



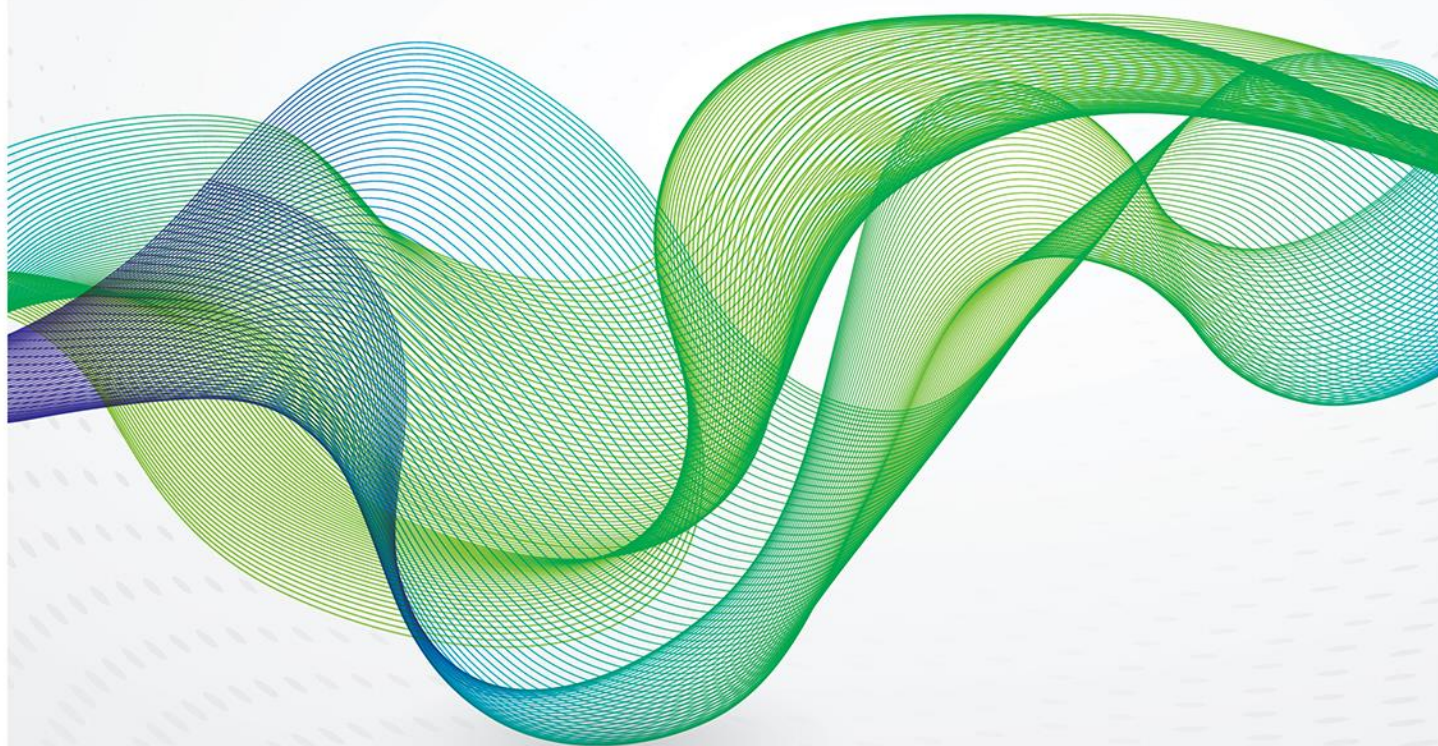
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Russian LNG: Becoming a Global Force



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James Henderson Director, Natural Gas Research Programme,
Vitaly Yermakov Senior Research Fellow, OIES



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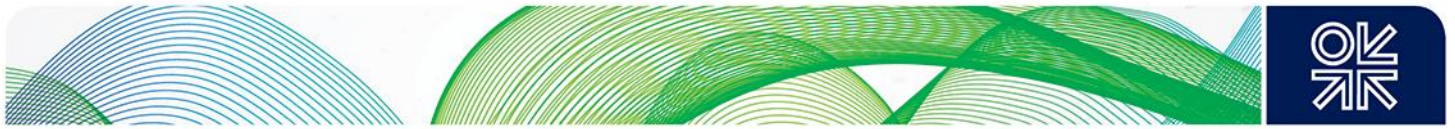
Preface

The perception of Russian LNG industry has been transformed over the past few years. In the 1990s and 2000s it was synonymous with delay and indecision as Gazprom announced and then postponed or cancelled a number of projects, including Shtokman, Baltic LNG and Vladivostok LNG. A transformational moment arrived in December 2013, however, when the Russian government announced a limited opening of LNG development to competition from third parties. Novatek and Rosneft jumped at this opportunity, with the former leading the way in its development of the Yamal LNG project and surprising the gas world by bringing it online at the end of 2017 both on time and on budget.

Since then, the Russian government has recognised development of LNG as a significant political and commercial priority, and this paper seeks to analyse how this may be achieved as a vital part of the country's overall gas export strategy. Russia's gas pipeline exports will continue to be dominated by Gazprom, but the debate within the EU over dependence on Russian gas and Russian pipeline infrastructure clearly demonstrates the political difficulties that this can entail. In contrast, LNG offers more flexible access to a global market that is rapidly expanding, especially in Asia, and although politics can still play a role the increasing liquidity of the LNG market offers wider diversification options. As this paper details, Novatek seems to have become the Russian LNG champion, and has aggressive growth plans over the next decade, but Rosneft and Gazprom also have new projects planned which could make Russia one of the four largest LNG exporters in the world by the middle of the next decade.

This paper examines how realistic these objectives are, which projects will be key in achieving Russian corporate goals and how Russia's overall LNG strategy is set to develop. The conclusions would certainly suggest that, although cynicism about Russian LNG over the first 25 years of the post-Soviet era was largely justified, it may now be time to acknowledge that the country is set to become a major player in the industry.

James Henderson
Director, Natural Gas Programme
Oxford Institute for Energy Studies



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Thanks also to the many industry executives, consultants and analysts with whom we have discussed this topic, but as always the results of the analysis and any errors remain entirely our responsibility.



Abbreviations and Units of Measurement

bbls	Barrels
bcm	Billion cubic metres
bcma	Billion cubic metres per annum
bn bbls	Billion barrels
boepd	Barrels of oil equivalent per day
bpd	Barrels per day
FSU	Former Soviet Union
IOC	International Oil Company
kboepd	Thousands of barrels of oil equivalent per day
kbpd	Thousands of barrels per day
km	Kilometres
mm bbls	Million barrels
mcm	Thousands of cubic metres
mmboepd	Millions of barrels of oil equivalent per day]
mmbpd	Millions of barrels per day
mmbtu	Million British thermal units
mmcm	Millions of cubic metres
mt	Millions of tonnes
mtpa	Millions of tonnes per annum
Mm tonnes	Millions of tonnes
P&P	Proved and Probable
tcm	Trillion cubic metres

Conversion Factors

<i>Equals</i>			
1	tonne oil	7.3	barrels of oil equivalent
1	tonne condensate	8.0	barrels of oil equivalent
1	bcm gas	6.6	mm barrels of oil equivalent
1	bcm gas	35.3	billion cubic feet of gas
1	bcm gas	0.9	mm tonnes of oil equivalent



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1. Introduction

Historically, Russian gas exports have meant one thing only – Gazprom supplies to Europe via pipeline. Infrastructure built during the Soviet era has transported increasing amounts of Russian gas to Europe, culminating in record sales of over 200 bcm in 2018. However, over the five decades since exports began, the global gas market has changed dramatically, in particular becoming a more global business thanks to the emergence of LNG that can be transported easily between regions, breaking the dominant role that pipelines long enjoyed. In addition, the security of supply risk that pipelines inherently bring with their point-to-point delivery has been underlined for Gazprom and the Kremlin in the recent debates over gas transit through Ukraine and EU objections to the expansion of Russian gas export infrastructure to Europe.

Market diversification has been the obvious solution for Russia. For Gazprom as an accomplished pipeline company, this has primarily meant the development of new infrastructure to China with the Power of Siberia pipeline due to open in December 2019. Beyond this, though, Russia has now decided that its long-held ambition to become a major player in the LNG business now needs to be realised. However, after multiple false starts by Gazprom, the Kremlin has come to understand that this more competitive world may need a different corporate approach. Following its decision in 2013 to partially liberalise LNG exports, two new players, Novatek and Rosneft, have emerged to challenge Gazprom's role as the dominant exporter of Russian gas. This paper will explore how these two companies have emerged as important actors in the Russian gas sector, how one in particular (Novatek) looks set to become the national LNG champion, and how Gazprom is planning to respond. The paper will also assess the reality and practicality of Russia's overall LNG ambitions over the next two decades and will assess whether the country can become a major actor in the LNG market, perhaps even developing its own indigenous technology to challenge the incumbent players.

2. The big bet: Russia's corporate and political ambitions in the LNG market

LNG has emerged as a theme that is now discussed at the highest levels of Russian politics. President Vladimir Putin, speaking during Russia's Energy Week in Moscow in October, was particularly upbeat, stating that the country's LNG production will reach 120-140 mt by 2035.¹ This would make Russia one of the world's top three LNG producers and enhance the country's position as the world's number one natural gas exporter.

The practical realisation of this ambition had been underlined the previous month at the Far Eastern Economic Forum in Vladivostok which made headlines in the global LNG market with a series of major announcements. The most important of these was Novatek's Final Investment Decision (FID) on its 19.8 mt Arctic LNG 2 project (three trains, 6.6 mt capacity each, to be launched in 2023, 2024, and 2026) and the inauguration of its 19.8 mt Arctic LNG 1 (to be started post 2025). Novatek also said that it was going to start train 4 of Yamal LNG at the beginning of 2020. This 'add-in' smaller size 0.9 mt train will be based on a Russian liquefaction technology called 'Arctic cascade'. The technology, designed to take advantage of the colder Arctic climate, will be based on Russian equipment and technology and will result in significant cost savings for Novatek.

Provided train 4 of Yamal LNG operates successfully, Novatek plans to extend the 'Arctic cascade' application to a 4.8 mt Obsskiy LNG project located near Yamal LNG (three trains of 1.6 mt capacity each) that is now planned to start in 2022-23. The Verkhnetitskoye and West Seyakhinskoye fields with combined gas reserves of 157 bcm will be the resource base for this project, and the mineral license for developing these fields runs until 2044. Owing to the size of the project, Novatek is likely to

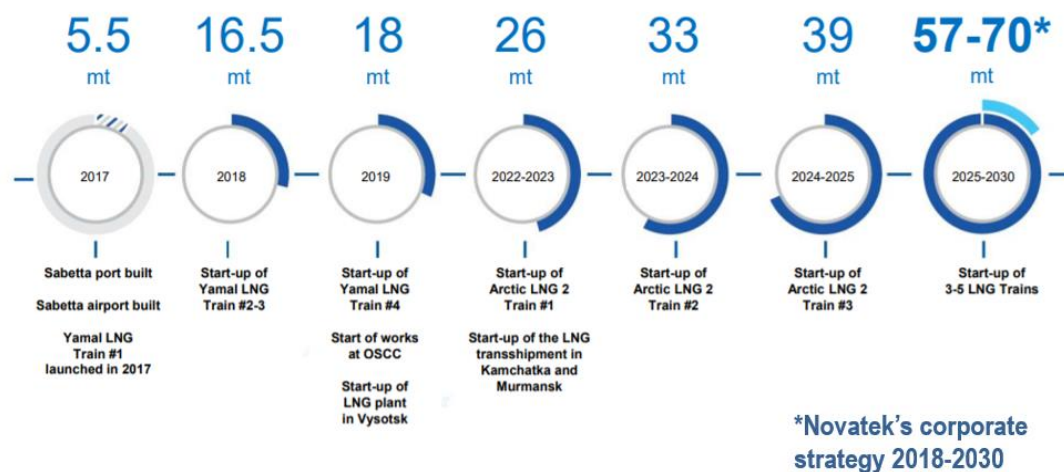
¹ <http://kremlin.ru/events/president/news/61704>



go it alone and finance the project from its own funds. The implications of this development could be far-reaching, as it would be the first example of a Russian company developing its own liquefaction technology that could be replicated for other medium-size projects in the Russian Arctic. Not only would it give Russia protection against possible technological sanctions but it could also provide greater marketing flexibility for LNG produced from smaller-size units (making this part of Novatek's output a better fit for targeting smaller-size niche markets).

Assuming that these projects go ahead, building on the existing success of the Yamal LNG scheme that was launched in 2017, and including the small-scale 0.6 mt Cryogen Vysotsk project on the Baltics that started in 2018, then by 2025 the output of Novatek's LNG projects is set to reach a level of 40 mt, and by 2030 may be as high as 70 mt, turning the company into an international LNG powerhouse (See Figure 1). Furthermore, the company has stated its ambition to create a cluster in the Yamal-Gydan region to produce as much as 140mt by 2035 and is actively promoting its objective in political circles.²

Figure 1: Novatek's LNG plans



Source: Novatek

In addition, Gazprom and Rosneft are also planning new LNG projects. Gazprom still plans to add one more 5.8 mt train to its Sakhalin 2 project in the Far East, but its focus has shifted somewhat to the Baltic where it has outlined plans to build a 13 mt LNG plant as part of the giant complex in Ust-Luga, which also includes a 45 bcm gas processing and gas chemical plant, by 2023-24.³ At the same time, Gazprom's previous flagship LNG project in Russia's Far East, Vladivostok LNG, has been downgraded from a large 15 mt plant to a much smaller 1.5 mt plant focused on producing LNG for bunkering in Asia-Pacific. It will cost two billion dollars and will be built in 2020.

Rosneft's CEO Igor Sechin announced in October in Vladivostok that the shareholders of the Sakhalin-1 project had decided to monetize gas as LNG and build a 6.2 mt LNG plant at De Kastri in the Khabarovsk region on the mainland, next to the existing oil terminal there.⁴ The choice of

² See <https://www.rbc.ru/business/05/04/2019/5ca764589a79471a3300c4db>

³ <http://www.gazprom.com/press/news/2019/march/article477709/>

⁴ Sakhalin-1 is an international consortium developing oil and gas resources offshore Sakhalin under a PSA. The consortium members are Exxon Neftegas Ltd (the operator), a subsidiary of US-based ExxonMobil with 30 per cent, Rosneft (20 per cent), Japanese SODECO (30 per cent) and Indian state-owned company ONGC Videsh Ltd. (20 per cent). Sakhalin-1 has been developing the Chayvo, Odoptu, and Arkutun Dagi fields, located off the northeastern coast of Sakhalin Island and producing oil and gas since 2005. While crude oil is delivered by a pipeline to an export terminal at De Kastri and exported, only about 2.3 bcm of potentially available 10-12 bcm of natural gas is delivered to customers in Khabarovsk region via the Sakhalin-Khabarovsk-Vladivostok pipeline. Significant amounts of the extracted natural gas have been reinjected into the reservoir.

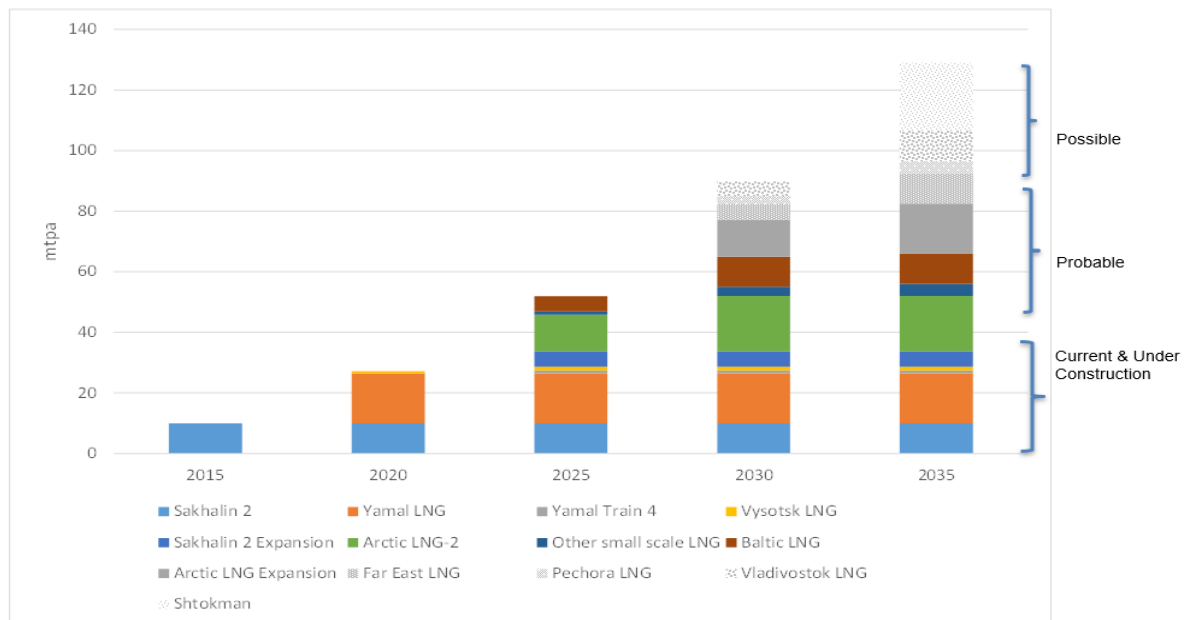


Sakhalin-1 to build its own liquefaction plant ends an almost ten-year saga of negotiations and indecision over whether the Far Eastern LNG project should go forward or whether natural gas from Sakhalin-1 should become the resource base for the expansion of the Sakhalin-2 (Gazprom/Shell/Mitsui/Mitsubishi) LNG plant near Yuzhno-Sakhalinsk.

On a more speculative note, GazpromNeft has also shown some interest in LNG projects,⁵ specifically in the Yamal region, while the private company Energiya, run by former Energy Minister Igor Yusufov, also owns licences in western Yamal and is believed to have plans to develop an LNG project there. LUKOIL has also reportedly shown some interest in a potential project in the Ob Bay.⁶ Finally, Gazprom has mentioned plans to develop an LNG plant to supply the bunker market in the Black Sea and has even announced a tender for a feasibility study.⁷

As a result, Russia's official LNG output targets have been upgraded substantially. In April 2019 Russia's Energy Minister Alexander Novak said that the country's LNG output would amount to 73.2 mt by 2025 from about 27 million tons in 2019.⁸ His longer-term estimates ranged from 130 to 160 mt of LNG by the mid-2030s (see Figure 2).

Figure 2: Potential outlook for Russian LNG



Source: Authors' analysis

2.1 Political ambitions for Russian LNG

These targets for LNG development by 2030 suggest a significant increase in capacity over the next decade and an important shift in government strategy. In early 2018 Novak presented the government's overall thinking in an article in the industry magazine *Neftegazovaya Vertical* in which he outlined Russia's vision of future developments in the global gas market and the potential role of

⁵ <https://www.vedomosti.ru/business/articles/2019/01/22/792125-gazprom-neft>

⁶ <https://www.rbc.ru/business/28/10/2019/5db1cedd9a79475853da2daf>

⁷ <https://www.petroleum-economist.com/articles/midstream-downstream/lng/2019/gazprom-plays-lng-catch-up>

⁸ Novak's speech was at the Arctic Forum in Moscow on April 10, 2019. The estimate is based on the capacity of the planned LNG projects, including Arctic LNG-2, Baltic LNG, the addition of train 3 at Sakhalin LNG along with the construction of a smaller scale Vladivostok LNG and a medium scale Vysotsk LNG project in the Baltic - <https://neftegaz.ru/news/finance/387010-a-novak-proizvodstvo-spg-v-rf-k-2025-g-mozhet-vyrasti-do-73-mln-t/>



Russian LNG.⁹ He stated that Russia should be actively pursuing the expansion of its market share in the LNG business, which he identified as the fastest-growing segment of the global gas market. He recognised that the market niche potentially available for new LNG projects—the ‘window of opportunity’—could amount to about 200 mt by 2035, and he asserted that Russia might claim between 66 mt (already announced Russian projects) and 106 mt (including potential additional projects) of this incremental amount. This would not only allow Russia to monetize its vast gas reserves in remote geographical zones (the Arctic in particular) but could also induce an economic multiplier effect for the economy at large.

Prime Minister Dmitry Medvedev further underlined the country’s goals, stating in late 2018 that “global competition in the liquefied gas market is very tough. Qatar, Australia, Malaysia, and a number of other countries are actively competing, as is the United States with its aggressive and sometimes ‘breaking-all-the-rules’ strategy to promote its gas to the European market. Therefore, the situation requires maximum attention and decisive actions from us.”¹⁰ In addition he asserted that the country’s LNG global market share should reach 17-20 per cent within fifteen years, from 6 per cent in 2018.

These ambitions are driven by a number of political and economic considerations. Oil and gas revenues contribute a significant amount to the state budget, so development of Russian hydrocarbons is an important economic goal. This is less true of LNG when compared to pipeline gas or oil because the government has granted substantial tax breaks to encourage development, but nevertheless over time LNG revenues could become important to the Russian state. More importantly, though, government fiscal support is aimed at encouraging Russia’s technical capability as an LNG developer and also at promoting economic growth in remote areas of the country, in particular the Far North. As a result, projects such as Novatek’s Yamal LNG and Arctic LNG-2 projects are seen as beneficial because they will have trickle down effects both in the Yamal region but also now in the Murmansk region where much of the equipment for Arctic LNG-2 is being built.

Russia is also keen to develop new industries as part of its import substitution strategy, which has accelerated since the imposition of US and EU sanctions in 2014. Enabling Russia to manufacture all the equipment needed for its oil and gas sector is seen as a vital objective, as the majority of the more advanced items are still imported.¹¹ In addition, only a few global players actually have the ability to create the liquefaction plants that are at the heart of the LNG process, and so if Russia can develop this skill it will not only avoid the potential impact of future sanctions (which have not yet been applied to LNG technology) but could also become a technology exporter.

Beyond this industrial development goal, LNG also offers Russia the chance to enhance its geopolitical status. Exports of LNG involve developing international relations with a number of new and existing customers for Russian goods, but the development of the industry also allows greater interaction with those countries, such as China and India, who are keen to invest in Russian hydrocarbons and to access export routes, such as the Northern Sea Route through the Arctic, which can enhance their trading opportunities. As a result, LNG can provide a bargaining chip for Russia in international negotiations as well as providing Russia with a tool to interact with new potential allies and partners.

Of course, LNG development is not just about cooperation but also allows Russia to develop a stronger competitive position relative to key rivals, especially the US.¹² At present, US LNG and Russian pipeline gas are competing in Europe (alongside other sources of LNG), but the introduction of larger volumes of Russian gas could extend this competition to the global market and allow, for example, potential allies such as China and India, as well as emerging Middle Eastern and South American importers of LNG, to have an additional opportunity for diversification. Indeed, it would

⁹ Novak, A. *The Window of Opportunity for Russia*, Neftegazovaya Vertical, Issue 1, 2018, pp. 20-26

¹⁰ Reuters, 25 Oct 2018, “Russia should develop an effective strategy of LNG exports, says PM”

¹¹ The Moscow Times, 13 Oct 2017, “Russia’s import substitution has not been a great success”

¹² CNBC, 8 Jan 2019, “Russia and the US battling over Europe’s gas market”



seem that the US authorities are already aware of the threat from a growing Russian presence in the LNG market, as Novatek is a sanctioned company on the US list, meaning that it cannot raise capital in western financial markets, while various bills threatening Russian LNG projects and the transshipment of Russian LNG in foreign ports have been passed by the US Congress.¹³

The conflict around Russian LNG is not just external, though. As will be discussed below, the ending of Gazprom's monopoly has not just brought competition from new companies but has also empowered different vested interest groups in and around the Kremlin. The leaders of Gazprom, Novatek, and Rosneft all have influence in different parts of the Russian hierarchy, while numerous manufacturing and industrial companies around the gas industry are also lobbying for their own interests to be advanced. On a wider scale, the debate about whether growing Russian LNG exports will compete with Russian pipeline exports remains heated, with exponents of both sides vociferous in making their point of view.¹⁴

2.2 LNG is now a key part of Russia's gas export strategy

Overall, though, it would now seem that LNG has become an integral part of Russia's gas export strategy, with dual commercial and political objectives. From a commercial perspective, LNG is now seen as vital to maintaining Russia's competitive position in the global gas market while also providing opportunities for industrial and economic development domestically. From a political standpoint, LNG also provides a new avenue for developing international relations with new and existing customers for Russian hydrocarbons, while also allowing Russia to compete with key rivals in a rapidly globalizing market. Perhaps the only surprise is that it has taken the Kremlin and its energy companies so long to develop this new business, but as will be discussed in the next section this has much to do with institutional inertia at its major gas company over the past twenty years.

To many an outside observer, Russia's LNG ambition has been a surprise. Indeed, just a few years ago the prospects for LNG development in Russia did not look good. Until 2018 the only active project was a Sakhalin LNG plant operated by Shell under the auspices of a PSA.¹⁵ However, its 9.6 mt of capacity accounted for less than four per cent of the global LNG market, while the long-planned expansion (adding train 3) had run into problems securing enough gas reserves. Since then, although LNG developments in Russia have been on a fast track, many international narratives still present a picture of there being only three leading global LNG suppliers by 2030 – Qatar, Australia, and the US. In Russia, however, the future involves a 'Big Four' of LNG producers, with Russia meeting the threshold for entry to the 'elite club' via its ability to produce 100 mt of LNG per annum within two decades. Our analysis, detailed below, suggests that Russia's LNG ambitions should be taken seriously.

3. A brief history of Russia's LNG ambition

Russia's ambitions in the LNG market began as early as the 1970s, when the Soviet Ministry of Gas recognised an opportunity to supply the US market during a period of relative détente during the Cold War.¹⁶ The North Star project in the early 1970s involved participation by American companies in the potential development of gas fields on the Yamal peninsula, a pipeline to Murmansk, a liquefaction

¹³ Reuters, 15 Feb 2019, "Russian sanctions proposal seen as having most impact on gas pipes"

¹⁴ Warsaw Institute, 14 April 2018, "Gazprom not relishing Novatek's LNG" at <https://warsawinstitute.org/gazprom-not-relishing-novateks-lng/>

¹⁵ In 2007 Gazprom shouldered its way into the ready-to-go Sakhalin LNG project (Sakhalin-2 PSA) after Russia's Ministry of Natural Resources launched an investigation into environmental violations by the PSA consortium and threatened to revoke its license. Soon after Gazprom's entry the case was promptly closed. Gazprom paid US\$7.45 billion for the controlling stake of 50 per cent plus one share in the operating company Sakhalin Energy. The original members of the consortium Shell, Mitsui and Mitsubishi reduced their shares from 55 per cent, 25 per cent, and 20 per cent to 27.5 per cent minus one share, 12.5 per cent, and 10 per cent, respectively. In February 2009 the 9.6 mt LNG plant (two trains with 4.8 mt capacity each) started operations.

¹⁶ Stern (2005), p.162



plant there and subsequent exports of LNG to the US market.¹⁷ At about the same time there were talks with Japan on deliveries of gas from Yakutia for liquefaction on the Pacific coast.¹⁸ Both projects came to nothing, and the whole LNG strategy was then deferred as US president Ronald Reagan ended any cooperation with the Soviet Union, leaving Russia to revert to its traditional role as an exporter of pipeline gas to Europe. The 1990s saw Gazprom, which had taken over control of Russia's gas exports as well as most of its production in the post-Soviet era, make occasional references to possible LNG projects in the Barents Sea or on the Baltic Sea coast, but it was the first decade of the 2000s that witnessed a true resurgence in activity. Once again it was the potential of the US market which catalysed action, as its increasing demand for LNG prompted Gazprom to consider three projects: the Shtokmanovskoye (Shtokman) field in the Barents Sea, the Ust Luga LNG plant on the Baltic Sea near St Petersburg, and the Kharasevey project on the Yamal peninsula in West Siberia. In addition, the company also began investing in the Sakhalin 2 project in the Far East of Russia, with its potential to sell LNG into Asia, and also formed Gazprom Marketing and Trading as a subsidiary with the objective of establishing itself as a force in global LNG trading.¹⁹

The commercial and political logic for a Russian move into LNG was strong. Gazprom was keen to exploit new markets that could not be accessed by its pipelines, particularly in North America and Asia, and was also eager to assert itself as a global gas major with a broad and flexible portfolio of supply options.²⁰ From a political standpoint, the opportunity to expand geo-strategic relations with a broader array of countries based on stronger commercial relations was clear, and the Russian government was also keen to add LNG as a new area of expertise in order to catalyse development of the energy economy.²¹ Gazprom was given the task of pursuing these goals, enjoying its monopoly over gas exports, and for the first time the company started to interact actively with international partners in this new field.

Although Gazprom had taken control of the Shtokman field in the Barents Sea in 1995,²² it was not until the early 2000s before the company truly expanded its horizons beyond the European gas market and towards the opportunities which LNG could provide to make it a global gas player. Indeed, in its 2005 Annual Report Gazprom announced its first sale of an LNG cargo into the US market,²³ and over the rest of the decade it continued to give LNG ever-increasing importance in its long-term strategy. By 2011 it envisaged having a 9 per cent share of the global LNG market by 2020, increasing to 14 per cent by 2030,²⁴ in effect seeing the opportunity to develop stranded assets in remote offshore regions while building its expertise in a new technology (for Russia), with the additional benefit of accessing gas markets that had previously been closed to it for geographical reasons.

The Russian government shared the company's enthusiasm, seeing LNG as a path to achieving a number of core objectives. These included expanding gas exports and thereby improving the country's trade balance and foreign currency income, catalysing industrial development in Russia, supporting the exploitation of remote resources in areas such as Sakhalin Island and the Barents Sea, encouraging the development of geo-politically important regions such as the Arctic and the Far East of Russia, and expanding Russia's commercial (and therefore political) reach to new areas such as North and South America and North-East Asia.²⁵ As such, the Russian Energy Strategy that was published in 2009 also foresaw a rapid increase in Russian LNG output, with a plan to reach 15 per

¹⁷ Klinghoffer (1981)

¹⁸ Egyed (1982)

¹⁹ Gazprom Marketing and Trading was formed in 1999. For detail see <http://www.gazprom-mt.com/WhoWeAre/OurHistory/Pages/default.aspx>

²⁰ Gazprom (2011), p.22

²¹ Mitrova (2013), p.3

²² Stern (2005), p.162

²³ Gazprom (2006), p.15

²⁴ Gazprom (2011), slide 22

²⁵ Mitrova (2013), p.3



cent of the global total by 2030,²⁶ and the Russian government provided an incentive to reach this target by reducing the export tax on LNG exports to zero (compared to the 30 per cent rate for pipeline gas exports). However, although many elements of this initial strategic thinking remain relevant today, a number of profound changes in the global gas market have forced the Russian authorities to reconsider the detail of the country's LNG plans.

A particular problem was that the majority of Gazprom's early plans were aimed at western markets, especially the US. As early as 2003 the company CEO Alexei Miller offered cautious optimism in stating that, "Russia may consider supply of LNG to the American market...In principle, the unique Yamal and Northern Sea fields provide a basis for implementation of LNG production."²⁷ The following year, in the 2004 Annual Report, Gazprom's plans had crystallised somewhat, with the Shtokman field being identified as the key Northern Sea asset and Kharasavey as the main Yamal asset. A third project was also mentioned near St Petersburg – Baltic LNG, a stand-alone liquefaction scheme that would receive gas from Siberia via the main trunk pipeline system rather than be associated with any one field.²⁸ These projects were all pointed towards western markets, although interest in Asia did emerge in 2005 and 2006 as Gazprom opened negotiations on, and ultimately acquired, a 50 per cent plus one share in the Sakhalin 2 project, buying its share from Shell and the Japanese consortium that was developing the scheme. Indeed, Shell continued to manage the operations of the development until it came online in 2009,²⁹ meaning that Gazprom was largely a passive partner in the early years of its ownership.

Sakhalin 2 shipped its first cargo to the Asian market in April 2009,³⁰ with Gazprom now taking over control of Sakhalin Energy, the field operator. Its confidence in its LNG future started to grow, and in its strategy presentation to investors in February 2010 it again reiterated the potential for production from Yamal, Shtokman, and Sakhalin to serve the North American and Asian markets.³¹ A year later it stated that its target was to have a 14 per cent share of all globally traded LNG by 2030, both from projects in Russia and overseas, with the implication that this would mean production of 44 bcma by 2020 and 85 bcma by 2030.³² Interestingly it also claimed that Shtokman would be one of the lowest cost LNG producers in the world, with a breakeven price of around US\$6/mmbtu, given the cost escalation at many other global LNG projects had occurred during the 2000s.³³

Over the next two years the company continued to devote significant time to the establishment of Shtokman as a viable LNG project, but unfortunately the combined effects of the aftermath of the 2008/09 economic crisis and the rise of shale gas production in the US meant that demand for its gas declined as its estimated cost of development was rising.³⁴ This resulted in the project company, which Gazprom had formed with Total and Statoil, being wound up in August 2012,³⁵ with Gazprom declaring in 2013 that the field would only be developed "by future generations." This certainly appeared to be an eminently rational decision, and indeed was hailed by some commentators as "a triumph for common sense" because it prevented the company spending a huge amount of money on a project with significant technical, commercial, and financial risks.³⁶

²⁶ The Energy Strategy of the Russian Federation for the period up to 2030, 13 November 2009, sourced from <http://minenergo.gov.ru/aboutminen/energostrategy/> on 15 July 2015

²⁷ Alexey B. Miller, "Eurasian Direction of Russia's Gas Strategy", 2003, World Gas Conference, Tokyo

²⁸ Gazprom Annual Report 2004, p.27

²⁹ New York Times, 21 Dec 2006, "Shell cedes control of Sakhalin-2"

³⁰ Shell web site at <http://www.shell.com/about-us/major-projects/sakhalin/sakhalin-one-of-the-worlds-largest-integrated-oil-and-gas-pro.html>, accessed on 17 Feb, 2017

³¹ Gazprom Presentation, Feb 2010, "Gaining Momentum; Gazprom Investor Day", slide 24

³² Gazprom Presentation, Feb 2011, "All You Need Is Gas", slide 22

³³ Songhurst, B. (2014) *LNG Plant Cost Escalation* Working Paper NG 83, Oxford Institute for Energy Studies, Oxford, p.2

³⁴ LNG Journal, 7 Nov 2006, "Shtokman LNG project may cost US\$40bn"

³⁵ Financial Times, 29 Aug 2012, "Shtokman exit shows a realistic Gazprom"

³⁶ The Times, August 2012, "Costs force Gazprom to quit vast Arctic gas field", quoted by Utilitas Solutions at <http://www.utilitas-solutions.co.uk/news/News/2012-08-30> accessed on 2 Mar 2017



However, the failure of the project also reflected somewhat on Gazprom's ability to move away from its core pipeline business and was perhaps a harbinger of its future problems with developing an LNG business. One key issue, which has continued to dog the company, was that Gazprom was consistently reluctant to make firm decisions on foreign partnership, and even when it had selected partners it was reluctant to respond in a timely fashion to advice on field development options, despite its own lack of expertise in LNG development. In addition, an uncertain tax regime increased the risk for all the participants, with the lack of a PSA regime being of paramount importance.³⁷ The failure of the Russian government to provide any fiscal support to Shtokman, while offering it to other schemes, undermined the economics of the project and perhaps reflected a lack of confidence in Gazprom's ability to manage such a large project.³⁸ Furthermore, an inability to be definitive about the market for Shtokman gas and the means of export led to Gazprom missing a window of opportunity in the US and Europe. In particular, indecision around whether some of the gas should go through the Nord Stream pipeline to Europe, thus maintaining Gazprom's core business, or should be entirely devoted to the new LNG venture created uncertainty and delay. Nevertheless, it must also be acknowledged that market conditions also played a role, with the unexpected rise of US shale production radically altering the outlook for Russian gas exports. Ultimately, though, the challenging nature of the project led to cost estimates rising to a level (US\$30 billion) that made it uneconomic,³⁹ while Gazprom's lack of technical experience and the slow progress made with foreign companies meant that a practical solution could not be found before the window of opportunity for Shtokman gas had closed.

However, the limitations of Russia's 'Atlantic' export strategy were further exposed when a combination of structural changes in the regulation of Europe's gas market and increased competition to pipeline gas from LNG became a threat to Gazprom's legacy export model based on long-term contracts, take-or-pay clauses, and oil-linked pricing formulae. At the same time, growing tensions in gas relations between Russia and the EU, catalysed by interruptions in Ukraine transit in 2006 and 2009, made the Kremlin wary of its overdependence on a single market and keen to build alternatives. Notably, soon after the EU started an antimonopoly investigation into Gazprom in September 2011, President Putin said, "We should do everything to avoid difficulties with the EU, and we will ...Russia will at the same time look for the other sales opportunities in other markets. Asia is waiting for Russia."

Beyond diversification to Asia, Russian decision-makers also realized that the rigidity of Gazprom's traditional pipeline gas business put it at a disadvantage relative to more flexible LNG suppliers. New challenges called for new responses and required a significant course correction with regards to the target markets. Gazprom, however, had little to show as far as the LNG business was concerned. Russia was late in entering the LNG game and faced strong competition from a rising tide of global projects, many of which were significantly more advanced than the Russian ventures.

As a result, Kremlin strategists have needed to re-assess Russia's gas export strategy in the face of fundamental changes in the global gas market, of which the most significant include:

1. The position of the US gas market has shifted dramatically. In the early 2000s it was believed that the US would be importing significant quantities of LNG by 2020, but in fact the development of the country's huge shale gas resources has turned it into an exporter of LNG. Not only has this changed the balance of the global LNG market, but it has also introduced a fundamentally new pricing structure related not to the traditional oil price methodology but to a market price, in this case Henry Hub in the US.
2. The European gas market has also changed significantly, challenging Russia and Gazprom's dominance there. The introduction of the Third Energy Package in 2009 has created a more competitive marketplace, breaking up vertically integrated monopolies and forcing all players

³⁷ The Moscow Times, 23 Dec 2002, "Conoco, Total push for Barents Sea PSA"

³⁸ Moe (2010) p.233

³⁹ Reuters, 7 April 2012, Gazprom flags Shtokman gas shift; Europe wary"



to operate within a pricing environment driven by gas-on-gas competition at hubs, again breaking the link with oil prices. In addition, Europe has built a large amount of LNG receiving capacity, meaning that it has become closely linked with the global market and has in some senses become the market of last resort for LNG producers if their product cannot be sold elsewhere. This has provided a significant challenge to Russia's pipeline gas exports.

3. Furthermore, the drive to decarbonise in Europe combined with economic growth in Asia driven largely by coal-fired power generation has led to a shift in the prospects for gas demand. The future for gas consumption in Europe appears to be flat at best over the medium to long term, and although imports may rise due to declining indigenous production the long-term outlook is relatively stagnant or declining.⁴⁰ By contrast, the outlook in Asia is for rapid growth in gas demand driven by economic growth and by the desire to improve air quality by switching away from coal.⁴¹ Although renewable energy is the most desirable long-term alternative, gas can and will benefit in the short to medium term. However, a lack of pipeline infrastructure in much of Asia and the isolation of many of the key markets mean that LNG will be the main source of gas supply.⁴²
4. Analysis by the IEA underlines the view that LNG will be the major source of growth in gas trade over the next few decades, driven not only by Asian demand but also by a growing demand in emerging markets such as South and Central America, Africa, and the Middle East. The IEA estimates that global LNG trade will more than double to 760 bcm by 2040, and that LNG's share of global trade will increase from 42 per cent in 2018 to 60 per cent in 2040, underlining the point that it will become the dominant form of gas exports.⁴³
5. The growth in LNG trade has also increased the liquidity of the global gas market, underlining the flexibility of being able to move cargoes to wherever the market demand is greatest. This contrasts markedly with the position of Russia, as the dominant position of Gazprom in its core market, Europe, is underpinned by pipeline infrastructure. Although this has provided a basis for Gazprom's strong market position over the past two decades, it is now leaving the company exposed to political and economic pressure as the EU looks to diversify its sources of supply and especially to decrease the potential influence of the Kremlin in the wake of the Ukraine crisis that started in 2014. Furthermore, the vulnerability of reliance on pipelines is also being exposed by negotiations over the renewal of the contract covering the transit of Russian gas through Ukraine, which accounts for almost half of Russian exports to Europe and expires on 31 December 2019.⁴⁴ At the same time the EU is also attempting to delay or block the construction and use of new pipelines such as Nord Stream 2, underlining the risks for Gazprom and Russia.

These fundamental changes have gradually been absorbed and accepted by both Gazprom and the Russian energy authorities, albeit with some reluctance. Gazprom has adapted to the new market conditions in Europe and has accepted that its traditional oil-linked contracts will be displaced by gas prices set in a market environment.⁴⁵ It has also started to trade its gas more actively, even creating its own electronic sales platform to sell extra volumes into Europe. Furthermore, the shift in gas market growth away from Europe and towards Asia has been reflected in Russia's 'Pivot to Asia' strategy, although from a Gazprom perspective this has involved another pipeline - the Power of Siberia - to China, with its inherent political and economic risks.

⁴⁰ IEA World Energy Outlook 2018, p.176

⁴¹ Asia Times, 26 April 2019, "Asia continues to pivot away from coal"

⁴² Bloomberg New Energy Finance, 12 Sept 2018, "Asia set to dominate long term LNG demand growth"

⁴³ IEA World Energy Outlook 2018, p.182

⁴⁴ Pirani, S. (2019) *Russian gas transit through Ukraine post 2019: the options* Oxford Institute for Energy Studies, Oxford, sourced from <https://www.oxfordenergy.org/publications/russian-gas-transit-ukraine-2019-options/?v=79cba1185463>

⁴⁵ Henderson, J. (2018) *Gazprom in Europe – two "Anni Mirabili" but can it continue?* Oxford Institute for Energy Studies sourced from <https://www.oxfordenergy.org/publications/gazprom-europe-two-anni-mirabiles-can-continue/?v=79cba1185463>



However, from a political as well as a commercial perspective it has increasingly become clear that if Russia is to retain its status as a major global gas player it will have to play a much greater role in the LNG business as well as in pipeline gas. Many of the major gas markets in Asia, for example Japan, South Korea, and Taiwan, can only be accessed by sea, while others such as China, India, and Vietnam see LNG as a core part of their gas strategy. In addition, many other parts of the gas world are seeing LNG as a flexible tool either to catalyse gas demand growth with relatively low infrastructure requirements or as a back-up for other forms of fuel. For example, Bangladesh is building its gas market on LNG imports,⁴⁶ while Brazil is using LNG to supplement its fuel inputs for power generation when its hydro resources are reduced due to low rainfall.⁴⁷ If Russia is to access any or all of these markets it must be a significant LNG player.

The Russian president and his government have responded to this with increasing levels of urgency, insisting that LNG must become a core part of the country's export strategy. Moreover, President Putin started to pay growing attention to LNG in the context of Russia's 'Pivot to the East'. In February 2013, speaking at a meeting of the Presidential Energy Commission, he stated that "the liquefied natural gas market is set to become more and more important, [but] Russia's share of the global liquefied natural gas export market is only 3.6 per cent at the moment. If we do not follow an active policy, we will risk losing this market almost entirely to our competitors."⁴⁸ As will be discussed in more detail later, he followed up this statement with a decision to partially liberalise LNG exports later in the same year.

Against this background, LNG advocacy by Gazprom's emerging competitors, Rosneft and Novatek, played an important part in putting LNG at the top of the energy policy agenda. Rosneft, which under its CEO Igor Sechin had launched an ambitious expansion of its domestic gas business, also added a Far Eastern LNG terminal to its portfolio of plans, initially designed to be located on Sakhalin Island but presently moved to the mainland, to the site of the existing oil terminal at De Kastri. Novatek, whose Yamal LNG project on the Yamal Peninsula had been in the works for a decade, was proceeding actively with marketing arrangements and procurement contracts, and was successfully attracting foreign backers. Gazprom, meanwhile, started to focus on LNG trading and small-scale projects aimed at supplying gas for the transport market,⁴⁹ while in 2014 it also introduced plans for a new large-scale (10-15 mt) project in Vladivostok, at the end of the (yet to be built) Power of Siberia line that would also take gas direct to China. At this point it seemed that Gazprom could be producing as much as 25-35 mtpa of LNG by 2020. The Baltic LNG project was due online by 2019, the Vladivostok scheme by 2018,⁵⁰ and the company had also signed an agreement with Shell for the expansion of Sakhalin 2, with the possibility that a third 5 mt train could also be online by the end of the decade.⁵¹ Indeed in its 2015 presentation to investors the company was stating LNG production target of more than 30 mtpa (41bcm/a) by 2022, underlining its aggressive growth plans.⁵²

However, by 2016 it had become clear that, for all the grand ambition, the reality of market conditions and Gazprom's inability to coordinate such large engineering projects using a technology with which it had very little experience would mean significant delays. By the time of the February 2016 presentation to investors, Vladivostok LNG had been postponed amid uncertainty about gas supply and project economics, Baltic LNG had been pushed back to 2021, and the expansion of Sakhalin 2 had also gone backwards (again to 2021) amid confusion over the source of gas for the project.⁵³

⁴⁶ Dhaka Tribune, 20 Aug 2018, "Bangladesh enters the LNG era"

⁴⁷ Gomes, I. (2018) *The vanishing LNG market in Brazil* Oxford Institute for Energy Studies sourced from <https://www.oxfordenergy.org/publications/vanishing-lng-market-brazil/?v=79cba1185463>

⁴⁸ Bloomberg, 13 Feb 2013, "Putin calls to phase Gazprom monopoly on LNG export"

⁴⁹ Gazprom Presentation, Feb 2012, "Scale Does Matter", slide 24; Gazprom Presentation, Feb 2013, "Gas for the Future", slide 26

⁵⁰ Gazprom Presentation, Feb 2014, "Investor Day 2014", slide 9

⁵¹ Gazprom Press Release, 23 Feb 2014, "Gazprom and Shell sign roadmap for third train of Sakhalin 2"

⁵² Gazprom Presentation, Feb 2015, "Gazprom Investor Day: Gas Business", slide 34

⁵³ Gazprom Presentation, Feb 2016, "Gazprom: navigating in a new market environment"



Subsequently Baltic LNG has slipped further, to 2023,⁵⁴ although its scope has now expanded to include a petrochemicals plant. However, its major foreign partner, Shell, has withdrawn from the project, once again raising questions about Gazprom's ability to manage a major LNG consortium.⁵⁵ Meanwhile the FID for the expansion of Sakhalin 2, which had been expected in 2017, has been deferred once more and may have to wait until a development plan for Gazprom's Sakhalin 3 fields has been finalised (see later discussion). Indeed, in a recent Eurobond document Gazprom estimated that first gas from the new train would not be produced before 2023/24 at the earliest.⁵⁶

As a result, it is clear that Gazprom's plans for the development of a Russian LNG business have consistently disappointed over the past decade. Not all of the blame can be laid at the company's door, though, as changing market conditions have clearly shifted the playing field and it could be argued that the company was sensible to realize that some of its projects were economically unviable in a lower oil and gas price world. Nevertheless, in overall terms it is obvious that Russia cannot claim to be a global gas player without a significant LNG presence, as a number of major markets are not accessible by pipeline, and the country has fallen well behind Australia and the US, as well as Qatar, the industry leaders. It is perhaps not surprising, then, that in 2013 President Putin decided that Gazprom's gas export monopoly should be loosened to allow Novatek and Rosneft to develop specific LNG projects designed to supply markets in Europe and Asia.⁵⁷

4. Russian gas export monopoly legislation and LNG: Managed competition for selected players

Russian gas export strategy has traditionally pursued the interrelated goals of defending Russia's existing export market shares, opening up new gas markets, and pre-empting competition from other sources of gas supply. The cornerstone of this strategy has been the concept of a 'single gas export channel' - a unified set of contractual and pricing arrangements for Russian gas sales abroad. Gazprom historically controlled Russian pipeline gas exports, but officially the gas export monopoly was only established in the Law on Gas Exports of 1 August 2006.

The 2006 law legalized a de facto export monopoly that Gazprom already had with pipeline gas, explicitly extending this into the future for all gas exports except those conducted within the framework of existing PSAs, namely the Sakhalin-1, Sakhalin-2, and Kharyaga projects. In addition, the law extended Gazprom's export monopoly to LNG. This provision effectively eliminated competing supplies of natural gas out of Russia into world markets that would bypass Gazprom.

It was not until 1 December 2013, when the so-called LNG export liberalization law took effect in Russia that Gazprom's complete monopoly on all gas exports (pipeline and LNG) was broken. An additional surprise was that President Putin revoked his earlier order to Novatek to co-operate with Gazprom in the development of LNG on the Yamal peninsula (in early 2013 the two companies had signed a joint venture agreement in which Gazprom had a controlling 75 per cent stake⁵⁸). Within twelve months, Novatek had the confidence to go it alone, essentially in a direct challenge to Gazprom's LNG aspirations, asserting that it should be allowed to develop the Yamal LNG project singlehandedly and that it could only raise the finance needed to achieve its goals if it had full control of the project.

Some observers hailed the December 2013 amendments to the laws "On Gas Exports" and "On Regulation of Foreign Trade" as a liberalization of Russian LNG exports. However, liberalization it was not; the term that better described the new policy was 'managed competition for access to

⁵⁴ Interfax, 8 Nov 2016, "Gazprom says launch of Baltic LNG might be postponed to 2022"

⁵⁵ LNG World News, 10 April 2019, "Shell calls it quits at Baltic LNG"

⁵⁶ Reuters, 13 March 2017, "Russia's Gazprom delays Baltic, Sakhalin LNG projects"

⁵⁷ Reuters, 2 Dec 2013, "Russia's Putin approves LNG exports for Gazprom's rivals"

⁵⁸ Gazprom Press Release, 10 Jan 2013, "Gazprom and Novatek setting up joint venture for LNG production in Yamal Peninsula"



export', since the scope of the law was limited to allowing LNG exports only to a carefully targeted selection of projects. But it was an important step forward in loosening Russia's gas export monopoly and introducing new gas export channels other than GazpromExport. In particular, it allowed independents to secure financing on preferential terms using their export contracts as a guarantee of loan repayments and to reach FID much sooner than would otherwise be the case.

The amendments introduced on 1 December 2013 did not change the overall scope of the Law on Gas Exports: it continued to cover all exports of gas - both pipeline and LNG. Two legacy categories of eligible exporters have and retained the right to export gas from Russia:

- **Gazprom/Gazpromexport.** The owner of the Unified Gas System and its 100 per cent-owned subsidiaries (essentially, Gazprom and Gazpromexport) can export gas (pipeline or LNG) from any source (including any onshore gas fields), whether the licensee of such gas fields is Gazprom or any other producer.
- **Grandfathered PSAs.** The pre-existing exemption for exports of gas (both pipeline and LNG as well) produced by grandfathered PSA projects also remained in place.

In addition, two new categories of eligible exporters (but only for LNG, not pipeline gas) were added:

- Owners of mineral licenses to deposits of federal significance that had (as of 1 January 2013) provisions in their licenses for the construction of LNG plants or gas delivery to such plants. Novatek's licenses for South Tambeiskoye (the resource base for Yamal LNG) and Utrenneye (the resource base for Arctic LNG 2) contained the relevant LNG provisions. Novatek subsequently formed international consortia to develop the projects (see below). Furthermore, it has recently received licenses to gas fields in the Yamal and Gydan peninsulas that apparently contain the relevant LNG provisions and thus can serve to expand the production and export base for both the Yamal LNG and Arctic LNG 2 projects.
- Any state-controlled (specifically more than 50 per cent state-owned) company, for gas produced from any offshore field for which it is the licensee (or from a PSA field). Currently, this means only Rosneft and Gazprom since, per the Subsoil Law and practice to date, they are the only two state companies that are licensees of such fields.⁵⁹ Of course, Rosneft's proposed new LNG plant on Sakhalin could be the prime beneficiary - because Gazprom already had and will retain the blanket right to export gas according to the original clauses of the Law on Gas Export.

A specific extension of the second category to include subsidiaries of state companies was designed for structuring project companies and for bringing in prospective foreign partners by extending their interests in the projects to export sales contracts. This clause was supposed to help Rosneft launch a new generation of proposed projects on Russia's continental shelf with ExxonMobil, Eni, and Statoil. In these projects, Rosneft was the owner of the licenses and intended to retain a 50 per cent-plus one share interest in the JV operating companies that would construct, own, and operate LNG plants and produce LNG. The new law was apparently designed to allow project operators to receive an export license for produced LNG. A similar operating structure could apply to Rosneft's proposed LNG project on Sakhalin with ExxonMobil and possibly other participants, since Rosneft would own more than 50 per cent of the plant project company and produce LNG from offshore gas fields licensed to Rosneft or from Sakhalin-1 PSA fields in which Rosneft had equity interest. In addition, this clause could also help Gazprom to structure its proposed 'small-scale' Vladivostok LNG plant deal with the possible participation of Japanese consortium partners, with gas likely to come from fields around Sakhalin Island (see discussion on projects below).

To date the hope for active involvement of foreign companies in Rosneft and Gazprom LNG projects has not lived up to expectations owing to the combined pressures of international sanctions on Russia

⁵⁹ Other state-controlled companies, for example Gazpromneft and Zarubezhneft, may technically qualify in the future.



and the downward cycle of global LNG prices. Nevertheless, the importance of the legislation has been to streamline project structuring in order to bring foreign partners onboard if and when the need arises. Indeed, as we will discuss in the next section, one company in particular, Novatek, has fully exploited this opportunity.

5. New Russian players enter the game: Three approaches to developing LNG business

The introduction of the new law on LNG exports catalysed competition between the three key players in the Russian gas industry, Gazprom, Rosneft, and Novatek. Perhaps not surprisingly, each developed a strategy that was compatible with its own asset base and previous experience, and as a result, during the 2010s three competing approaches to LNG developments in Russia have emerged:

- **Gazprom's approach.** Gazprom has always been a company wedded to the pipeline business. It is no surprise, therefore, that when charged with the task of developing an LNG business, Gazprom proposed a combination of pipeline gas and LNG (Baltic LNG and Vladivostok LNG), with LNG playing the supporting role. This approach offered potential flexibility and bargaining leverage, but was also extremely costly, especially with regards to the eastern gas projects, since it required the development of new fields and pipelines and coordination with China with regards to pipeline plans. Adding a liquefaction component to the end of a value chain comprising greenfield development upstream in Eastern Siberia and a new long-distance pipeline midstream which ran through wilderness meant dramatic cost increases. In the early 2010s, gas prices were high and rising, but the potential price windfall was offset by a strong Russian rouble that inflated the dollar costs of Gazprom's capital construction programmes.
- **Rosneft's approach.** Rosneft wanted to develop LNG within the scope of its partnership with ExxonMobil and utilize the potential strengths of the alliance and its established position on Sakhalin. The Far Eastern LNG project would help monetize the gas reserves of the Sakhalin-1 PSA, as the gas extracted by Sakhalin-1 had to date been re-injected to maintain the reservoir pressure and assist in oil recovery. However, Russia's annexation of the Crimea and the imposition of US sanctions against Rosneft put Far Eastern LNG on the back burner of its corporate priorities. An announcement in September 2019, though, about a revival of the project suggests that Rosneft now believes that the partnership can be rekindled.
- **Novatek's approach.** In contrast, Novatek's plan of pure LNG development, with no strings attached, based on a confirmed and already half-developed onshore project (Yamal LNG) and in partnership with Total and CNPC, offered the lowest upstream costs and was least affected by geopolitical problems. Its key disadvantage was the mismatch between the location on Yamal peninsula in the Russian Arctic and the key markets. To offset the geographical disadvantage, Novatek developed a plan to send LNG carriers to Asia via the Arctic shortcut—the Northern Sea Route (NSR). This required the creation of port infrastructure on Yamal, the construction of a fleet of Arctic-resistant LNG carriers, and an expansion of capacity of the fleet of Russian nuclear icebreakers.

Despite the contrast between these various strategies, it is interesting to note that all three are now being pursued. Novatek has already proved, with its Yamal LNG project, that its Arctic strategy can work, although it remains to be seen whether the new concepts planned for Arctic LNG-2 and Obskaya LNG can be equally successful. Meanwhile, Gazprom needs to demonstrate that it can make a success of its 'pipeline plus liquefaction' strategy, having failed twice already with the long-term postponements of Baltic LNG and Vladivostok LNG. Finally, Rosneft needs to show that it is a gas as well as an oil company, and that the associated gas which it plans to develop at Far East LNG can underpin an economically robust single train LNG project, with the potential for future discoveries to offer an expansion opportunity.



6. Novatek emerges as Russia's LNG champion

Yamal LNG has arguably been the most successful LNG project in the world during the last decade, demonstrating levels of project and cost management that have put many other international and domestic rivals (including Russian state company Gazprom) to shame. Firstly, Novatek successfully brought together an international consortium (see Table 1) comprising one international company with LNG expertise (Total), one major buyer of LNG (CNPC from China), and one major source of finance (the Silk Road Fund, whose investment opened the way for Chinese lenders to cooperate with the project).

Table 1: Shareholder structure of Novatek LNG projects

<u>Stakeholders</u>	<u>Country</u>	<u>Interest (%)</u>
Yamal LNG		
Novatek	Russia	50.1%
Total	France	20.0%
CNPC	China	20.0%
Silk Road Fund	China	9.9%
Arctic LNG 2		
Novatek	Russia	60.0%
Total	France	10.0%
CNPC	China	10.0%
CNOOC	China	10.0%
Japan Arctic LNG (JOGMEC/Mitsui)	Japan	10.0%

Source: Authors, based on Novatek public releases

Secondly, contracts for sales to customers in the Asia-Pacific region, Southern Asia, and Europe were signed relatively swiftly, allowing the project to take its FID in 2013. Thirdly, the project then proceeded on time and on budget, actually coming online ahead of schedule in 2017. All three of the originally planned trains are now producing at full capacity, and a smaller fourth train is due online at the end of 2019.⁶⁰

Fourthly, Novatek has been developing a new Russian LNG technology, Arctic Cascade, which will be used at Yamal LNG (the 4th train) and at subsequent projects, which could provide a major breakthrough for the industry in Russia. Another innovation by Novatek, the concept of using the giant gravity based structures (GBS) as floating foundations for the liquefaction plants of Arctic LNG 2 (and other future projects in the shallow offshore waters of the Yamal and Gydan bays) has provided a new industrial base in the Murmansk region where construction work on the GBS platforms is bringing jobs and investments to the region. Lastly, Novatek has achieved all this while being subject to US financial sanctions and facing the threat of low global gas prices due to an excess of new LNG supply.

With the successful on-time, on-budget launch of Yamal LNG and its aggressive future plans for Arctic LNG-2, Arctic LNG-1, and Obskaya LNG, Novatek has emerged as the Russian national LNG champion with major backing from the Kremlin for dramatic expansion in the Arctic.

7. Next generation of Russia's LNG projects: Risks and opportunities

Although Novatek has become the key player in the Russian LNG story, it is not the only company looking to develop new projects. In Russia's Far East, Gazprom and Rosneft have been looking to add new projects at Sakhalin, the bedrock of Russia's LNG business. Both companies have been

⁶⁰ Novatek reported that actual output of Yamal LNG exceeded the nameplate capacity owing to the additional efficiency in the liquefaction process stemming from the cold climate, and the output of the first three trains in 2019 may be as high as 18 mt.



looking at ways of utilizing their existing partnerships with foreign companies that have been developing oil and gas on Sakhalin as part of their production-sharing agreements. Another possible area for new LNG projects is on Russia's Baltic coast where Gazprom has been looking at a large potential LNG project for many years. It could be said that in terms of geographical 'division of labour', Novatek's key area of focus has been the Yamal and Gydan peninsulas in the Arctic, Rosneft has been active in Russia's Far East, and Gazprom has been looking at LNG opportunities in the Far East and in the Baltic (see Figure 3).

Map 1: Russia's key LNG projects



Source: OIES

7.1 Yamal and Gydan peninsulas

As mentioned above, Novatek has wasted no time in planning the expansion of its LNG programme. Its mineral resource base available for monetizing natural gas as LNG is vast and growing. As a result, the company's immediate plan is to 'double down' on its success in operating Yamal LNG by adding another project located in a nearby area – Arctic LNG 2.

Yamal LNG's natural gas feedstock is based on reserves located in the South-Tambeyskoye field which contains 424 bcm of natural gas, according to the SEC definition (see Table 2).

Table 2: Novatek SEC reserves at fields designated for LNG developments as of 31 December 2018

Field/license area	Ownership	Duration of license (year)	Natural gas reserves, Bcm	Liquids reserves, million ton	LNG project
South-Tambeyskoye	50.1% (59.97% of reserves)	2045	424	14	Yamal LNG
Utrenneye	100%	2120	417	15	Arctic LNG
Verkhnetitulyayskoye + West-Seyakhinskoye	100%	2044	157	2	Obskiy LNG

Source: Novatek Annual report 2018

For a project with a planned nameplate capacity of 17.4 mt per annum the 'reserves cover' based on this SEC definition is enough for nineteen years of operations. According to the Russian classification, however, gas reserves in the field are much higher, with 1,036 bcm in the A+B+C1 category and



368.6 bcm in B2+C2, suggesting that the operations of the LNG plant could in theory continue for over fifty years.⁶¹

Arctic LNG 2 will have a total nameplate capacity of 19.8 mt and consist of three trains, each with a capacity of 6.6 mt of LNG, which will be installed on three GBS platforms. With an estimated cost of US\$23 billion, Arctic LNG 2 is based on the hydrocarbon resources of the Utrenneye field (417 bcm, according to the SEC definition). The Russian definition of reserves is higher, at 665.2 bcm in the A+B+C1 category and 560.6 bcm in the B2+C2 category. Moreover, Novatek reported that during 2018 additional gas reserves were discovered at the field that bring the total up to over 2 Tcm of gas.⁶² Thus, the reserves for both Yamal LNG and Arctic LNG 2 operations appear enough to support the significant expansion of the projects beyond the original scope.

Novatek has also continued its aggressive license acquisition policy. On 30 August 2019 the company announced that Arctic LNG 1, a wholly owned subsidiary, had won the auction for a geological survey, exploration, and production license for the subsoil area that includes the Soletsko-Khanaveyskoye field located on the Gydan peninsula in the Yamal-Nenets Autonomous Region. The license area has estimated hydrocarbon resources of 2,183 bcm of gas and 212 mt of liquids, or 16 billion barrels of oil equivalent according to the Russian resource classification system. The license term is twenty seven years and the auction resulted in a one-time payment for the subsoil use totalling 2,586 million rubles (approximately US\$40 million).

The new license area borders Novatek's Trekhbugorniy and Gydanskiy license areas on the Gydan peninsula and could allow it to create a resource base for a new LNG project similar in size to Arctic LNG 2, with liquefaction trains to be located at the Utrenniy terminal.⁶³ Novatek's CEO Leonid Mikhelson said that the proposed Arctic LNG 1 project will have a capacity of 19.8 mt and will use the infrastructure of the Utrenneye export terminal that will be built for Arctic LNG 2. Thus, Novatek has been and will continue using synergies between its projects on Yamal and Gydan. Indeed, further synergy may be found between Yamal LNG and a fourth project, Obskiy LNG, as the Arctic Cascade technology planned to be used in Train 4 of Yamal LNG could then be used for three larger trains at the new project nearby. The plan is that Obskiy's three 1.6 mt trains would start to come online in 2022/23, based on reserves located in the Seyakhinskoye field (see Table 2).

Additionally, Novatek has made new gas discoveries. The first exploration well drilled in 2018 at the North-Obskiy license area resulted in an additional 322 bcm of reserves (according to Russian classification), which turned out to be the world's largest stand-alone gas field discovery that year.⁶⁴

In summary, Novatek holds licenses for several fields that can potentially be considered for further expansion of LNG operations on the Yamal and the Gydan peninsulas (see Map 2).

⁶¹ RF State Report *On the Status and Usage of Russia's Mineral Resource Base in 2016-2017*. RF Ministry of Natural Resources, 2018.

http://www.mnr.gov.ru/docs/o_sostoyanii_i_ispolzovanii_mineralno_syrevykh_resursov_rossiyskoy_federatsii/2017_doklad_o_sostoyanii_i_ispolzovanii_mineralno_syrevykh_resursov_rossiyskoy_federatsii/

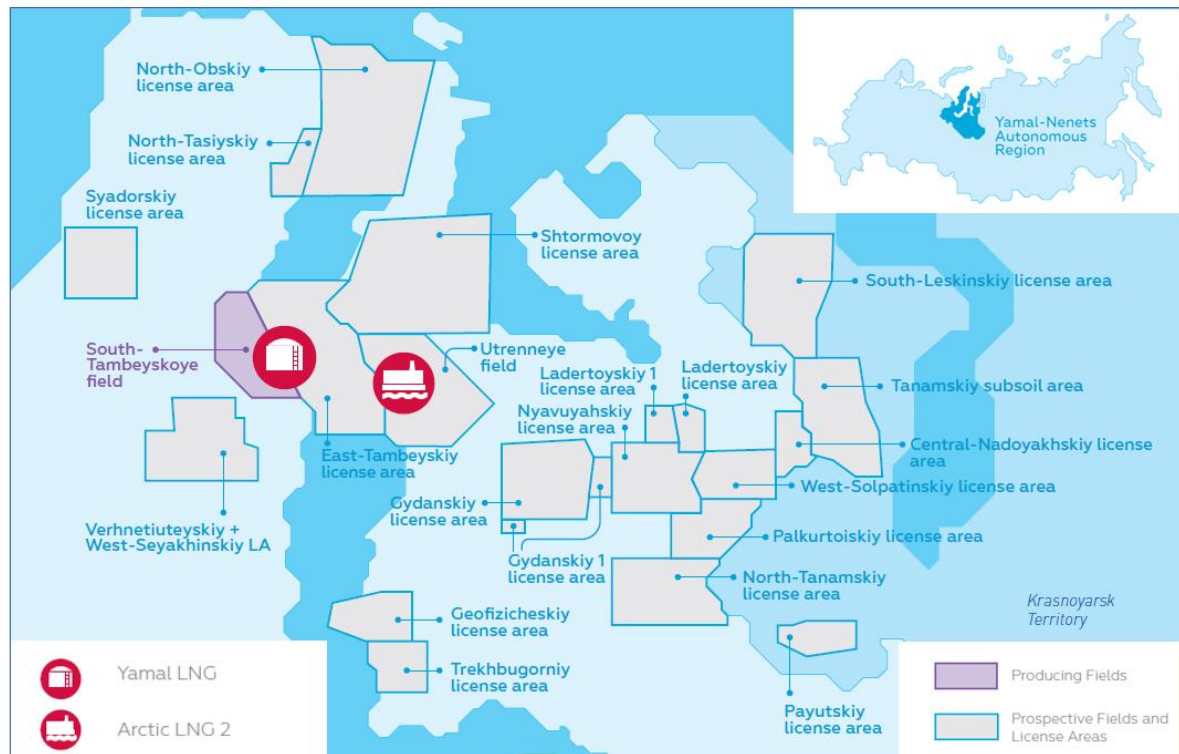
⁶² Novatek: Expanding our LNG footprint. Annual Report 2018. pp. 9-10

⁶³ http://www.novatek.ru/en/press/releases/index.php?id_4=3391&from_4=2

⁶⁴ Ibidem



Map 2: Novatek's selected licenses on the Yamal and Gydan peninsulas



Source: Novatek

7.2 Russia's Far East and Sakhalin

LNG projects in Russia's Far East region focus on the use of gas from offshore fields near Sakhalin Island. The island is the site of Russia's first LNG plant which has been operating as part of the Sakhalin-2 project since 2009 (operated by the Sakhalin Energy consortium led by Gazprom and Shell). Sakhalin-2's fields and gas production have been fully dedicated to supply the existing two-train LNG plant at Prigorodnoye thus creating a feed gas supply constraint for a possible expansion. At the same time, the Sakhalin-1 PSA consortium (30 per cent - Exxon Neftegas Limited, 30 per cent - Sodeco, 20 per cent - Rosneft and 20 per cent - ONGC) that operates the Chayvo, Odoptu, and Arkutun-Dagi fields with reserves of 307 mt of oil and 485 bcm of gas could potentially provide gas for the expansion of Sakhalin-2. Chayvo, the initial phase of the Sakhalin-1 project, began production in 2005. Most of the associated gas produced at the field has had to be re-injected to maintain the reservoir pressure for more efficient oil recovery, but some (about 1 bcm per annum) has been sold to consumers in the Khabarovsk region via Gazprom's Sakhalin-Khabarovsk-Vladivostok (SKV) pipeline. The expanded gas development programme at Chayvo planned for the early 2020s would result in annual production of up to 10 bcm of natural gas that would not be associated with oil development and requires a decision on how the output would be marketed. The two options are either for the Sakhalin-1 consortium to build its own LNG plant and export LNG, or to sell gas to Sakhalin-2 for the expansion of the existing LNG plant. Gazprom and Rosneft have been unable to reach an agreement on the appropriate gas price and negotiations have been stalled for almost a decade. As a result, Gazprom has considered that an alternative source of gas supply for the Sakhalin-2 LNG plant expansion could be from its Sakhalin-3 acreage which includes the Kirinskoye and Yuzhno-Kirinskoye fields; the total block is estimated to contain about 1.5 Tcm of gas reserves with the Yuzhno-Kirinskoye field alone containing gas reserves (C1+C2, according to Russian classification) of 711 bcm. However, to date Gazprom has been undecided about the future use for its Sakhalin-3 gas, considering options including domestic sales via the existing SKV pipeline, feed gas for the proposed



Vladivostok LNG scheme, feed gas for the proposed third train at Sakhalin-2, and pipeline exports to China via the SKV pipeline.

Gazprom's consortium (Sakhalin-2) owns the trans-Sakhalin pipeline delivering gas from the north of the island (where oil and gas are produced) to the LNG plant in the south of the island, while the Rosneft consortium holds the available gas resources of Sakhalin-1. Obviously, the lowest-cost option would be for developed Sakhalin-1 gas to use Sakhalin-2's existing trans-Sakhalin pipeline infrastructure, while the most expensive would be for Sakhalin-1 to build its own new pipeline infrastructure as well as its own liquefaction plant. However, the issues surrounding competition between the Gazprom-sponsored and the Rosneft-sponsored Sakhalin LNG projects has blocked the best economic solution for Russia. The two consortia have failed on multiple occasions to reach a deal with disagreements over the acquisition price for Sakhalin-1 being the key stumbling block. For its part, when the Sakhalin-1 consortium attempted to gain access to the trans-Sakhalin transportation system (which is owned and operated by the Gazprom-led Sakhalin-2 consortium) through a court battle, Gazprom objected saying that it was planning to use the available pipeline capacity to deliver Sakhalin-3 gas to its LNG plant at Prigorodnoye in the future.

In this context, the announcement by Sakhalin-1 in September 2019 of its decision to build its own 6.2 mt LNG plant at De Kastri, next to the existing oil terminal in the Khabarovsk region (as opposed to Rosneft's earlier plans to place its LNG plant at Ilyinskoye in the south of Sakhalin island) has ended doubts about the Rosneft/Exxon strategy. It advances the Far Eastern LNG project, at the same time putting the expansion of Sakhalin-2 on the back burner, at least until Gazprom clarifies its position with regards to the use of Sakhalin-3 gas resources. The construction and operation of the Far Eastern LNG plant will proceed under the umbrella of the existing PSA and will take advantage of the grandfathered tax and legal terms.⁶⁵

In addition to Sakhalin, another important project in Russia's Far East has been Vladivostok LNG. In 2013-2014 Gazprom considered the construction of a 15 mt liquefaction plant at Perevoznaya Bay as a key component of its Eastern gas programme. Vladivostok LNG, according to its original design, was supposed to be built at the terminus of the Power of Siberia (PoS) pipeline to provide Gazprom with an export alternative to pipeline deliveries to China. Strategically, it would connect East Siberian gas fields with the gas system in Russia's Far East and give Gazprom an opportunity to use Asian LNG prices as a benchmark and leverage in price negotiations over pipeline deliveries with China. It could also serve as an insurance against possible attempts by China to exercise its power of monopsony over Russian pipeline gas deliveries. At the same time, Vladivostok LNG would be connected via the SKV pipeline to gas fields on Sakhalin, giving Gazprom additional flexibility with regards to monetizing the gas reserves of Sakhalin-3.⁶⁶

This plan was strategically attractive, but costly. After the collapse of oil and gas prices in 2015 Gazprom gave up the idea of a large-scale LNG plant in Vladivostok, concentrating instead on finishing the shorter version of PoS without the extension to the Far East.⁶⁷ In 2017, Vladivostok LNG was re-formatted as a relatively small 1.5 mt LNG plant that would get its feedstock from Sakhalin-3 fields and focus on producing LNG for bunkering in the Sea of Japan.⁶⁸ Gazprom currently plans to start the construction of Vladivostok LNG in 2020. The announced cost of the project is US\$2 billion.⁶⁹

7.3 The Baltic

The construction of an LNG plant on the Baltic Coast has been in Russia's sights for almost twenty years. At the beginning of the 2000s Gazprom and Sovkomflot set up Baltic LNG AG – an 80-20 per

⁶⁵ <https://www.reuters.com/article/us-russia-rosneft-lng/rosneft-ceo-says-sakhalin-1-to-build-its-own-lng-plant-in-russias-de-kastri-port-idUSKCN1VQ162>

⁶⁶ <https://www.hydrocarbons-technology.com/projects/vladivostok-lng-project-primorye-territory/>

⁶⁷ <https://www.ft.com/content/16eb3ef2-509b-11e4-8645-00144feab7de>

⁶⁸ <https://www.eastrussia.ru/en/news/proekt-vladivostok-spg-budet-reanimirovan-pod-bunkerovku-miller/>

⁶⁹ <https://news.ru/en/economics/gazprom-is-working-on-launching-a-2-billion-project/>



cent JV that was intended to find foreign partners to build a 5 mt LNG plant in Primorsk. One of the early plans encompassed LNG imports to Canada under a partnership with Petro-Canada.⁷⁰ In 2006-2007 Gazprom then considered Baltic LNG as a possible outlet for Shtokman gas, as the potential advantages of the project would be lower construction costs compared with projects in the Arctic or Sakhalin, no need for icebreaker shipping support, and advantaged shipping to the Atlantic and South Asian markets. The downside was relatively expensive feedstock, since the gas would come from a high cost offshore field and would also have to travel a significant distance through the Russian pipeline system.⁷¹

The idea was shelved as the Shtokman field was postponed indefinitely in 2012, but in 2015 Gazprom modified the concept of Baltic LNG by moving the site of the proposed 10-15 mt LNG plant to Ust-Luga (the connection point between Russia's domestic pipeline system and Nord Stream 2) and forming an alliance for the venture with Shell, its established LNG partner in the Sakhalin LNG project. In late 2018, Gazprom and Shell inked a framework agreement on the technical concept for Baltic LNG, with Shell's proprietary large-scale liquefaction technology being seen as a crucial factor for the success of the project.⁷² It seemed that the FID was imminent, but at the end of March 2019 Gazprom changed course again.

Gazprom's latest concept for Baltic LNG provides for the full integration of the liquefaction plant with a large gas processing plant (plus the addition of an LPG production facility). Current plans envisage the processing of 45 bcm of gas and the production and shipping of 13 mt of LNG, up to 4 mt of ethane and over 2.2 mt of liquefied petroleum gases (LPG) per year. The complex will be processing ethane-rich gas produced by Gazprom from the Achimov and Valanginian deposits of the Nadym-Purtaz region, Gazprom has said. The gas remaining after processing (about 19 bcm) will go into the company's gas transmission system. However, much to the surprise of Shell, Gazprom announced that the RusGasDobycha company would join the project as a partner despite having no apparent experience in the construction of complex big-ticket gas processing and liquefaction facilities or in gas chemistry.⁷³

After a short deliberation Shell then decided to withdraw from the Baltic LNG project.⁷⁴ Cederic Cremers, Chairman of Shell Russia, explained the decision as follows: "The reason is that we don't believe in an integrated concept. We were discussing the initial concept which was to separate the LNG project from the chemical plant. That was the concept that we believed would be properly technical and economically investable. So that is why we decided to exit because we don't have the same view on the integrated development". When commenting on the possibility of technological participation in the new concept of the project, Cremers noted, "we normally only use the technologies on projects that we are involved in, projects where we are also investing and where we are involved in building. That is our normal practice".⁷⁵

Following Shell's exit from the project, Gazprom has reported that it is now considering the use of Linde's technology for the integrated complex project in Ust-Luga. Gazprom said it is expecting to put the first train of the complex into operation in the second half of 2023 and the second train in late 2024. Obviously, with much higher levels of complexity and no experienced partner with proprietary LNG technology, the risks of a delay to the start-up of Baltic LNG have increased dramatically.

⁷⁰ <https://www.reuters.com/article/gazprom-lng-idUSL0775920020080207>

⁷¹ <https://www.icas.com/explore/resources/news/2008/02/08/9302221/baltic-lng-falls-by-the-wayside-as-gazprom-focuses-on-shtokman-and-nord-stream/>

⁷² <https://www.gazprom.com/press/news/2018/october/article462137/>

⁷³ <https://www.gazprom.com/press/news/2019/march/article477709/>

⁷⁴ <https://www.reuters.com/article/us-gazprom-shell-exit/shell-exits-gazprom-led-lng-project-in-russia-idUSKCN1RM1FM>

⁷⁵ <https://tass.com/economy/1065298>



8. Will Russian LNG compete for export market share with Russian pipeline gas?

Despite all these plans and the success of Yamal LNG to date, one key concern remains for Russia's policymakers, namely that independent LNG exports might compete with Gazprom's pipeline exports, especially to traditional European consumers. It is noteworthy that the initial solution proposed for marketing production by Yamal LNG was a commission agreement whereby GazpromExport would charge a nominal one per cent sales commission for exporting LNG on behalf of the project. This would have allowed it to manage any potential competition with its own piped exports, thus reducing the risk. However, the plan never got off the ground because banks were not ready to provide financing to Yamal LNG on the basis of third-party export contracts, and GazpromExport had no incentive to actually conclude contracts with buyers.

Nevertheless, although the idea of preserving a single export channel for Russian gas is alive and well, there has been no explicit protection of Gazprom's exports written into the law after the amendments introduced in 2013, and the stated principle of 'no competition with Gazprom' is a matter of intent, not a legal requirement. According to the amendments, LNG exporters are only required to declare their export plans or contracts to the Russian government - there is no legally mandated process of export 'harmonization' to avoid competition abroad, as previously expected. In the absence of such legislation, Russian LNG produced by independents could compete with Gazprom's Europe-bound piped gas. The absence of specific measures restricting LNG sales by Russian independents in Europe suggests that the Kremlin has taken a practical approach and prioritized the swift growth of the Russian LNG sector over protection of Gazprom's gas sales. The test case for this new development has been LNG exports from the Yamal LNG project.

Yamal LNG's ability to send its liquefied gas westward during the winter season is an absolute must for the project to succeed. When possible, Yamal LNG would like to ship east, with the Northern Sea Route (NSR) serving as an important Arctic shortcut to reach premium Asian markets. However, for the foreseeable future the navigation window is likely to be limited to five to six months per year at best (July through November, with late June and early December as possibilities, depending on the weather). For the rest of the year, Yamal LNG has no other choice but to ship west, to European markets.

As a result, Yamal LNG has only two options available to it to minimize the concerns of Russian policy makers intent on avoiding, if possible, competition from Russian independent LNG production to Russian pipeline gas in Europe. These appear to be:

1. Targeting European gas markets where Gazprom currently does not deliver pipeline gas.
2. Using European ports as transshipment points to reach long-haul Asian or Latin American destinations, or as a swap point.

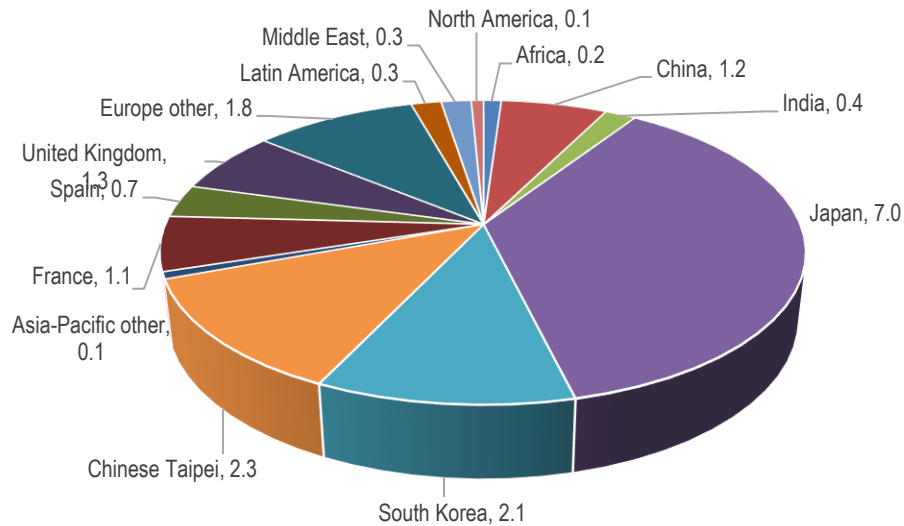
The records for 2018 underline these options to an extent, suggesting that Russian LNG exports have been quite diversified and while the majority of shipments went to Asia-Pacific, a significant share of sales also went to Europe, although this was targeted at markets such as Spain and the UK which Russian pipeline gas does not tend to reach (see Figure 3⁷⁶). Furthermore, even when Russian LNG reached Gazprom's core markets, such as France, Belgium and the Netherlands, it did not appear to cannibalise the demand for Russian gas as Gazprom's sales increased year-on-year.⁷⁷

⁷⁶ Yamal LNG was launched ahead of schedule resulting in an opportunity to sell first cargos on the spot market, before deliveries under long-term contracts kicked in.

⁷⁷ Gazprom in Figures, 2014-2018, p.78, sourced from <https://www.gazprom.com/investors/shareholders/2019/>



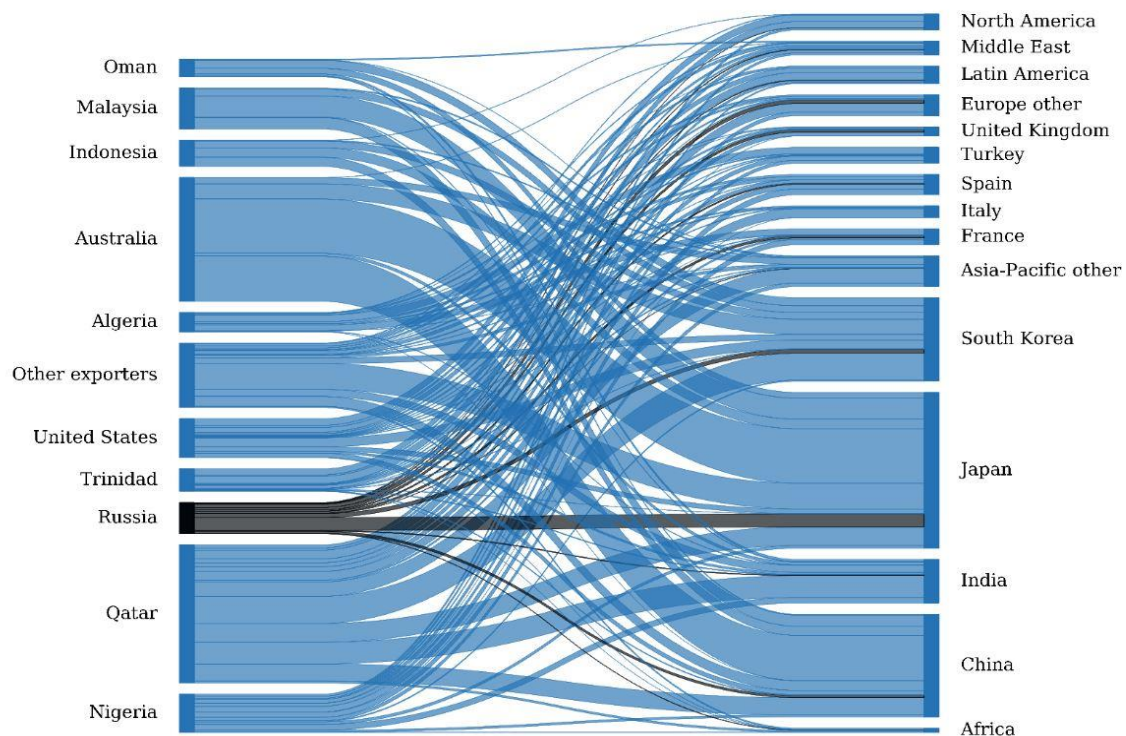
Figure 3: The distribution of Russia's LNG exports in 2018 by country (million ton)



Source: Authors, data from IGU

However, the available statistics for Russia's LNG exports in 2018 (Figure 4) do not yet account for the full effect of Yamal LNG. Once the data for 2019 becomes available, Russia's ranking among the major global LNG exporters is going to become more prominent, although one should expect even greater expansion for US LNG, on the back of several large projects launched in 2019.

Figure 4: Russia's LNG exports as part of global LNG trade in 2018



Source: Authors, data from IGU



The government's decision to exclude export market segregation clauses from the list of the amendments could be due to the realization that projects like Yamal LNG require maximum sales flexibility to be economically successful. On the other hand, considering the difficulty in tracking LNG swaps or resales, and the likelihood that Yamal LNG would use swaps in moving LNG throughout Europe, this exclusion could represent tacit acceptance that the Russian government cannot totally control gas flows beyond its borders.

9. The role of state support in Russian LNG developments

Beyond acknowledging that LNG projects need the right to market their gas without limitations being imposed, the Russian government has also shown that it is willing to support projects more directly as well. This idea culminated in a recent proposal by Russia's Energy Minister Alexander Novak to create a national state-run public corporation that could become a co-investor for LNG projects and also participate in building the related infrastructure. In September 2019 Novak sent a letter to President Putin outlining his proposal.⁷⁸ However, even before this announcement the Russian state had already been heavily supporting LNG developments in the country. This has taken the form of assistance across the whole spectrum of the value chain, including tax incentives, financing, state investments into infrastructure, including ports, shipbuilding facilities, and construction of a new generation of nuclear icebreakers. We discuss each of these in turn below.

9.1 Tax exemptions

For its first 250 bcm of natural gas and 20 mt of condensate, the Yamal LNG project received an exemption from mineral resource extraction tax (MRET) and from property tax for twelve years. Additionally, during this period the profits tax rate for the project was reduced to 13.5 per cent. Import of all equipment necessary for the construction of the liquefaction plant and for which there were no available Russian substitutes was exempt from VAT, and exports of LNG are exempt from export duty. Essentially, Yamal LNG will not be paying any taxes for many years.⁷⁹

The comprehensive nature of the tax exemptions for Novatek was primarily due to the location of its projects in the Arctic, as projects on the Yamal and Gydan peninsulas enjoy special exemptions under MRET regime. The existing LNG plant on Sakhalin and the Rosneft Far Eastern LNG plant have been or will be operating under the terms of PSAs that provide for cost recovery prior to profit production sharing. This treatment is also quite beneficial for investors.

LNG exports are exempt from export duty. For Baltic LNG this effectively means a subsidy as this project is going to take gas from Gazprom's network at the same point as the export-oriented Nord Stream 2 (with the latter paying 30 per cent export tax).

9.2 Financing

Yamal LNG attracted the largest ever project financing in Russia totaling US\$19 billion. It is worth noting that obtaining financing in US dollars was not possible owing to the US financial sanctions.⁸⁰ As a result, most of the loans were made in euros, with some financing in Russian rubles and Chinese yuans (see Table 3).

⁷⁸ <https://www.rbc.ru/business/17/10/2019/5da866299a7947233fabf745?from=center>

⁷⁹ <http://www3.energyintel.com/WebUploads/gei-moscow/media-files/iod-story-24-10.html>

⁸⁰ <https://www.ft.com/content/8412ba8c-6ace-11e7-b9c7-15af748b60d0>



Table 3: Project financing for Yamal LNG

<u>Entity</u>	<u>Percentage of total financing</u>	<u>Loan currency</u>	<u>Amount</u>
China Development Bank and the Export-Import Bank of China	3.7%	CNY	4.6 Billion
Russia's National Welfare Fund	12.4%	RUB	150 Billion
Gazprombank and Sberbank under the auspices of EXIAR program	21.2%	EUR	3.6 Billion
China Development Bank and the Export-Import Bank of China	54.9%	EUR	9.3 Billion
Intesa San Paolo, BPI Finance, SACE	4.3%	EUR	750 Million
Japan Bank for International Cooperation	1.1%	EUR	200 Million
Euler Hermes, EKN, Intesa San Paolo, Raiffeisen Bank International	2.4%	EUR	425 Million

Source: OIES, based on Novatek press releases

More than 90 per cent of the project financing came from Russian and Chinese entities. Of these, Russia's National Welfare Fund purchased dollar-indexed bonds issued by Yamal LNG to the amount of 150 billion rubles which accounted for 12.4 per cent of the overall financing. Russia also provided loan guarantees: under the auspices of Russia's new programme on providing support to Russian exporters through loan insurance, the EXIAR agency was established as a specialized state institution to support exports through the provision of a range of export credit and investment insurance products. In 2014 the ownership of Eximbank was transferred to EXIAR.⁸¹ EXIAR provided insurance for loans to Yamal LNG by Sberbank and Gazprombank to the amount of 3.6 billion euros. Russia's Vnesheconombank provided loan guarantees for Novatek which allowed the latter to extend the credit lines for Yamal LNG. An intergovernmental agreement between Russia and China helped Yamal LNG in attracting Chinese shareholders and loan financing, and ultimately loans from the China Development Bank and the Export-Import Bank of China (in yuans and euros) accounted for 58.6 per cent of the total loans for Yamal LNG.

9.3 Direct state infrastructure investments: Focus on the Northern Sea Route

Almost 18 per cent of Russia's territory (over three million square kilometres) is in the Arctic. In addition to its tremendous potential for developing hydrocarbons reserves, it plays an important part in Russia's geostrategic calculations. One of the strategic priorities for the Russian government is to develop the Northern Sea Route (NSR) – the Arctic shortcut to Asia. The route offers a significant reduction in transportation distances from Yamal to Asia compared with the much longer route through the Suez Canal. The NSR also offers an alternative to the US Navy-controlled maritime

⁸¹ In 2015, the Russian government acknowledged the desirability for a one-stop shop to be established as part of Vnesheconombank, offering financial and non-financial support for exports. Consequently, in the April of that year, the Russian Export Centre was officially registered as a company, and relevant legislative amendments were introduced by Federal Law 185-FZ dated 29 June 2015 ('On amendments to Federal Law "On the bank for development" and part two of article 970 of the Civil Code of the Russian Federation'). On 10 December 2015, the Russian Export Centre became the sole shareholder of JSC "EXIAR".

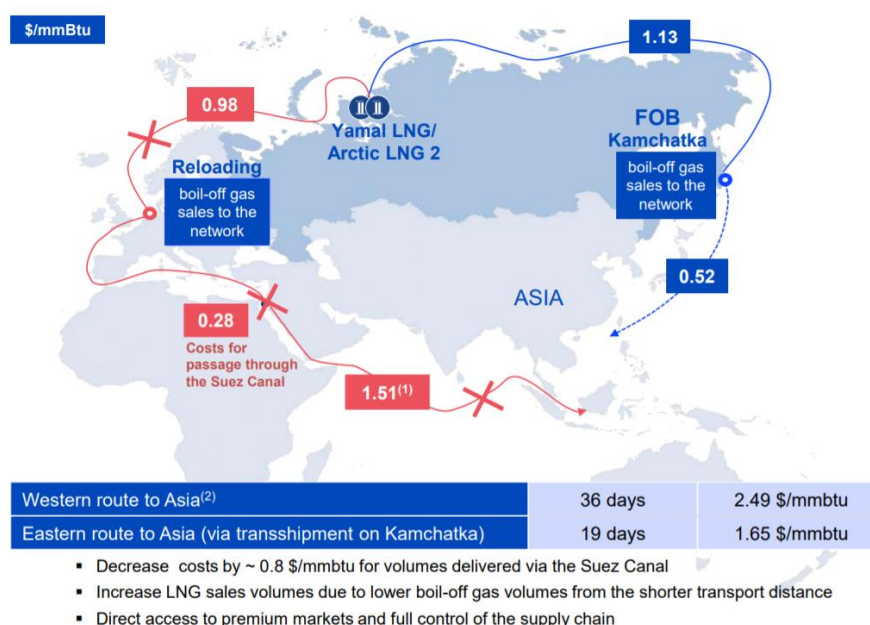


trading routes between Europe and Asia. The development of military bases along the Russian Arctic coast and the control by the Russian Navy of the NSR is an important factor and a potential leverage point in Russia's growing geopolitical cooperation with China amid US-China trade tensions.

The NSR connects the Atlantic and Pacific Oceans and is an important transit route for Europe and Asia. It extends about 4,800 km (3,000 miles) off the coast of the Russian Federation from the Novaya Zemlya archipelago in the west to the Bering Strait in the east. The NSR halves transit times, reduces fuel consumption and CO₂ emissions, and eliminates the risk of piracy. It is currently overseen by the Russian authorities via the Northern Sea Route Administration (NSRA) under the Ministry of Transportation.

According to Russian law, the NSR begins at the eastern coast of Novaya Zemlya (Kara Gate) and extends through to the latitude of Cape Dezhnev (the easternmost point of the Russian mainland). Within these limits, insurance requirements, shipping fees, and icebreaker assistance fees have been, to some degree, standardized. Finally, NSR use is limited to those vessels that are of the 1A-ice class (see Map 3).

Map 3: Northern Sea Route



Source: Novatek

Russia set out an ambitious goal to increase the traffic through the NSR to 80 mt per year by 2024.⁸² It now appears that even with the timely start of all planned hydrocarbon development projects in the area the timing of this goal is not realistic. By 2030, however, the NSR may emerge as a key transportation corridor. According to the latest available statistics for 2018, the transportation turnover via NSR amounted to 19.7 mt, an increase of 84 per cent year-on-year. Of this total, LNG (from the Yamal LNG project) accounted for 8.4 mt, crude oil and refined products for 7.8 mt (primarily from the Novoportovskoye field developed by Gazpromneft), and gas condensate for 0.8 mt. Thus, hydrocarbons accounted for 86 per cent of total transportation via the NSR in 2018.⁸³ Shipments from Novatek's LNG plants on Yamal and Gydan will become the largest contributor to increased traffic through the NSR in the next decade. With three trains of Arctic LNG 2 in operation, in addition to Yamal LNG and Obsskiy LNG, shipments from these plants combined will reach about 48 mt by 2027.

⁸² <http://portnews.ru/digest/21244/>

⁸³ <http://geoenergetics.ru/2019/02/21/perevozki-po-severnomu-morskou-puti-za-2018-god/>



The Russia government is probably also gambling on increased international shipping traffic via the NSR to contribute to higher transportation turnover in the future.

It is not surprising, therefore, that the Russian state became a long-term partner to the private companies working in the Russian Arctic and has invested in infrastructure development along the NSR. The most important state investment to date has been the construction of the seaport of Sabetta at the site of the Yamal LNG project at a reported cost of 71 billion rubles (approximately US\$1.1 billion at today's exchange rates). The Federal Russian budget financed the construction of the port itself (including an extensive ice protection system), a five-mile approach channel, and a thirty-five-mile seaway channel. The state will continue investing funds to keep the channels in good order (in particular by performing regular dredging operations⁸⁴).

State support is also evident in the development of the Arctic nuclear icebreaker programme that aims to ensure year-round navigation via the NSR.⁸⁵ At present, navigation for LNG carriers via the NSR eastwards is possible for six to seven months of the year, depending on quantity of ice. The new generation of Arc7 LNG carriers developed for Novatek's projects can travel through two-metre thick ice, (although travel speed is significantly reduced), but even Arc7s require the support of expensive nuclear icebreakers during the winter months. Owing to the width of the LNG carriers, two nuclear icebreakers are currently needed to open up a channel wide enough for the LNG tankers, imposing an additional cost on shippers.

In a new development the Russian government has also suggested that it may even create a state company for LNG investments in order to provide further support for what it regards as strategic projects for the commercial and geo-political future of the country.⁸⁶ A particular focus would most likely be on projects that enhance Russian influence in the Arctic region and encourage more traffic through the NSR, although it seems unlikely at this stage that a new state company would lead any new developments but would rather be a supportive minority shareholder. Nevertheless, the formation of such a company would be significant for the industry, underlining once more that state control will continue to be a dominant feature of the energy sector in Russia.

9.4 Russia's state programme on developing nuclear icebreakers

Russia is the only country in the world with a nuclear icebreaker fleet, operated by the Rosatomflot subsidiary of Rosatom, Russia's state-owned nuclear energy operator. Russia's first nuclear icebreaker 'Lenin' started servicing the NSR as early as 1959. Rosatomflot currently provides ice piloting along the NSR and also for other Russian ports which freeze in winter. Russia's nuclear icebreakers are built at the Baltic Shipyard near St. Petersburg. There are four in operation, but three of them ('Taimyr', 'Vaigach', and 'Yamal') were built in 1989-1992 and are approaching the end of their service life. The fourth icebreaker, 'The 50th Anniversary of Victory', a larger and more powerful nuclear icebreaker was commissioned in 2007.⁸⁷

Rosatomflot is now developing the next generation of nuclear icebreakers. Three vessels in the so-called LK-60 series ('Arktika', 'Sibir', and 'Ural') will be commissioned in 2020, 2021, and 2022 correspondingly with a reported price tag of about 50 billion rubles (about US\$0.75 billion) each. Approximately half of this amount will be financed by the Russian budget, with the rest coming from project financing. 'Arktika' was put afloat in June 2016, and construction is currently in its final phase. 'Sibir' was launched in September 2017. The new icebreakers are more powerful (60 MW), able to break through three-metre thick ice. At 34 metres width they can clear the way for a 70,000-dwt tanker (two 30-metre width icebreakers are required to perform this task at present). Another key advantage given the peculiarities of Russian Arctic operations is the dual draft construction that allows the new vessels to enter the river mouth to clear the way to the ports located along the NSR. This

⁸⁴ <http://yamallng.ru/en/project/harbor/>

⁸⁵ <https://roscongress.org/en/materials/ledokoly-budut-khodit-v-arktike-kak-tramvai-sem-voprosov-o-severnom-morskom-puti-/>

⁸⁶ <https://www.rbc.ru/business/17/10/2019/5da866299a7947233fabf745>

⁸⁷ <https://www.rosatom.ru/production/fleet/>



makes the new generation of nuclear icebreakers multi-use and reduces the number of conventional icebreakers required.

In 2026-27 Rosatomflot plans to commission two more 60 MW nuclear icebreakers (the so-called project 22220). The ultimate goal is to build an even more powerful generation (the LK-110 series) of nuclear icebreakers that would use a 110 MW power propulsion unit to cut through ice of up to 4.3 metres which is found at higher-latitude routes. Here waters are deeper and could be accessed by larger ships than those navigating the existing NSR route. These icebreakers would have a 48-metre width, which would allow them to cut a channel 50 metres wide for 100,000 dwt tankers. Even more importantly, these icebreakers would maintain a speed of ten knots even while breaking through two-metre thick ice, providing an ultimate solution to efficient year-round transportation via the NSR to Asia. The cost of the 110 MW nuclear icebreaker is currently estimated at about 100 billion rubles (US\$1.5 billion). The Russian state budget is going to fully finance the construction of the first vessel in the new series which is projected to be commissioned before 2030 at the Zvezda shipyard in Russia's Far East. The financing sources for the second two are not yet determined at the time of writing.

As mentioned earlier, Yamal LNG's transportation strategy has been based on creating maximum self-sufficiency using Arc7 ice-class LNG carriers.⁸⁸ This would allow the Russian Arctic LNG projects to minimize their dependence on Rosatomflot's icebreakers. According to Novatek's strategy, the icebreakers would primarily be needed to keep open the channel from the port of Sabetta to the open sea. The current LNG tanker fleet for Yamal LNG comprises twelve Arc7s and eleven conventional LNG carriers. A further three Arc7 LNG tankers are going to be delivered before the end of 2019 (two in October and one in November). The Arc7s, each with the capacity to hold 170,000 cubic metres of natural gas, are 299 metres long and 50 metres wide. They are powered by 45 MW engines which can be fueled by either marine fuel oil, diesel or LNG, and can travel at a speed of 19.5 knots in open water and at a reduced speed of 5.5 knots through sea ice up to two metres thick. The Azipod propulsion system allows them to move forward and astern through ice.

The LNG carriers for Yamal LNG have been built in South Korea, following the success of Daewoo Shipbuilding & Marine Engineering Company Ltd. which won a tender in 2013 to build fifteen Arc7 LNG tankers at a total cost of about US\$5 billion (approximately US\$333 million per ship). The financing for the construction was organized through third parties including Sovcomflot, Canada's Teekay LNG in a joint venture with China LNG Shipping, and Mitsui OSK Lines in a joint venture with China Shipping Development Company.

9.5 Developing domestic shipbuilding capabilities

The use of Daewoo by Yamal LNG to build the tankers has led to criticism in Russia for sending capital and jobs abroad instead of developing Russia's own shipbuilding capabilities. Novatek argued that it simply could not find domestic shipbuilders capable of delivering Arc7s in time for Yamal LNG to meet the long-term contract obligations that it had signed with its buyers. The Russian state reluctantly accepted a series of practical compromises for achieving its goal of jump-starting Russia's LNG exports with regards to foreign technology, ships, and equipment when no domestic substitutes were available or could be produced in time. Historically, Russian shipyards have always been oriented toward their largest client – the Russian Navy. Additionally, Russia's commercial fleet was aging, and the need for modern shipbuilding yards was rising. The domestic capability for constructing specialized commercial vessels such as ice-resistant LNG tankers was therefore limited, and it was realized that the magnitude of the task required the building of brand-new shipyards in Russia. In 2013, when Novatek's and Rosneft's programmes for developing Arctic projects encountered severe limitations with regards to the domestic construction of LNG carriers, oil and gas condensate tankers, support vessels and offshore platforms, Russian decision-makers formulated a plan for the reorganization of the domestic shipbuilding industry. The core of this plan was to separate defense-

⁸⁸ <http://yamallng.ru/en/project/tankers/>



industry shipbuilding from commercial shipbuilding and to start building domestic capabilities with the help of foreign expertise and technology. The development of the Zvezda shipyard became a centrepiece of this strategy.

9.6 Zvezda shipyard

The Zvezda shipyard is a large shipbuilding and engineering complex in the town of Bolshoi Kamen (Big Rock) in the Russian Far East. The shipyard at Bolshoi Kamen was built after WWII and started operations in 1954. Since 1962 it had been the main base for servicing the nuclear submarines of Russia's Pacific Fleet. After the end of the Cold War, the Zvezda shipyard was used to decommission old Soviet nuclear submarines.

Since the early 2000s there have been plans to expand and redevelop the shipyard to enable the construction of larger ships. In 2009 a consortium consisting of Zvezda's owner, Russia's state-owned Unified Shipbuilding Corporation (USC), and South Korea's Daewoo Shipbuilding & Marine Engineering (DSME) was formed with 80-20 per cent ownership to manage the expansion. USC, however, was unable to find a means of financing the JV, and in 2012 DSME withdrew from the partnership. The failure of USC to meet its shipyard construction deadlines generated growing frustration in the Kremlin. A meeting in August 2013 in Vladivostok about the problems of domestic commercial shipbuilding chaired by President Putin became a game-changer.⁸⁹ Later that year, USC was forced to sell 75 per cent less two shares in its subsidiary OAO Far East Shipbuilding and Ship Repair Centre, which included the Zvezda shipyard on its books, to a consortium of Gazprombank and Rosneft. Ultimately, USC is likely to reduce its ownership below the blocking interest as part of the separation process between the areas of the original Zvezda shipyard that continue to work on the defense orders, and the new parts of the shipyard which will focus on building commercial vessels. In December 2015 the Zvezda Shipbuilding Complex Limited Liability Company was established as a segregated part of the shipyard that would focus on the construction of commercial vessels.

The Zvezda construction is being implemented in several stages. The initial stages of construction have been started, which include the hull production shop, the painting shop and the outfitting slipway for the production of medium range vessels and offshore facilities. The second stage provides for the commissioning of a dry dock and full-cycle production facilities for the fabrication of large range vessels and offshore facilities. Later on, the commissioning of production facilities for the construction of offshore facilities is planned. The step-by-step commissioning of the entire complex will be completed by the end of 2024.

Zvezda is the first Russian shipyard designed to build a large range of ships, and one that is capable of meeting the needs of Russian customers for the construction of off-shore facilities to ensure the production of natural resources on the continental shelf of the country. Its capabilities will include the construction of drilling platforms that are designed for year-round work in Arctic, as well as commercial vessels for transporting goods by internal and external sea routes, Aframax and Suezmax tankers using LNG as fuel and which will meet the latest environmental standards, LNG carriers, icebreaking vessels and other specialized vessels and structures.

At present, most of the orders for Zvezda have come from Rosneft. In 2018 the shipyard started the serial production of 114,000 dwt Aframax tankers, with the first vessel planned for delivery in 2020. At the end of the 2020s Zvezda will start the construction of the unique Leader 120 MW nuclear icebreakers.

A real breakthrough with regards to orders for new ships came in 2018, when Novatek confirmed an order for the whole series of gas carriers for its Arctic LNG 2 project. Then in April 2019, Zvezda and Sovcomflot signed a contract for the construction of a pilot gas carrier for Arctic LNG 2. In September 2019 Zvezda signed a contract with Samsung Heavy Industries Co. Ltd. for the design of LNG tankers for the Arctic LNG 2 project during the 5th Eastern Economic Forum in Vladivostok. According to the

⁸⁹ <http://kremlin.ru/events/president/news/19107>



document, Samsung Heavy Industries will become the technology partner of the project and hand over the technical specifications and the design documentation of the project to the Zvezda Shipbuilding Complex. Managed technology transfer is at the core of the cooperation between South Korea and Russia in shipbuilding for South Korea, a “certain openness of the Republic of Korea to the idea of transferring its own technology is explained by the fact that Seoul considers such projects as an opportunity to get access to Russian oil and gas projects, through which the Republic of Korea would be able to secure a better deal on hydrocarbon supplies”.⁹⁰

The import substitution efforts of the Russian government have a clear geo-political purpose, but they also create risks for Novatek’s second generation of LNG projects. After all, it was the timely delivery of LNG carriers produced in South Korea that underpinned Novatek’s success enabling a prompt start for Yamal LNG. A key question now is whether Zvezda is likely to be as good with regards to on-time, on-budget delivery of the LNG carriers? The answer is yes and no. Yes, because at least up until the middle of the 2020s Zvezda will still rely heavily on South Korean shipyards. And no, because the learning process is likely to mean higher costs of construction. The reported cost of one LNG Arc7 carrier at Zvezda has been estimated at US\$383 million (if fifteen vessels are ordered) compared with US\$330 million for the same ship constructed in South Korea. But the Russian government has said it would be ready to subsidize Zvezda operations up to a level of 30 per cent above the comparable cost of building ships in South Korean shipyards in order to invest in technology transfer and in the hope that over time the localization of construction in Russia will become much higher than at present. As a result, the costs of ordering the second generation of LNG carriers in Russia by Novatek should essentially remain based on the market rates of construction in South Korea.⁹¹

Indeed, for all practical purposes, most of the work at Zvezda in the next five to seven years will involve the assembly of parts brought from abroad. In particular, the most complicated parts of the hulls of the vessels - the stern and bow - will be constructed in South Korean shipyards and brought to Zvezda by sea.⁹²

The steel used for ship construction at Zvezda is currently purchased from a joint venture between Rosneft and Ural Mining Company. The JV was supposed to set up its own steel production facilities, but currently imports steel from South Korea.⁹³ Plans exist to purchase steel from Russian producers, but the domestic metallurgical plant closest to Zvezda is the Amur Steelworks located 1,100 kilometres away by railroad. To complicate matters further, the Amur Steelworks does not have the capacity to produce large enough rolled steel plates and would need to be upgraded. Another metallurgical plant that could supply large rolled steel plates is MMK (Magnitogorsk Metallurgical Combine) in the Chelyabinsk region, but this is 7,000 kilometres away. Additionally, Russian railroads would need to introduce special rolling stock to transport these large rolled steel plates. Even more importantly, the Severomuysky Tunnel, a rail tunnel on the Baikal Amur Mainline (BAM) in northwestern Buryatia, appears to be in need of expansion if it is to handle this type of railroad shipment. In short, bringing steel to Zvezda from South Korea by sea is by far the cheapest option at present. As a result, the localization of production of large specialized oil and gas tankers in Russia is going to be complicated and true independency from imported parts and supplies will be hard to achieve.

Another example of Novatek’s greater involvement in the development of domestic supplies and job creation in Russia is the building of a major new centre for the construction of gravity-based structures (GBS) near Murmansk that will be used for the Arctic LNG 2 project and other prospective LNG projects on Yamal and Gydan. Having experimented with building the facilities of the Yamal LNG liquefaction plant in the Arctic permafrost, Novatek realized that giant floating GBS can serve as foundations for the liquefaction trains which would consequently not require expensive work on

⁹⁰ <https://russiancouncil.ru/en/analytics-and-comments/analytics/south-korea-and-the-development-of-offshore-shipbuilding-in-/>

⁹¹ <https://www.kommersant.ru/doc/3881485>

⁹² <https://www.kommersant.ru/doc/3819041>

⁹³ <https://www.vedomosti.ru/business/articles/2019/02/17/794352-verf-zvezda>



stabilizing foundations (often requiring cryogenic support of the bases). At the same time, pre-fabrication of the GBS in factories in the Murmansk area reduces the 'Arctic premium' on the cost side. Indeed, according to the Arctic LNG 2 FID, the project is going to achieve significant cost reductions per ton of produced LNG compared with the Yamal LNG project, (see Table 4). This part of the effort to localize production would appear to be more realistic since it does not require specialized technology and can rely on underutilized capacity in the Murmansk region.

Table 4: Cost projections for Russia's current and prospective LNG projects

	Project status	Start of operations	Nominal capacity (Mtpa)	Project cost (Billion US\$)	Cost per ton of liquifaction (US\$)
Yamal LNG	In operation	2018	16.5	27	1636
Arctic LNG 2	FID	2023, 2024, 2026	19.8	21.3	1076
Far Eastern LNG	Planned	2025	6.2	4.2	677
Vladivostok LNG	Planned	2021	1.5	2	1333
Sakhalin-2, 3rd train	Planned	2026	5.4	6.1	1130

Source: For Yamal LNG and Arctic LNG 2 - Novatek's press-releases; for other projects - Russia's Ministry of Energy estimates as of September 2019

10. Conclusion

For many years Gazprom was at the forefront of Russia's LNG strategy, which was initially aimed at developing the reserves around Sakhalin Island for the Asian market and opening a route to LNG markets in the Atlantic Basin from the Shtokman field and the Baltic LNG scheme. Although the former was successful, largely thanks to the early operatorship of Shell, the latter plans for western markets have disappointed, and as a result the Kremlin decided to create an opportunity for new players to enter the Russian LNG scene. Novatek, in particular, has grasped its chance, and following the successful development of Yamal LNG has become Russia's LNG champion. Rosneft has been slower to act but may now also be on the cusp of investing in a project in the East (Far East LNG). Meanwhile Novatek continues to progress with new projects such as Arctic LNG-2, which has just received FID, Obsskiy LNG, and Arctic LNG-1.

As a result, it would now appear that Russia's overall gas export strategy is developing a two-pronged approach. Gazprom remains dominant in pipeline exports, controlling all the routes to Europe and the West and now opening its first route to the East (Power of Siberia to NE China, with first gas flowing in December 2019). However, the Kremlin appears to have realized that Russia's pipeline-dominated export model is no longer optimal in the emerging global gas market, with LNG set to have the biggest share of the growth in gas trade over the next decades. The Russian authorities also appear to acknowledge that its state-controlled gas giant Gazprom does not have the flexibility and expertise to exploit this expanding market, and has chosen a smaller, nimbler, and more commercially efficient player to be its key player in the LNG world. Novatek has received significant support, both financial and political, and in return has to date delivered on all its promises. If it continues to do so, Russia could well be exporting 100 mt per annum by the 2030s, making the country one of the 'Big Four' LNG exporters (with the US, Qatar, and Australia).

Importantly, though, LNG is about more than gas exports for Russia. From a geo-political standpoint Novatek's projects are helping to open up the strategically vital Northern Sea Route in the Arctic, enhancing trading and political relations with Europe and Asia (and in particular China). LNG is also opening new markets for Russian gas, with commercial and political advantages as both companies and the Kremlin have opportunities for a wider range of negotiations and discussions. The current expansion of Russia's LNG business is also important domestically as well and the track record so far suggests partial success in new job creation in Russia and the industrial development of the Far North and Murmansk regions. Furthermore, expansion of Russia's ability to develop more simple LNG production processes is an additional plus point, although problems remain with regards to technology transfer and import substitution in more specialized areas. For some other goals, like developing



domestic liquefaction technology, the results will be known soon, since the promised start of train 4 of Yamal LNG based on 'Arctic cascade' in early 2020 is likely to provide significant evidence. Meanwhile progress in some areas has been more mixed, for example building Russian capabilities in specialized LNG tanker shipbuilding. Russia has created the new Zvezda shipyard facilities for local construction of large and very large military and commercial vessels but remains critically dependent upon imported inputs and special steel from South Korea in particular. Clearly the technological and logistical efficiencies of the well-established, world-class shipyards in South Korea remain a big competitive advantage, while Russia still has some way to go as it aims to create similar facilities almost from scratch. Nevertheless, it is already clear that Russia has set out on an ambitious course of LNG development supported by domestic industrial development, and although it will have to overcome many practical difficulties in achieving its ambition of becoming one of the world's top LNG producers and exporters it has already taken significant steps forward and appears likely to continue its growth trajectory over the next decade.



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