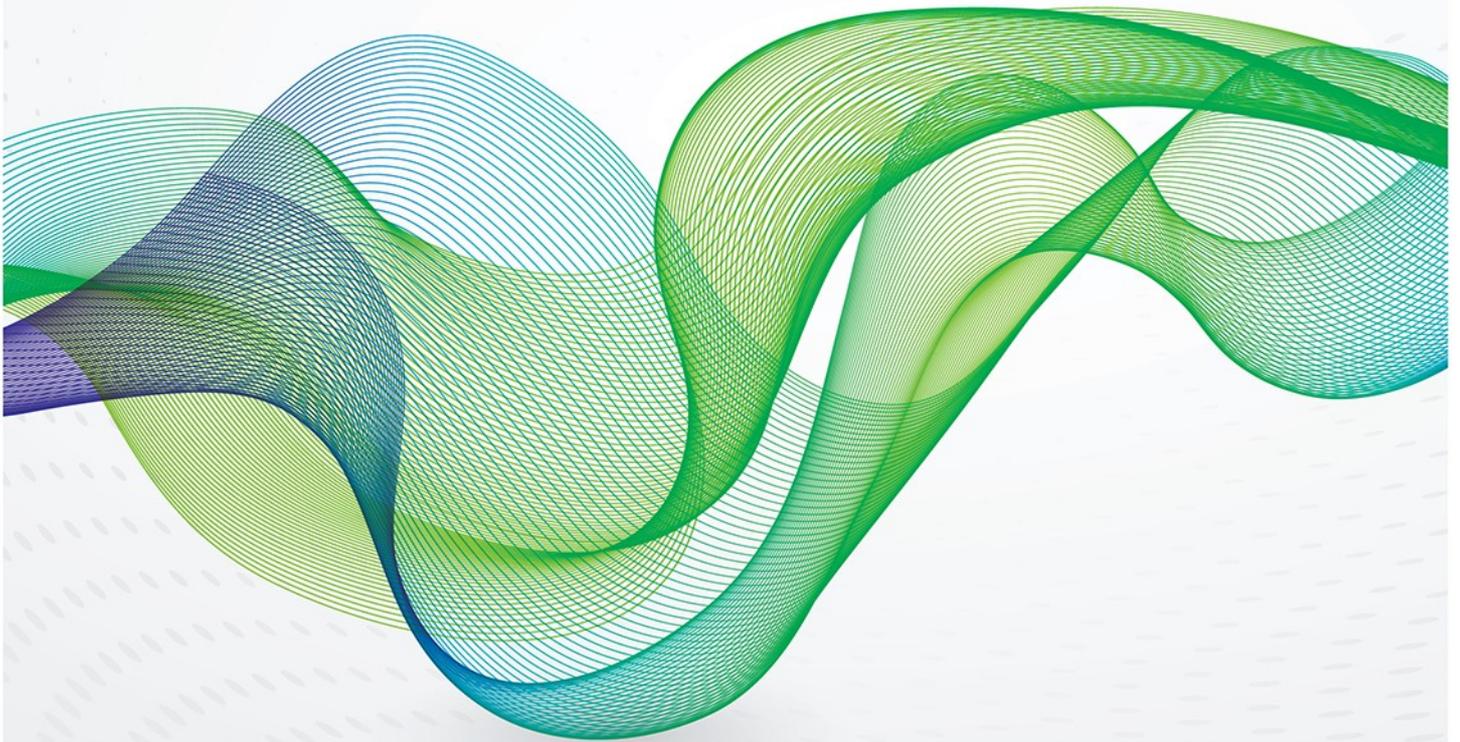
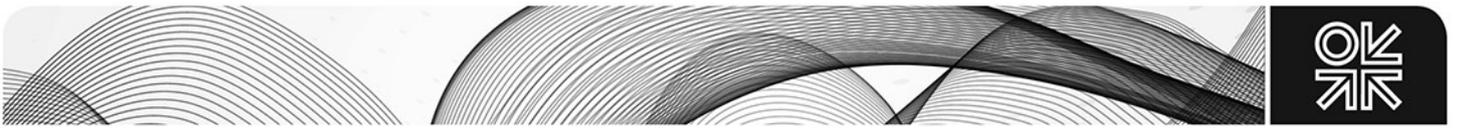


February 2014

# The Potential Impact on Asia Gas Markets of Russia's Eastern Gas Strategy





## Introduction

Russia possesses the potential to produce significant gas from its Eastern Regions, with total proved reserves in East Siberia and the Far East of Russia standing at 5 trillion cubic metres (Tcm) while prospective resources could be as large as 65Tcm.<sup>1</sup> This would appear to give Russia a huge opportunity for export sales into the Asia Pacific region, which contains the world's largest LNG importing nations and two of the world's fastest growing gas markets in China and India (also importers of LNG).<sup>2</sup> It is surprising, therefore, that despite the obvious commercial logic of linking enormous gas resources to expanding consumption centres, to date Russia's only significant exports in the region are from the Sakhalin 2 project, which currently sells 10.8mt (14.6 Bcm) of LNG per annum into the neighbouring Asian markets.<sup>3</sup> However, it is possible this situation could change significantly over the next five to ten years as Russia attempts to re-focus its Asian efforts with plans for potential sales of piped gas and LNG. A number of key uncertainties remain, though: will Russia finally sign a gas export contract with China; will Gazprom as a result remain the dominant player, or will its domestic competitors Rosneft and Novatek take on a more prominent role? If the latter is the case, will Russia's eastern strategy be driven by LNG alone, implying much lower volumes of exports into Asia; and finally, is it possible that Russia may miss this opportunity altogether, either as a result of political delay or failure to price gas competitively from these new projects? We briefly discuss these issues below and assess the potential consequences for the Asian gas market.

### *Russia has a number of projects to support its Eastern strategy*

The Russian Energy Strategy to 2030, published in 2009, emphasized that the future growth of the country's gas industry would be focused to the East, with exports expected to rise to around 75Bcm by 2030, equivalent to one quarter of the country's total.<sup>4</sup> It was anticipated that Gazprom, with its monopoly over piped gas exports, would be the leading player, in particular because, during the 2000s, it acquired the vast majority of the gas assets in East Russia. Its major fields include the Sakhalin 2 project, dedicated to LNG, and also the Chayanda and Kovykta fields in East Siberia, which are planned to provide the gas for Russia's extensive Eastern Gas Programme.<sup>5</sup> This Programme has both a domestic and export agenda, being seen by the Kremlin as the basis for the development of infrastructure and gas supply in Russia's Far East, a region of huge geo-political

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<sup>1</sup> Data from Gazprom Presentation 'Gazprom in Eastern Russia', June 2013, <http://www.gazprom.com/press/conference/2013/asia-pacific/>

<sup>2</sup> IEA (2013), p.103.

<sup>3</sup> Interfax, 27 Dec 2013, "Gas production in Russia".

<sup>4</sup> Henderson (2011), p.21.

<sup>5</sup> See <http://www.gazprom.com/about/production/projects/east-program/>, accessed on 28 Jan 2014

significance because of its proximity to China but also one of economic and population decline in the post-Soviet era. Development of the gas industry is regarded as one catalyst for regeneration, but the huge expenditure on new fields and pipes can only be commercially justified if export revenues can also be generated, implying a need for significant sales to China to underpin this venture.

The Chayanda field contains an estimated 1.3Tcm of reserves, with the potential to produce 25 billion cubic metres per annum (Bcma) of gas, and is due to be brought onstream in 2018, while Kovykta has a larger 1.5Tcm of reserves and a production capacity of 35Bcma, but is not due to begin production until 2022.<sup>6</sup> The combined output of these two fields would fill the planned “Power of Siberia” pipeline, which would run for approximately 3,500 kilometres from East Siberia to the Pacific Coast, with a spur pipeline down into NE China at the border point of Blagoveshchensk. This spur would carry 38Bcm of gas into China, while the remainder of the gas would be split between the domestic market and a 10-15mt LNG facility that is planned to be built at Vladivostok.<sup>7</sup>

**Map 1: The Power of Siberia Pipeline**



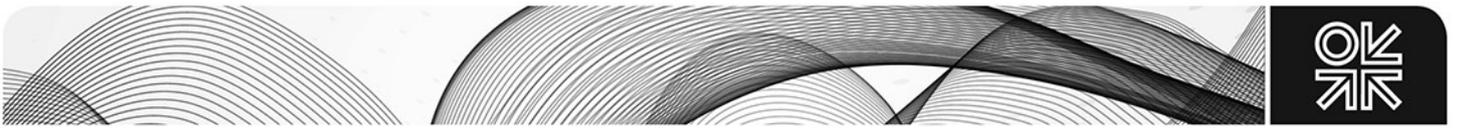
Source: “The Russian Gas Matrix: How Markets Are Driving Change”, Henderson & Pirani eds, OIES, forthcoming 2014

However, the negotiations around the viability of this whole eastern scheme, which has a total cost estimated at \$80-90 billion,<sup>8</sup> encapsulate the dilemmas that Russia, and in particular Gazprom, are facing in the East. Negotiations with China over the 38Bcm of gas exports via the spur pipeline have

<sup>6</sup> See Henderson and Pirani (eds), (2014 forthcoming), Chapter 12

<sup>7</sup> See <http://www.gazprom.com/about/production/projects/pipelines/ykv/>, accessed on 28 Jan 2014

<sup>8</sup> See Henderson and Pirani (eds), (2014 forthcoming), Chapter 8



dragged on for over a decade, with this eastern route only being accepted as the preferred option in 2011 after years of debate over the Russian preference for a western route from West Siberia.<sup>9</sup> However, after numerous rounds of negotiations it now appears that the direction, volume and even the majority of the contract terms have been agreed, with one major proviso that the base price remains under negotiation.<sup>10</sup> During 2013 Gazprom promised a conclusion of a deal in June, then by year end, then by the end of January 2014 and most recently has suggested that a final agreement will be reached when President Putin visits Beijing in May 2014.<sup>11</sup> Reports in early 2014 suggested that Gazprom and CNPC were getting closer to agreeing a base price, with a range of \$10-11/mmbtu at the Russian border being mentioned.<sup>12</sup> Our analysis would suggest that at \$10/mmbtu both parties can be satisfied: Gazprom would make an adequate return and CNPC would receive gas whose cost-reflective price at the Chinese eastern seaboard would broadly equal that of imports arriving by pipe from Central Asia.<sup>13</sup> Furthermore, gas priced at this level would be competitive with prospective LNG imports from other global suppliers (see Figure 1).

However, during 2013, press reports suggested that two further elements had entered the negotiations: the request from the Chinese side that some element of Henry Hub (US) prices should be included in the indexation (to reflect future LNG prices) and, more importantly, that the Russian side had requested a substantial loan (a figure of \$25bn was mentioned) from the Chinese side. From the Chinese side, a loan of this magnitude would almost certainly only be forthcoming in exchange for equity in (particularly) the upstream part of the project, which would require additional time to negotiate. Whether Gazprom could finance the entire \$80bn Power of Siberia and VLNG investment in the absence of such a loan must be questionable.

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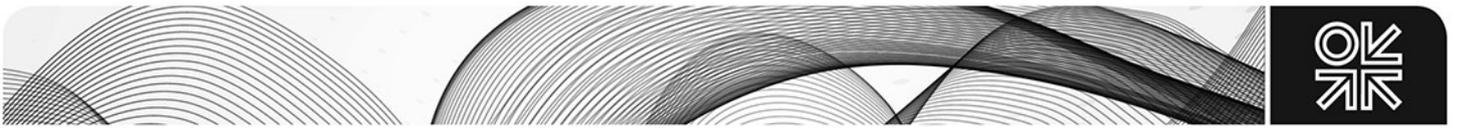
<sup>9</sup> For a history of the negotiations from both the Russian and Chinese sides see Paik (2012).

<sup>10</sup> The base price – or  $P_0$  – is the figure to which indexation to other energy (including gas) price movements is applied over the duration of the contract.

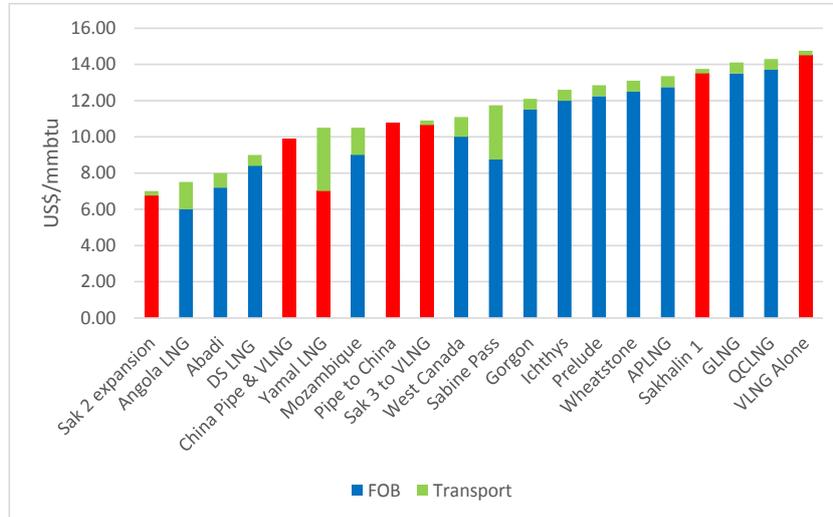
<sup>11</sup> Interfax, 22 Jan 2014, "Gazprom, CNPC earmark Putin's May visit to China for gas contract signing"

<sup>12</sup> For example Financial Times, 5 Jan 2014, "Gazprom close to agreeing gas pricing deal with China"

<sup>13</sup> Stern, (2013) pp.199-210.



**Figure 1: Comparison of Russian gas export projects with other global gas supplies to Asia**



Source: Authors' estimates, Skolkovo Energy Centre (2013)

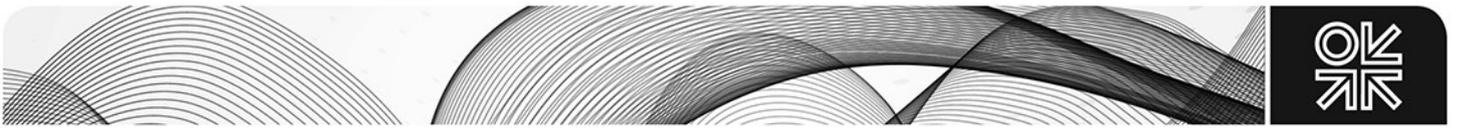
The continued delay in reaching a final agreement with China has undermined Gazprom's entire strategy in the East. The Vladivostok LNG (VLNG) scheme was first introduced in 2011 as a means to provide an alternative outlet for the company's East Siberian gas, in order to create bargaining strength in the negotiations with China, mirroring Rosneft's tactics with its eastern oil sales via the ESPO<sup>14</sup> oil pipeline, which are sent to China and the Pacific coast.<sup>15</sup> Unfortunately, Gazprom's tactic has been undermined by the fact that the profitability of VLNG is negative at LNG prices below \$15/MMBtu if it is a stand-alone project at the end of a 3,500km pipeline (see Figure 2). As a result the company had to come up with an alternative source of gas supply in the event the China negotiations fail completely. This alternative source is gas from its Sakhalin 3 licence, where almost 600 Bcm of gas has already been discovered and where further reserve upgrades are anticipated in March 2014.<sup>16</sup> Gas from the Kirinskoye and South Kirinskoye fields could flow south to Vladivostok via the recently constructed Sakhalin-Khabarovsk-Vladivostok (SKV) pipeline, justifying the huge \$16 billion cost of this 1,800km pipeline; in 2013 only 2.2 Bcm flowed through the pipeline to domestic customers in Primorye and Khabarovsk.<sup>17</sup> Up to 30 Bcma could flow south, enough to satisfy a 15mmt LNG plant as well as domestic demand in the region. However, the apparent logic of this move is

<sup>14</sup> ESPO is the acronym for the East Siberian Pacific Ocean pipeline which runs from Taishet in the Irkutsk region of Russia to the Pacific coast at Kozmino Bay near Vladivostok, with a spur line also running to China from the Russian town of Skovorodino in East Siberia

<sup>15</sup> See <http://www.gazprom.com/about/production/projects/vladivostok-lng/>, accessed 28 Jan 2014

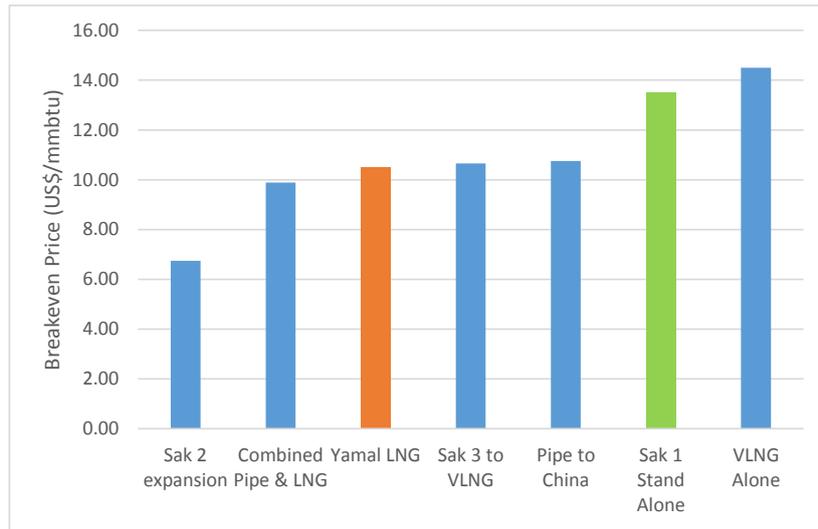
<sup>16</sup> Interfax, 17 Dec 2013, "Gazprom expects major oil and gas reserves growth at South Kirinskoye field"

<sup>17</sup> <http://www.osw.waw.pl/en/publikacje/analyses/2011-05-18/russian-gazprom-reveals-costs-its-gas-pipeline-investments>, accessed 28 Jan 2014. Capacity utilisation on Sakhalin-Khabarovsk-Vladivostok gas pipeline rises to 36% in 2013, *Interfax Russia and CIS Oil and Gas Weekly*, January 23-29, 2014, p.34.



itself undermined by the fact that an alternative, and more cost effective, use of Sakhalin 3 gas would be via the expansion of the Sakhalin 2 liquefaction facilities on Sakhalin Island (see Figure 2), bringing into question the entire logic of Gazprom’s eastern LNG strategy.

**Figure 2: Comparative economics of Russia’s eastern gas export projects**

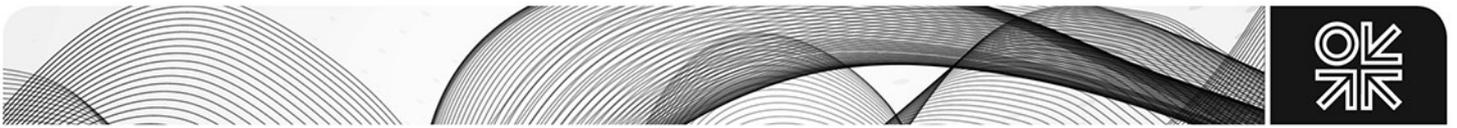


Source: Authors’ estimates

Potential customers have recognised the inconsistencies in Gazprom’s plans with the Japanese consortium, which are prospective investors in VLNG, unwilling to commit to the project while the source of its gas remains uncertain. An additional issue is that the offshore Sakhalin fields carry significant development risk with Gazprom as operator given its lack of offshore experience. As a result, the importance of Gazprom signing an export deal with China to underwrite the Power of Siberia, and by default the VLNG scheme, is becoming increasingly clear. If the entire project can go ahead then our estimate that the overall average break-even price of the gas exported will be \$10/mmbtu, allowing it to compete via pipe or LNG, but the ultimate outcome will depend upon Gazprom’s marketing strategy in its negotiations with CNPC and with customers for its potential LNG. Gazprom’s failure to conclude any new deals to date has left the Russian government concerned that it could miss the Asian opportunity altogether, given the number of other LNG supply options that will potentially be available by 2020, when the majority of Russia’s gas would realistically reach the Asian market.<sup>18</sup> As a result it has made the very significant decision to end Gazprom’s monopoly over LNG exports in order to encourage third party producers to help increase supply.<sup>19</sup> The monopoly legislation has been rewritten in such a way as to mean that in reality only two companies, Rosneft

<sup>18</sup> See IEA (2013a), p.181.

<sup>19</sup> Reuters, 30 Oct 2013, “Russian government passes law to open up LNG exports”.



and Novatek, have projects which qualify, but one of these projects, Novatek's Yamal LNG scheme, will be Russia's next, and ultimately largest, LNG export project. The project is based around the 900 Bcm South Tambey field on the Yamal peninsula, and will comprise three 5.5mt trains for a total ultimate capacity of 16.5mt.<sup>20</sup> The scheduled start date for the project is early 2017, but given the likely technical difficulties of operating in such a harsh environment it would be no surprise if this was delayed by up to a year, but nevertheless it is likely to come online before any new Gazprom projects. However, the northern location means that the Asian market is difficult to access in the winter months, other than by a very long route via the Suez canal, so it is likely that a maximum of only half the total output will reach eastern markets. CNPC has become a 20% partner in the project and will take at least 3.0mtpa of LNG, but the European market will also provide demand as evidenced by a recent 2.5mtpa contract signed with Gas Natural of Spain.<sup>21</sup>

The total project cost for Yamal LNG is likely to be in the \$25-30 billion range, but the commercial viability of the project has been underwritten by significant tax breaks and also by government support in the construction of port facilities and other infrastructure, underlining how keen the Kremlin is to encourage new Russian projects even if they do not belong to Gazprom. As a result the breakeven price of the gas arriving in Asia is estimated by the authors at around \$10-11/mmbtu, making it competitive even with new US LNG export projects at a Henry Hub price of \$5/mmbtu (see Figure 2). Yamal LNG provides clear evidence of commercial competition for Gazprom in Asia, as it has already signed a contract with CNPC, the company with which Gazprom is also negotiating. However, a greater long-term threat may come from Rosneft, even though its Sakhalin 1 scheme is smaller and less commercially robust. Rosneft and Exxon, the main partners at Sakhalin 1, have been trying to export the project's gas for the best part of a decade, but have been thwarted by Gazprom's refusal to countenance anything other than domestic sales. Rosneft CEO Igor Sechin, a hugely influential figure in the Russian energy industry and a close affiliate of President Putin, was therefore not surprisingly one of the main proponents of the ending of the LNG monopoly, and has proposed a stand-alone 5mt LNG project based around Sakhalin 1's 8Bcma of gas production.<sup>22</sup>

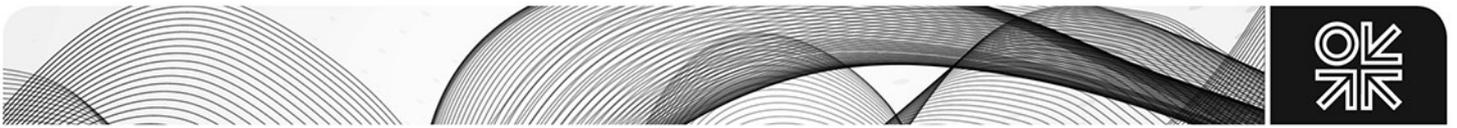
The cost of the project, estimated at \$15 billion, means that it will produce relatively high cost LNG, with a breakeven price of around \$13.50/mmbtu in Asia, and as a result it is not the most commercial solution for Russia, but its significance is more in the political outcome that it may catalyse if Gazprom continues to fail in its own projects. Rosneft has already secured preliminary agreements for all 5mtpa of potential output from the project, and has suggested a first production target of 2019, meaning that

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<sup>20</sup> Novatek, Nov 2013, "Russia's Natural Gas Frontiers", Slide 18.

<sup>21</sup> Novatek press release, 31 Oct 2013, "Yamal LNG and Gas Natural Fenosa sign long-term contract".

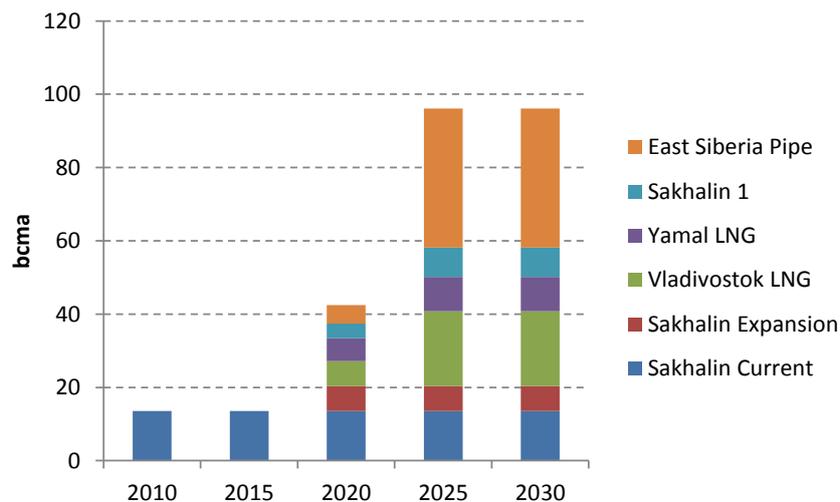
<sup>22</sup> Bloomberg, 11 April 2013, "Rosneft, Exxon weigh \$15 billion LNG project to vie with Gazprom".



it too could export new Russian LNG before Gazprom.<sup>23</sup> It is possible, if Gazprom continues to delay, that Rosneft could start to promote itself as a possible leader for Russia’s entire eastern gas strategy, having demonstrated its capabilities in the oil sector and now moving gradually into LNG exports. This is not a likely outcome, and would certainly imply a further delay in Russia’s overall eastern export plans. It is however possible, and would certainly tie in with Rosneft’s significant plans in the gas sector, although it again largely relates to Gazprom’s ability, or lack of it, to conclude a deal with CNPC for piped export sales to China.

The potential for Russia’s gas exports to Asia therefore covers a wide range of outcomes, largely hinging on the conclusion (or otherwise) of a pipeline contract with China. In the event that a deal is signed in 2014 it remains possible that the first piped gas could arrive in China in late 2019, with sales rising to a peak of 38Bcm sometime in the early to mid-2020s. On roughly the same timescale first LNG could also leave a new Vladivostok liquefaction plant, with train one starting up in 2019 and with train two perhaps a year later. Train 3, taking the plant to its full capacity of 15mt, could then arrive in the mid-2020s according to market conditions. Some Sakhalin 3 gas might be used to supply initial gas to VLNG, but it is likely that the license would have more than sufficient gas to also supply a one train expansion at Sakhalin 2. Indeed, after the expected reserve upgrade announcement in March 2014 this may be achievable in any case, and an earlier expansion of Sakhalin 2 to a capacity of 15mtpa prior to the construction of VLNG is possible. Overall, then, Gazprom projects could be selling around 30Bcm to Asia in 2020 and as much as 95Bcm by 2025 (see Figure 3).

**Figure 3: Russia’s potential gas exports to Asia (optimistic case)**



Source: Authors’ estimates

<sup>23</sup> Reuters, 21 June 2013, “Vitol signs preliminary LNG contract with Rosneft”.

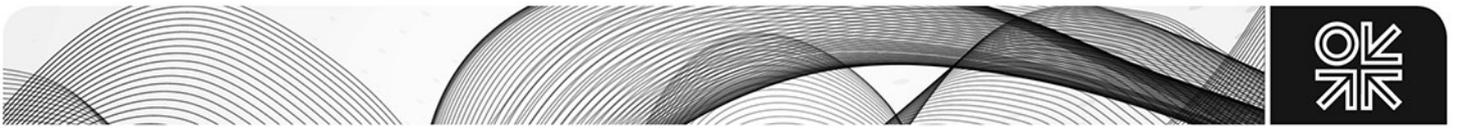
In this Gazprom-dominated scenario, Novatek's Yamal LNG project would still proceed, and on the current project timetable could have reached its full capacity of 16.5mtpa by 2020. Of this total it is realistic to expect that LNG could be delivered to Asia for five months of the year, implying ultimate sales of around 7mtpa. It is also worth noting that Novatek has a second LNG project under consideration, supplied by gas from its neighbouring Gydan Peninsula assets, but this project is at a very early stage and not included in Figure 3. Rosneft's Sakhalin 1 project is less certain than Yamal LNG, given its more marginal economics, but is still a possible producer before 2020 given Rosneft's overall gas ambitions and its stated timetable for the project of first LNG by 2019. But it is possible that a successful Asian outcome for Gazprom could dampen Rosneft's enthusiasm for the region, implying some doubt about the future of Sakhalin 1 as a gas export project given its high cost.

However, a perfectly feasible alternative outcome could see Putin's May 2014 discussions in Beijing again fail to produce a positive outcome for a number of reasons. Gazprom may continue to insist that a high price (up to \$12/mmbtu) is needed to justify its project economics, arguing that China's rising gas demand and the uncertainty and potential cost of its alternative supplies mean that the high price for Russian gas is justified. Alternatively China may continue to pursue its recent line that it can afford to wait, given the diversified portfolio of supply options that it has been building and also arguing, with some justification, that Russia's East Siberia gas is effectively stranded with no alternative market but China. In this case it is possible to conceive of further delay and the possibility that the idea of a piped gas deal collapses altogether.

In this scenario Russia's entire eastern gas strategy becomes focused on LNG. Yamal LNG would proceed as discussed above, and Rosneft would be more highly incentivised to progress the Sakhalin 1 project as a demonstration to the Kremlin that it could become a major player in the gas export market, with possible ambitions to dominate in the Russian East. Gazprom would be left with its existing Sakhalin 2 project and the possibility of VLNG, sourced from Sakhalin 3. In this scenario it is less likely that the company would use Sakhalin 3 for both a Sakhalin 2 expansion and a full 15mt VLNG project, with the logical outcome being the Sakhalin expansion project and a smaller VLNG. However, the total volume in terms of LNG would be the same, 15mt of extra capacity from three new trains to add to the two existing trains at Sakhalin 2. In a worst case scenario, the VLNG project could collapse altogether if the current Japanese partners are no longer convinced of its viability.

### ***The Potential Impact on Asian Gas and LNG Markets***

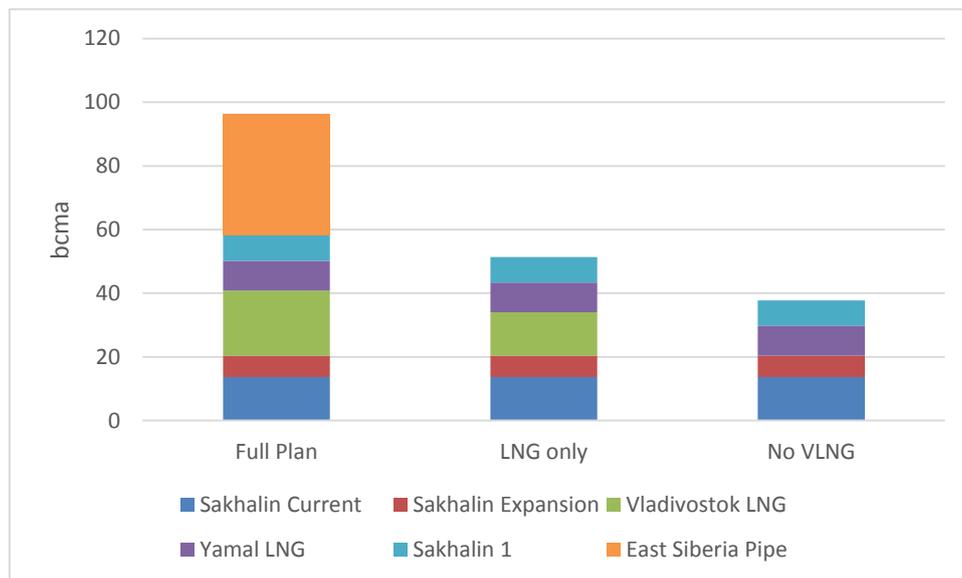
Three potential outcomes for Russian gas exports to Asia are shown in Figure 4. In the most optimistic case Russia is selling just under 100Bcm by 2025. However, in the most pessimistic case,



where there is no pipeline to China and the VLNG concept fails altogether, this falls to only 38Bcm. Clearly these outcomes are of substantial significance for the Russian government and companies, and for Asian countries, both in terms of volumes but also timing.

Around the end of the 2010s and the beginning of the 2020s, large numbers of LNG export projects are planned to commence operation from a number of different sources but notably Australia, East Africa (Mozambique and Tanzania) and North America (US and Canada). A great deal of speculation surrounds how many, and which, of these projects will go ahead and on what timescale. From the perspective of exporters there is urgency to sign contracts in order to be ahead of other projects in what may become a very competitive market in the 2020s. From the perspective of importers there is urgency to reduce the price of LNG imports from extremely high levels in the early 2010s – both in absolute terms and in relation to European and (particularly) US markets – due to the Japan Crude Cocktail (JCC) mechanism which has historically dominated Asian LNG pricing. Other OIES research has suggested that the Pacific LNG market has reached a turning point in relation to LNG pricing, with the JCC likely to be replaced by different price formation mechanisms and eventually by hub prices.<sup>24</sup>

**Figure 4: Comparison of potential Russian gas export scenarios to Asia (2025 estimate)**



Source: Authors' estimates

Due to price uncertainty, the next decade will therefore be a period of difficult commercial transition in Asian LNG markets, particularly for projects under construction and new high cost projects shown in

<sup>24</sup> Rogers and Stern (2014).

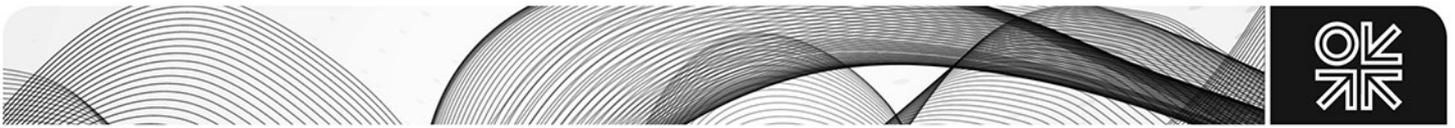
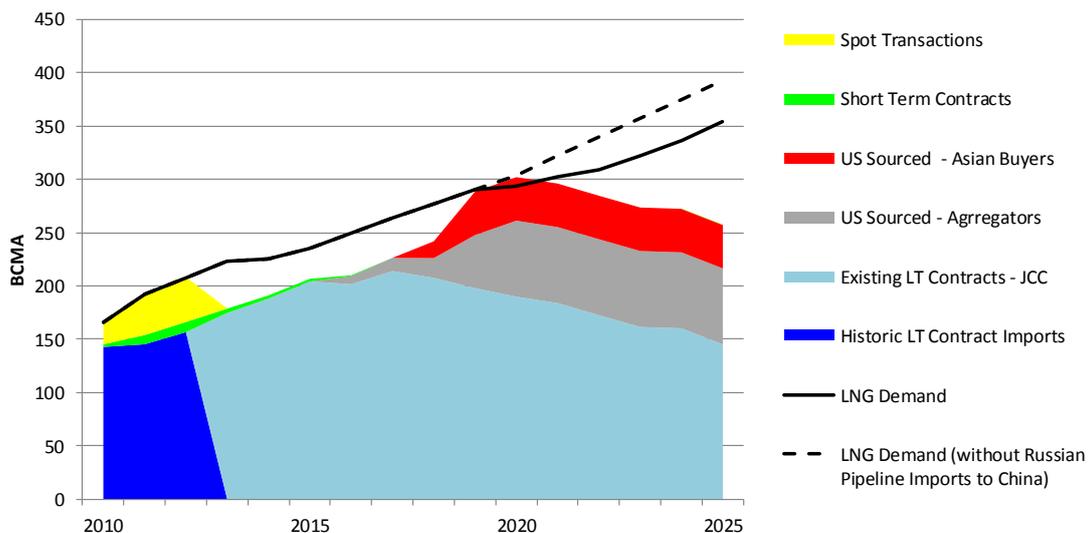


Figure 1. This is mixed news for Russian export projects to Asia with the Sakhalin 2 expansion being a low cost option, certainly in comparison to a stand-alone Sakhalin 1 project which is shown in Figure 2 at the high end of the cost curve. For the other projects, the crucial judgement is that a pipeline to China makes VLNG a cost-competitive project. Without the pipeline, VLNG is at the top of the cost curve unless it is using Sakhalin 3 gas which would be possible, but would leave the majority of Eastern Siberian gas as a stranded resource. This means that an export pipeline to China is critical both for unlocking stranded Russian gas resources, delivering the domestic and export aspirations of the Eastern Gas Programme; and for providing Asia with a substantial additional source of supply which would help to create competition among suppliers. Without a pipeline contract to China, Russian exports to Asia will only reach a third to a half of their potential by 2025.

Figure 5 shows a projection of already contracted supply and possible demand for LNG in Asia drawn from other OIES research. This illustrates a number of important points. For about 5 years starting in 2014 there is contestable demand which is likely to be filled by short term and spot LNG; it is unlikely that any project which has not yet started construction will contribute supply prior to 2019. For a short period post-2019 there is likely to be over-supply in Asia which would be prolonged by the start of Russian pipeline exports to China. But also, because Figure 5 does not include any projects which have not yet signed contracts or started construction, it is clear that the early 2020s could be a very competitive period for LNG supplies to Asia. There will be only a modest requirement for additional LNG (particularly if the China-Russia pipeline contract is signed), and (as mentioned earlier) projects from Australia, East Africa, North America and probably elsewhere, competing for that demand.

**Figure 5: LNG Supplied to Asia by Contract Category 2010 – 2012 and Illustrative Contestable Demand to 2025, including US LNG Projects**



Source: Rogers and Stern (2014, figure 22).



### ***2014 – year of decision for Russian gas exports to Asia?***

By way of a conclusion, our judgement is that – on balance – there is a strong likelihood that CNPC and Gazprom (and their governments) will reach agreement on a pipeline export contract in 2014, but there is no guarantee; and agreement may require most of the year to achieve. If we are correct then we would expect substantial pipeline exports to commence by 2020 and LNG exports from Vladivostok shortly thereafter. If we are wrong, then the consequences may be more fundamental than simply prolonging the negotiations into 2015. This is because Chinese gas requirements may dictate the need to arrange for alternative gas imports for the early 2020s.<sup>25</sup> From the Russian side, governmental and presidential confidence in, and patience with, Gazprom's ability to conclude a China deal may be exhausted and create pressures for a reconfiguration of asset ownership and transfer of negotiations to other Russian parties, specifically Rosneft and Novatek. However, this would require several more years and once again delay Russia achieving its potential as a major supplier of gas to Asia.

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<sup>25</sup> Chinese gas requirements in the early 2020s are discussed in Rogers and Stern (2014), pp.33-34.



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