

The Big Deal

On 21 May, China National Petroleum Corporation (CNPC) signed a very large gas purchase contract with Gazprom to bring Russian gas to China via a new eastern route.¹ China's appetite for natural gas is growing, driven by the value of natural gas to the non-power sector as a feedstock, for process heat, and to support opportunities in transportation, as well as to the power sector which has historically not used much natural gas due to higher cost and limited availability.²

In this issue of **TLG on China** we examine this big deal and its impact on the Chinese domestic gas sector.

The Move to the East

Mega deals can take a long time. China had been negotiating with Russia for pipeline gas imports for over a decade. Initially, Russia sought a western pipeline project to bring gas into China from Russia's existing Western Siberian production centre, which would give Russia optionality to divert gas to Europe. China, in contrast preferred an eastern route, closer to its largest gas demand centres and that would commit Russia more firmly to the Chinese market.³ After years of making no progress with Russia, China switched to enter into gas contracts with several Central Asian countries, principally Turkmenistan. The gas is transported via China's major West to East pipeline network, which reaches both Shanghai and Hong Kong, nearly 5,000 kilometres from the China-Kazakhstan border.⁴

¹ The contract is 30 years at a rate of 38 billion cubic meters (bcm) per annum. The contract has take or pay conditions and deliveries are expected by 2018, following construction of the pipeline and associated infrastructure. For comparison, 38 bcm of piped natural gas is equivalent to about 28 million tonnes of LNG. See: CNPC website, http://classic.cnpc.com. cn/News/en/press/newsreleases/201405/20140522_C1584.shtml

² See: Lantau Pique, "Will Large Volumes of Domestic Gas Ever Get into Power", available at http://www.lantaugroup.com/files/pique_sisyphus.pdf

³ A preference is merely a preference. China would have been happy with a western route at the right price, as it fully revealed when it rapidly concluded deals with Central Asian gas suppliers. More importantly, for both parties, China has managed to diversify piped gas access points (east and west) and gas supply sources (Central Asia and Russia). Russia has managed to diversify its customer base (Europe and China) as well as its production centres (east and west). With growing infrastructure interconnectivity, the region has moved one step closer to being able to exploit a widening array of trading opportunities.

⁴ CNPC and Turkmengaz signed a 30-year sale and purchase agreement in 2007 for 30 billion cubic meters per year. This gas has been flowing along pipelines A and B since 2009 and 2010. In 2014, pipeline C will be commissioned and used to bring in additional gas from Central Asia (perhaps 10 bcm per annum from Turkmenistan, 10 bcm per annum from Uzbekistan and 5 bcm per annum from Kazakhstan). In 2011, the then-Chinese president Hu Jintao and Turkmenistan President Gurbanguly Berdymukhamedov signed a heads of agreement for a further 25 billion cubic meters per year of gas which would presumably supply planned pipeline "D". In total, 80 bcm per annum of Central Asian gas could soon be finding its way into China.

Figure 1: Russian Gas Production Centres in East Siberia and the Eastern Route Gas Pipeline Against a backdrop of increased European-Russian tension, Sino-Russian negotiations coalesced around China's preferred eastern route.⁵ The route, as shown in Figure 1 involves development of East Siberian greenfield sites⁶ and the construction of a new 4,000 km pipeline with transportation capacity of 61 bcm per annum to the Far East coast, of which ultimately 38 bcm per year would be used for gas sales to China at Blagoveshchensk beginning from 2018⁷.



Source: Gazprom

As shown in Figure 2, the eastern route brings Russian gas to the Chinese border at a point much closer to the major gas demand centres in Beijing-Tianjin-Hebei compared to gas from Central Asia or the previously considered western route, thus saving on pipeline transportation costs.

How Will the Gas be Used?

Under the new deal, Russian gas will enter northeast China⁸ where it will join up to a planned Chinese pipeline connecting to key gas consuming regions of Beijing-Tianjin-Hebei in the Bohai Bay delta region. The northeast region has easy access to coal and wind power, so that region is unlikely to use more expensive natural gas for power generation. Therefore, we expect gas in northeast China will mainly go to the non-power sector. The amount of gas remains unclear, however. China's northeast heavy industry is not very competitive, with slowing growth and increased dependence on incentives. Switching to higher cost natural gas will pose a challenge, though some gas will need to be used to address air quality concerns arising from of small industrial coal-fired boilers.

⁵ The eastern route is planned to be a 4,000 kilometre unified gas transmission system encompassing the Yakutia and Irkutsk gas production centres designed to supply gas to Russia's Far East and China. It will run in parallel with the Eastern Siberia – Pacific Ocean operational oil pipeline.

⁶ Chayanda and later Kovykta.

⁷ From CNPC news: http://www.cnpc.com.cn/cnpc/tpxw/201405/2540e4e9f73648619928c0 16824fe241.shtml

⁸ Heilongjiang, Jilin and Liaoning.

Figure 2: China Key Backbone Pipelines and Piped Gas Imports



Source: CNPC and TLG research

In contrast, the opportunity for increased gas usage in Bohai Bay Delta region (covering Beijing-Tianjin-Hebei) is much larger. The Bohai Bay Delta region is currently one of the most polluted regions in China (and the world). Environmental initiatives in the region are much more stringent. One key role of the new gas will therefore be to replace small coal furnaces used by industrial users with much more efficient gas-fired combined-heat-and-power (CHP) facilities.⁹ At the same time, Beijing seeks to shutdown nearby coal-fired power generation by 2016 to assist in improving local air quality. Tianjin and Hebei are expected to follow suit. A combination of increased power import (transmission) and new local gas-fired power generation are the two strongest options.

It is worth noting, however, that gas use by the power sector has long been impeded not only by limited gas availability, but also by China's regulation of the prices earned by gas-fired generators when selling power to the grid. Following a recent price hike in January 2014, on-grid gas tariffs in Beijing and Tianjin (except the Binhai Gas power plant¹⁰) were 0.65 Yuan/kWh or US\$ 104/MWh. If we assume that the net effective heat rate for a CCGT plant is 7.5 MMBtu/MWh, then the new on-grid tariff barely covers the short-run marginal cost of generation from a new gas-fired facility at the estimated \$13.7/mmBtu delivered price of Russian gas – meaning that it is either not possible for CNPC to make money selling gas to the power sector, or it is not possible for the power sector to cover the cost of actually building the gas-fired power station. Clearly, further on-grid tariff increases will be needed to support gas use by the power sector, but the timing of such further increases remains unclear.

⁹ For example, the government has stated that all industrial users that use coal furnaces need to switch to gas furnaces in Beijing by 2015.

¹⁰ The on-grid tariff for the Binhai power plant is 0.6879 Yuan/kWh.

Table 1: Upstream and PipelineProjects for Russia's EasternProgram¹¹

In the longer term, China's growing domestic pipeline network will also connect China's new eastern network to China's west-east gas pipelines, creating a more integrated and secure system with broader access to gas-consuming regions throughout China. At the same time, Russia's planned eastern gas development programme is massive, as summarised in Table 1.

	Capacity (bcm per annum)	Expected start-year	Possible CAPEX (\$ bn)	Details	
Upstream projects (key fields)					
Chayanda	25	2017-2018	10	1.2-1.3 trillion cubic meters (tcm) gas reserve.	
Kovykta	30	2022-2023	15	1.5-2 Tcm meter of gas reserve, expected production peak at 25-35 bcma after 2023.	
Kirinskoye	5.5	2013	7	162 bcm gas reserve.	
South Kirinskoye	13.2	2018-2019	unknown	637 bcm estimated gas reserve	
Pipeline					
Power of Siberia (eastern route)	61	2017	37	The total length of the pipeline is 4,000 km and separated into several development phases: (1) 2,000 km connecting Chayanda with Blagoveshchensk; (2) link to Kovykta and expansion of the main part with a 38 bcma spur pipeline to China; (3) building a second pipeline or expanding the existing one to 65 bcma.	
Sakhalin- Khabarovsk-	28	2011	20	The first stage of the pipeline (6 bcm per year) was started in 2011.	

Source: Gazprom news releases; Gazprom annual reports; and various public documents

How is the Gas be Priced?

Although specific pricing details are not publicly available, media and wire services indicate a cost in the range of US\$ 350-400/million cubic metre¹², equivalent to US\$ 9.8-11.2 /MMBtu, a price well below the cost of imported LNG in Asia at present. We estimate the pipeline cost from the Russian border to Beijing-Tianjin-Hebei will be about US\$ 2-2.5/MMBtu, or about half the cost of transporting Central Asian gas to the same region.¹³

Russian gas from the eastern route costs slightly more at the north-eastern Chinese border than does Central Asian gas at the corresponding western China border. Transportation costs make all the difference as shown in Figure 3. Notably, the fixed component (transportation costs) of Russian gas from the eastern route to China's coastal cities is lower than that of Central Asian gas. Consequently, a greater proportion of the delivered cost of Russian gas from the east is sensitive to oil price fluctuations than that of Central Asia gas from the west. If oil prices fall, China will even more strongly prefer Russian gas from the east. And if oil prices rise, gas from Central Asia will relatively become more attractive. Someday, trading arrangements that enable these differences to be exploited over time (assuming sufficient contractual flexibility) will make sense for China.

¹¹ Gazprom also plans to build two 5 million tonnes per annum (mtpa) LNG trains in Vladivostok for exporting LNG to Asia. The LNG project is scheduled to start in 2018-2020, but it seems more likely to be delayed to post-2020 as it waits for gas from Power of Siberia or from Sakhalin Island.

¹² The price range that the media quoted is likely based on Brent price of US\$ 100/barrel, and the settlement currency is likely to be US dollar.

¹³ Indeed, it is less than half of the distance from the border at Blagoveshchensk to Beijing-Tianjin-Hebei compared to the distance from Xinjiang to Shanghai.

Figure 3: Comparison of Estimated Russian and Central Asian Gas Cost to Demand Centres



Source: TLG analysis

What Was China's Alternative?

Without Russian gas imports, the incremental gas needed for Northeast China and the Beijing-Tianjin-Hebei region would likely have required increased LNG imports. At current prevailing long-term Asian LNG market prices, the delivered price of imported Russian gas is lower than that of regasified incremental LNG imports (Figure 4).¹⁴

In fact, the delivered price of imported eastern Russian gas, including the domestic gas pipeline tariff, is slightly lower than the regulated city gate prices for incremental gas supply¹⁵ to Northeast China of US\$13/MMBtu and to Beijing-Tianjin-Hebei of \$14/MMBtu (Figure 5). It appears CNPC will not make a loss selling its new Russian gas, but neither will it make much profit, at least not until domestic gas prices increase further or the Chinese Yuan appreciates significantly relative to the US dollar.

¹⁴ Assuming Brent at US\$ 100 bbl, a slope of 13.5, shipping from Australia of US\$ 0.85 mmbtu, and a regasification charge of US\$ 1 mmbtu.

¹⁵ Currently, China has a two-tiered gas system: legacy gas (defined as 2012 consumption volume of 112 billion cubic metres) and incremental gas (for both incremental domestic supply and pipeline imports). The city gate price of the incremental gas is a weighted average of 60 percent fuel oil import price and 40 percent of LPG import price with 15 percent discount and the prices for different provinces in July 2013 are listed in Figure 6. For the legacy gas, the average price is currently about 40 percent below the incremental gas, and the Chinese government stated that it would increase the legacy gas price gradually over the next few years until it is in line with the price defined for incremental volumes.

Figure 4: Comparison of Estimated Russian Gas and LNG Cost at Coastal Cities



Source: TLG analysis

Figure 5: City Gas Prices for Incremental Gas Supply Under New Gas Pricing Mechanism Rolled Out in July 2013



Source: NDRC and TLG research

Summary

The Russian gas deal is big as far as deals go, but it is still small in the broader context of what is needed to develop more effective gas markets and greater gas supply in China and Asia. Natural gas from any new source in China is relatively expensive. Even the attractive cost of Russian gas is only slightly below LNG import costs once transportation is factored in. Given that the deal is not very profitable for Petrochina (at least not without further gas price increases in China), it also raises the question of whether it will simply push back further development of local shale gas until pricing arrangements are more supportive. After all, if China's shale gas resources could be developed at a materially lower cost than the Russian gas, then arguably it would have been more sensible to push that development more aggressively. So far, China's shale gas development is limited to a relatively few wells and an overall gas development ecosystem that shares almost nothing in common with the successful US shale gas development experience.

China's gas comes from an increasingly diverse array of sources, each with different pricing and contractual terms and different degrees of linkage to oil prices. As global oil markets change, the relative cost of sourcing gas from the east or the west in China will also change. It will be interesting to watch what pressures begin to form to support more flexible trading arrangements.

The Russian gas deal is a mega deal, but it is probably not signalling a new age of gas in China. A new age of gas in China will not be ushered in by a single deal, however large, but by a comprehensive set of reforms that still appear years away.

About TLG

TLG team and network of affiliates provide expert economic and commercial consulting services to businesses and governments throughout the Asia Pacific region. We have deep expertise in the energy and infrastructure sectors, in regulatory economics and competition, and in commercial opportunity assessment.

Our clients engage us on a wide range of matters ranging from assistance with business planning, regulatory economics, complex financial modeling, asset and contract valuation and the provision of expert testimony and analysis in disputes.

About the Authors

Liutong Zhang

Consultant Izhang@lantaugroup.com +852 9220 9270

Dr Xinmin Hu

Manager xhu@lantaugroup.com +852 9381 6938

Neil Semple

Consultant nsemple@lantaugroup.com +852 9163 1962

Mike Thomas

Partner mthomas@lantaugroup.com +852 9226 2513 Liutong is an expert in the oil and gas sectors and how these sectors affect the economics of power generation throughout Asia. He has extensive experience analyzing the dynamics of international fuel-linked energy markets such as Singapore and the Philippines, as well as the many regulated and transitional markets elsewhere in Asia. He joined TLG from FACTS Global Energy (FGE) in Singapore, where for over three years he advised international oil companies, national oil companies, traders, institutional financial institutions, private investors and government clients on issues such as gas/LNG sourcing strategies, investment due diligence, and energy demand and price forecasting. Liutong holds a Bachelor of Chemical Engineering with first class honours from the National University of Singapore (NUS). He is fluent in English and Mandarin.

Xinmin is an expert in the Chinese power sector and energy economics having advised clients on generation, transmission and energy supply issues as well as regulatory developments and cost trends. He is a former lecturer at Jilin University in Changchun and at Zhongshan University in Guangzhou. He combines his knowledge of China's power sector with over a decade of experience as a consultant in the Australian and other power markets and as an associate director of RepuTex (AU) focusing on environmental and greenhouse gas emission issues. He is a regular reviewer for several international energy, operations research and optimization journals. He holds a PhD in operations research with a minor in economics from the University of Melbourne and an MSc in Applied Mathematics from Jilin University of Technology, China. Xinmin is fluent in both English and Mandarin.

Neil brings over twelve years' experience as an advisor to gas and power stakeholders. For gas companies he has prepared gas monetization plans and strategies, assessed competition between piped gas and LNG, developed LNG terminal regasification tariff mechanisms, and analysed a wide variety of small and large gas-supply opportunities and applications, including transport. For power companies, he has advised on LNG vs piped gas and other fuel sources, and on the economics of various forms of electricity generation in merchant and non-merchant markets. Neil has an MA in economics from the University of Aberdeen, UK.

Mike has advised energy sector stakeholders on sensitive regulatory, commercial, and strategic matters for over 25 years. He is an expert in the rigorous analysis of energy sector decisions including: how or whether to regulate; how and when to rely on market forces; and what value to place on opportunities and risks. Prior to co-founding The Lantau Group in 2010, he headed the Asia Pacific Energy & Environment practice of a global consulting firm. Mike has an MPP from Harvard Kennedy School and a BA in economics from Carleton College.

Subscribe

Newsletters like this will be available monthly for future China power and gas service subscribers and TLG clients.

For more information, please contact Dr Xinmin Hu at **TLGonChina@lantaugroup.com**

Disclaimer:

This newsletter has been prepared for general information only. It is not meant to provide consulting advice and should not be acted upon without professional advice. If you have questions or require further information regarding these or related matters, please contact the author or your regular TLG advisor. This material may be considered advertising.

TLG on China ©The Lantau Group (HK) Limited Cover image ©imagestock/SSSCCC

For more information about The Lantau Group, please visit www.lantaugroup.com