgency for the Chinese leadership as part of their diversification strategy and their wish to enhance the security of their energy supplies.

[8] For the details and update of Sino-Russian oil and gas cooperation during the 2010s, see Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation: The Reality and Implications*, Oxford: Oxford University Press, 2012; Keun-Wook Paik, 'Sino-Russian Energy Relations: Heading for a new era?', *The Northeast Asian Economic Review* (ERINA), vol. 1, no. 2, November 2013, pp. 13–26; Keun-Wook Paik with Glada Lahn and Jens Hein, 'Through the Dragon Gate? A Window of Opportunity for Northeast Asian Gas Security', Chatham House EER BP, December 2012, www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/1212bp_paik.pdf; Keun-Wook Paik, 'The Role of Gas Imports from Russia in China's Energy Strategy', *Asia Europe Journal*, vol. 11, no. 3, September 2013, pp. 323–38.

[9] For the details of Sino-Russian oil cooperation, see Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, pp. 317–50; National Energy Security Fund (NAEF), 'Dragon Hunting: Russia Fighting its way to Oriental markets', NAEF, Moscow, July 2014.

[10] 'Chinese President Xi Jinping in Russia for first foreign tour', BBC, 22 March 2013, www.bbc.co.uk/news/world-asia-china-21873944.

Table 1: Projected oil production of China's north-eastern oilfields: 2005–2015 (mt/y)

	Daqing	Jilin	Liaohe	Total
2005 (A)	44.95	4.58	12.26	**61.79**
2010 (A)	39.87	6.10	9.50	**55.47**
2014 (A)	40.00	4.93	10.22	**55.15**
2015 (P)	**30.00**	**6.00**	**9.35**	**45.35**

Note: 'A' means actual and 'P' means projection.
Source: Revised from Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, p. 161, with the 2014 figure from *China OGP* (Xinhua News Agency), 1 February 2015, p. 27.

The March 2013 China–Russia summit set the stage for dramatic increases in flows of crude from Russia to China. Rosneft agreed to triple its oil deliveries to China from 300,000 barrels per day (b/d) to as much as one million b/d; this is twice the amount of oil that Russia exported to China in 2012 and equals the amount of oil that Saudi Arabia (China's top crude oil supplier) delivered to China in 2012.[11] The two most important points from this March 2013 summit were as follows: first, Russia agreed to allocate maximum volumes of crude to China (even though this could affect the scale of East Siberia–Pacific Ocean (ESPO) crude supply to the Asian market); second, Russia accepted China's preference of eastern route gas supply, even though Russia's priority had been the Altai route.[12] The crude supply deal reconfirmed the fact that the driving force of Sino-Russian oil cooperation was China's dire necessity to enhance its energy security; the Chinese leadership was very concerned by the country's increased dependence on oil imports by sea. The maximization of oil supply by pipeline offered reassurance given China's potential vulnerability to sea route disruption. This explains why China offered a large-scale financial package in return for crude oil supply security, with the oil deal serving as a highly effective collateral for the loan.

Based on its massive foreign reserves (US$4 tn[13] as of April 2014) China has exercised the money card very skilfully and effectively. On 21 June 2013 Rosneft reconfirmed the deal, (365 mt for 25 years supplies, worth US$270 bn) to double oil supplies to China. The deal could bring Rosneft US$60–70 bn in upfront pre-payment, but there have not been any updates on this so far. According to Standard and Poor's, Rosneft has to pay back debt to the value of $6.6 bn, $15.9 bn, and $16.2 bn in 2013, 2014, and 2015 respectively. Pre-payment from China would allow Rosneft to lighten the burden on its balance sheet by reducing its debt to banks.[14] Beijing knows the value of pre-payment very well, and is screening the timing of using the lending card very carefully.

[11] Erica Downs, 'Money Talks: China–Russia Energy Relations after Xi Jinping's Visit to Moscow', The Brookings blogs, 1 April 2013, www.brookings.edu/blogs/up-front/posts/2013/04/01-china-russia-energy-relations-downs.

[12] Moscow's compromise on export route was important as Beijing had been dragging its feet on both routes and price issues for ten years.

[13] As of March 2013, the figure was US$3.44 tn. See, Simon Rabinovitch, 'China's forex reserves reach $3.4 tn', *Financial Times*, 11 April 2013; Josh Noble, 'China's foreign exchange reserves near record $4 tn', *Financial Times*, 15 April 2014, www.ft.com/cms/s/0/4768bd3c-c461-11e3-8dd4-00144feabdc0.html#axzz3932uoFy9.

[14] Denis Pinchuk, 'Rosneft to double oil flows to China in $270 bln deal', Reuters, 21 June 2013, http://uk.reuters.com/article/2013/06/21/rosneft-china-idUKL5N0EX0JR20130621.

Another important deal was Rosneft's 10 mt/y oil supply deal with SINOPEC, for ten years from 2014; this has a trading value of US$85 bn.[15] In one year, including this crude supply deal, Russia had signed a total of oil trading deals with China worth US$355 bn. On 18 October 2013, Rosneft and the Chinese company CNPC reportedly signed a memorandum on the extension of cooperation in the field of exploration and production in Eastern Siberia. Rosneft was to have 51 per cent and CNPC 49 per cent of the resulting joint venture. Rosneft said that the future joint venture would be based on operations within its subsidiary, Taas-Yuryakh Neftegazodobycha, which owns a licence for the Srednebotuobinskoye field in Yakutia.[16] However, no progress on this deal has been made so far as the evaluation price on the project was too high, according to CNPC.[17]

Instead, CNPC was chasing a bigger prize. An agreement to acquire 10 per cent equity in Rosneft's main production base, Vankor field, was signed during President Putin's visit to Beijing in November 2014.[18] The real prize, however, will be a 19.5 per cent equity buyout of Rosneft – not of the field but of the state-owned company's equity itself. Once there is a compromise on the price (Rosneft CEO Igor Sechin was asking US$8.12 per share while the market price was US$4.56 per share),[19] CNPC is very likely to take over a 19.5 per cent stake in Rosneftegaz, which will open the door to Russia's upstream sector. It is worth noting the remarks made by Deputy Premier Arkady Dvorkovich at an investment forum held at Krasnoyarsk on 27 February 2015 – that there are no political barriers preventing China's control of strategic assets, because Russia has overcome a psychological barrier and now views China as the most obvious investor. 'Strategic reserves' are defined as holding over 70 mt (511 million bbls) of crude reserves and more than 50 bcm of gas reserves, and many fields designated as strategic reserves are under the ownership of Rosneft and Gazprom. If Chinese access to these strategic reserves materializes, it will open a new chapter in Sino-Russian oil and gas cooperation.[20]

[15] Interfax, *Russia & CIS Oil and Gas Weekly*, 17–23 October 2013, p.8.

[16] Interfax, *Russia & CIS Oil and Gas Weekly*, 17–23 October 2013, pp. 5–10; Vladimir Soldatkin, 'Russia lets China in on East Siberia oil production', Reuters, 18 October 2013. http://uk.reuters.com/article/2013/10/18/rosneft-cnpc-jv-idUKL6N0I80K520131018; Stephen Bierman, 'Rosneft Invites CNPC Into East Siberian Oil Production Venture', Bloomberg, 18 October 2013, www.bloomberg.com/news/2013-10-18/rosneft-invites-cnpc-into-east-siberian-oil-production-venture.html.

[17] Interfax, *Russia & CIS Oil and Gas Weekly*, 13–19 November 2014, pp. 8–11.

[18] On 1 September 2014, during the ceremony celebrating the welding of the first joint of the Power of Siberia line, President Putin had told the Chinese deputy premier attending the ceremony that Russia would support China's plans to take a stake in the Vankor oil field. See Interfax, *Russia & CIS Oil and Gas Weekly*, 13–19 November 2014, p. 11 & 28 August–3 September 2014, pp. 8–9.

[19] 'Rosneft sale gets the nod', Argus, *FSU Energy*, 4 December 2014, p. 1.

[20] Argus, *FSU Energy*, 5 March 2015, p. 3.

2.2. The gas deals[21]

The May 2014 eastern route gas deal 'Power of Siberia'

Well before the Sino-Russian gas deal (in which Gazprom agreed to supply 38 bcm/y of gas from east Siberia to China for 30 years – the deal is estimated as having a value of US$400 bn) on 21 May 2014, a report from the Bank of America raised the key question of why a deal was likely this time. The report pointed out four factors:

i) an increase in domestic gas prices in China;

ii) exponential growth in Chinese gas consumption;

iii) Gazprom's need to diversify away from stagnant European markets;

iv) Russia's need to develop Far Eastern energy resources.[22]

Requirements on both sides drove the historic deal, but the triggering point for this deal was the Ukraine crisis. Russia had to show the outside world that it is not completely isolated by the Ukraine crisis, while China had to find a way to reduce the excessive Asian premium for LNG supply.

The 21 May 2014 gas deal was a timely breakthrough for President Putin, who was being isolated by US and EU sanctions in the wake of Russia's annexation of the Crimean Peninsula. Putin's ambition went well beyond the eastern route export deal. He said:

> After the signing of today's contract, work will begin straight from tomorrow. Secondly, this gives us the possibility to proceed with the next project with [our] Chinese partners – starting to work out a western supply route. This is from the resource base of Western Siberia.[23]

His remarks strongly indicate that Russia is determined to be a swing gas supplier between Europe and Asia.

The key obstacle to the gas deal was the border price. Was there a compromise on the price, as expected by many observers? Energy Minister Alexander Novak of Russia stated that the price of gas in the contract between Gazprom and CNPC was close to US$350 per 1,000 cubic metres. If the contract's value is calculated at US$400 bn with assumed volumes of 38 bcm for 30 years, the price is equivalent to US$9.9/mmbtu. If the price is determined with consideration of a five-year period of increasing shipments, the price will total US$380 per 1,000 cubic metres (US$10.8/mmbtu) of gas.[24] Reportedly, according to Russian officials, Gazprom will supply fuel to

[21] Lucy Hornby, Jamil Anderlini, and Guy Chazan, 'Russia and China strengthen ties by striking $400 bn deal for gas', *Financial Times*, 22 May 2014; Iacob Koch-Weser and Craig Murray, *The China–Russia Gas Deal: background and Implications for the Broader Relationship*, US–China Economic and Security Review Commission (Staff Research Backgrounder), 9 June 2014; Morena Skalamera, 'Booming Synergies in Sino-Russian Natural gas Partnership: 2014 as the Propitious Year', Belfer Centre for Science and International Affairs, Harvard Kennedy School, May 2014; National Energy Security Fund (NAEF), 'Dragon Hunting: Russia Fighting its way to Oriental markets', NAEF, Moscow, July 2014.

[22] Merrill Lynch, Bank of America, 'Looking to the East: Russian gas prospects in China', 28 April 2014, pp. 1–24.

[23] Interfax, *Russia & CIS Oil and Gas Weekly*, 16–21 May 2014, pp. 5–10 and 22–28 May 2014, pp. 4–10; 'Russia and China seal historic $400bn gas deal', (*Russia Today*) rt.com, http://rt.com/business/160068-china-russia-gas-deal/

[24] Interfax, *Russia & CIS Oil and Gas Weekly*, 22–28 May 2014, pp. 4–10.

China at a price close to that paid by Germany. The base price for CNPC is about US$360 per 1,000 cubic metres (US$10.24/mmbtu). This is close to the average price of US$366 that Gazprom charged Germany (which pays one of the lowest prices in Europe) in 2013.[25]

According to a **research report** from Poten & Partners, the structure of the pricing formula under the Chinese deal is similar to that found in Russia's traditional European pipeline gas contracts; it will be linked to a basket of crude and oil products in Singapore, with standard take-or-pay terms thought to be around 75 to 80 per cent of the total contract quantity. This means that China has agreed to a formula under which changes in a weighted basket of crude and oil products over a specified base period are added to the P-zero price. Market sources note that the crude portion of this formula is likely to be linked to the Japanese Crude Cocktail (JCC), with the products basket possibly comprising a mean of Singapore gas oil or fuel oil prices, as quoted by Platts.[26]

A Russian scholar summarized that:

> ... the Sino-Russian 30-year, $400 bn gas deal ... is as important to global energy geopolitics as the agreement concluded in the 1960s which opened the way for Russian gas to reach Western Europe. It will, however, change more than energy flows.
> Russia's pivot to Asia, particularly to China, is becoming more pronounced even as the West is ratcheting up sanctions against Moscow. The Russo-Chinese partnership, originally a pragmatic arrangement, is acquiring truly strategic depth.
> ...
> The recent gas deal, which can be expanded in the future, addresses the first challenge. Joint steps, however modest, which would reduce Russia's and China's reliance on the US dollar move in the direction of the second.
> As the world keeps changing, and, as both Beijing and Moscow believe, changing in favor of non-Western players, the Sino-Russian relationship looks an important feature of the things to come rather than a throwback to the 1950s.[27]

The November 2014 Altai MOU[28]

On 9 November 2014, Russia and China took a very important step toward closer economic and political ties with an agreement on another massive gas deal that promises to strengthen the strategic relationship between Moscow and Beijing for decades to come. The preliminary deal envisages supplies of 30 bcm/y for 30 years. It is worth noting that unlike the May 2014 deal which was legally binding, the November MOU is non-binding. Gazprom CEO Miller indicated that Russian gas shipments to China could, in the medium-term, exceed the volume of exports to Europe. According to Miller, under an optimistic scenario, Altai gas could flow as soon as 2020–21, or 2024 under a more pessimistic scenario. Gazprom identified Zapolyarnoye field (reserves

[25] Elena Mazneva and Aibing Guo, 'Gazprom's China Gas Price Said to Be Near German Level', *Business Week*, 2 July 2014. www.bloomberg.com/news/articles/2014-07-02/gazprom-gas-price-in-china-deal-said-to-be-near-germany-s-level.

[26] LNG Hub, http://lnghub.biz/russia-shifts-east-long-awaited-chinese-gas-deal/. 30 June 2014.

[27] Dmitri Trenin, 'Gas Deal Entails China–Russia Strategic Depth', *Global Times*, 25 May 2014, http://www.carnegie.ru/2014/05/25/gas-deal-entails-china-russia-strategic-depth/hbrh.

[28] Lucy Hornby, 'Moscow–Beijing gas accord: Agreement heralds supply shift away from European markets', *Financial Times*, 11 November 2014; Keith Johnson, 'Xi's Just That Into You', *Foreign Policy*, 10 November 2014; Bree Feng, 'Russia Uses Its Natural Gas to Play the China Card, Again', *New York Times* (Sinosphere), 25 September 2014; Interfax, *Russia & CIS Oil and Gas Weekly*, 13–19 November 2014, pp. 8–11; James Henderson, 'The Commercial and Political Logic for the Altai Pipeline', Oxford Energy Comment (OIES), December 2014, pp. 1–13; 'Putin, Xi Jinping sign mega gas deal on second gas supply route', 9 November, 2014, (*Russia Today*) rt.com, http://rt.com/business/203679-china-russia-gas-deal/; Régis Genté, 'Gazprom, a new competitor to Turkmenistan in China?', Chronicles of Turkmenistan, 1 June 2014, www.chrono-tm.org/en/2014/06/gazprom-a-new-competitor-to-turkmenistan-in-china/.

of 3.3 tcm) and Yuzhno-Russkoye (reserves of 1.03 tcm) in West Siberia as the key sources for Altai project.[29]

The timing of the MOU for the Altai route for exports to China was a big surprise. Russia's keen interest in maximizing the volume of its exports to China, coming straight after the 38 bcm/y supply deal in May 2014, is understandable,[30] but a key question is: what drove China to accept the offer from Russia? As elaborated later, President Xi's call for an energy revolution in China (which requires a significant reduction of China's coal dependence), the Chinese leadership's obsession with reducing China's dependence on seaborne oil and gas supplies, together with President Xi's ambitious initiative to pursue Silk Route Economic Belt (SREB) development all require strengthened gas cooperation between the two countries. In particular, the SREB initiative envisages the bypassing of Russia – which also aims at forming a Eurasian Economics Union. China cannot afford to upset or offend Russia for the sake of a successful implementation of the SREB initiative.[31] The Altai MOU was the minimum price China had to bear for the sake of the Chinese Dream,[32] first mentioned by President Xi in November 2012.

On 8 March 2015, China's Foreign Minister Wang Yi told a press conference that:

> There is enormous internal impetus and room for expansion. Much of that expansion will be in oil, gas and nuclear energy cooperation ...We will fully begin construction of the eastern gas line and sign a cooperation agreement for the western line ... Increased economic ties with Russia, particularly the Russian Far East, fall under the broader One Belt, One Road strategy of increasing exports and investment in Central Asia.[33]

This is a very strong signal that the Altai gas deal will become a reality.

Once the Altai MOU is converted into a binding agreement it will, from the mid-2020s, give Russia a limited role as a swing supplier between Europe and Asia (China). At the same time, it will carve out a sizable slice for its pipeline gas from what had been expected to be China's future LNG demand. An Altai deal will not make Russia a swing supplier capable of diverting gas from the European market to the Chinese/Asian market whenever needed (as it can with oil supply using the ESPO pipeline). The similarity between ESPO and the Altai line lies in the fact that while the Altai gas pipeline will physically make Russia a swing supplier between Europe and Asia, the physical need to divert the gas between the two markets is minimal or non-existent for the time being, due to surplus supply availability in West Siberia. But as Jonathan Stern argues, the impact of the Altai gas deal on the European gas market will be negligible, specifically that:

[29] Interfax, *Russia & CIS Oil and Gas Weekly*, 6–12 November 2014, pp. 4–9; Argus, *FSU Energy*, 13 November 2014, p. 1 & 19 February 2015, p. 1.

[30] Many factors can explain Russia's decision to build the Altai line. These include: huge oversupply of the domestic market and need to find an outlet for all this gas; political message to Europe that Russia has another market for the Western Siberian gas and could theoretically divert its export flows in the longer term; geopolitical need to make a strategic alliance with China; and Altai could be built faster than POS, with lower CAPEX and does not require any upstream investments.

[31] 'Xi suggests China, C. Asia build Silk Road economic belt', 7 September 2013, http://news.xinhuanet.com/english/china/2013-09/07/c_132700695.htm; http://news.xinhuanet.com/english/china/2014-11/08/c_133774993.htm; Shannon Tiezzi, 'China's Push for an Asia-pacific Trade Agreement', *The Diplomat*, 30 October 2014. http://thediplomat.com/2014/10/chinas-push-for-an-asia-pacific-free-trade-agreement/.

[32] 'Potential of the Chinese Dream', 26 March 2014, http://usa.chinadaily.com.cn/epaper/2014-03/26/content_17380146.htm.

[33] Lucy Hornby, 'China and Russia set to finalise gas deal', *Financial Times*, 8 March 2015. www.ft.com/cms/s/0/c0c385ea-c55f-11e4-bd6b-00144feab7de.html#axzz3Tmq8KWEQ.

> It will be difficult for Russia to play off Asian against European markets. The Asian deal would provide some insurance for Russia, but it is not as if the supply will go either to Asia or Europe, there is plenty of gas for both. Russia's intention to apply the European export price for the export to Asian markets, including China, will not succeed for two reasons: first because the European price will increasingly be the hub price which is set by European gas supply/demand dynamics; second because the Chinese price will increasingly be determined by Shanghai city gate ('hub') price which will be subject to different dynamics. The Russians will not be in a position to resist these evolving price dynamics in either China or Europe. If Russia was short of gas and was resisting the construction of new very expensive export pipelines, and the European and Chinese markets were similarly short of supply and desperate to get more Russian gas, then a Russian policy of arbitrage between the markets could work. The opposite is the case: Russia is very keen to sell additional gas which it has abundantly available, and seemingly very keen to build new high cost pipelines which it will then need to utilise in order to pay back its very large investments. It will not be able to impose prices on either market until and unless the current commercial dynamics change radically.[34]

It remains to be seen whether these dynamics will change in the foreseeable future, but Russia looks unlikely to give up the policy of arbitrage between European and Asian markets easily. Whatever happens, China will be the biggest beneficiary of the Altai deal. The Altai deal could be a nightmare for new LNG projects from the USA, Canada, and Australia as it will wipe out 21 mt/y of potential Chinese LNG demand, and consequently only LNG at the Shanghai hub price will be saleable in China. For the next several years, there will be a fundamental oversupply of gas in the Chinese market, and the Altai deal could be a significant blow for new (and possibly even a significant problem for existing) LNG suppliers.

In summary why, from a gas perspective, was Gazprom so keen to achieve the two gas deals described above?

- First, without the Chinese market, Chayanda and Kovykta gas are largely stranded. While Gazprom has claimed that the gas could be piped to the coast and liquefied, this would have been horrendously expensive which is one reason (but not the only one, see below) why Vladivostok LNG has been abandoned;
- Secondly, Gazprom has more than 100 bcm/y of stranded production in Western Siberia.

In fact, Gazprom CEO Alexei Miller constantly repeats that Gazprom could produce 600 bcm/y; this means that in 2014, the company had more than 150 bcm/y of gas which could have been, but was not, produced.[35] The only chance to make some use of this shut-in production in the next 10 years is Altai. Gazprom (not to speak of other Russian producers) have so much production for which there is no market that the Altai pipeline would only make a rather small dent in that surplus.

[34] Personal communication with author.

[35] Ibid.

3. Russia's motivations

According to the Draft Russian Energy Strategy to 2035 (prepared and released by the country's Ministry of Energy in January 2014) the share represented by the Asia–Pacific region in Russian exports of oil and refined products by 2035 will increase from 12 per cent to 23 per cent (32 per cent for crude oil) and from 6 per cent to 31 per cent for gas. To achieve this target, capital expenditure in the energy sector is set to increase gradually to US$793 bn between 2031 and 2035 from US$460 bn between 2011 and 2015.[36]

Following the Ukraine crisis, Europe will try to minimize its imports of Russian gas, although this will probably not be successful apart from a few small markets like the Baltics.[37] Falling demand will probably mean no significant increase in Russian gas deliveries, together with increasing problems and arguments in relation to Turkish Stream and transit through Ukraine. This means that Russia and Gazprom – if they wish to monetize their huge volumes of stranded gas – must seek new (in other words, non-European) markets and these must be in Asia. This is not a new realization but Gazprom wasted nearly 10 years negotiating with a variety of Asian buyers with no result until May 2014. Russia's position has now become more difficult due to the political situation and sanctions, which have of course improved China's negotiating position.

Contracted gas demand from European markets will give Gazprom a real headache and alternative markets in Asia should be developed without delay. This is why Russia has decided to prioritize the Pivot to Asia policy, although the European market is the most reliable and lucrative market for Russia's oil and gas exports. As shown in Table 2, the potential of Russia's gas export to Asian markets is around 130–140 bcm/y: 61 bcm/y of this will be delivered from Power of Siberia, 40 bcm/y from Sakhalin Islands, 30 bcm/y from Altai export, and finally 5–10 bcm/y from Yamal LNG. Assuming that Vladivostok LNG (23 bcm/y or 15 mt/y) is very likely to shelved for a while due to US and EU sanctions against Russia,[38] Russia's priority will be given to pipeline gas exports to China by two trunk pipelines.

[36] The draft Russian Energy Strategy to 2035 is available on Russia's Ministry of Energy website:; 'Russian draft energy strategy sees 23% of exports to Asia–Pacific by 2035', Platts, 24 January 2014, www.platts.com/latest-news/natural-gas/moscow/russian-draft-energy-strategy-sees-23-of-exports-26649363.

[37] Ralf Dickel et al., 'Reducing European Dependence on Russian Gas: distinguishing natural gas security from geopolitics', OIES NG 92, October 2014, www.oxfordenergy.org/wpcms/wp-content/uploads/2014/10/NG-92.pdf.

[38] While Vladivostok LNG does not suffer from sanctions, lower LNG prices, lack of feed gas, and lack of interest from both investors and buyers meant that the project had little prospect even before the imposition of sanctions.

Table 2: Asian-oriented Russian Gas Export Projects

Project Name	Project Ownership Structure	Start-up time	Capacity	Project cost***
Sakhalin-2	Gazprom 50% Shell 27.5% Mitsui 12.5% Mitsubishi 10%	2009	10 mt/y	US$22 bn
Sakhalin-2 Expansion		2019	5 mt/y	US$5–7 bn (LNG plant only)
Sakhalin-1	ExxonMobil 30% SODECO 30% ONGC Videsh 20% Rosneft 20%	2019	5 mt/y	US$15 bn
Sakhalin-3	Gazprom	2019	16 bcm/y,	US$12–16 bn
Vladivostok LNG*	Gazprom	2020	10–15 mt/y	US$12.4 bn (3 train LNG plant only)
Yamal LNG**	Novatek 60% Total 20% CNPC 20%	2018	15 mt/y	US$27 bn
Chayandinskoye field	Gazprom	2018	38 bcm/y first stage, and 61 bcm/y second stage	US$55 bn
Kovyktinskoye field	Gazprom	2020		
Altai route export	Gazprom	2020 ??	30 bcm/y	US$14 bn
Total volume for Asia			133–140 bcm/y	

Note: * Up to 49% of VLNG was offered to Japanese (Japan Far East Gas Co. comprising: Itochu Group 37.5%, Japex 32.5%, Marubeni 20%, and Inpex 10%) and Chinese investors;
** assumes 5 mt/y will be heading for Asia (including 3 mt/y to CNPC); it is worth noting the project cost in US dollars in this table was based on the ruble rate of 32–33/dollar (as of January 2014), and the oil price collapse after 2014 summer was not reflected.
Source: 'Russia–Northeast Asia Energy Trade and Investment: Opportunities and Challenges', Tatiana Mitrova, 2014 North Pacific Dialogue in the Shale-Gas Era, Honolulu, August 2014; 'China's Gas Choices', Macquarie Equities Research; author's research.

3.1. The gas initiative

Soon after the May 2014 gas deal, Macquarie Research quoted that the eastern route development would require the investment of US$55 bn (based on Gazprom's calculations). Of this figure, US$41 bn was for Chayandinskoye field development (US$13 bn for upstream and US$28 bn for midstream), while the remaining US$14 bn was for Kovyktinskoye gas development

(US$12 bn for upstream and US$2 bn for midstream).[39] Under the current situation (with sanctions against Russia) financing will play a decisive role for the timely development of East Siberian gas and oil fields and the related infrastructure development.

The roadmap for Chayanda and start of POS development

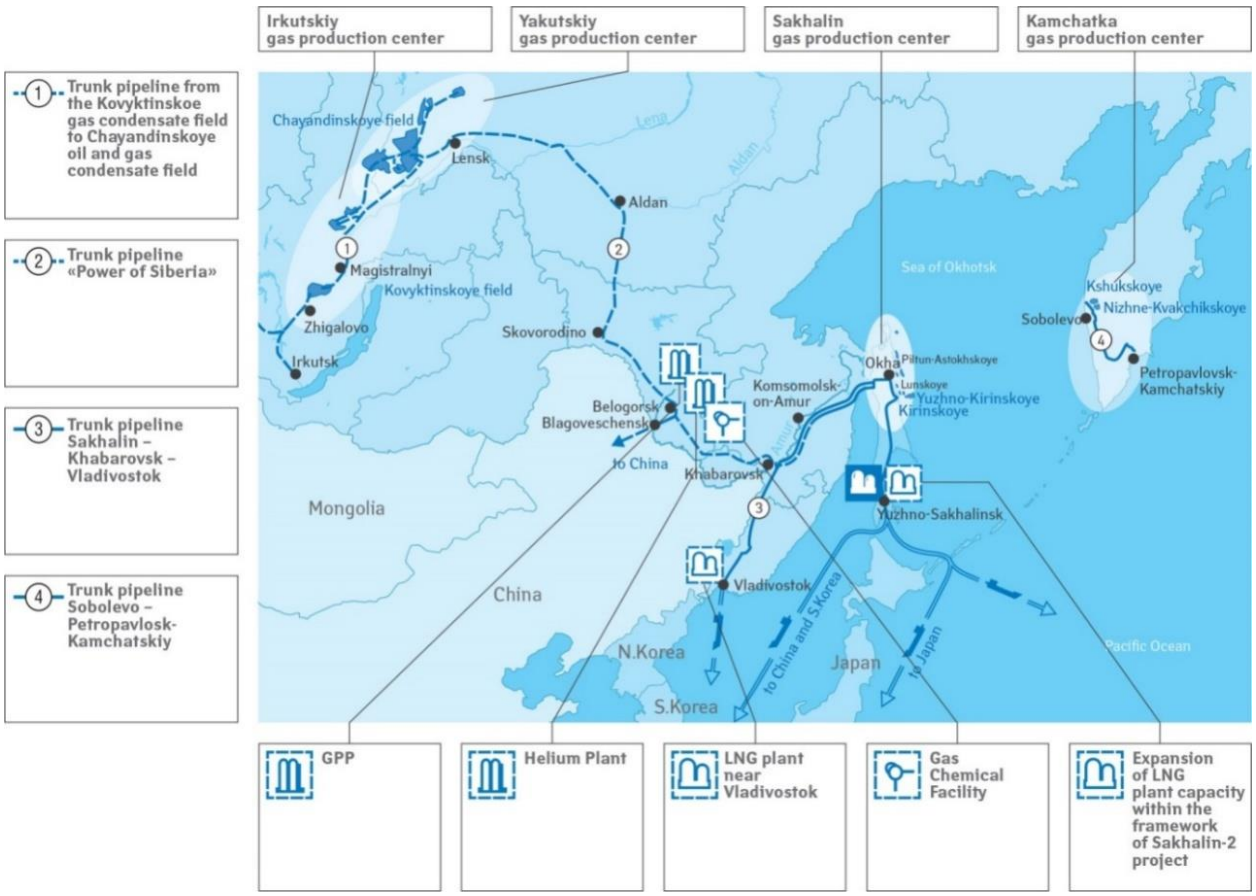
Gazprom aims at supplying China with gas from the Chayandinskoye field in Yakutia in 2019, and oil via the ESPO pipeline in 2017. In line with the approved comprehensive Action Plan, Gazprom will start pre-developing the gas deposits of the Chayandinskoye field, constructing the first string of the POS gas transmission system (GTS), and creating a gas processing and helium complex in the Amur Region in 2015. It is planned to launch gas production from the Chayandinskoye field in late 2018. By this time, the top-priority section of the POS GTS from Chayandinskoye to Blagoveshchensk and the primary gas processing capacities will be on-stream. Gazprom will also construct helium and gas processing plants in the Amur Region to extract valuable components (helium and ethane, for instance) from the gas. The cost of this development was not included in the above-mentioned US$55 bn. On 1 November 2013, Gazprom and Sibur signed a MOU for the construction of a gas processing plant (GPP) and petrochemical complex in Belogorsk, in the Amur region.[40]

Unlike the ESPO crude supply to China, which designated Skovorodino as the Russian border point (Mohe as the Chinese border point), the POS gas supply to China will make Blagoveshchensk the Russian border point (Heihe will be the Chinese border point, which will be linked to Harbin, capital of Heilongjiang province). In a sense, the WEP (West–East Pipeline) corridor concept will be applied to POS gas imports from Russia's East Siberia to north-eastern China. WEP was a very effective vehicle to accelerate west China's economic development and there are hopes that the new gas pipeline in the three provinces in north-eastern China will have a similar effect.

[39] Aditya Suresh et al, 'China's Gas Choices: Dawn of the Russia–China axis?', Macquarie Research, 4 June 2014, pp. 1–36.

[40] Interfax, *Russia & CIS Oil and Gas Weekly*, 22–28 May 2014, pp. 4–10. In Belogorsk, Gazprom was considering construction of a GPP of 60 bcm annual capacity that would separate ethane and other gas fractions. Sibur was considering construction of a petrochemical complex, technologically connected with the GPP, to process ethane and produce monomers and polymers. See, Interfax, *Russia & CIS Oil and Gas Weekly*, 31 October–6 November 2013, pp. 56–7.

Figure 1: Major gas pipelines of East Siberia and the Far East

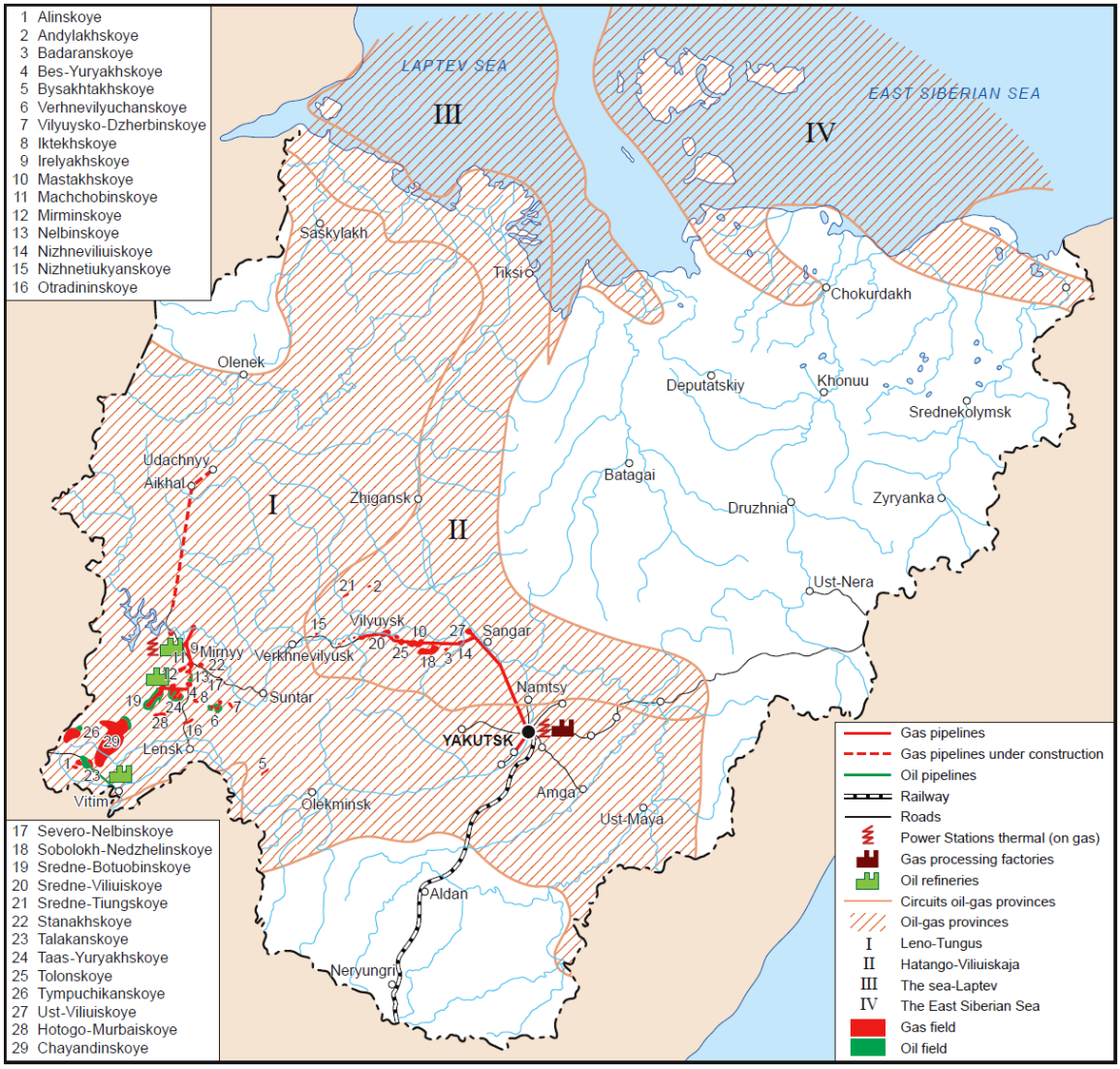


Source: Gazprom.

The role of the Galkynysh gas field for the WEP is similar to that of the Chayandinskoye gas and oil field for the POS, and the Chayandinskoye field will be the cornerstone of the Yakutia gas production centre. It is a unique field in terms of reserves (C1 + C2): some 1.45 tcm of gas and some 93 mt of liquid hydrocarbons (recoverable). In the plateau period, up to 25 bcm of gas and no less than 1.5 mt of oil will be produced annually from the field. In Yakutia, Gazprom also holds subsurface use licences for the Sobolokh-Nedzhelinskoye, Verkhnevilyuchanskoye, Taas-Yuryakhskoye, and Srednetyungskoye fields.[41](See Map 1)

[41] Interfax, *Russia & CIS Oil and Gas Weekly*, 29 May–4 June 2014, p. 18.

Map 1: Gas and Oil Fields in the Sakha Republic



Source: Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, p. 135.

Gazprom began construction of the Power of Siberia gas pipeline on 1 September 2014, when welding of the first joint took place at a ceremony near Yakutsk. President Putin attended the ceremony, at which China's Deputy Premier Zhang Gaoli said that construction of the Chinese section of the pipeline would begin in the first half of 2015.[42] On 9 October 2014 China's NDRC approved the preliminary domestic routing, which will start from Heihe City in Heilongjiang and end in Shanghai. The pipeline will be composed of three sections: North, Central, and South.[43] A more detailed timetable was reported by Xinhua News Agency. On 29 October 2014, Jilin

[42] Interfax, *Russia & CIS Oil and Gas Weekly*, 28 August–3 September 2014, pp. 8–11; 'Power of Siberia construction launched', September 2014, www.gazprom.com/press/news/2014/september/article200026/.

[43] http://news.xinhuanet.com/2014-10/09/c_1112754799.htm (in Chinese); http://news.xinhuanet.com/2014-10/09/c_1112754799.htm (in Chinese)

province announced a timetable for the construction of the Eastern Sino-Russian Natural Gas Pipeline in the province. The construction of the Heihe (Heilongjiang province)–Changling (Jilin province) section and the Changling–Changchun (Jilin province) branch pipeline should start in May 2016, and be ready for operation in June 2018. The building of the Changling–Yongqing (Hebei province) section would commence in April 2017 and become ready for commissioning in September 2019. Russia would start supplying natural gas to China through the eastern part of the Sino-Russian natural gas pipeline in 2018, according to bilateral agreements.[44]

On 20 February 2015, Russia's Ministry of Energy (MOE) announced that the Russian section of the Power of Siberia pipeline would be built in three stages.[45] (See Table 3) Gazprom said that in 2013–14, a total of 4.72 billion rubles had already been spent. In 2015, 7 billion rubles of investment is planned. The POS line passes through Irkutsk region, Yakutia (Sakha), and Amur region and in future will connect to the Sakhalin–Khabarovsk–Vladivostok gas transportation system.[46] This blueprint from the MOE and Gazprom is a reminder of the importance of third-party access to the POS.

Table 3: Power of Siberia line's Three Stage Development Plan: by the MOE

First Stage, 2018–20	The pipeline will begin to supply gas from the Chayanda field to Belogorsk, with a line leading to China. The capacity will amount to 32 bcm/y, with a length of 2,170 km.
Second Stage, 2020–25	To increase the supply volume, Kovyktinskoye field will be connected. The distance between Chayanda and Kovykta field is 790 km. Fields such as Yurubcheno-Tokhomskoye, Kuyumbinskoye, and Sobinskoye may also be connected to the system and could add an additional 30 bcm/y in volume. The total volume will expand to 60 bcm/y.
Third Stage, 2025–30	The third section of the gas pipeline from Blagoveshchensk to Vladivostok will be built with a capacity of 32 bcm/y and a length of 620 km. The volumes of gas, which are supplied from the fields of the Sakhalin shelf in the Primorye and Khabarovsk territories, will be replaced by resources supplied by Power of Siberia.

Note: The third stage was designed for Vladivostok LNG supply. If the project is abandoned, there is no need to expand POS to Vladivostok.
Source: Interfax, *Russia & CIS Oil and Gas Weekly*, 18–25 February 2015, pp. 23–4.

Breakup of Gazprom monopoly and rivalry with Rosneft

A law expanding the ranks of companies other than Gazprom that could export LNG came into effect on 1 December 2013[47] and in July 2014 Premier Dmitry Medvedev officially announced that the Russian government had approved the right to export LNG to Gazprom, its subsidiary

[44] 'China's Jilin unveils time table for building Sino-Russia gas pipeline', 29 October 2014, Xinhua Finance Agency, http://en.xinfinance.com/Industries/Energy/2014/4253.html; Liu Yanan, 'China, Russia deepens energy cooperation', *China OGP*, 1 November 2014, pp. 5–6; 'SKET Wins Bidding on Engineering Survey Works for Sino-Russia Natural Gas Pipeline Project', MCC, 28 September, 2014, www.mccchina.com/ENGLISH/ShowArticle.asp?ArticleID=22177.

[45] Interfax, *Russia & CIS Oil and Gas Weekly*, 18–25 February 2015, pp. 23–24; Argus, *FSU Energy*, 26 February 2015, p. 5.

[46] Interfax, *Russia & CIS Oil and Gas Weekly*, 18–25 February 2015, pp. 23–24.

[47] Interfax, *Russia & CIS Oil and Gas Weekly*, 10–16 July 2014, pp. 9–10.

Gazprom Export, and two other companies – Rosneft and Yamal LNG.[48] The driving force behind this change was Rosneft CEO Igor Sechin.

Rosneft's next target was the breakup of Gazprom's monopoly on pipeline gas exports to Asia. In March 2014, Rosneft proposed synchronizing construction of the Power of Siberia gas pipeline not only with the development of Gazprom fields, but also with that of fields belonging to other companies. Energy Minister Novak reported that this proposal had been made at a meeting of the legal commission for the fuel and energy sector.[49]

Right after the 21 May 2014 gas deal, Rosneft CEO Igor Sechin confirmed that his company could take part in construction of the POS gas pipeline. He argued that Rosneft could be producing 45 bcm at existing and future fields in East Siberia and the Far East by 2030. Energy Minister Novak said that independent producers could gain access to the POS gas pipeline after its expansion, and the possible volume of its supplies would total 25 bcm.[50] As shown in Table 4, Chayanda's peak production is projected to be 25 bcm/y by 2022; at least 13 bcm/y gas has to be provided to ensure the volume (38 bcm/y) of pipeline gas required for China. Without Kovykta gas development, Gazprom would struggle to cover the gap of the minimum 13 bcm/y. This is why independent gas producers like Rosneft and Surgutneftegas are demanding third-party access to the POS.

Table 4: Projected parameters of development of Kovyktinskoye and Chayandinskoye[51]

	Kovyktinskoye deposit	Chayandinskoye deposit
Maximal annual gas production (bcm/y)	35	25
Year of reaching maximal capacity	2024	2022
Launch of production	2018	2017
Period of maximal gas production (years)	15	30
Designed level of condensate production (1,000 t/y)	1,882	
Gas producing wells	543	335

Source: Gazprom (March 2014).

On 1 July 2014, it was reported that Rosneft was prepared to take court action in order to gain access to Gazprom's POS gas pipeline as an independent producer.[52] In the same month, President Vladimir Putin instructed the government to explore possibilities which would permit independent producers to export natural gas from new fields in Eastern Siberia and the Far East; the deadline for this work was 1 September.[53] However, on 23 July presidential aide Andrei Belousov said that Gazprom's monopoly on pipeline gas exports remained inviolable and that the

[48] Strictly speaking, Rosneft does not have a specific right, its Sakhalin-1 project qualifies as being an offshore gas project owned by a state company.

[49] Interfax, *Russia & CIS Oil and Gas Weekly*, 6–12 March 2014, pp. 29–30.

[50] Interfax, *Russia & CIS Oil and Gas Weekly*, 22–28 May 2014, pp. 4–10.

[51] For a discussion on the order of Chayandinskoye and Kovyktinskoye field development, see Tom Washington, Alexey Novikov, and Svetlana Savateeva, 'Chayanda will not disrupt China's gas – Gazprom', Interfax Global Energy, *Natural Gas Daily*, 16 July 2014, p. 4. The productive horizons at Chayandinskoye are the Vendian Botuobinsky, Khamakinsky, and Talakhsky. The officially approved geological model divides the complex structure into tectonic blocks: Severny, Yuzhny I and II, and Samanchakitsky. See, Interfax, *Russia & CIS Oil and Gas Weekly*, 10–16 July 2014, pp. 10 & 17–19, and Argus, *FSU Energy*, 17 July 2014, p. 4.

[52] Interfax, *Russia & CIS Oil and Gas Weekly*, 26 June–2 July 2014, pp. 38–9.

[53] Courtney Weaver, 'Putin suggests ending Gazprom pipeline monopoly', *Financial Times*, 22 July 2014, www.ft.com/cms/s/0/d87d224a-11af-11e4-b356-00144feabdc0.html.

situation must continue, so that Russian companies weren't competing with one another for customers. However, he added that a consortium of independent gas producers had the option of participating in construction of the gas pipeline system.[54]

It is worth noting that Rosneft's other initiative – to take advantage of Gazprom's trunk gas pipeline in Sakhalin Islands – was also made in July 2014.[55] Rosneft filed a lawsuit against Sakhalin-2 operator Sakhalin Energy to secure non-discriminatory access to free capacity on Sakhalin-2's trunk gas pipeline, and has the technical ability to supply up to 8 bcm of gas a year to the pipeline.[56] Following advice from the MOE that Sakhalin-2 infrastructure could become the state's property after the consortium pays off its loans, President Putin ordered the Russian government to start looking into how and when this could happen. It is questionable how easily the state would be able to sequester Sakhalin-2's infrastructure, which is still being used as a guarantee against a US$3.7 bn loan issued by the Japan Bank for International Cooperation (JBIC) in 2008. Sakhalin Energy only expects to pay this loan off in 2021.[57]

On 13 October 2014, according to a draft Sino-Russian intergovernmental agreement on cooperation in gas deliveries to China on the 'eastern route', the Russian government authorized Gazprom alone to deliver gas to China on the POS pipeline and barred independent producers from requesting free capacity on the pipeline.[58] However, in February 2015, the Russian Ministry of Energy's blueprint for staged development of the POS indicated that Rosneft and other independent gas producers may receive access to the Power of Siberia gas transportation system two years after its launch – in 2020. In its presentation on 20 February 2015, the MOE did not disclose whether Rosneft would independently supply gas to China via the Power or Siberia, whether it would sell gas to Gazprom, or what conditions would be applied. The MOE is desperate to find a compromise which would allow Gazprom to retain the export monopoly, while enabling it to buy gas from independent gas producers, including Rosneft, for supplies to China at export prices minus transport costs.[59] Also, the independents might just supply the domestic market.

Rosneft's moves to acquire third-party access to the POS look very likely to continue. In particular, if Rosneft's 19.5 per cent equity is allocated to CNPC (see Section 2.1), large-scale lending from China to Russia could be arranged, while at the same time China would indirectly enjoy the upstream equity position from Rosneft's gas fields in East Siberia. It is logical to take advantage of the gas produced from Rosneft's fields in the Sakha Republic to fill up the POS. Time will tell how this would occur in practice.

[54] Interfax, *Russia & CIS Oil and Gas Weekly*, 17–23 July 2014, pp. 8–10.

[55] In February, 2015, the court rejected Rosneft initiative, but Rosneft plans to appeal. https://www.oilandgaseurasia.com/en/news/russian-court-вenies-rosneft-sakhalin-gas-pipeline-access-company-appeal.

[56] Interfax, *Russia & CIS Oil and Gas Weekly*, 10–16 July 2014, p. 24. As for Sakhalin-3's proven reserves and projected production capacity, see Interfax, *Russia & CIS Oil and Gas Weekly*, 20–26 February 2014, p. 11 and 8–14 May 2014, p. 34.

[57] Argus, *FSU Energy*, 17 July 2014, p. 3.

[58] Interfax, *Russia & CIS Oil and Gas Weekly*, 9–15 October 2014, pp. 10.

[59] Interfax, *Russia & CIS Oil and Gas Weekly*, 18–25 February 2015, pp. 23–4.

3.2. The oil initiative

The success of the first stage of ESPO development was good enough to accelerate its second stage. Again, a massive investment is required to increase the total export capacity to 80 mt/y. In terms of market and financing provision, China is the pivotal player, and Russia has no other choice but to strengthen oil cooperation with China. Energy Minister Novak said on television channel Vesti 24 that:

> Russia needs to expand the ESPO oil pipeline to its design capacity of 80 mt by 2020. The total capacity of ESPO was planned at 80 mt to Skovorodino and 50 mt to Kozmino. Now we have 50 mt to Skovorodino and 30 mt to Kozmino. A question is whether there are the necessary resources and grounds for expansion to design capacity. Given decisions made on additional supplies of oil to China along the Skovorodino–Mohe branch to 30 mt and considering the scale of production planned in the eastern part of our country, there are clearly all grounds for expanding the pipeline to design levels. This is a necessity.

He added that there are plans to deliver about 40 mt of East Siberian oil and about 40 mt of oil from the Tomsk Region and the Vankor group of fields into the ESPO pipeline in the period to 2020. Transneft's President Nikolai Tokarev said that Gazprom Neft could be shipping about 6 mt (instead of 8 mt) of crude through ESPO in two years.[60]

Table 5: Transneft projections for ESPO Supply

	2014	2020	2030
ESPO 1	46.1	37.8	91.7
ESPO 2	20.5	54.7	58.1
Production in East Siberia	21.0	42.3	27.2

Source: Transneft plans dated November 2013.

In late 2013, Transneft started to build the Kuyumba–Taishet oil pipeline, which is due to go into service in the fourth quarter of 2016. It will link new fields in Krasnoyarsk Territory – Kuyumbinskoye and Yurubcheno-Tokhomskoye – with the Taishet main pumping station of the ESPO oil pipeline system. At peak production, the pipeline will carry about 15 mt of oil, the majority of which will come from the Kuyumbinskoye field which Gazprom Neft and Rosneft are developing via the Slavneft–Krasnoyarskneftegaz company; the rest will come from Yurubcheno-Tokhomskoye, which Rosneft's East Siberian Oil and Gas Company is developing.[61]

Rosneft's anchor production base for its Asian exports is the Vankor oil and gas field. It produced 18 mt of oil in 2012 and the field itself reached plateau production in Q1 2014. Rosneft amended the project after buying TNK-BP in 2013 and included adjacent fields that it received as part of the deal in the Vankor cluster. The 25 mt plateau by 2019 will include production at the Suzun, Tagul, and Lodochnoye fields as well as Vankor. Initial recoverable reserves at Vankor were 500 mt oil and condensate and 182 bcm natural and dissolved gas, as of 1 January 2014. The Vankor cluster fields are planned to start being put on stream in 2017.[62]

[60] Interfax, *Russia & CIS Oil and Gas Weekly*, 7–13 November 2013, p. 35. (& 24–30 October 2013, pp. 35–6.)

[61] Interfax, *Russia & CIS Oil and Gas Weekly*, 12–18 December 2013, pp. 28–9.

[62] Interfax, *Russia & CIS Oil and Gas Weekly*, 29 May–4 June 2014, p. 18.

Finance will be key for maximizing oil production in eastern Siberia. At the World Petroleum Congress in June 2014, Deputy Premier Arkady Dvorkovich said that investment in the oil and gas sector in Russia's east will exceed US$1.0 tn and US$0.7 tn respectively by 2035.[63] The growing cost of western sanctions against Russia is forcing Rosneft to ask the Russian government for up to 1.5 tn rubles (US$42 bn). Rosneft's CEO Igor Sechin proposed the expenditure of 1.5 tn rubles from Russia's national welfare fund to buy Rosneft's debt. At the end of June 2014, the firm's net debt was just under 1.5 tn rubles, of which 1.1 tn rubles must be repaid by the end of 2015. Alexei Kudrin estimated that western sanctions against Russia would cost the country at least US$200 bn over the next three years.[64]

According to *Kommersant*, Russia offered China a stake of up to 10 per cent in ZAO Vankorneft, a Rosneft subsidiary which already produces over 440,000 barrels of oil a day and has nearly 3 billion barrels of proven and probable reserves.[65] As discussed earlier, CNPC signed the 10 per cent equity acquisition deal in November 2014, though this remains only a framework agreement. A similar offer was made to India's ONGC Videsh; this is an indirect confirmation of the fact that the difficulty of acquiring financing from the west is introducing the option of upstream equity sales to both China and India.[66] US and EU sanctions against Russia are hence forcing Russia to open its upstream oil and gas sector to China – the chance for China to enter into Russia's upstream oil and gas sector therefore looks quite realistic. China is set to be a silent but huge beneficiary of Russian initiatives but ultimately such moves will benefit both China and Russia.

[63] Interfax, *Russia & CIS Oil and Gas Weekly*, 11–18 June 2014, p. 20.
[64] Jack Farchy and Kathrin Hille, 'Rosneft chief appeals to Moscow for $ 42 bn bailout as west's sanctions bite', *Financial Times*, 15 August 2014.
[65] Geoffrey Smith, 'Russia offers China a stake in Siberian oilfields', *Fortune*, 2 September 2014, http://fortune.com/2014/09/02/russia-offers-china-a-stake-in-siberian-oilfields/; 'Digest of the Russian media – September 18 – RIA Novosti', Russian Economy News, 17 September 2014, http://russianeconomyportal.blogspot.co.uk/2014/09/digest-of-russian-media-september-18.html
[66] 'Russia's Rosneft offers OVL stake in Vankor oilfield: Vankor is largest field to have been discovered and brought into production in Russia in last 25 years', Business Standard, 6 October 2014, www.business-standard.com/article/pti-stories/russia-s-rosneft-offers-ovl-stake-in-vankor-oilfield-114100500093_1.html.

4. China's motivation

What drove China to provide Russia with 'breathing space' by strengthening its oil and gas cooperation with Russia? China needs a reliable source of oil and gas supply – requiring the development of pipelines. China's energy balance still depends heavily on its massive coal resources and the time has come for the country to move away from its heavy dependence on coal use. This is why China aims at importing pipeline gas on a very large scale, which will help in reducing the excessive LNG premium to Asia. The maximization of gas use in China offers a kind of solution to the key issue of how to reduce the share of coal in China's energy mix below 50 per cent by 2030.

4.1. China's energy revolution and natural gas expansion

On 13 June 2014, President Xi's speech at a meeting of officials of the ruling Communist Party called for an energy revolution in China. He called for a revolution in supply that would involve: the country's diversification into non-coal energy sources, a strengthened cooperation with big oil and gas producing regions (such as the Middle East, central Asia, America, and Africa), a boosting of the country's oil and gas storage and distribution capacity, and an acceleration of China's nuclear reactor programme on the eastern coast. For Xi's energy revolution to be successful, the Chinese government has to be prepared to inflict pain on some sectors, and to deal with any political and social disquiet that may result. A Reuters article concluded that:

> ... it's possible China won't face a price motivator for its energy revolution, it's rather more likely that it's a social motivator as the populace becomes increasingly unsettled by rising pollution and environmental degradation.[67]

In late 2013, a study by the China Energy Fund Committee (CEFC) summarized six driving forces for growth in China's natural gas consumption during the period of the Twelfth Five Year Plan (FYP) (2011–15): domestic environmental pressure; low-carbon economy, which has become an international priority; development of unconventional gas; gas import infrastructure built in recent years; energy security; and uncertainty in clean energy sources.[68]

The study then suggested factors that will affect natural gas consumption during the Thirteenth FYP (2016–20) period as follows: international commitments to reduce carbon emissions; increased domestic supply; the scaling-up of unconventional gas development; continuous improvement in pipeline infrastructure; and price restriction and burden.[69]

On 6 August 2014, Beijing announced that it would stop using coal for electricity in six main districts by 2020, according to the Xinhua News Agency. Western media reported that Beijing Municipal Environmental Protection Bureau had made the announcement. While such a step would target harmful pollutants, it would also have the effect of blunting greenhouse gas

[67] Clyde Russell, 'Shades of Carter in Xi's China energy revolution', Reuters, 17 June 2014, www.reuters.com/article/2014/06/17/us-column-russell-china-energy-idUSKBN0ES16M20140617.

[68] 'CEFC China Energy Focus: Natural Gas 2013', China Energy Fund Committee, p. 22.

[69] Ibid. p. 26.

emissions by taking coal-fired power plants offline.[70] Clearly policy change can help maximization of gas use.

Expansion of China's domestic gas production

China's domestic gas production during the 1990s was quite negligible but it has witnessed a massive expansion during the 2000s. Strictly speaking, China's gas development is heavily dependent on four key regions – the Tarim basin, the Sichuan basin, the Ordos basin, and the South China Sea basin. At their peak, it is projected that production in these regions will reach 75–80 bcm, 55–65 bcm, 40–45 bcm, and 40–50 bcm respectively. The total could be in the range 210–240 bcm.[71] As shown in Table 6, China's gas production in 2014 reached 123.5 bcm.

Table 6: China's Natural Gas Production (bcm)

	2002	2005	2010	2014
CNPC total	22.463	36.082	72.363	**94.693**
SINOPEC Total	5.095	6.285	12.493	**20.164**
CNOOC & others	5.307	8.124	8.744	**10.649**
China Total	**32.865**	**50.492**	**93.600**	**123.506**

Source: Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, p. 193; *China OGP*, 1 February 2015, p. 27.

In June 2012 at an international gas conference in Kuala Lumpur CNPC's President Zhou Jiping said that:

> ... with proper incentives, China's gas demands is going to grow by about 8% annually, which is to increase our consumption to 350 bcm and 550 bcm in 2020 and 2030 respectively, accounting for 10% to 12% of China's primary energy consumption.[72]

These figures are indicated in Table 7.

In 2014, China's gas demand in 2020 was projected at 420 bcm,[73] while the figure of 700 bcm in 2030 was introduced for the first time.[74] Ever-growing gas demand projection figures, however, were somewhat adjusted in 2014 in the wake of the oil price collapse and slowdown of China's economy.

[70] 'China announces move to restrict use of coal', *Washington Examiner*, 5 August 2014, http://washingtonexaminer.com/china-announces-move-to-restrict-use-of-coal/article/2551674

[71] Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, p. 193.

[72] 'China: Natural gas consumption to rise from 130 bcm in 2011 to 550 bcm by 2030, says CNPC chief', *EnergyAsia*, 25 June 2012, http://energyasia.com/public-stories/china-natural-gas-consumption-to-rise-from-130-bcm-in-2011-to-550-bcm-by-2030-says-cnpc-chief/.

[73] Colin Shek, 'China targets gas supply of 420 bcm by 2020', Interfax Global Energy, *Natural Gas Daily*, 25 April 2014, p. 8. For China's gas demand projection, please see Trevor Houser and Beibei Bao, 'Geopolitics of Natural Gas: Charting China's Natural Gas Future', Belfer Centre for Science and International Affairs, Harvard Kennedy School, and Rice University's Baker Institute Centre for Energy Studies, October 2013.

[74] Jie Zhu, Chenglin Liu, Hulin Yang, and Daoyong Zhang, 'China looks ahead to a robust natural gas endowment', *Oil & Gas Journal*, 9 January 2014, www.ogj.com/articles/print/volume-112/issue-9/exploration-development/china-looks-ahead-to-a-robust-natural-gas-endowment.html.

Table 7: China's Gas Production and Demand Projection, 2012 (bcm)

	2010	2015	2020	2030
CNPC	72.5	118.5	151.0	198.0
SINOPEC	12.0	18.0	23.0	31.0
CNOOC	10.3	18.0	32.5	45.0
Local firm	4.0	18.0	31.5	37.0
Supply total	98.8	172.5	238.0	311.0
Demand total		230.0	350.0	550.0

Source: data for 2012 obtained from CNPC.

Table 8: Gas Demand Projections 2010 vs 2014 (bcm)

	year	2010	2015	2020	2025	2030
RS*	2010	119.9	231.1	297.3	350.7	392.4
	2014	-	202.0	298.0	375.0	454.0
HGS*	2010	126.0	242.4	317.5	384.2	438.0
	2014	-	213.0	334.0	431.0	541.0
LGS*	2010	114.6	218.7	279.2	315.6	341.1
	2014	-	191.0	269.0	327.0	381.0

Note: The actual figure in 2010 was 108 bcm.
* RS means reference scenario; HGS means high growth scenario; LGS means low growth scenario.
Source: data for 2010 and 2014 obtained from CNPC Economics and Technology Institute.

According to CNPC's Economics and Technology Research Institute (ETRI), China's gas imports in 2013 reached 53 bcm, of which pipeline gas represented 52.8 per cent or 28 bcm. China's gas demand in 2013 was 167.6 bcm. In 2014, the growth of natural gas consumption fell to a 10-year low of 8.9 per cent (from 17.4 per cent in 2013). Initially, figures for demand and import in 2014 were projected to reach 186 bcm and 63 bcm respectively, but the actual figures were 183 bcm and 58.3 bcm. ETRI estimated that natural gas demand will be about 200 bcm in 2015 with imports of 65 bcm.[75] It is worth noting (in Table 8) that ETRI's 2014 reference scenario figure of 454 bcm (for 2030) is much higher than its 2010 reference scenario figure of 392 bcm (also for 2030), but it is much lower than the figure of 550 bcm (for 2030, projection made in 2012, see Table 7). The IEA's latest projected figure for 2030 was 471 bcm.[76]

Coal-to-gas and shale gas factor

As shown in Table 9, Xu Bo, a veteran expert from CNPC, has projected that China's gas production capacity in 2015 and 2020 will range around 185.0–196.5 bcm, and 360.0–410.0 bcm respectively. However, CNPC's ETRI (Economics and Technology Research Institute) suggests a figure of some 20–30 bcm of coal-to-gas production by 2020 – much lower than Xu Bo's projection of 60 bcm. Nevertheless, even 20 bcm would still represent a ten-fold expansion from

[75] Du Juan, 'China's Oil demand to slow in 2015', *China Daily*, 29 January 2015; Li Xin, 'China to miss shale output target for 2015 – CNPC', Interfax Global Energy, *Natural Gas Daily*, 2 February 2015, pp. 1–2; Du Juan, 'Gas imports to rise by 19%', *China Daily*, 16 January 2014.

[76] *World Energy Outlook 2014*, International Energy Agency, p. 139.

volumes expected this year, making coal-to-gas a substantial component of domestic Chinese gas supply.[77]

Table 9: China's Gas Production Capacity projection: 2015 vs 2020 (bcm)

	2015		2020	
	Low estimate	High estimate	Low estimate	High estimate
Conventional gas	138.5	150.0	200.0	200.0
Coal-to-gas	20.0	20.0	60.0	60.0
CBM	20.0	20.0	40.0	50.0
Shale gas	6.5	6.5	60.0	100.0
Total	185.0	196.5	360.0	410.0

Source: Xu Bo, 'Natural Gas Production Outlook in China before 2020', in 'CEFC China Energy Focus: Natural Gas 2013', China Energy Fund Committee, p. 98.

According to the NDRC's Energy Research Institute (ERI), by April 2014, China's cumulative investment in shale gas development had reached to 15 bn yuan, with 322 shale gas wells drilled on a cumulative basis, including 96 horizontal wells.[78] Bernstein Research projected that China's shale gas production would reach 6.5 bcm in 2015 and 40 bcm in 2020, with required CAPEX of 25 bn yuan in 2015 and 65 bn yuan in 2020. Bernstein argued that 2014 would be a transformational year for China's shale gas development. Considering that SINOPEC is targeting production capacity of 5 bcm from Fuling by 2015 and 10 bcm by 2017 (while PetroChina is targeting 2.6 bcm of shale production by 2015), the figure of 6.5 bcm in 2015, projected by Bernstein Research and noted above, is an achievable target. To achieve the 40 bcm target in 2020, however, China will have to drill more than 4,000 wells and spend more than US$50 bn.[79]

Beijing authority has halved the quantum of shale gas production by 2020. Citing Wu Xinxiong, the head of China's National Energy Administration, the industry website (www.cpnn.com.cn) reported that China aims to pump 30 bcm of shale gas by 2020, versus an earlier goal of 60–80 bcm (mapped out in 2012).[80] This is an indirect recognition that the initial expectations of a 'shale gas revolution' by 2020 were not realistic.

4.2. Pipeline gas import via the west–east pipeline (WEP) corridor[81]

In 2014, China's total gas import volume was 58.3 bcm, of which 31.3 bcm was pipeline gas and 27 bcm was LNG.[82] Assuming that WEP IV and V will be constructed during the Thirteenth FYP, the WEP corridor (I, II, III, IV, and V) is set to play a pivotal role in the expansion of pipeline gas imports.

[77] 'China: coal-to-gas projects', Platts, 31 January 2014, www.platts.com/news-feature/2014/naturalgas/china-coal-to-gas-projects/index.

[78] Liu Xiaoli, 'China Energy Mix Options and Scenarios', presented at 2014 North Pacific Energy Dialogue in the Shale Gas Era, organized by East–West Centre and KEEI, Honolulu, 14–15 August 2014.

[79] Neil Beveridge, 'China Oil Field Services: Shale Gas Party. What…Are We Invited', Bernstein Research, 10 July 2014.

[80] 'China finds shale gas challenging, halves 2020 output' target', Reuters, 7 August 2014, www.reuters.com/article/2014/08/07/china-shale-target-idUSL4N0QD1GL20140807.

[81] Paik, *Sino-Russian Oil and Gas Cooperation*, pp.234–43 & 350–67.

[82] *China OGP*, 1 February 2015, p. 26; Du Juan, 'Gas Imports to rise by 19%', *China Daily*, 16 January 2014.

WEP I, II, and III

WEP I was the starting point of WEP corridor development. By 2010, WEP I and its branch pipelines supplied 110 cities, 3,000 companies, and about 300 million residents with natural gas. By June 2011, construction of infrastructure for the major line of WEP II, with a total distance of 8,653 km (main trunk line 4,859 km) and a total budget of 142.2 bn yuan (US$21.88 bn), was complete. The project was expected to save 76.8 mt of coal. Construction of WEP III started in October 2012 and is scheduled to be completed by 2015. Some delay now seems inevitable as the eastern section will be built in the 2016–17 period.[83] It will run from Horgos in western Xinjiang to Fuzhou in Fujian. The pipeline will be supplied from Line C of the Central Asia–China gas pipeline (CACP), supplemented by supplies from the Tarim basin and coalbed methane in Xinjiang. In early June 2014, the Beijing authority gave its approval for construction to start on the middle section of WEP III, which will run for 2,016 km, starting at Zhongwei in Ningxia and terminating at Ji'an in Jiangxi. It will have a designed transmission capacity of 25–30 bcm/y, with 10 compressor stations.[84]

WEP IV, V, and VI[85]

According to the city government of Jinchang in Gansu Province, WEP IV starts from Ili in Xinjiang. After passing North Tianshan Mountains, it runs parallel with WEP II & III and ends in Zhongwei in Ningxia, passing a number of regions and cities in Xinjiang and Gansu provinces. In Xinjiang Province, WEP IV passes Wusu, Kuitun, Shihezi, Changji, Urumqi, Turpan, Lianmuqin, Liaodun, and Hongliu (the last two being in Hami region). In Gansu Province, WEP IV passes Yumen, Jiayuguan, Jiuquan, Zhangye, Jinchang, Wuwei, and Gulang. The total length of WEP IV is 2,454 km.[86, 87]

On 28 May 2014 the details of WEP V were revealed by Xinhua Net. A survey team from Xinjiang Petroleum Investigation Design and Research Institute of CNPC visited the western part of the proposed route and launched a preliminary investigation, in order to provide first-hand survey data for the initial design. The WEP V project, with a transportation capacity of 45 bcm/y (much bigger than the WEP III line's 30 bcm/y capacity), starts from Wuqia county in Xinjiang and ends in the provinces of Jiangsu and Zhejiang. WEP V will be connected to the D line of the Central Asia–China gas pipeline (CACP).[88] The level of success of CTG development in Xinjiang will be an important factor for WEP V's final capacity.

[83] Li Xin and Tang Tian, 'China's gas infrastructure buildout plans challenged', Interfax Global Energy, *Natural Gas Daily*, 13 April 2015, p. 2.

[84] For the details of WEP Corridor development, see Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, pp. 234–43; 'West–East Gas Pipeline Project, China', hydrocarbons-technology.com, www.hydrocarbons-technology.com/projects/west-east/; Wu Jian and Cui Haipei, 'China, Turkmenistan sign key gas agreement', *China Daily*, 24 November 2011; Tang Tian, 'China advances third West–East Pipeline construction', Interfax Global energy, *Natural Gas Daily*, 5 June 2014.

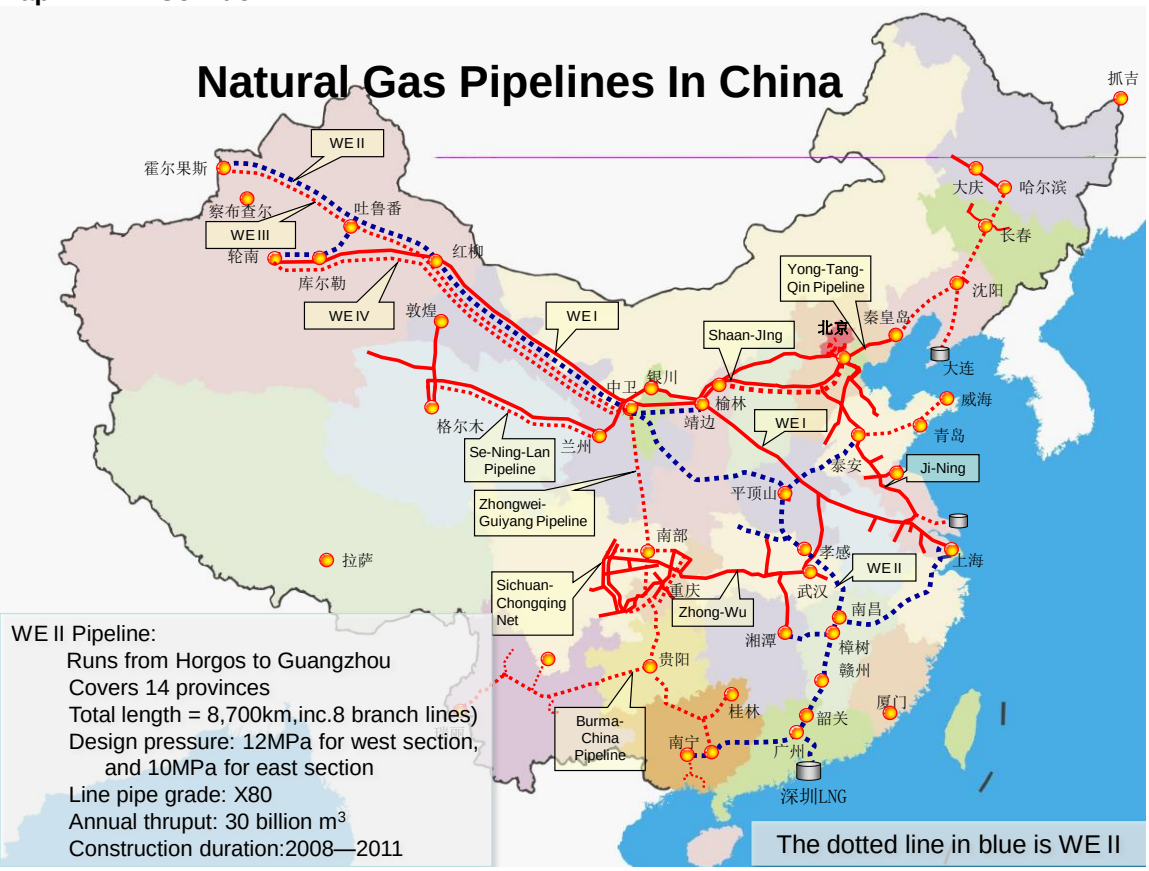
[85] Author would like to express special thanks Mr. Yu Kaho, Researcher, CBNI Energy Research Centre and Research Associate, EUCERS (King's College London) who helped with chasing the news on WEP IV and V route development.

[86] '西气东输四线天然气管道工程规划自我市永昌县境内通过', http://ghj.jc.gansu.gov.cn/art/2014/6/18/art_6961_131721.html.

[87] WEP IV is shorter than the other pipelines as it is intended to connect gas fields and coal-to-gas plants in Yining in Xinjing to existing pipeline infrastructure in Ningxia. See Li Xin and Tang Tian, 'China's gas infrastructure buildout plans challenged', Interfax Global Energy, *Natural Gas Daily*, 13 April 2015, p. 2.

[88] In April 2015 CNPC indicated that the operation could start one or two years after Line D starts up, and the supply capacity could be 25–30 bcm/y. Capacities of both 25–30 bcm/y (with 1219 mm diameter) and 45 bcm/y (with 1422 mm) are being considered. The bigger volume can carry both Central Asian gas and SNG from Coal-to-Gas (CTG) plants in

Map 2: WEP Corridor



Note: For the actual WEP II and III route, see Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, p. 239 (map).
Source: CNPC (2011).

Xinjiang. Ibid; '新疆克拉瑪依西氣東輸五線進入實施階段', 新華網新疆頻道 (Xinhua Net), 29 May 2014. http://big5.xinhuanet.com/gate/big5/www.xj.xinhuanet.com/2014-05/29/c_1110917314.htm.

Table 10: WEP Development Status

	Supply Sources	Supply Capacity (bcm/y)	Development stage
WEP I	Domestic gas	17	Completed
WEP II	Central Asian gas	30	Completed
WEP III	Central Asian gas	30	Completion in 2016–17
WEP IV	Domestic gas	25	Not yet
WEP V	Central Asian gas	25–30 or 45	Not yet
WEP VI	Altai gas	30	Not yet

Source: Author's data base.

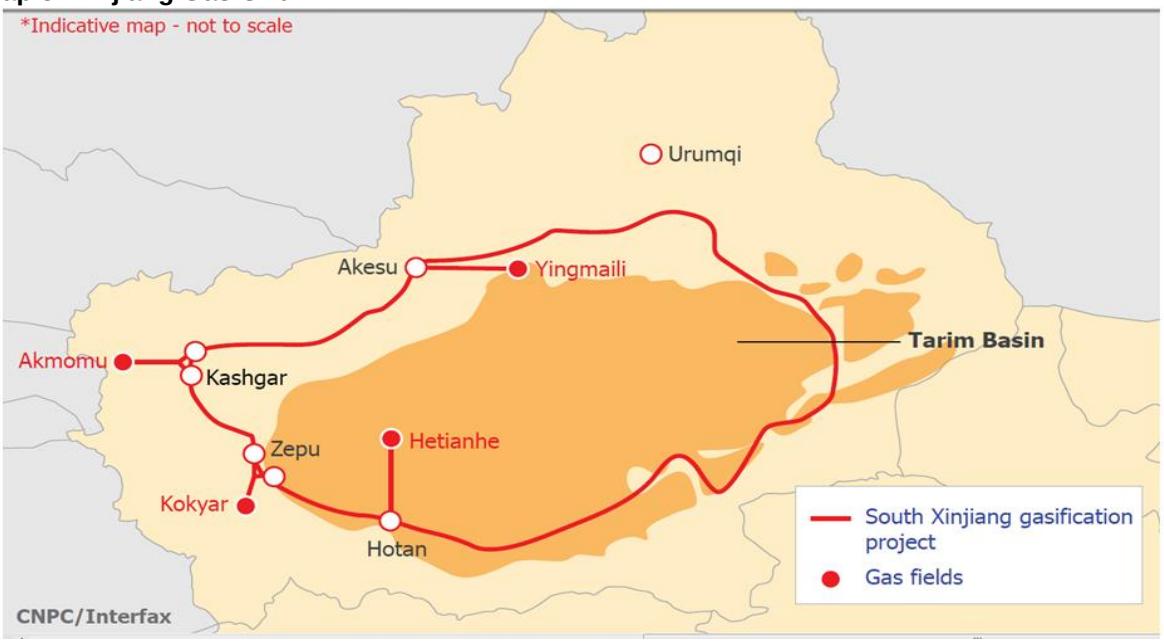
The most significant development is CNPC's indication, for the first time since 2011, that WEP VI would be the vehicle used for importing Altai gas. The details for WEP VI remain unclear due to the CTG factor. But the uncertainties surrounding WEP IV and V seem to have been resolved. WEP II, III, and V lines are allocated for pipeline gas from the Central Asian Republics, and Altai line could be connected by WEP VI.[89] Assuming that the capacity for WEP V stands at 25 bcm/y, the total volume of Central Asian gas to China will be 85 bcm/y, much lower than the initially envisaged volume of 100 bcm/y. This could open the door for the early development of WEP VI for Altai gas supply to Xinjiang. It remains to be seen whether China will give priority to pipeline gas from Central Asian Republics or seek greater competition between Central Asian gas and Russian gas by accelerating the entry of Altai gas to China.

Xinjiang Circular Gas Grid

It is worth highlighting the role of Xinjiang as the gateway for pipeline gas from both the Central Asian republics and Russia. The Xinjiang branch of the National Development and Reform Commission (NDRC) had approved the feasibility study for a major gas grid project in the Xinjiang Uyghur Autonomous Region after CNPC broke ground on the 6.41 bn Renminbi (US$1.04 bn) Xinjiang circular gas grid project. The pipeline network forms the latest stage of the South Xinjiang Gasification Project, a major infrastructure programme overseen by CNPC and launched in 1999.

[89] Li Xin and Tang Tian, 'China's gas infrastructure buildout plans challenged', Interfax Global Energy, *Natural Gas Daily*, 13 April 2015, p. 2.

Map 3: Xinjiang Gas Grid



Source: Interfax Global Energy, *Natural Gas Daily*, 15 May 2013.

The 'Xinjiang Circular Gas Grid' project forms a key part of the central government's Western China Development Strategy, aimed at improving economic conditions in Xinjiang. Spanning an area larger than Mongolia, Xinjiang plays an important role in CNPC's strategy. CNPC has invested more than 300 bn yuan in this remote region over the past three decades and has built up some 23 bcm/y of gas production capacity over the period. Development of this circular gas pipeline grid began in July 2010. The pipeline network comprises four trunk lines surrounding the Tarim basin, with a total length of 1,917 km, and 19 spurs spanning 549 km. The grid will be capable of pumping 2.35 bcm/y from four gas fields in the Tarim basin (Yingmaili, Hetianhe, Kokyar, and Akmomu) to Hotan and Kashgar cities, and the Kizilsu Kirghiz Autonomous Prefecture. The trunk lines were expected to be fully operational by July 2013.[90]

The systematic development of the WEP corridor and the Xinjiang circular gas grid indirectly confirms that Beijing's planners are taking advantage of energy infrastructure as a part of western China's economic development. It is also worth noting that China's domestic security considerations provided some impetus for building regional transportation infrastructure. Beijing firmly believes that the political and ethnic tensions in Xinjiang can be attenuated by economic development, and for this reason it has been investing massively in the local economy and infrastructure.[91] In March 2014, CNPC's President Zhou Jiping said that the company would play a leading role in the construction of a new Silk Road that would stretch across Central Asia.[92] Six months later, *The Wall Street Journal* reported China's plan to transform the far-flung frontier crossing into an international railway, energy, and logistics hub for a Silk Road Economic Belt

[90] Li Xin, 'CNPC gets belated approval for Xinjiang gas grid project', Interfax Global Energy, *Natural Gas Daily*, 15 May 2013, p. 7.

[91] Nadege Rolland, 'China's New Silk Road', National Bureau of Asian Research (NBR) Commentary, 12 February 2015.

[92] James Byrne and Colin Shek, 'CNPC paving the way for China's new Silk Road', Interfax Global Energy, *Natural Gas Daily*, 13 March 2014, p. 8.

(plans for the SREB had been unveiled by President Xi Jinping in 2013) the aim being to establish new trade and transport links between China, Central Asia, and Europe.[93] It is safe to say that the development of the WEP corridor is set to play a pivotal role in implementing China's Silk Road Economic Belt initiative, which forms part of President Xi's 'One Belt, One Road' strategy, together with the Twenty-First Century Maritime Silk Road initiative.[94]

Central Asian gas, Altai gas, and the WEP corridor

The strengthened relationship between China and the Central Asian republics during the 2000s and the first half of the 2010s, as both oil and gas pipelines were constructed, was an important reminder that there are no circumstances under which Russia's 'talk-only-no-action negotiations'[95] serve a purpose.[96] Gazprom's interest in linking with China's WEP corridor dated back to its negotiations with CNPC as a part of WEP I's western consortium. The collapse of western participation in WEP I in the early 2000s was a fatal blow to Gazprom's strategy to link WEP I with its Altai gas export scheme. Gazprom responded by vetoing the TNK-BP–CNPC–Kogas pipeline export project. Russia's interest in reactivating the Altai export option is quite understandable and natural.

Before finalizing the eastern route deal, however, the Chinese energy planners had no interest in inviting any criticism for 'robbing' the Europeans of their gas when, in fact, they would prefer to buy Russian gas not from West Siberia but from East Siberia. In fact, China did not need Altai gas for WEP II and III as they had already secured the necessary volume from the Central Asian republics. It did not necessarily mean that China had completely given up the Altai route option. Professor Xia Yishan of the China Institute of International Studies (CIIS) said that:

> Turkmenistan cannot become a competitive rival to Russia in terms of supplying gas to China for two reasons. One is that Turkmenistan does not have as large a supply potential as Russia. The other is that the vast scale of China's future energy demand should provide ample room for both countries. Russian gas will start flowing to China at an initial rate of 5 bcm/y in 2018, and is unlikely to hit the contracted capacity of 38 bcm/y until 2023. As Gazprom has already told the press that it looks forward to resuming another dialogue with China for the western line, it is very likely that China will sign this deal in one or two years.[97]

China's WEP corridor could handle 85–105 bcm/y of imported gas from the Central Asian Republics. WEP II and III can handle 60 bcm/y of imports from the Central Asian republics, WEP IV is for domestic gas, and WEP V will be connected by CACP D line with two supply volume options: 25–30 bcm/y or 45 bcm/y. With Altai gas, China's total volume of pipeline gas import by the mid-2020s could reach 165 bcm/y (at least 85 bcm/y from Turkmenistan, Uzbekistan, and Kazakhstan, 68 bcm/y from Russia by the eastern route and the Altai route, and 12 bcm/y by Myanmar). The timely construction of WEP V and VI will be crucial to take at least 115 bcm/y of gas from the Central Asian republics and West Siberia, via the WEP corridor.

[93] Jeremy Page, 'China Sees Itself at Center of New Asian Order: Beijing Builds Roads, Pipelines, Railways and Ports to Bind Itself to Region', *The Wall Street Journal*, 9 November 2014, http://online.wsj.com/articles/chinas-new-trade-routes-center-it-on-geopolitical-map-1415559290.

[94] ' "One Belt, One Road" projects get approval', *China Daily*, 13 January 2015, www.chinadaily.com.cn/china/2015-01/13/content_19309666.htm.

[95] Unlike the situation in the oil sector, Gazprom had dragged its feet on the issue of pipeline gas supply to China during the 2004–13 period, before the 2014 gas deal.

[96] Wu Jiao, Li Xiaokun, and Du Juan, 'Deal ensures supplies of natural gas', *China Daily*, 6 September 2013; Marat Gurt, 'Chinese asserts clout in Central Asia with huge Turkmen gas project', Reuters, 4 September 2013.

[97] Interfax, *Russia & CIS Oil and Gas Weekly*, 11–18 June 2014, pp. 44–5.

Appendix 1 shows China's systematic approach to importing pipeline gas from the Central Asian republics. There was a report that Kazakhstan and Russia are considering constructing a gas pipeline through Kazakhstan to China. Kazakhstan is already supplying small volumes of gas (0.18 bcm during January and June 2014) to China via CACP. Kazakhstan is also trying to increase access to gas at home, which would include cities such as Astana, but it needs more infrastructure to do this.[98] The proposal could add a new option for China to diversify its supply sources.

In short, China's imports of gas from the Central Asian republics will be no more than 85 bcm/y by 2020.[99] If the Altai deal is signed in 2015, China's imports of pipeline gas will be at least 115 bcm/y by early next decade. If volumes imported via the eastern route (38 bcm/y) and from Myanmar (12 bcm/y) are added, total pipeline gas imports will be 165 bcm/y. It is worth noting that CNPC's decision to move the D line completion timing from 2016 to 2020 is not coming out of the blue. The delay of Line D is partly due to China's weakened gas demand forecasts and partly due to CNPC's interest in renegotiating the price of gas from Turkmenistan by introducing the Altai gas option. China's stance towards pipeline gas supply via the Altai route and CACP is to introduce competition to reduce the import price and to diversify the sources of supply. Besides this, a breakthrough in the Altai gas deal will be very bad news for China's LNG expansion.

4.3. China's LNG Imports

The driving force behind China's LNG expansion was CNOOC, and the firm was the full beneficiary of the cheap LNG supply deal with Australia and Indonesia in the early 2000s. Since then, there has been no sign of a slowdown in LNG expansion. As shown in Appendix 2, up to the end of 2014, CNOOC was operating seven LNG terminals. In February 2012, the *21st Century Business Herald*, a state news outlet, reported that the NDRC (National Development and Reform Commission) had lifted restrictions on the construction of LNG terminals, permitting 'any company' to build such projects as long as they had signed a long-term contract to import more than 1 mt/y of LNG.[100] CNOOC wasted no time in taking advantage of NDRC's new policy guideline. The Tianjin FSRU facility in Bohai Bay became CNOOC's second LNG receiving terminal to be brought online in 2013.

CNOOC's chairman, Wang Yilin, announced in the summer of 2011 that the firm aimed at investing up to 200 billion yuan (US$31 billion) over a five-year period on LNG receiving and distribution capacity capable of handling 60 mt/y by 2015, up from the 2010 capacity of 12.4 mt/y. Of the total outlay, about 30 per cent will go on building LNG terminals, including the three FLNG vessels to be deployed at Bohai Bay and in the East China Sea. Of the rest, 27 per cent will go towards the acquisition of natural gas assets overseas. Another 23 per cent will go on building natural gas pipelines in China, 14 per cent on construction of gas-fired power plants, 4 per cent on building LNG refilling stations, and 2 per cent on building small-scale onshore LNG plants. The most ambitious initiative is the building of three regasification vessels (each of which will have a

[98] 'Kazakhstan and Russia mull building gas pipeline to China', Interfax Global Energy, *Natural Gas Daily*, 27 August 2014, p. 3.

[99] Wang Jun, 'Brightening Up the Silk Road', *Beijing Review*, 27 November 2014, www.bjreview.com.cn/business/txt/2014-11/24/content_654375.htm; '100 bcm of gas delivered by China–Central Asia pipelines', 14 November 2014, www.china.org.cn/business/2014-11/14/content_34056195.htm.

[100] 'LNG 接收项目审批放宽', 21 世纪经济报道 (上海报道), 21 February 2012, www.21cbh.com/HTML/2012-2-21/0NNDE3XzQwMzM0NA.html; www.platts.com/latest-news/natural-gas/singapore/cnooc-gets-final-approval-for-chinas-first-floating-26182845.

storage capacity of 145,000 cubic metres) to be located off Tianjin in northern China, Longkou (Yantai) in Shandong province, and Yancheng in Jiangsu province.[101] However, CNOOC decided to turn the FSRU concept into traditional onshore facilities in Tianjin and other locations, after the loss made by the Tianjin FSRU project. CNOOC's initiative to penetrate the Bohai Bay market could have been very effective, if not for the Sino-Russian gas deal in May 2014. Luck was not on the side of CNOOC.

As of December 2014, CNOOC has seven operational LNG receiving terminals along China's eastern coast, with a total capacity of 24.9 mt/y. In the case of CNPC, there are three operational LNG receiving terminals in Dalian, Rudong, and Tangshan, with a combined capacity of 10 mt/y. SINOPEC's first terminal in Qingdao started operations in 2014, and the remaining three terminals (in Lianyungang, Tieshan, and Tianjin, with a combined capacity of 12 mt/y) are under construction. The combined LNG supply capacity (first phase) of the CNPC and SINOPEC facilities is 22 mt/y.

China is building LNG-receiving terminals at a rapid pace, with the current capacity of 32.5 mt/y slated to rise to 80 mt/y by 2018. If the further 13 terminals that are in the planning stages are eventually built, it would take China's import capacity to 110 mt/y.[102] Gazprom Marketing & Trading projected that China will increase its imports of LNG from the current (2014) figure of 18 mt to 67 mt in 2025.[103] Bernstein Research projected that capacity in 2015 will reach 51 mt/y and that the figure will stay at 63 mt/y (of which 38.8 mt/y is the operating capacity) during the second half of the 2010s.[104]

As mentioned above (at the start of Section 4.2) China's figure for LNG imports was 27 bcm/y in 2014, much less than its receiving capacity of well over 30 mt/y. Achieving an operating capacity of 40 mt/y by 2020 will be an encouraging performance. This shows, indirectly, that imported gas (whether pipeline or LNG) has been too expensive over the past decade, and explains why LNG terminals have been under-utilized. China's policy has been to negotiate and sign contracts with a variety of suppliers, in order to play one off against the other. Between 2006 (when the ambitious 68 bcm/y pipeline gas supply from Russia to China was announced) and 2014, China has signed contracts with a variety of LNG and pipeline suppliers, partly in order to indicate to the Russians that they needed to change their commercial stance. China's ever-growing LNG expansion is showing signs of slowdown, partly due to the high burden of import costs. With economic slowdown, all suppliers now need to understand that they cannot sell gas in China unless their prices are competitive – both with the price of competing (domestic and imported) supplies and with the price that customers can afford to pay. This is a general problem since all new projects are high-cost, but unless suppliers can reduce these costs China would rather maximize supplies of domestic gas (conventional and unconventional) than pay high prices to exporters. The only important constraint on the Chinese leadership will be whether such a policy will improve air quality in the cities at the required speed.

[101] Xu Yihe, 'CNOOC eyes three regas vessels in five year drive', *Upstream*, 11 June 2011; 'CNOOC set for FLNG first', *Upstream*, 20 September 2013; 'CNOOC is on course for FLNG', 10 January 2013; 'CNOOC forges ahead with its third floating and regasification project', *Upstream*, 31 January 2013; 'CNOOC breaks ground for China's 1st floating LNG project', Reuters, 1 March 2014, www.reuters.com/article/2012/03/02/china-lng-idUSL4E8E20SK20120302.

[102] Clyde Russell, 'Russia–China gas deal more a threat to LNG pricing than volumes', Reuters, 22 May 2014, http://uk.reuters.com/article/2014/05/22/column-russell-china-gas-idUKL3N0O80TF20140522.

[103] 'China to raise LNG imports to 67 million tons by 2025 – Gazprom', Itar-tass, 28 May 2014, http://en.itar-tass.com/economy/733710.

[104] Neil Beveridge, 'Global LNG: Texas Standoff. How Lower Oil Prices Impact Our Outlook For the Global LNG Industry in 2015 and Beyond', Bernstein (Asia & Pacific Oil & Gas), 21 January 2015, p. 16.

5. Border price and upfront payment issues

Unlike Sino-Russian oil cooperation, whose impacts are confined to China's domestic needs, the impacts of Sino-Russian gas cooperation are much broader. China is becoming the battleground between pipeline gas from Russia and the Central Asian republics and LNG from Australia, North America, and East Africa.

5.1 The Price Issue: Before Oil Price Collapse

Immediately after the May 2014 gas deal, a number of institutions pointed out that the importance and significance of the Sino-Russian gas deal lay in the fact that it would set a floor for prices of the liquefied fuel. Francisco Blanch, the Bank of America (BOA)'s global head of commodities research, said that the deal:

> ... establishes possibly the most important gas benchmark in decades … If LNG prices were to fall below Russian import parity levels several years into the future, the Chinese market would probably absorb them rather easily.

BOA added that global gas markets will probably converge to the Russian export price into China, with spot Asian LNG cargoes likely from the Chinese floor of $11/mmbtu to the Japanese ceiling of about $16/mmbtu.[105] Fitch Ratings also highlighted the fact that the Sino-Russian pipeline gas deal 'sets a new benchmark for what China is willing to pay for natural gas over longer-term contracts'.[106]

A thorny issue for the May 2014 Sino-Russian gas deal was the border price, but the details are not publicly available. Russia had insisted on introducing the European border price as a single benchmark price for its pipeline gas exports to China so it did not have to renegotiate its exports to both Europe and Asia. When the 21 May gas deal was announced, the estimated price was US$350/1000 cubic metres (cm). Industry observers, however, took the price range as being between US$350–380/1000 cm (US$9.9–10.8/mmbtu). Assuming that the Chinese border price is US$10.24/mmbtu (US$360/1000 cm[107]) based on Ukraine contract heat content, and the US$25 bn advance payment agreement is mutually accepted, the border price could potentially by lowered by US$21.9/1000 cm (US$0.62/mmbtu). In other words, the price could be discounted to roughly US$9.6/mmbtu, which is almost the same as the Turkmen price in 2013.[108]

A big difference between East Siberian gas and Turkmen gas, even if the border price is roughly the same level, lies in the fact that the distance from Heihe (or Blagoveshchensk) in Heilongjiang province to Shanghai is 2,778 km (of which the Heihe–Beijing section is 1,565 km, and the

[105] Isis Almeida, 'Russia–China Natural Gas Deal to set LNG price floor, BOFA says', Bloomberg, 27 May 2014, www.bloomberg.com/news/2014-05-27/russia-china-natural-gas-deal-to-set-lng-price-floor-bofa-says.html.

[106] www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/china-gas-deal-will-affect-european-canadian-markets-gazprom-ceo-says/article18819238/

[107] www.bloomberg.com/news/articles/2014-07-02/gazprom-gas-price-in-china-deal-said-to-be-near-germany-s-level

[108] Michael Chen, 'The Development of Chinese Gas Pricing: Drivers, Challenges and Implications for Demand', OIES Paper NG 89, July 2014.

Beijing–Shanghai section is around 1,213 km), while the distance from Xinjiang to Shanghai is 4,000 km. The Beijing and Shanghai city gate prices based on eastern route gas supply will be roughly US$12/mmbtu and US$13.0–13.5/mmbtu respectively. This is definitely cheaper than the benchmark price (US$13.5–14.0/mmbtu) of Turkmen gas at Shanghai. However, despite the price advantage, the supply volume of the south section of the eastern route may be marginal.

Nonetheless, the link with Shanghai is important. Wood Mackenzie highlighted three points:

i expanding the domestic gas grid will not only allow Russian gas to reach as far south as Shanghai but could theoretically also allow alternative gas supply options to flow from south to north, helping to balance China's notoriously tricky north–south seasonal demand swings;

ii a future connection to the Russia–East pipeline would provide more support to the establishment of Shanghai as a gas trading and pricing hub, not only for China but for the Pacific market;

iii as buyers south of Shandong seek to procure more LNG, an alternative supply option would provide pricing leverage.[109]

The benchmark price of US$13.5–14.0/mmbtu for Turkmen gas at Shanghai city gate is also applicable for Altai gas (in 2013, the Chinese border price for Turkmen gas was US$9.55/mmbtu) as its entry point is also Xinjiang province. The Beijing authority is very conscious of the price competitiveness of Altai gas. The difference between Turkmen gas and Altai gas lies in the availability of the upstream equity gas option (see Section 5.3) which allows China to reduce the border price indirectly; Gazprom, however, had never indicated this possibility. From Beijing's viewpoint, China's access to upstream equity for Altai gas supply is a good way of satisfying the minimum requirement.

On top of the competition from Turkmen gas, US LNG supply to China's LNG market, with a price tag of US$10.5–12.0/mmbtu, presents a different pressure which will affect Russia's entry to China's gas market.[110]

5.2 After the collapse of the oil price

The above price benchmarks were based on a crude price of US$100–110/barrel. Since summer 2014, however, the crude price has witnessed a free fall to a level of US$50/bbl, and as of February 2015 the price is hovering at US$60/bbl.[111] A well-known LNG specialist, Andy Flower, explained how the oil price collapse will be reflected in the LNG price.

[109] Jing Li and Gavin Thompson, 'NDRC approves "Russia–East" gas pipeline', Wood MacKenzie Inform (www.woodmac.com), 10 October 2014.

[110] Author's discussion with Mr. Shigeru Muraki (deputy chairman, Tokyo Gas) during Sakhalin Oil and Gas 2014 conference organized by Adam Smith Conference and held at Yuzhno-Sakhalinsk, 23–24 September 2014.

[111] It is worth noting that with the collapse in the value of the ruble, all capital requirements for projects which are quoted in dollars (see Table 2) need to be revised according to the share of the project which can be supplied with Russian equipment. This has implications, in turn, for the pricing of gas from those projects. No definite numbers can be placed on this effect due to the large number of variables involved (currency fluctuations, general inflation, and project cost inflation) but the previous calculations probably need to be revisited to understand the full scale of financial burden of the development.

> There is a further time lag built into most LNG price formula, since the LNG price in month n is commonly indexed to JCC in month n-3. In some contracts, the lag is not as great with the price of LNG in month n linked to the average JCC price in months; n-1, n-2 and n-3. As a result the $50/bbl average Brent price in January 2015 will not feed fully through into long-term Asian LNG prices until May 2015. When it does, the price under the typical long-term pricing formula used in Asia will fall to $8–8.5/mmbtu. However, the bounce back in oil prices in early February 2015 will, if it is maintained, add around $1.10/mmbtu to the LNG price in June 2015.[112]

During the Gas Asia Summit Conference (held in Singapore 29–30 October 2014), Laszlo Varro, head of gas, coal, and power at the International Energy Agency (IEA), said that 'At $80 a barrel, US LNG is competitive. At $70 to $75, oil-linked and Henry Hub are roughly the same'.[113] Kazuo Yoshino, chief financial officer at Tokyo Gas pointed out that the 'Crude price would have to fall below $70 a barrel to make long-term oil-linked contracts competitive against North American LNG.'[114] If the crude oil price stays at US$50–60/bbl for too long, however, it will affect US LNG exports to Asia negatively.

This will serve as a very important benchmark for the Altai gas price deal. Considering that POS export is based on oil-indexed price formula, the city gate price of Beijing is to be well below US$9/mmbtu, if the oil price stays at US$50–60/bbl. Pressure to compete against LNG supply in the US$8/mmbtu price range will be intensified. The price competitiveness is critically important. For example, Sinopec wants to sell some long-term LNG import deals just as a slowing economy makes them unprofitable, signalling the end of a five-year boom fuelled by rising Chinese demand.[115]

5.3 The advanced payment or equity gas option

One of the most effective ways of lowering the border price is the use of upfront or advanced payment, or upstream equity acquisition. Gazprom had previously always ruled out Chinese NOCs from such upstream openings and unlike Rosneft, Gazprom had shown no interest in using large-scale lending from China. Based on this background, China had never been willing to offer upfront payment for Russia's gas supply to China – until the end of 2011, when a very large scale upfront payment was made for crude supply. For the 2014 gas deal, China was ready to bend its stance on upfront payment to secure the eastern route gas deal. In fact, the first official acknowledgement of a CNPC financial package for Gazprom was made by Gazprom's Deputy CEO Alexander Medvedev in June 2012; six months later Russia's Deputy Premier Arkady Dvorkovich officially confirmed that the upfront payment proposal was being reviewed. Although this proposal had not been approved, serious efforts behind the scene had been made.

In June 2014, Gazprom Deputy CEO Medvedev said:

> Agreement has been reached with the Chinese side on an advance payment of $25 billion prior to the start of deliveries. The terms will be agreed. They will include the schedule for disbursement of the

[112] Andrew Flower, '2015 will be a year of change for the LNG business', LNG Hub (CWC), 19 February 2015. http://lnghub.biz/2015-will-be-a-year-of-change-for-the-lng-business/.
[113] Ann Koh and Christine Buurma, 'Oil Rout Seen Diluting Price Appeal of US LNG Exports', Bloomberg News, 31 October 2014, www.bloomberg.com/news/2014-10-30/oil-rout-seen-diluting-price-appeal-of-u-s-lng-exports.html.
[114] Ibid.
[115] Oleg Vukmanovic and Henning Gloystein, 'LNG boom over as China looks to sell out of long-term deals', Reuters, 9 December 2014, http://uk.reuters.com/article/2014/12/09/china-gas-imports-idUKL6N0TN1HM20141209.

> advance payment and the schedule for the gas that will be delivered in exchange for the advance and its effect on one or another of the parameters.

This was the first official confirmation on the prepayment by China to Gazprom.[116] However, Gazprom officially confirmed that the upfront payment option (as part of an agreement on a price reduction) was being ruled out. Gazprom CEO Millar said:

> ... we had an advance payment as an element of negotiations on the price, but we're not considering the possibility of raising an advance as a financial instrument to further reduce the price, considering that we reached a final agreement on the price.[117]

He added that Gazprom is now considering taking out loans from Chinese banks, although no concrete agreements have so far been reached.[118] Under the current situation, where Russia's access to the western financing option is completely blocked, China would be doing Russia a significant favour by extending such type of loans. It remains to be seen whether a hybrid financing format will be introduced for Sino-Russian gas cooperation.

[116] Interfax, *Russia & CIS Oil and Gas Weekly*, 11–18 June 2014, pp. 16–20.

[117] Interfax, *Russia & CIS Oil and Gas Weekly*, 6–12 November 2014, pp. 4–9.

[118] Alexander Panin, 'China Gets Upper Hand in Gas Deals Amid Russia–West Tensions', *The Moscow Times*, 10 November 2014, www.themoscowtimes.com/business/article/china-gets-upper-hand-in-gas-deals-amid-russia-west-tensions/510910.html.

6. From bilateral to trilateral/multilateral cooperation: based on cooperation with Korea and Japan

The 21 May Sino-Russian gas deal could provide a special opportunity for the development of the region's first multilateral cooperation project. Construction of a relatively short length of pipeline beneath the Yellow Sea – between Weihai in China's Shandong province and Inchon in Korea's Gyeonggi province – could establish the basis for trilateral pipeline development between Russia, China, and South Korea. On 16 February 2012 CNPC's Chairman Jiang Jiemin made a serious proposal to Kang Young-won, president of the Korea National Oil Corporation (KNOC). *JoongAng Daily* reported that:

> ... it would be an alternative for South Korea, which is waiting for progress in the Russia-initiated plan of building a gas pipeline via North Korea for the supply of Russian gas.… China believes the pipeline would be mutually beneficial for Seoul and Beijing as the South's involvement could give it more bargaining power in negotiations over the price of Russian gas.[119]

The first indirect response by the new government of South Korea was made in autumn 2013. On 18 October, at the Global Cooperation in the Era of Eurasia conference in Seoul, President Park Geun-hye proposed a 'Eurasia Initiative to build one continent, creative continent, and peaceful continent'. The initiative for the peaceful prosperity of Eurasia as the 'Resurrection of the Silk Road' calls for linking energy and logistics infrastructure across the continent.[120] Even though there has been no official feedback during the last 18 months on the proposal made by Jian Jiemin, the chance of a positive response by the Korean government is getting higher as Seoul's energy planners begin to recognize the potential impact of the Yellow Sea pipeline on Korea's LNG import price negotiations. In parallel with cooperation on the Korea–China gas pipeline, both countries could cooperate on LNG; such cooperation could include a swap deal and joint procurement of LNG supply. If the Russia–China–Korea pipeline gas alliance happens, it will open the door for LNG cooperation between Korea and China which ultimately could be expanded towards LNG cooperation among Korea, China, and Japan; this would lay the ground for an Asian Gas Consumers Alliance or Cooperation. If such an LNG alliance among China–Korea–Japan is arranged, a Russia–China–Korea pipeline extension will be possible. Time will tell whether progress towards such an energy alliance in north-east Asia will happen.

Strictly speaking, Japan has been a lonely monitor of Sino-Russian gas cooperation. Meltdown at the Fukushima Daiichi nuclear power plant (caused by the earthquake and tsunami of March 2011) led Japan to revise its energy policy, switching off its last working nuclear reactor in May 2012.[121] To make up the deficit in fuel for power generation, Japan aimed at increasing its LNG imports drastically over the coming years. Following an agreement in January 2011, Japan and Russia had carried out a feasibility study on a 10 mt/y LNG project near Vladivostok,[122] and on 25

[119] Keun-Wook Paik, 'Through the Dragon Gate?', pp. 9–10.

[120] Choi He-suk, 'Park seeks "Eurasia Initiative" to build energy, logistics links', *Korea Herald*, 18 October 2013, www.koreaherald.com/view.php?ud=20131018000620.

[121] 'Tomari shutdown leaves Japan without nuclear power', 5 May 2012, www.bbc.co.uk/news/world-asia-17967202.

[122] Takeo Kumagai, 'Japan completes feasibility study on Vladivostok LNG project', Platts, 4 January 2012, www.platts.com/RSSFeedDetailedNews/RSSFeed/NaturalGas/7967723.

June 2012 Japan reached agreement with Russia on the supply of LNG from Vladivostok. If a timely investment is now made, the Vladivostok LNG facility has been projected to start operating as early as 2018, with an annual output of 5 mt rising to 10 mt by 2020.[123] Following the China–Russia agreement, the biggest gas deal ever, new gas supplies will be unlocked and gas prices across Asia could fall – developments that would pay the biggest dividends for Japan, the world's top buyer of LNG. However, Japan's cautious stance in the wake of the Ukraine crisis is set to delay the Vladivostok LNG development significantly.

The Sino-Russian gas deal has also revived talk of a pipeline from Russia to Japan. A group of 33 Japanese lawmakers from the ruling party plans to lobby Prime Minister Abe to sign a deal with President Putin on a 1350 km gas link, at an estimated building cost of about US$6 bn, with 20 bcm/y supply capacity.[124] Compared with the LNG supply projects, Sakhalin–Japan pipeline gas price competitiveness looks solid.[125] Naokazu Takemoto, the Japanese parliamentarian heading the group in favour of the pipeline, estimates that 'the price of natural gas will be two times lower than the export of liquefied natural gas.' Politically, given Russia's current isolation from the West over its actions in Ukraine, a pipeline deal would also gain Vladimir Putin some vitally needed political currency. Indeed, Russia's recent deal with China was probably motivated by the Kremlin's political concerns – China seems to have won a deal at a very favourable price.[126] However, Japan's stance towards gas supply from Russia, in particular by pipeline, will be significantly influenced by US and EU sanctions policy against Russia with regard to the Ukraine crisis.

In short, both Japanese and Korean buyers would find it impossible to sign new long-term contracts for Russian gas while sanctions are in force, not because this would be illegal, but because they would be failing to show solidarity with the USA and the EU. In any case, it is not clear that these buyers are in a hurry to sign any new LNG contracts, due to uncertain demand requirements and confusion over what the price basis of future long-term contracts should be. The Russian switch from LNG to pipeline gas in all markets is specifically aimed at avoiding sanctions and minimizing financing requirements. There is widespread expectation that future US sanctions will include LNG technology. A very large percentage of POS equipment and labour is supplied from Russian sources and the position for Altai will be similar. When Gazprom's CEO Miller indicated that pipeline gas to China was an alternative to the construction of an LNG plant in Vladivostok,[127] Moscow knew that the delay of Vladivostok LNG development would be inevitable.

[123] Takashi Fukuyama, 'Japan, Russia to cooperate on LNG project in Vladivostok', *The Asahi Shimbun*, 25 June 2012, http://ajw.asahi.com/article/economy/business/AJ201206250049.

[124] Osamu Tsukimori and James Topham, 'Huge Russia–China gas deal still leaves door open to Japan', Reuters, 8 June 2014, www.reuters.com/article/2014/06/08/russia-japan-gas-idUSL3N0ON13L20140608; 'Japanese Lawmakers to Lobby Abe for Russian Gas Pipeline', 28 May 2014, Bloomberg, www.bloomberg.com/news/2014-05-27/japanese-lawmakers-to-push-abe-on-russia-natural-gas-pipeline.html.

[125] 'A new Option for Russia's Gas Supply to Japan', prepared for World Petroleum Congress (Moscow), by Energy Research Institute, Russian Academy of Sciences, and Institute of Economics of Japan (IEEJ), 16 May 2014.

[126] http://voiceofrussia.com/news/2014_05_28/Japanese-parliamentarians-propose-to-build-gas-pipeline-from-Sakhalin-to-Japan-for-6-billion-6553/; www.globalresearch.ca/is-a-russia-japan-natural-gas-pipeline-next/5384706; Interfax, *Russia & CIS Oil and Gas Weekly*, 24–29 April 2014, pp. 13–15 & 30 April–7 May 2014, p. 41.

[127] Interfax, *Russia & CIS Oil and Gas Weekly*, 6–12 November 2014, pp. 4–9.

7. Implications for Future LNG Projects

The global gas market is set to witness a transition from a seller's market to a buyer's market, with the influx of new LNG supplies from Australia, the USA and Canada, Russia, and East Africa. Indeed, it is expected that by 2025 there will be at least 100 mt/y of aggregate LNG equivalent supply from US exports and Russian pipelines, none of which was in consensus forecasts just three years ago. It is clear that LNG supply will be all about the survival of the fittest and only the lowest-cost projects will survive.[128]

The breakthrough of the long-awaited Sino-Russian gas deal in May 2014 was triggered by the Ukraine crisis; the signing of the Altai MOU in November 2014 signalled that Russia's ultimate dream of becoming a swing supplier between Europe and Asia was no longer a remote reality. ESPO was the vehicle that made Russia the swing oil supplier, likewise the Altai project will be the cornerstone of the link making Russia the swing gas supplier. However, its impact on the European gas market will be very limited. If the Altai deal is signed in 2015, it will cause massive pressure on LNG suppliers and it will make China the battleground for the struggle between pipeline gas exports from Russia and the Central Asian republics, and LNG supplies from Australia, Canada, the USA, Russia, and East Africa. In particular, it will signal a fierce but invisible competition between Russia's 'Pivot to Asia' policy and the USA and Canada's 'Pivot to Asia' policy (which aims at a massive expansion of North Pacific energy trading).

Table 11: Sino-Russian oil & gas trading projection: by 2030 (mt and bcm/y)

	2020		2030	
	Oil	Gas	Oil	Gas
Business-as-usual scenario	25–30	30	25–30	40
Optimistic Scenario	30–35	68	40–45	68
Pessimistic Scenario	15	0	15	20

Source: Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation*, p. 399.

[128] Adrian Wood, et. al, 'Australian LNG Outlook: Russian roulette', Macquarie Research, 5 June 2014, pp. 1–13. For LNG supplies from Australia, Canada, the USA, and East Africa, please see David Ledesma, 'The Potential LNG boom in Australia: Will Australia become the leading player in the Global LNG market?', presented at IP Week Conference organized by Energy institute, London, 18 February 2014.; David Hackett, Roman Karski, Michal Moore, Leigh Noda, Mark Pilcher, and Jennifer Winter, 'Risky Business: The Issue of Timing, Entry and Performance in the Asia–Pacific LNG Market', SPP (The School of Public Policy, University of Calgary) Research Papers, Vol. 7, No. 18, July 2014, pp. 1–181, http://policyschool.ucalgary.ca/sites/default/files/research/moore-lng-onl.pdf.; Guy Caruso, 'The US Shale Gas Revolution: Implications for the Global Energy Market', presented at 2014 North Pacific Energy Dialogue in the Shale Gas Era Conference, organized by the East–West Centre and KEEI, Honolulu, 13–15 August 2014; Anne Fruhauf, 'Mozambique's LNG Revolution: A Political Risk Outlook for the Rovuma LNG Ventures', OIES NG 86, April 2014, www.oxfordenergy.org/wpcms/wp-content/uploads/2014/04/NG-86.pdf.

Table 12: Russia's pipeline gas and LNG exports: by 2035 (bcm/y)

	2015	2020	2025	2030	2035
Pipeline gas to EU, Turkey, and the CIS	200	189	160	155	145
Pipeline gas to China		8	68	68	68
LNG export to EU		3	7	7	7
LNG export to Asia–Pacific	12	12	20	35	50
Total	212	212	255	265	270

Source: Argus, *FSU Energy*, 26 February 2015, p. 4.

In summary, as shown in Table 11, the two 2013 crude supply deals and the 2014 gas deal have made Table 11's optimistic scenario projection much more realistic than the business-as-usual scenario projection. The gas export scheme recently announced by the Ministry of Energy strongly indicates that Russia aims at exporting 68 bcm/y of gas to China by 2025 (Table 12) while the figure of LNG exports to Asia is projected at 20 bcm/y. The projection fully reflects the difficulty of penetrating the Asian LNG market with a non-competitive price.

The most important point is that in the absence of large-scale pipeline gas supply from Russia, efforts by Asian gas consumers to reduce the Asian LNG premium will not succeed. Without the reduction of the excessive Asian premium, expansion of LNG supplies to China will not reach their maximum levels; consequently the drastic reduction of China's heavy dependence on massive coal use looks unlikely during the 2020s. If China's coal share in energy mix by 2030 can fall below 50 per cent, that will be the biggest contribution China can make to tackling the global climate change issue, as it will encourage other Asian countries – such as India and the ASEAN countries – to rethink their energy mix structure in the coming decades. If Russia's pipeline gas supply to China can contribute to this special target, it will show the real merit of Sino-Russian gas cooperation.

8. Summary

- Sino-Russian oil and gas cooperation witnessed two major crude supply deals worth US$355 bn in 2013, and the eastern route pipeline gas deal worth US$400 bn on 21 May 2014, before the oil price collapse in mid-2014. The Altai gas MOU in November 2014 strongly signalled that cooperation will be intensified. If the Altai deal is finalized in 2015, the total trading volume based on oil and gas supply could reach the US$1 trillion level. The breakthroughs that have boosted the level of Sino-Russian energy cooperation will test whether it can move to the level of strategic cooperation. The continuous US and EU sanctions against Russia are making China the biggest beneficiary of the Ukraine crisis, as Russia has no other choice but to strengthen its energy links with China to avoid complete isolation from global affairs.
- The greatest importance of the May 2014 gas deal lies in the fact that the pipeline gas market of China's north-eastern provinces, together with the gas market in northern China's Bohai Bay area are saved from the onslaught of LNG supplies. If the Altai gas deal materializes in 2015, its impact on regional and global gas trading will be much bigger than that of the 2014 May gas deal, as the deal will carve out a sizable LNG volume from the Chinese gas market, and prices of LNG supply to China will become more competitive. The twin breakthroughs of the May 2014 gas deal and the Altai MOU in November 2014 opened the door for a very large scale entry of Russian gas to the Asian market. The potential of the supply is as high as 130–140 bcm. However, US and EU sanctions against Russia (due to the Ukraine crisis) could pose a serious obstacle for the implementation of a couple of Russia's LNG export projects. Ironically, the West's sanctions against Russia could backfire if the Altai deal is signed in 2015, as the Altai deal will deliver a significant blow to LNG projects by IOCs. The more important point is that the Altai deal will make Russia the second game changer – US LNG exports to Asia being the first game changer.
- Sino-Russian oil cooperation is strengthened due to China's need to maximize its crude supply based on the pipeline network; this will help reduce China's heavy dependence on seaborne oil supply and enhance its energy security. But Russia may have to struggle to balance the volume of crude supply to China via Skovorodino and to Asian buyers through Kozmino. Nonetheless, strengthened Sino-Russian oil cooperation will be maintained continuously, as the maximization of onshore pipeline oil supply is a top priority for China. If Rosneft's 19.5 per cent equity stake is allocated to China (due to Russia's need for timely access to China's large-scale financing) it will boost Sino-Russian oil cooperation hugely; at the same time it could indirectly open the door to an upstream gas equity position for China in Russia.
- China's gas expansion is set to continue, but imports of pipeline gas and LNG will be fundamentally influenced by China's domestic production – in particular by the shale gas revolution in China. Shale gas production looks unlikely to reach the Beijing authority's initial, but very ambitious, target until the end of 2010s. The scale of shale gas production in China during the first half of the 2020s will have a fundamental effect on China's plans to finalize the scale of pipeline gas and LNG imports. China's WEP corridor expansion scheme is not a mere infrastructure development project, but a part of facilitating Beijing's ambition to promote its Silk Route Economic Belt initiative. The impact of a maximum supply of pipeline gas from Russia and the Central Asian republics, set against China's LNG imports by the mid-2020s, will be very significant.

- CNPC's indication of mulling WEP VI for Altai gas import highlights Beijing's intention to introduce competition between the Central Asian Republics and Russia for pipeline gas supply. It also re-confirms Beijing's determination to maximize the volume of pipeline gas supply to China, based on the assumption that the initiative for Altai will not cause any delay of POS development.
- The Altai deal will make Russia a swing supplier between Europe and Asia, but the impact on the European market could be quite restricted as the main issue will be the application of the same export price for both markets, rather than the physical diversion of the supply. Of some importance is the fact that the Altai deal will make China the battleground for supplies of pipeline gas and LNG exports. It will signal a fierce competition between Russia's 'Pivot to Asia' policy and the USA and Canada's 'Pivot to Asia' policy (which aims at a massive expansion of North Pacific energy trading). Such competition is not necessarily negative as it will help reduce the Asian LNG premium, which will be instrumental in terms of reducing China's heavy dependence on massive coal use. If China's share of coal in its energy mix by 2030 can fall below 50 per cent, it will be the biggest achievement for the global climate change initiative. If Russia's pipeline gas supply to China can contribute to this special target, the merit of the Altai deal should not be underestimated. Russia is currently being demonized for its annexation of Crimea, but there should be some recognition of the role it is playing with regard to global climate change (its pipeline gas exports to China could lead to a massive reduction in China's coal use) whether it was intended or not. However, Russia's goal is not climate change but increased revenue generation.
- The Sino-Russian gas deals will fundamentally affect the regional and global gas trading pattern in the coming years. A string of LNG projects from Australia, Canada and the USA, Russia, and East Africa that are targeting the Asian market will be very seriously affected as China's LNG market will be smaller than the LNG suppliers had expected. If a subsea (the Yellow Sea) pipeline between China and Korea is introduced, it will increase pressure to reduce the Asian LNG premium. Price competitiveness will be the most effective tool to penetrate the Asian gas market. LNG cooperation between Japan and Korea already exists, and consensus on the need for cooperation between Japan, Korea, and China to reduce the Asian LNG premium is being explored. Cooperation at government level could open the door for the establishment of an Asian Gas Consumers' Alliance.

Appendix 1. Central Asia–China Gas Pipeline (CACP)

Turkmenistan–China Gas Pipeline

June 2003	The initial proposal for CACP was presented as the 'Kazakhstan–China gas pipeline', and it was to run alongside the Kazakhstan–China oil pipeline.
April 2006	China and Turkmenistan signed a framework agreement on pipeline construction and long-term gas supply.
June 2007	During his visit to China, Turkmenistan's President Gurbanguly Berdimuhamedow signed an accord to speed up implementation of the Turkmenistan–China gas pipeline project.
July 2007	It was formally announced that Turkmenistan would join the original Kazakhstan–China pipeline project.
August 2007	Construction of the 188 km long Turkmen section of the pipeline began. This section was built by Stroytransgaz, a subsidiary of Gazprom. Main contractors were China Petroleum Pipeline Bureau, China Petroleum Engineering and Construction Corporation, and Zeromax.
During 2008	Turkmengaz and CNPC agreed to boost the pipeline's volume to 40 bcm/y by 2015.
December 2009	The whole pipeline was inaugurated at a ceremony in Saman-Depe during Hu Jintao's visit to Turkmenistan.
November 2011	The limit of 40 bcm/y by 2015 was raised to 65 bcm/y by 2020.
September 2013	President Xi Jinping and President Gurbanguly Berdymukhamedov welcomed completion of the Galkynysh gas field's first phase, and reconfirmed another 25 bcm/y of gas supply from the Galkynysh field.
May 2014	China and Turkmenistan agreed to accelerate imports and brought forward the 65 bcm/y target to 2016.

Uzbekistan–China Gas Pipeline

April 2007	Uzbekistan and China signed an agreement on the construction and exploitation of the pipeline's Uzbekistan section.
June 2008	Construction of the Uzbek section started. A joint venture between Uzbekneftegaz and CNPC (Asia Trans Gas LLC) was formed to build and operate the Central Asia–China gas pipeline on the Turkmenistan–Uzbekistan–Kazakhstan–China route.
August 2014	Uzbekistan and China agreed to set up a JV to build and operate a gas pipeline to China on the Turkmenistan–Uzbekistan–Tajikistan–Kyrgyzstan–China route.

Tajikistan–China Gas Pipeline

December 2012	French Total and China's CNODC (a CNPC subsidiary) signed an agreement with Tethys Petroleum to explore Tethys' Tajik gas assets. The JV aims at commencing deep drilling in 2015.

September 2013	China signed pipeline construction agreements with Turkmenistan and Tajikistan. The 400 km Tajik segment (25 bcm/y capacity) is scheduled to enter operation by the end of 2016. It will boost deliveries of Turkmen gas to China to 65 bcm/y.
October 2013	Tajikistan's Energy and Industry Ministry reported that China plans to invest US$3 bn to build the Tajik segment of the Turkmenistan–Uzbekistan–Tajikistan–Kyrgyzstan–China gas pipeline.
March 2014	CNPC's subsidiary TAGPC (Trans-Asia Gas Pipeline Co. Ltd) signed an agreement with Tajiktransgaz to jointly establish a company to manage construction of Line D; work on the Tajik section was expected to start in 2014.
September 2014	China and Tajikistan began construction of the longest stretch of Beijing's first gas pipeline to run deep into Central Asia.

Kazakhstan–China Gas Pipeline

July 2007	KazMunayGas signed an agreement with CNPC on the principles of future pipeline work.
July 2008	Construction work on the Kazakh section started; the first stage was finished in July 2009. It was built by the Asian Gas Pipeline company, a joint venture between CNPC and KazMunayGas. Main contractors of this section were KazStroyService and China Petroleum Engineering and Construction Corporation.
December 2009	The Kazakh section of the pipeline was inaugurated during the visit of China's President Hu Jintao to Kazakhstan.
June 2010	An agreement was signed between China and Kazakhstan to construct the second phase of the Kazakhstan–China gas pipeline. Phase II (from Beyneu to Shymkent) will be 1,480 km long, with 5–10 bcm/y capacity. It will connect to the Central Asia–China pipeline at Shymkent, and will be connected to WEP II.

Central Asia–China Gas Pipeline (CACP)

- The whole pipeline is about 1,833 km long (188 km in Turkmenistan and 530 kilometres in Uzbekistan). The diameter of the pipeline is 1,067 millimetres (42.0 inches).
- Construction of the first line cost US$7.3 bn. The pipeline project also includes the purification plant at Saman-Depe to remove high sulphur content of natural gas.
- Line C (capacity of 25 bcm/y) began construction in September 2012 and became operational in June 2014; it starts at Gedaim on the Turkmenistan–Uzbekistan border, runs through Uzbekistan and Kazakhstan, and ends at the border town of Khorgos in China's far western Xinjiang province, where it will link up with WEP III.
- It consists of three parallel lines with combined total capacity of 55 bcm/y, which will be reached by 2015.
- According to Lv Jianlong, director of strategy planning at TAGPC, Trunk Line D is expected to be put into operation in 2016. However, in-mid November 2014, Cao Yaming, head of CNPC Central Asia–China Gas Lines Company, reported that Line D was set to complete construction by the end of 2020, with 30 bcm/y of capacity and

US$6.7 billion investment.[129]

- By the end of China's Thirteenth Five Year Plan (2020) the four lines of the CACP will be in a position to supply China with 80 bcm/y of gas.

Source: Interfax, *Russia & CIS Oil and Gas Weekly*, 11–18 June 2014, pp. 44–5; 21–27 August p. 25; 24–30 October 2013, p. 57;
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[129] '中国—中亚天然气管道累计输送天然气突破 1000 亿立方米', Guangming Rebao (光明日报), 15 November 2014.

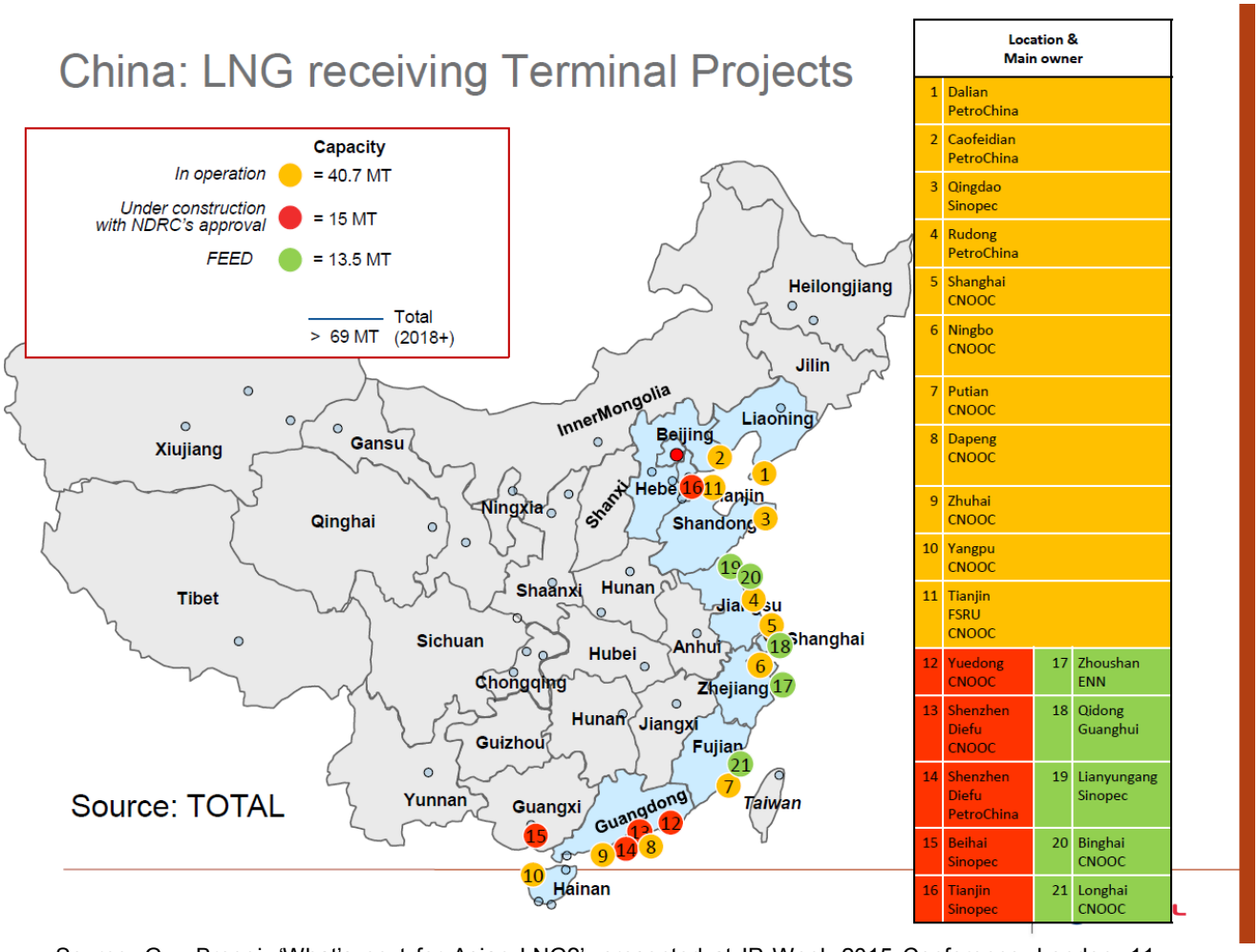
Appendix 2. China's LNG Import projects, as of December 2014

Project	Phase I/II (mt/y)	Operation date	Company	Remarks/LNG Source
Guangdong Dapeng LNG	3.7/3.0	2006/2010	CNOOC (33%), BP (30%)	Operation/NWS, Australia
Fujian Putian LNG	2.6/2.4	2008/2011	CNOOC (60%), FIDCL (40%)	Operation/Tangguh, Indonesia
Shanghai Yangshan LNG	3.0/3.0	2009	CNOOC (45%), Shenergy (55%)	Operation/Petronas, Malaysia
Dalian LNG	3.0/3.0	2011	CNPC (75%), Dalian Port (20%)	Operation/Qatargas IV & Australia
Jiangsu Rudong LNG	3.5/3.0	2011	CNPC (55%), Pacific Oil & Gas Ltd (35%)	Operation/Qatargas IV
Zhejiang Ningbo LNG	3.0/6.0	2012	CNOOC (51%), Zhejiang Energy (29%), Ningbo City Electricity Development Co. (20%)	Operation/Qatargas III
Hebei Tangshan (Caofeidian) LNG	3.5/3.0	2013	CNPC, Beijing Enterprises Group & Hebei Natural Gas Company	Operation/
Guangdong Zhuhai Jinwan LNG	3.0/3.5	2013	CNOOC (30%), Guangdong Yudean Group (25%)	Operation/Qatargas +
Hebei Tianjin FSRU	2.2/3.8	2013	CNOOC	Operation/
Hainan Yangpu LNG	2.0/1.0	2014	CNOOC	Operation/Qatargas
Shandong Qingdao LNG	3.0/3.0	2014	SINOPEC	Operation/PNG LNG
Sub-Total	**32.5–61.8**			
Guangdong Shenzhen Diefu LNG	4.0/??	2015	CNOOC	Under Construction
Jiangsu	3.0/??	2015	SINOPEC	Under Construction

Lianyungang LNG				
Guangxi Tieshan LNG	3.0/3.0	2015	SINOPEC	Under Construction
Hebei Tianjin LNG	3.0/7.0	2016	SINOPEC	Under Construction
Total	**45.5/71.8+**			

Note: FIDCL means Fujian Investment & Development Co Ltd
Source: Paik, *Sino-Russian Oil and Gas Cooperation*, p. 255 & CNPC, CNOOC, SINOPEC websites and various media reports.

Appendix 3. China LNG Terminal Projects



Source: Guy Broggi, 'What's next for Asian LNG?', presented at IP Week 2015 Conference, London, 11 February 2015.