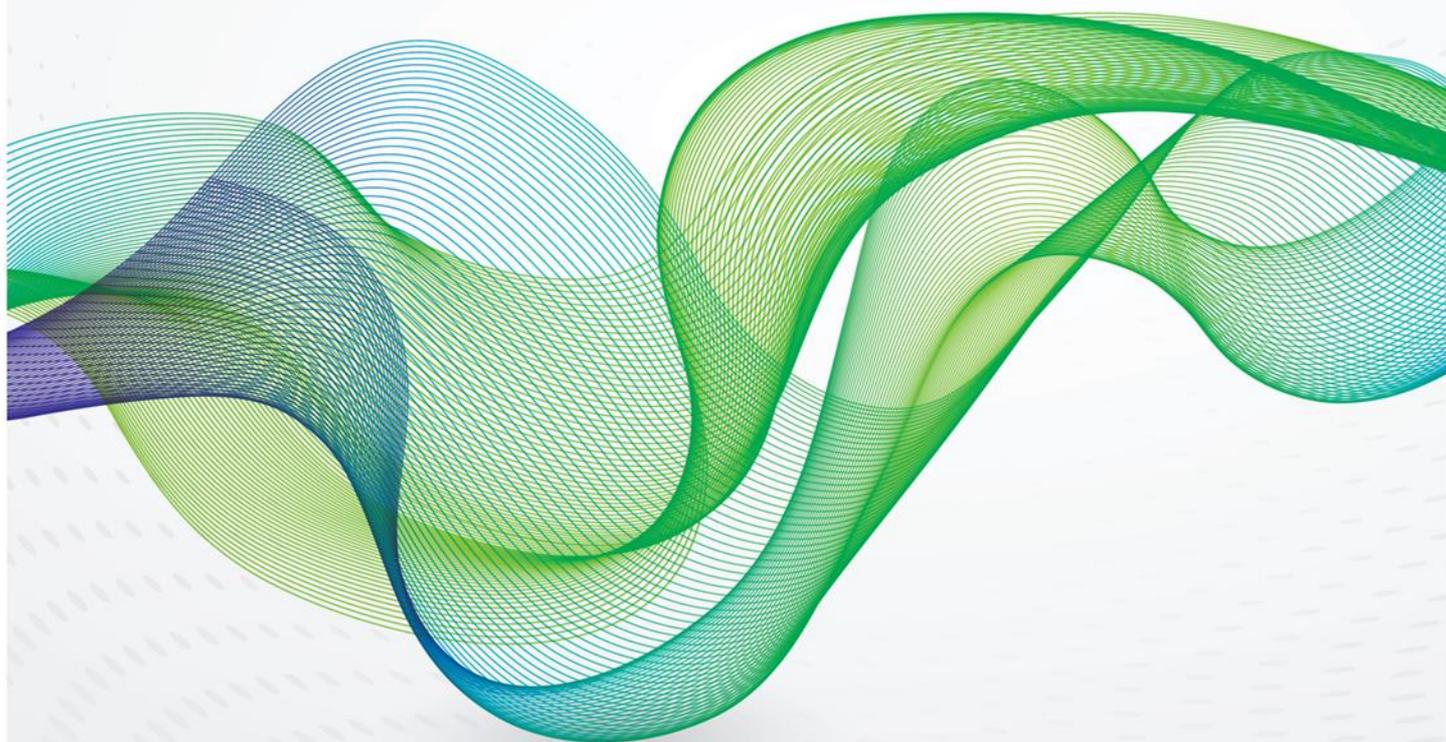
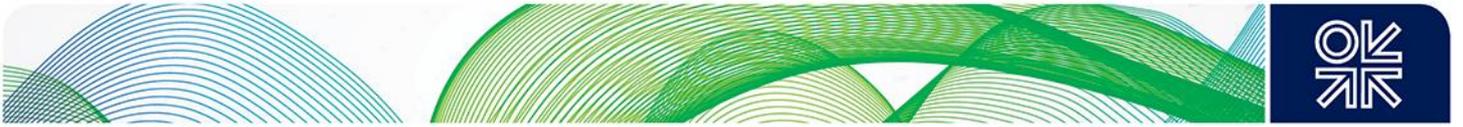


March 2024

Outlook for Russia's oil and gas production and exports



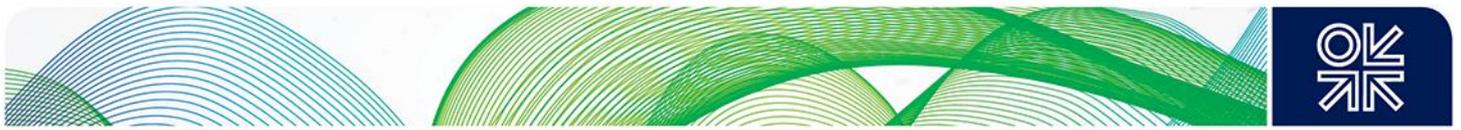


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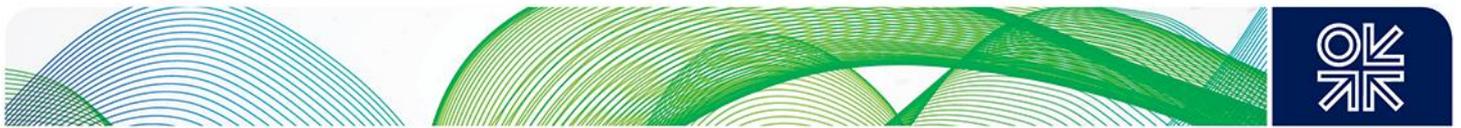


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UKERC Research on the Geopolitics of Energy System Transformation

This is the third, and final report, that is the result of a collaboration between the OIES and Theme 1 of UKERC-4 that deals with UK Energy in a Global Context. The first report by Bassam Fattouh on '[Saudi Oil Policy: Continuity and Change in the Era of the Energy Transition](#)' was published back in 2021. At the time it was envisaged that there would be a partner report dealing with Russia, but events conspired to radically change the context for considering the impact of the energy transition on Russia's energy strategy. Following Russia's invasion of Ukraine, just over two years ago, it has been necessary to rethink the role of Russia in the global energy system and the impact of oil and gas on the Russian economy in the context of extensive Western sanctions. As a result, this study has been a while in the making. Meantime, the OIES has published a second report by Marshall Hall on '[LNG and UK Energy Security](#)', again conducted in a very different context from that originally envisaged. This report presents a comprehensive analysis of the current state of affairs with Russian energy and its impact on the country's economic prospects. It is particularly timely, and I thank the authors for working through some extremely challenging times. The current phase of UKERC will soon come to an end and UKERC is about to celebrate its 20th anniversary. All being well, there will be a UKERC-5 and we look forward to continuing our work with colleagues at the OIES.

Mike Bradshaw

Co-Director

UKERC

Professor of Global Energy

Warwick Business School

Analytical Framework

This paper is the combined work of three authors who have all spent decades covering the Russian energy sector and economy. Vitaly Yermakov, James Henderson and Richard Connolly have contributed sections on the future of the Russian oil and gas industry, the outlook for oil and gas exports and the future impact of hydrocarbon revenues on the Russian economy respectively. While the views of all three are complimentary on many issues, the paper was constructed to allow all of them to express their opinions individually, with the consequence that the resulting paper may show some alternative views in places. We attempt to pull them all together in our overall conclusions, highlighting where different interpretations are possible, but the paper should be read as offering an amalgam of individual analyses which can be combined to provide a useful lens through which the outlook for the Russian energy economy can be viewed. We believe that, amid the uncertainty which has been created by the war in Ukraine and the resulting shortage of data from Russia, this is just as useful as attempting to provide a definitive story based on restricted information. It should also be noted that the Russian government has significantly reduced the amount of data it publishes on the oil and gas sectors since the invasion of Ukraine in February 2022. As a result, much of the data for 2023 is taken from secondary sources or is based on estimates.

James Henderson

Distinguished Research Fellow

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Introduction and Overview

The End of an Era

Cheap energy from Russia has been a foundation of European industrial competitiveness over the past 50 years while the revenues from hydrocarbon exports have allowed the Kremlin to finance Russia's budget. However, the era of Russia-Europe energy cooperation that has produced these significant benefits to both sides has ended amid the largest geo-political conflict since the end of the Cold War.

Geopolitics makes the split between Europe and Russia seem irreversible. A radical overhaul of Europe's energy imports and a fast diversification of Russia's exports toward Asia are already becoming the most likely way forward. Both would represent a radical shift in the global energy economy and trade with uncertain economic and geopolitical consequences.

It is not the split itself that is most surprising, but rather its abruptness. Even before the war in Ukraine, both Russia and the EU had formulated plans that suggested fundamental changes in the relationship. The EU had embarked on a path of deregulating its energy markets and transitioning to home-based clean energy (which would also lessen its energy dependency on imports from Russia). Russia envisaged a gradual and managed diversification from Europe towards Asia, where energy transition would take longer and where buyers continue to view security of supplies in a traditional sense as an obligation to deliver physical molecules, considering long-term contracts as viable insurance against volatile commodity cycles. But now there is less time for an orderly adjustment, and any issues must be addressed in a more *ad hoc* manner.

Finding new markets: Russia's Oil

For Russia, the near-term shock of having to re-direct the flows of its energy exports to different markets and find alternative customers has been softened by the price windfall since global prices for all fossil fuel commodities, including oil, coal and especially natural gas have been robust since February 2022, albeit with some relative weakness in 2024. Russia's export revenues in 2022 set historical records, helping to finance the transition to new export schemes. But in terms of redirecting volumes to new markets the story of Russia's fungible oil and refined product exports has been markedly different from the story of Russia's infrastructure-constrained pipeline gas exports.

Russian crude oil exports in 2022 increased to 242 million tonnes (about 4.9 mmbpd), up 7.6 per cent year-on-year. Alexander Novak, Russia's Deputy Prime Minister in charge of the energy complex hailed this development as the evidence of the industry's resilience to the pressures from the Western sanctions in his recent article for the "Energy Policy" magazine¹.

In 2023, it is possible to say that Russia has managed to re-direct the flows of its crude oil exports away from so-called "unfriendly" countries to alternative markets and to limit any decrease to manageable levels driven mainly by an agreement with the OPEC+ group to constrain exports.² This happened thanks to the significant discounts that Russian energy commodity exporters offered to buyers in Asia (mostly to India and China), although the extent of these discounts has been somewhat exaggerated. The so-called "mirror statistics" from the Indian and the Chinese customs demonstrate that imported Russian crude was only \$10-15/bbl cheaper than Brent, not the often reported \$35-40/bbl.³

It appears that the relative success of this Russian diversification strategy achieved in record time has been facilitated by the Kremlin's tacit acceptance of a reduced tax take, at least temporarily, as a significant portion of the oil price windfall has been retained by the exporters (and used to build new logistical chains to Asia) at the expense of the Russian budget in the first five months of 2023.⁴

¹ <https://energypolicy.ru/rossijskij-tek-2022-vyzovy-itogi-i-perspektivy/2023/12/13/>

² OIES Oil Monthly, Dec 2023, p.9

³ <https://www.reuters.com/business/energy/india-china-snap-up-russian-oil-april-above-price-cap-2023-04-18/>

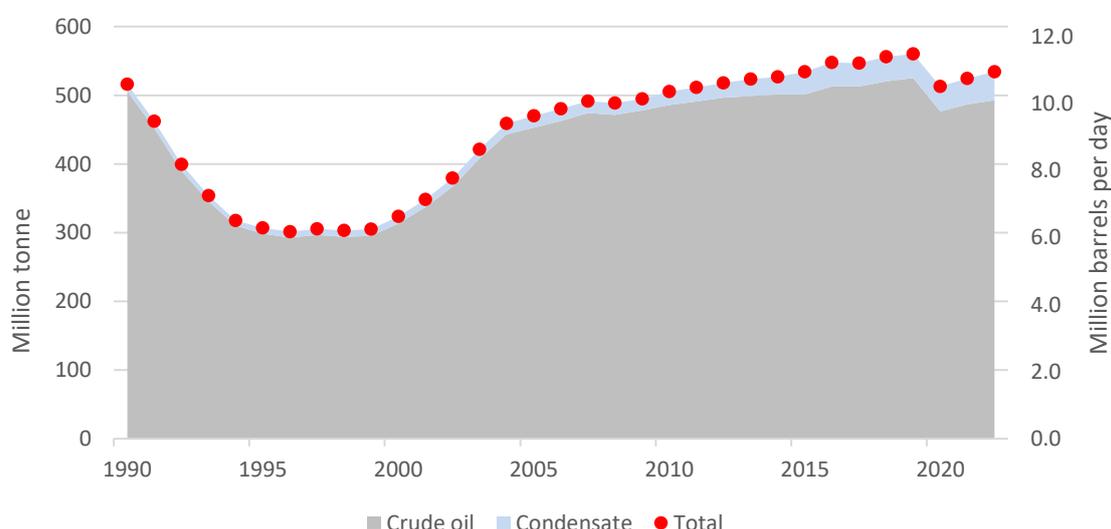
⁴ That was primarily due to the use of international price benchmarks for Russian crude (the quotations for Urals crude as defined by Argus that lost their relevance in the new conditions) rather than the actual sales prices in the statutory tax formulae determining the tax obligations of Russia's oil producers. Currently, the Russian government is considering different options for modifying the calculation mechanisms in the Russian oil and product taxes that would protect state tax take and introduce a new balance of interests between the state and the hydrocarbon producers.



Compared to former exports to Europe, the netbacks to the exporters on the new trade routes and rents for the Russian state are lower due to longer transportation distances, complicated logistics, and price discounts to the new customers. On balance, however, Russia’s ability to sustain and protect its niche in the global crude and product markets despite unprecedented trade restrictions could be considered a significant achievement. It has allowed Russia to avoid a significant reduction of oil output and refining throughput at home.

In 2022 Russia’s liquid hydrocarbons output (crude oil and condensate) increased to 534 million tonnes (about 10.9 mmbpd), up 1.8 per cent year-on-year. This was a second year of robust growth after the sharp reduction of output in 2020 that Russia had to implement as part of its OPEC+ commitments on dealing with the unprecedented fall in global oil demand during the COVID-19 pandemic. The support to overall liquids production came from the rising volumes of condensate produced. Since the early 2010s Russian gas condensate output has grown robustly, due to the wider development of deep layers of gas fields that contained a lot of “wet” gas, a trend that has continued to date. While in 2000 the share of gas condensate in total liquids output in Russia was 3.7 per cent, in 2010 it increased to 4.5 per cent, and in 2022 to 7.7 per cent. (See Figure 1).

Figure 1: Russian liquid hydrocarbons production, 1990-2022



Source: Author, data from Russia’s Energy Ministry, Rosstat, TEK Rossii magazine

Russia’s oil industry performance in 2023 has further defied earlier pessimistic expectations from many market watchers. The Russian Energy Minister, Nikolai Shulginov, suggested in December 2023 that the country’s total output for the year would be 523 million tonnes (10.5mmbpd), a 2% decrease from the 2022 figure.⁵ However, a subsequent estimate from OPEC put production at 10.92 mmbpd (c.544 million tonnes), equivalent to a 1.7% increase, underlining the uncertainties in the data emerging from Russia at the present time.⁶ Finally, a statement by Deputy Prime Minister Novak in the Duma suggested that production was 531 million tonnes (10.66mmbpd).⁷ In any case, the range of estimates suggests that overall liquids production remained relatively stable in 2023.

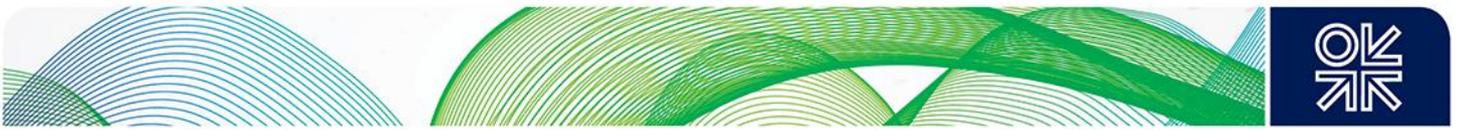
Of the total liquids, crude oil production amounted to around 9.8 mmbpd and condensate for about 1.1 mmbpd, based on the higher OPEC figures. Crude output was affected by a series of cuts in production and exports during the year. Russia announced a 500 kbd voluntary output cut for crude oil from March 2023⁸, measured against the output in February, meaning that overall production was expected to fall

⁵ Interfax CIS Oil and Gas Weekly, 10 Jan 2024, “Russian oil production in 2023 to reach maximum of 523 mln tonnes”

⁶ Interfax CIS Oil & Gas Weekly, 14 Feb 2024, “OPEC increase liquid hydrocarbon production estimate for Russia in 2023”

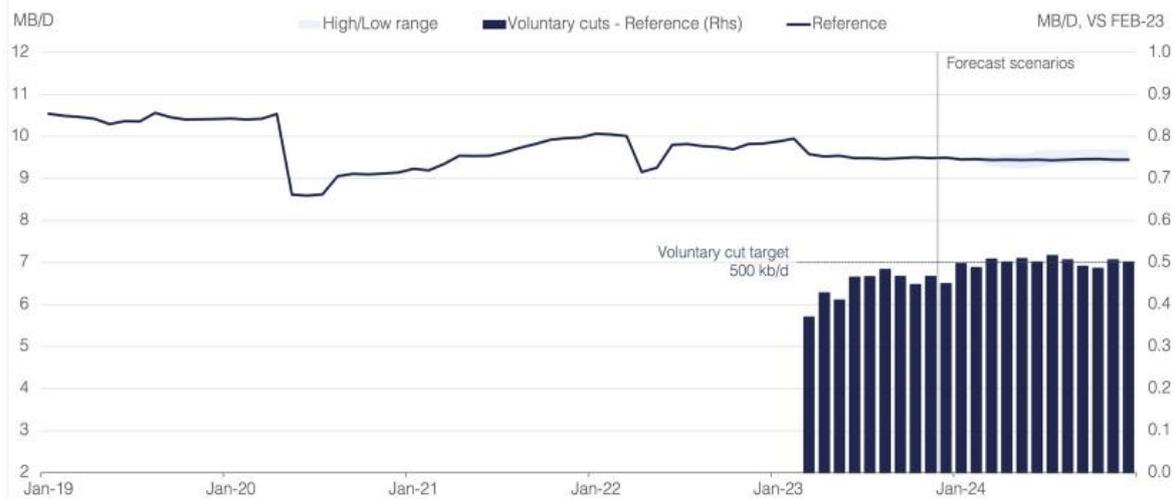
⁷ <https://neftegaz.ru/news/dobycha/814415-itogi-2023-q-ot-a-novaka-dobycha-nefti-v-rossii-upala-menee-chem-na-1-gaza-na-5-5/>

⁸ <https://www.reuters.com/business/energy/russia-cut-oil-output-by-500000-bpd-march-2023-02-10/>



by a similar amount. On March 21st Novak said that the announced reduction of output has been almost achieved and also that the voluntary cut would continue through the end of June 2023⁹. The cut was then extended into August, and was then developed further into a cut in exports of crude oil and oil products in support of the OPEC+ group.¹⁰ Crude oil accounted for 300,000bpd of the cut, with oil products making up the remainder. As can be seen from Figure 2, crude oil output has remained at approximately 9.5mmbpd since March, with total liquids output then implied at approximately 10.6mmbpd. Figure 2 shows total oil output since 2019 and (on the right axis) shows the level of voluntary cuts that have actually occurred.

Figure 2: Russian crude oil output since 2019



Source: IEA, OIES forecast

Notes: Excludes condensates

Finding new markets for Russia's natural gas

The situation with Russian pipeline gas is markedly different. Supply of export sales to Europe has fallen by 80% since February 2022 due to sanctions, contractual disputes triggered by a Russian demand for payment in roubles and then exacerbated by infrastructure issues. Flows through the Nord Stream pipelines fell to zero due to a series of commercial issues before the physical infrastructure was destroyed by 4 explosions that prevented any further flows from being possible. The transit via Ukraine was cut in half because of a dispute over the gas delivery points and is now 75% below contracted transit levels. Transit via Yamal-Europe fell victim to a commercial dispute between the Polish and Russian shareholders and consequent sanctions and countersanctions. As a result, having catalysed a series of legal disputes with European customers and lost access to most of the pipeline export infrastructure to the European gas market in 2022, Russia had to drastically reduce its gas output and consequently increase its spare productive capacity.

Russia's national gas output in 2022 amounted to 695 bcm, down 11.2 percent year-on-year, or by 87 bcm. This represented the largest year-on-year production decline since 1990 at a national level. It is also worth noting that Gazprom's output in 2022 was affected disproportionately, ending up at only 412.6 bcm, 20 percent less than in 2021, an annual decline of about 103 bcm, the largest in Gazprom's history¹¹. At the same time, Russian oil companies and independents increased their gas output in 2022 (See Figure 3).

⁹ https://www.rbc.ru/business/21/03/2023/6419c07c9a7947949f0386ac?from=from_main_12

¹⁰ Reuters, 5 Nov 2023, "Russia to continue voluntary cut of oil and oil product exports until year-end"

¹¹ <https://www.gazprom.com/press/news/miller-journal/2023/405413/>

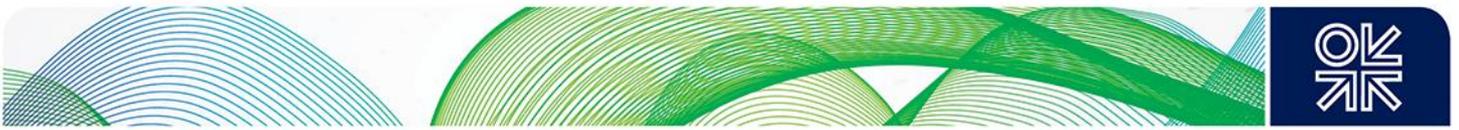
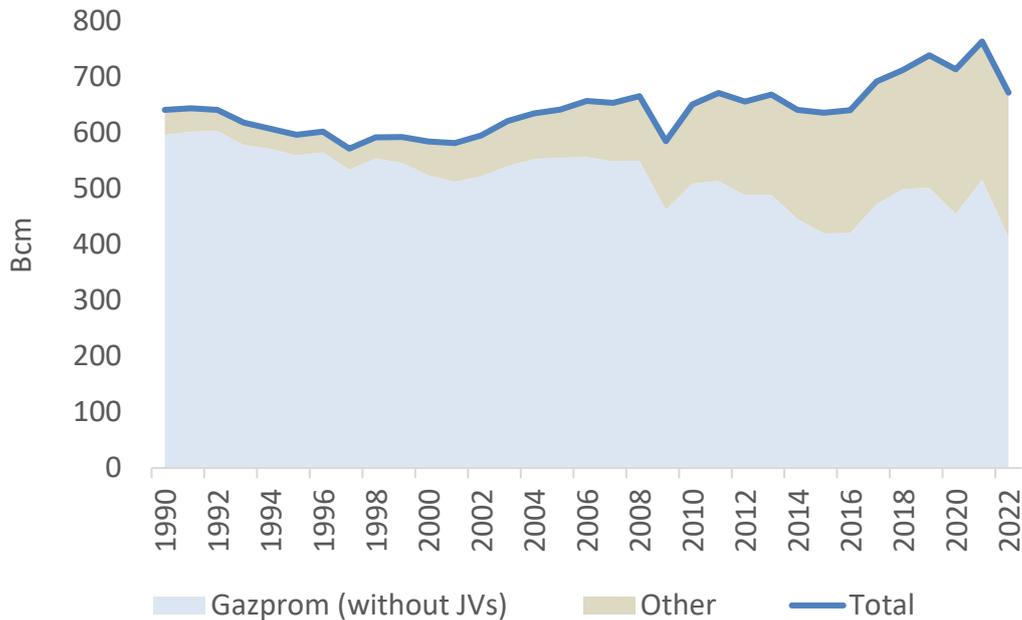


Figure 3: Russia's gas output, 1990-2022



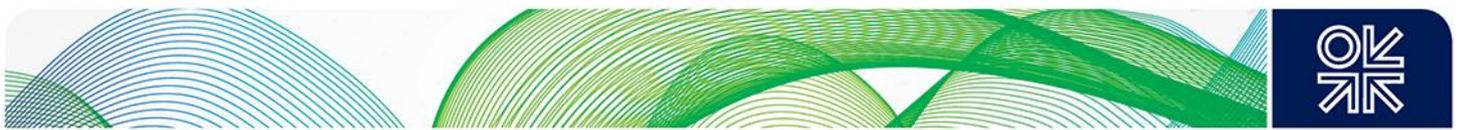
Source: OIES, data from Rosstat and Gazprom

These developments have continued into 2023. Production fell by a further 36bcm to 659bcm (down 5%) driven by a further sharp fall in Gazprom's pipeline exports to Europe (a fall of around 40bcm to 25bcm) which was only partly offset by rising exports to China (22bcm) and stable sales to Turkey (21bcm). Sales to countries in the Near Abroad were also stable at approximately 32bcm. Gazprom's share of national output has again been affected disproportionately as Russian independents increased their production. The biggest production increases occurred at two of Rosneft's projects, Rospan and Kharampur.

For several years it seems that Gazprom will have to accept the reality of reduced production and lower revenues. Any pivot to the East is going to be neither fast nor easy. Natural gas volumes delivered by pipeline are limited by the available infrastructure. Natural gas trade with China is expected to expand from 22 bcm in 2023 to 48 bcma by the end of the 2020s under the SPAs currently in place, as contracted gas supplies via the existing Power of Siberia pipeline reach their planned volume of 38 bcma by the end of 2025 and pipeline gas supplies from Sakhalin add another 10 bcma (post 2027, even in the most optimistic scenario). This is significantly less than recent Russian pipeline gas exports to the EU - about 150 bcm in 2021.

For China's gas market to become a viable alternative to the lost European market for Gazprom, a significant expansion of trade beyond the currently signed sales and purchase agreements (SPA) is needed. Russia and China have been in negotiations over a new 50 bcma gas pipeline that would connect Russia's gas resources on Yamal with China via a pipeline across Mongolia and might become a game-changer post 2030. Obviously, for the project to move ahead a new giant SPA with China will be needed. China is set to be a clear winner in the situation since it would be able to use its negotiating leverage to secure Russian gas at discounted prices¹².

¹² <https://www.ft.com/content/541f8bcb-118a-419e-869f-3273fcc9ce92>



1. Outlook for Russian Oil

1.1 Introduction

The longer-term outlook for Russian oil production is extremely uncertain. The IEA's World Energy Outlook 2022 postulates a 2 mmbpd drop for Russia's oil production by 2030 in their STEPs scenario. However, the only supporting analysis for this assumption in WEO 2022 (the latest WEO where oil production is discussed in country detail) is a short paragraph that states:

“Russia has been under sanctions since 2014 but the financial and technology restrictions bite much harder now. As access to technologies, oil field service expertise, equipment and assets is removed, Russia struggles to maintain production in existing fields and to develop large new fields in the Arctic, tight oil, and other offshore areas”¹³.

This set of assertions, however, is no substitute for the analysis of the factors that have governed the dynamics of Russia's oil production to date and the evaluation of how these might change in the future.

The obvious lines of investigation should attempt to answer the following questions:

- Are there reserves constraints on Russia's future production growth?
- Where is most of Russian oil going to be produced out to the 2030s, and does Russia need to rely on the high-cost and technically challenging areas in the Arctic offshore and the Bazhenov suite (a tight oil formation in Western Siberia) to maintain its oil output during the next decade?
- What role will Russia's tax policies play in addressing the risk of an oil production fall?
- What equipment will Russia need to manage the production declines at its producing fields and how critical are sanctions in this regard?
- Which specific projects is Russia planning to implement to produce “new” oil in the next decade and are there critical dependencies on Western technology?

Each of these questions merits fundamental research. This note will merely highlight the key points.

1.2 Russian oil reserves

The first thing to note is that Russia is one of the world's “big three” oil producers (along with the US and Saudi Arabia) and has vast oil reserves and resources. According to the 2023 edition of the Energy Institute's Statistical Review of World Energy 2023, Russia's proved reserves as of the end of 2020 amounted to 108 billion barrels (representing 6.2 per cent share of global reserves) with a reserve to production ratio of 28 years.

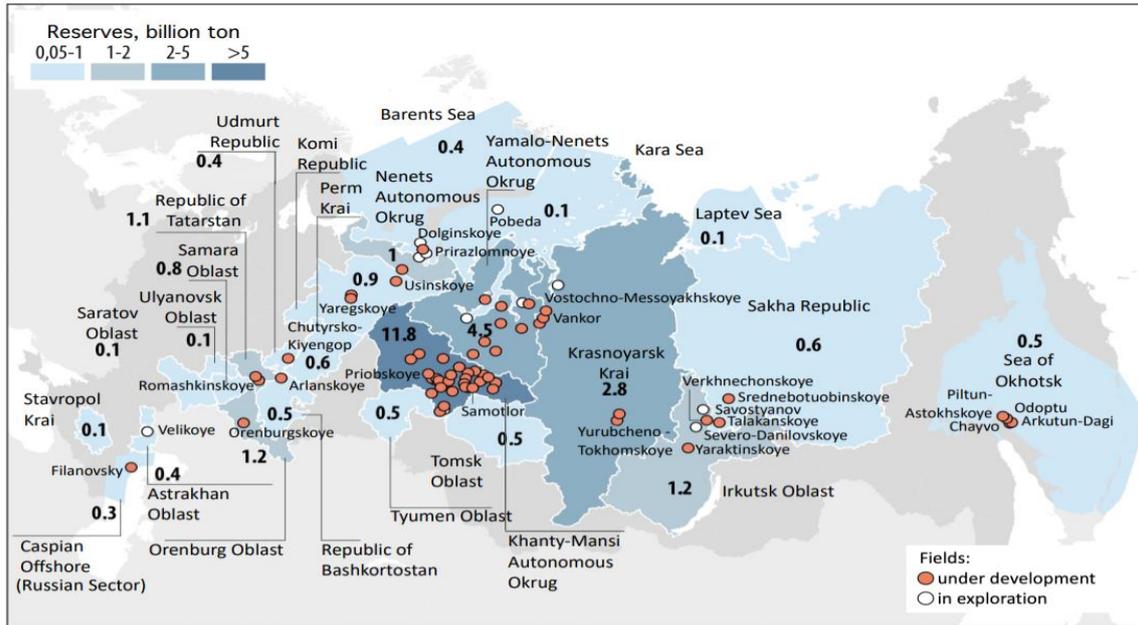
Russia's methodology of reserves calculation differs from the Western system by putting greater emphasis on technical recoverability of reserves rather than the economic efficiency of doing so (under the prevailing market prices at the moment of assessment). According to Russia's Ministry of Natural Resources (MNR), as of January 1, 2021, Russia's oil and condensate reserves under the A+B1+C1 categories (which roughly correspond to proven and probable categories in the Western methodology) constituted 19,010.4 million tonnes and 2,242.4 million tonnes, respectively¹⁴, equivalent to an overall total of 156 billion barrels.

For 2020, the MNR assessed a recovery factor for oil under these categories of reserves in Russia at 37.1 per cent. This methodology thus suggests a “cover” of about 16 years from what essentially are fields under development and assessment. The estimates of oil resources for Russia that might underpin new discoveries in the future run as high as 55,800 million tonnes for oil and 13,100 million tonnes for condensate. The bottom line: Russia is not going to run out of oil for many decades and there is a tremendous potential for additional giant discoveries, but these are most likely in the Arctic offshore (See Figure 4).

¹³ IEA WEO 2022, p.338

¹⁴ State Report on the usage of Russia's mineral resources in 2020. Moscow, 2021

Figure 4: Russia’s A+B1+C1 hydrocarbon liquids reserves by region and location of main fields (as of 1 January 2021)



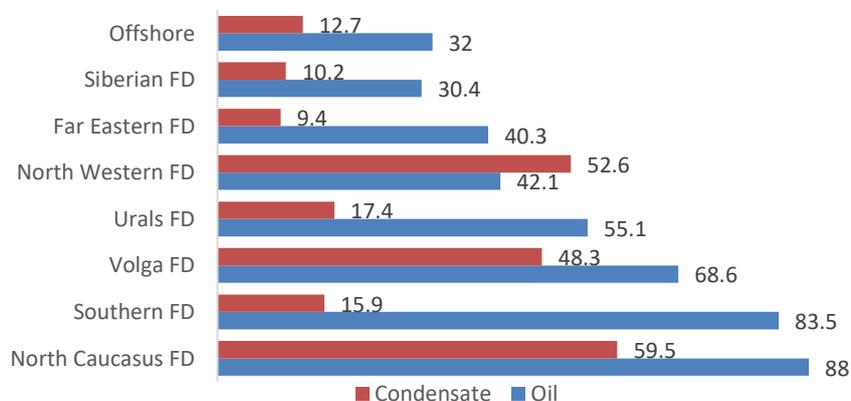
Source: Russia’s Ministry of Natural Resources

Regarding the geographical distribution of Russia’s oil reserves, there are several oil basins, including the “older” oil provinces in the North Caucasus and in the South, very mature production in the Volga region that has been under development since the 1930-40s, the most prolific and mature Western Siberia, under development since the 1960-70s, and the “newer” Timan-Pechora in the northwest of the country, Eastern Siberia and Far East oil provinces, where large-scale oil production mostly started in the 1990s-early 2000s.

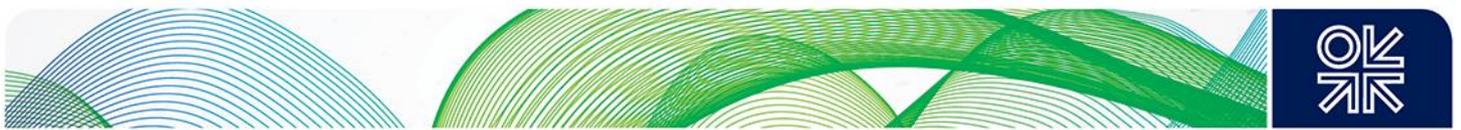
Western Siberia is the core region, containing most of the country’s oil reserves and accounting for the lion’s share of Russia’s liquids output. Khanty-Mansiysk autonomous okrug or KhMAO is home to Russia’s largest oil fields, whereas Yamal-Nenetsk autonomous okrug or YaNAO is home to Russia’s super-giant gas fields, and, consequently, to the largest condensate reserves in the country.

The available Russian statistics on the rates of depletion of the oil reserves by region is organized by the federal district, not by oil basin, which complicates the analysis (See Figure 5).

Figure 5: Degree of depletion of A+B1+C1 reserves by Russia's federal districts, per cent (as of January 1, 2021)



Source: State Report on the usage of Russia’s mineral resources in 2020



The overall conclusion, however, is that the remaining reserves will allow Western Siberia (located within the administrative borders of the Urals Federal District) to hold its position as the core of the Russian oil industry for decades to come, especially if modern production techniques are used. The older oil provinces would be able to maintain production at lower levels for many years, and new contributions to growth are likely to come primarily from the current periphery of the Western Siberian oil province in the Krasnoyarsk region and from Eastern Siberia, from fields that are logistically challenging but are conventional from the upstream development perspective. Russia does not need to develop new high-cost oil from tight formations or from the Arctic offshore for the next twenty years unless future market conditions justify the need for Russia to grow its total oil output aggressively. Given the predominance of peak oil demand theories and the policies of moving away from fossil fuels as part of the global energy transition agenda, this is unlikely to be the case.

1.3 Russia's fiscal policies: systematic upstream incentives at last

The most important above-ground factor for the future of Russia's oil output is taxation. Since the early 2000s, the Russian government has been using fiscal instruments that have relied on taxing gross revenues of the Russian oil producers – the so-called Mineral Extraction Resource Tax (MRET) and the export duty (export tax). From the Russian state's perspective, the administrative simplicity of these levies represented a clear advantage. The potential downside was that these levies did not take costs into account and thus could be detrimental for high-cost projects.

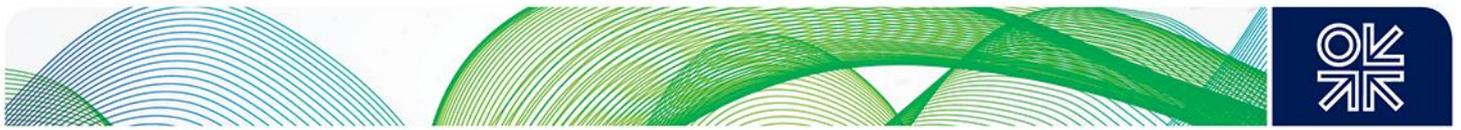
To account for oil price fluctuations and to tax windfall price revenues, sliding scale formulae for both MRET and export tax were introduced, linked to the price of Urals crude in international markets. When oil prices were high, state tax take would go up, to a maximum of about 90%, and when oil prices were low, it would decline to shield producers and secure their minimum operating margins. So long as the legacy of Soviet era investments could be run down, this was a second-best but reasonably rational tradeoff for Russian planners to choose, and indeed the tax system has worked reasonably well and survived the oil price crashes in 2009, 2015 and 2020.

Mineral royalties are, however, usually site specific. The philosophy of the Russian MRET when it was introduced in the early 2000s was of a "one-size-fits-all" tax, but over time the Russian tax administrators had to accept the reality: an oil production tax should reflect the differences in project economics that are a function of site-specific mineral rents. The flip side of relying on a gross revenue type of taxation for Russian oil has been its negative impact on the economics of many Russian brownfields and also on new big-ticket projects. From a project development perspective, the tax burden was all front-end loaded, and the distribution of risks favored the state over the producers.

Russia's fiscal authorities had been reluctant to embrace the idea of a full-scale transition to oil taxes that would be sensitive to costs or profits (a few early production sharing agreements (PSAs) are the exceptions that prove the general rule) for fear of tax base manipulation by oil companies. At the same time, ad hoc state interventions to address the problems of non-performing oil fields were increasing and numerous exemptions and rate reductions to MRET had flourished in Russia during the 2010s. These were primarily addressing the situations at depleted fields, and also new fields in regions that were lacking developed infrastructure. As Russia's production base was deteriorating and more new fields were brought into production, the share of assets that had different MRET exemptions reached almost 60 percent by 2020. Moreover, Russia's Ministry of Finance was concerned that by 2035 the output with reduced rates of MRET would reach 90 percent of the total.

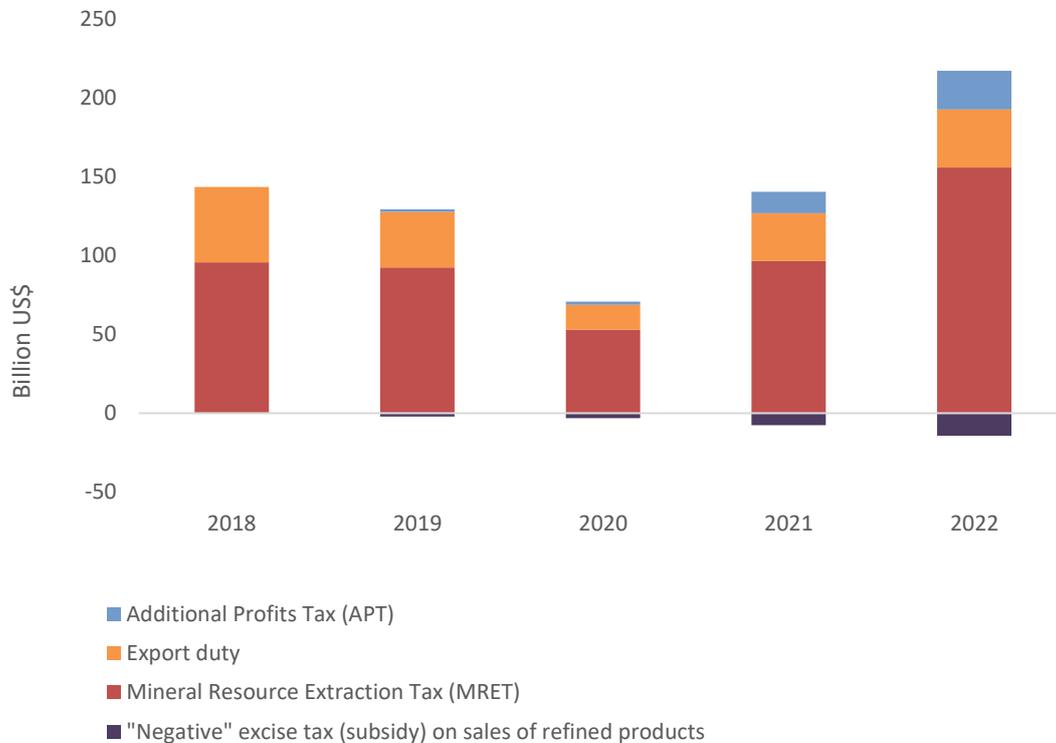
The so-called Additional Profits Tax (APT), a cash flow-based alternative to MRET for certain fields was introduced in Russia on January 1, 2019, initially with limited application to a few pilot projects. In 2021 it was finally moved from the pilot stage to more general application. The income tax rate was set at 50% after deducting production and transportation costs and this should significantly reduce tax terms for mature fields, while taxes for new fields would be slightly improved as well¹⁵.

¹⁵ <https://www.nalog.gov.ru/rn77/taxation/taxes/ndd>



In 2021 the collected APT reached \$13.7 billion and accounted for 11 percent of all collected oil and gas federal taxes. In 2022 these increased to \$24.7 billion and 15 percent. (See Figure 6)

Figure 6: The changing composition of Russia’s oil and gas tax take



Source: Author, data from Russia’s Ministry of Finance

The Russian government’s ability to be flexible and to recognize the need for providing incentives to the oil producers has been a vital element of oil production growth in Russia in the past decade. The good news from the perspective of the Russian industry is that a systemic solution in the form of APT has finally replaced a practice of ad hoc exemptions. This is a definite improvement from a long-term planning perspective for the Russian oil developers.

1.4 “New Oil” versus “Old Oil”

In the past twenty years Russian oil companies have achieved very good results in managing the decline rates of the so-called “old” oil in Russia and have been consistently adding new capacity.

Russia’s oil industry is relatively mature. One indicator of this maturity is that most Russian liquid hydrocarbon production comes from “older” fields. For example, fields that have been in production for more than five years accounted for 95.7% of Russia’s total liquids production in 2022. Many of these fields passed their peak production phase some time ago and have been in a natural production decline for many years. It is noteworthy that in the Russian statistics “new” fields are defined as those put into operation fewer than five years earlier; the field composition changes with each passing year. The fluctuations in the category of “new” oil are often due to the departure of major fields from this category, as was the case in 2015 when the Vankor’s field production passed the five-year threshold and the output by other new fields was insufficient to compensate for the fallout. At the same time, the series since 2000 suggests that Russia has been able to develop and add to its overall portfolio of new fields very consistently suggesting sustainable investments in new productive capacity (see Figure 7).

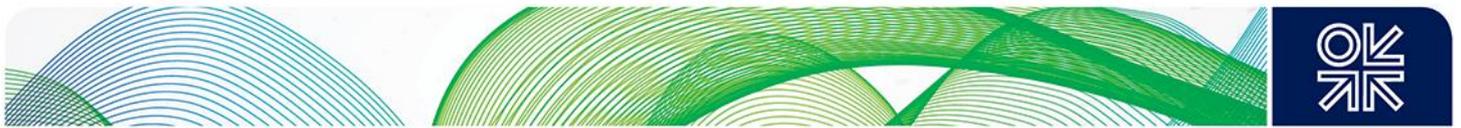
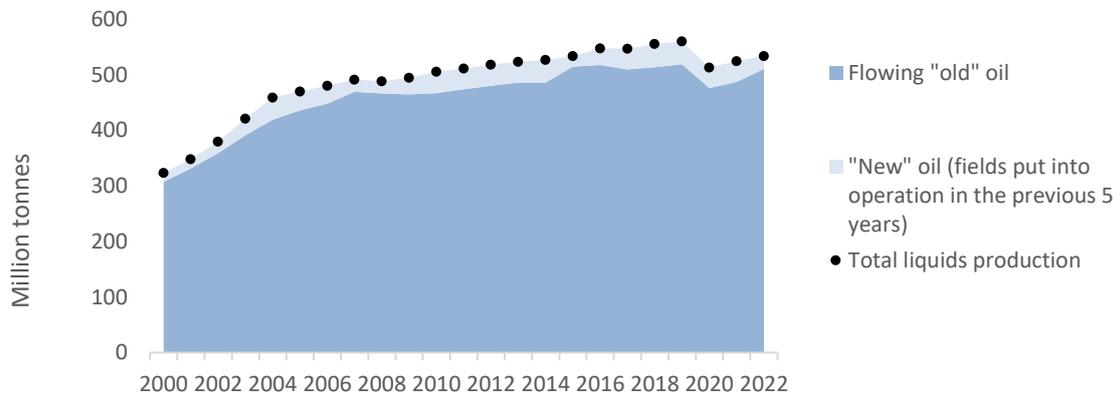


Figure 7: “New” and “Old” Oil in Russia’s output



Source: Author, data TEK Rossii magazine

The bulk of activity, however, happens at mature fields. At the end of 2022 there were 158.8 thousand producing wells in Russia. After idling lots of wells in 2020 as part of the cuts agreed with OPEC, Russia brought most of them back into production and also developed new ones at a high rate in 2021 and 2022. It is universally accepted that drilling volumes represent one of the most reliable among the readily available indicators of the near-term future production. The data for 2022 demonstrates a significant increase in development drilling that resulted in production growth that year (See Table 1).

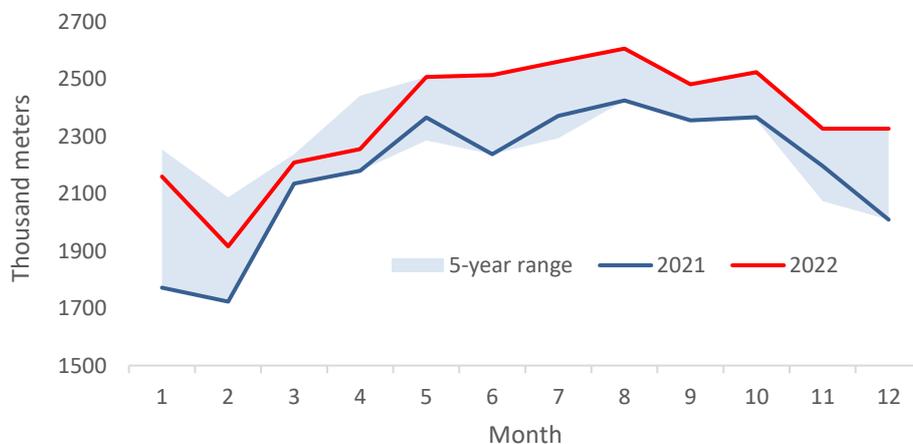
Table 1: Main indicators of productive capacity and drilling

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<i>(thousand meters)</i>										
Total drilling volumes	21,656	20,772	22,883	25,594	28,636	28,702	28,497	27,984	26,974	29,189
Development wells	20,839	19,778	22,065	24,680	27,648	27,634	27,356	27,005	26,136	28,386
Exploration wells	817	994	818	914	988	1,068	1,141	979	838	803
<i>(units)</i>										
Total well stock at end of year	165,423	168,315	170,163	173,073	175,335	177,459	180,449	178,712	183,168	186,443
Producing	143,835	146,282	148,658	151,470	150,770	155,046	154,965	136,492	155,590	158,785
Idle	21,588	22,033	21,505	21,603	24,565	22,413	25,484	42,220	27,378	27,658
New	6,454	6,065	6,261	7,141	6,251	7,946	7,861	6,957	7,365	7,866

Source: Author, data from TEK Rossii magazine

Moreover, the development drilling volumes were robust throughout 2022 (See Figure 8)

Figure 8: Development drilling in Russia in 2022 by month, thousand metres



Source: Author, data from TEK Rossii magazine



The data on the composition of producing wells by method of extraction in Russia in 2021 (the latest year for which this statistic is available) demonstrates that most of the methods are very traditional. The bulk of extraction in Western Siberia involves water flooding and extensive use of submersible electric pumps. The Volga region producers typically use sucker rod pumps. The related equipment is produced in Russia (see Table 2).

Table 2: Composition of the producing oil wells of main Russian companies by method of extraction in 2021

	<u>Gusher</u>	<u>Submersible electric pumps</u>	<u>Sucker rod pumps</u>	<u>Gaslift</u>	<u>Other</u>	<u>Total</u>
Rosneft	1704	30706	2729	152	384	35675
Bashneft	9	3454	8732	0	5	12200
Lukoil	286	20329	6872	2	1393	28882
Surgutneftegas	434	23046	981	0	64	24525
Gazprom-neft	283	7356		443		8082
Tatneft	8	4469	15013			19490
Slavneft	45	3133				3178
Rusneft	61	1570	190		4	1825
NNK	139	5886	535		49	6609
Total main companies	2969	99949	35052	597	1899	140466
<i>Percent of total</i>	<i>2.1%</i>	<i>71.2%</i>	<i>25.0%</i>	<i>0.4%</i>	<i>1.4%</i>	<i>100%</i>
Total Russia						155590

Source: Author, data from TEK Rossii magazine

1.5 Western sanctions and technological dependency of the Russian oil sector

The role of Western technology in Russia’s oil sector must be put in proper context. Western service companies have been instrumental in rationalizing field modelling and drilling practices in Russia. But they have always worked in close partnership with the Russian oil companies that have developed their own fit-for-purpose solutions and talent. Many Russian majors have relied on in-house service teams, using the Russian affiliates of the Western service companies only for the most challenging tasks.

The “miracle” in Western Siberian oil fields in the early 2000s is a case in point. The collapse of the Soviet Union and its command economy had a corollary in dwindling oil output at the Russian oil fields in the first half of the 1990s, followed by a stabilization at circa 60% of the 1990 level in the second half of the decade. Lack of investment during this period resulted in high natural decline rates at the fields not being offset by enhanced recovery measures or new field development. By the end of the 1990s Western Siberia seemed to be written off as a future growth prospect.

But instead, what happened in the Russian oil patch (primarily in Western Siberia) during the five years after 1999 was nothing short of a miracle, as national output increased from 6.2 mmbpd in 1999 to 9.2 mmbpd in 2004, up 50% for the period. Thane Gustafson, the famous scholar and historian of the Soviet and Russian oil and gas industries, attributes “the miracle in the oil fields” to a set of innovative practices introduced by two Russian oil companies, Yukos and Sibneft, in the early 2000s, which were consequently adopted and widely applied by the rest of the Russian oil industry. These included a creative merger of sophisticated Western reservoir modelling with low-cost Russian logging data, which allowed the correction of water flooding patterns and well spacing design for Western Siberian fields to increase well productivity greatly while keeping lifting costs at very low levels; much wider use of hydrofracturing (Yukos) and horizontal drilling (Sibneft) to raise well flow rates; and the “re-discovery” of prospective zones between principal reservoirs and horizons left unexplored as a result of distorted incentives during the Soviet time. The main result was the realization that the size of the remaining opportunity in West Siberia had been grossly underestimated because of the Soviet legacy¹⁶.

The much publicized “exodus” of the Western service companies from Russia in 2022 and its assumed negative effect on Russia’s oil industry performance appears not to have had as big an impact as

¹⁶ See Gustafson T. *Wheel of Fortune: The Battle for Oil and Power in Russia*. Cambridge, MA 2012



expected. The role of (or rather unavailability of) Western technologies for Russia's oil sector that many market watchers consider to be the crucial factor in determining the future of Russia's oil needs some further analysis. The overall share of the Western service companies in 2022 was about 20 per cent, with Schlumberger accounting for 8 per cent, according to "Yakov and Partners" research¹⁷. Some Western service providers like Halliburton decided to leave Russia in 2022, selling its business to Russia-based management teams made of their former employees¹⁸, but some, like Schlumberger (re-branded SLB and re-registered in Russia) stayed and expanded their business and revenues¹⁹. Presently, Russia's service industry, which has been learning from the best global practices for thirty years, is fully capable of continuing to be successful in conventional oil developments and delivering oil production growth from these assets. A comprehensive review of the situation with Russian oil services performed by Bloomberg in 2023 concluded that the sector has been largely immune to the Western sanctions²⁰.

1.6 Russian oil production by company

The past few years have been very dramatic and challenging for Russia's oil producers. First, the global economic slowdown as a result of the COVID-19 pandemic caused an unprecedented drop in global oil demand in 2020. For the first time since Russia joined OPEC+ it had to introduce drastic production cuts to help stabilize and re-balance the global oil market²¹. Russia has never been a swing producer, but the unprecedented crisis called for unprecedented responses, and in the spring of 2020 Russia committed to reduce its crude oil output by almost 2 mmbpd.

Implementing an abrupt production cut at this scale and within a very short timeframe represented a tremendous technical challenge for the Russian oil companies as they were confronted with the task of delivering 10-20 percent cuts from their upstream portfolios while having to solve a complex problem of optimizing output and trading it off against the risks of permanent loss of production²².

The fact that Russian oil companies managed to implement the cut and then to resume increasing production in 2021 and 2022 suggests that very little if any productive capacity has been permanently lost after the wells were shut down and consequently re-started. The sectoral statistics for the "swing period" of 2019-2022 are extremely important for understanding how the Russian oil industry managed to cope with the challenge.

In recent years the state-owned companies have expanded their footprint in Russia. This is especially the case of Rosneft, which in the past decade has acquired Yukos, TNK-BP, and, most recently, Bashneft. Another state-owned company, Gazpromneft, has taken over the Sibneft assets and is developing a portfolio of liquids assets on behalf of its parent company Gazprom. The production data by company reported by Russia's Ministry of Energy, however, has kept the notions of the previous era, providing separate output data for Bashneft and Slavneft (the latter is jointly managed by Gazpromneft and Rosneft), and also showing oil production by PSA projects (Kharyaga, Sakhalin-1 and Sakhalin-2) as a separate category.

Gazprom and Novatek produce significant amounts of gas condensate. The "other" category consists of about a hundred independents with some companies (for example Tomskneft) and joint ventures (such as Arktikgaz, Salym Petroleum Development) producing very substantial output. (See Table 3).

¹⁷ <https://www.forbes.ru/biznes/485635-eksperty-ocenili-zavisimost-dobyci-nefti-ot-zapadnyh-nefteservisnyh-kompanij>

¹⁸ https://www.rigzone.com/news/halliburton_wraps_up_exit_from_russian_operation-09-sep-2022-170308-article/

¹⁹ <https://www.reuters.com/markets/commodities/slb-wins-russia-business-oilfield-rivals-exit-after-ukraine-invasion-2023-01-19/>

²⁰ <https://www.bloomberg.com/news/articles/2023-02-14/russia-did-most-oil-drilling-in-a-decade-even-as-sanctions-hit>

²¹ See also Yermakov V. *Changing Landscapes: New Strategies for the Big Three Oil Producers*. Journal of International Affairs, April 2021. <https://jia.sipa.columbia.edu/online-articles/changing-landscapes-new-strategies-big-three-oil-producers>

²² See Yermakov V. and Henderson J. *The New Deal for Oil Markets: implications for Russia's short-term tactics and long-term strategy*. OIES Insight, Oxford, 2020 <https://www.oxfordenergy.org/publications/the-new-deal-for-oil-markets-implications-for-russias-short-term-tactics-and-long-term-strategy/>

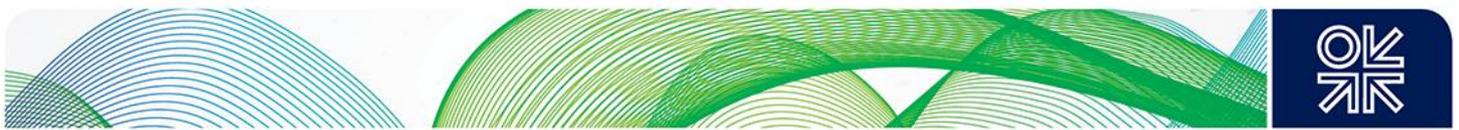


Table 3: Russian oil and condensate production by company (million tonnes)

	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2020/19,</u> <u>percent</u> <u>change</u>	<u>2022/21,</u> <u>percent</u> <u>change</u>	<u>2022/19,</u> <u>percent</u> <u>change</u>
LUKoil	85.7	83.0	81.7	82.1	82.1	73.4	75.7	80.0	-10.6%	5.6%	-2.6%
Rosneft	188.8	189.7	188.2	194.2	195.1	180.0	168.9	163.7	-7.8%	-3.1%	-16.1%
Gazprom-neft	34.3	37.8	39.5	39.5	39.2	38.9	38.6	40.2	-0.6%	4.2%	2.6%
Surgutneftegaz	61.6	61.8	60.9	60.9	60.8	54.8	55.5	59.6	-9.9%	7.4%	-1.9%
Tatneft	27.2	28.7	28.9	29.5	29.8	26.0	27.8	29.1	-12.7%	4.6%	-2.3%
Bashneft	19.9	21.4	20.6	18.9	18.7	12.9	13.8	18.1	-30.7%	31.2%	-3.3%
Slavneft	15.5	15.0	14.3	13.8	14.0	9.7	9.8	12.0	-30.5%	22.0%	-14.0%
Rusneft	7.4	7.0	7.0	7.1	7.1	6.4	6.7	6.9	-10.1%	3.4%	-2.9%
NNK	2.3	2.3	2.1	2.0	2.1	2.0	16.0	17.1	-2.7%	6.6%	730.9%
Total VICs	442.7	446.7	443.4	448.1	448.8	404.1	412.8	426.6	-9.9%	3.3%	-4.9%
Gazprom	17.1	17.4	17.4	17.4	18.3	18.9	20.6	24.3	3.3%	17.6%	32.4%
Novatek	4.7	8.0	7.7	8.3	8.4	8.1	8.1	7.7	-4.3%	-4.1%	-8.4%
Other	54.6	59.4	61.7	63.5	66.2	63.1	66.1	66.8	-4.7%	1.0%	0.8%
PSAs	15.0	16.0	16.5	18.7	19.4	18.6	16.9	9.8	-4.3%	-41.8%	-49.4%
Total Russia	534.1	547.5	546.7	555.9	561.1	512.8	524.5	535.2	-8.6%	2.0%	-4.6%

Source: Author, data from TEK Rossii magazine

The first thing to note is that there is a slight discrepancy in the data reported by the Ministry of Energy for 2022, as the sum of the company contributions (535.2 million tonnes) exceeds the reported national total (534 million tonnes). The most likely explanation is that the 2022 production data by company was preliminary, and the final national production number has taken account of losses. This means that the reported production numbers by company might be corrected in the future, but the correction is going to be minor and not material.

Another observation is that the 2022 national output was negatively affected by lower production by PSA operators, which declined 42 per cent or by 7.1 million tonnes year-on-year. The main reason for the drop was the withdrawal of ExxonMobil as the project operator from Sakhalin-1 in March 2022 causing a halt of oil production for many months. In October 2022 the Russian government established a Russian company, managed by Rosneft subsidiary Sakhalinmorneftegaz-shelf, that will own investors' rights in Sakhalin-1²³. The new operator started to restore output and managed to bring it back to about 70 per cent of capacity at the beginning of January 2023. It was reported that the oil output at Sakhalin-1 might be fully restored by the end of February 2023²⁴. As a result of Exxon's exodus from Russia, Sakhalin-1 oil output in 2022 was only 4.6 million tonnes, 59.2 percent lower year-on-year. Assuming a normal operation of the project, Russia's national output could have been higher by about 5 million tonnes in 2022 suggesting an even stronger bounce back. Rosneft's report on the operating results in 2022 noted that the company's total hydrocarbons output in that year was 5.1 mmbpd, but stood at 5.5 mmbpd at year end, most of the difference due to the recovery of output at Sakhalin-1²⁵. The return to normality at Sakhalin-1 in 2023 means that 2023 national production will receive a booster shot from the reinvigorated Sakhalin-1 output.

Robust growth in Gazprom's liquids production confirms the continuation of the recent trend in rising gas condensate output. Novatek's liquids output declined, year-on-year, and even more so compared to 2019.

As mentioned earlier, probably the most interesting question to address is what the available statistics tell us about how Russian companies managed to manage the "swing" in production during 2019-2022.

Liquids output by vertically integrated Russian oil companies as a group (VICs) was up 3.3 per cent year-on-year in 2022 and 4.9 per cent below the level of 2019, the year when Russia's oil production

²³ <https://www.reuters.com/world/europe/russias-putin-signs-decree-setting-up-new-operator-sakhalin-1-tass-2022-10-07/>

²⁴ <https://www.reuters.com/business/energy/russias-sakhalin-1-near-full-oil-output-after-exxon-exit-source-2023-01-09/>

²⁵ <https://www.rosneft.ru/press/releases/item/214041/>



hit an all-time record of 560 million tonnes. This is a surprisingly good result for the industry because when Russian oil companies were utilizing full productive capacities, from 5 to 7 per cent of the production was represented by marginal wells, operating on the brink of financial profitability. The reasons for keeping these wells operational were license obligations and employment issues rather than economic rationale. To the extent that companies were able to rationalize their portfolios during the crisis by retiring the most marginal assets, the fact that oil production in 2022 was 5 per cent less than in 2019 might be interpreted as a sign of a “leaner” and better positioned industry that has bounced back to the optimum and sustainable level of output.

Another important insight from the dataset in Table 3 is that at first sight the production cut in 2020 was not on a pro rata basis among the Russian VICs. The year-on-year reduction in output in 2020 for VICs as a group was 9.9 per cent. Surgutneftegaz was the only company among the Russian VICs that exactly matched its reduction in output with that number. Lukoil, Tatneft, and Rusneft reduced their output slightly more than average; Bashneft and Slavneft – much more than average, by over 30 per cent; Rosneft – by 7.8 per cent, and Gazprom-neft – by only 0.6 per cent. However, if we use the wider definition of Rosneft that recognizes its ownership of Bashneft and 50 per cent interest in Slavneft, the production cut for the company in 2020 was 10.4 per cent. Gazpromneft was a special case indeed, apparently due to the higher share of condensate in its liquids output. (The agreement between OPEC+ explicitly excluded condensate from the production cut).

One should also use caution interpreting the apparent deterioration of Rosneft output on the basis of Table 3 data. In 2021 Rosneft’s output did not stabilize as was the case with other VICs but continued to fall. At the same time, we see a tremendous increase in production by NNK. The explanation is simple: that year Rosneft sold a collection of its assets (mostly mature and with marginal economics) in the south of Russia, in the Volga region, in Timan-Pechora and in Western Siberia with a combined output of about 12 million tonnes to NNK as part of a portfolio optimization strategy. The effort apparently paid off since the average well flow rates for Rosneft improved and were the highest among the VICs in 2021 (See Table 4).

Table 4: Well productivity by company (crude oil), thousand tonnes per day

	<u>2019</u>	<u>2020</u>	<u>2021</u>
LUKoil	8.2	8.6	8.2
Rosneft	12.6	12.5	13.5
Gazprom-neft	14.3	14.5	13.1
Surgutneftegaz	7.3	6.3	7.6
Tatneft	4.5	5.0	4.1
Bashneft	3.9	3.8	4.5
Slavneft	10.3	12.8	12.2
Rusneft	9.9	10.7	10.8
NNK	7.8	7.5	6.6

Source: Author, data from TEK Rossii magazine

After adjusting for non-organic factors, Rosneft’s remaining portfolio did not fare too badly. However, Rosneft without Bashneft and 50% of Slavneft registered a production decline in 2022 year-on-year while most of the other Russian producers were demonstrating growth. Adding back production from Bashneft and from the interest in Slavneft to the core Rosneft production, however, is just enough to move gross Rosneft output into positive growth territory in 2022 with a 0.1 percent year-on-year increase.

1.7 Russia’s oil production by region

Unfortunately, the latest available aggregate national statistics on the split between crude oil and condensate output by region from the Ministry of Natural Resources is available only for 2019. On the other hand, these historic statistics can still be very useful since 2019 was the year of the highest liquids production in Russia to date. Clearly, the lion’s share of Russian condensate is produced in YaNAO, which is home to Russia’s super-giant gas fields (See Figure 9).

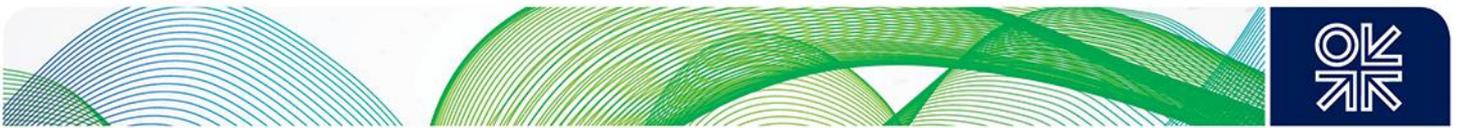
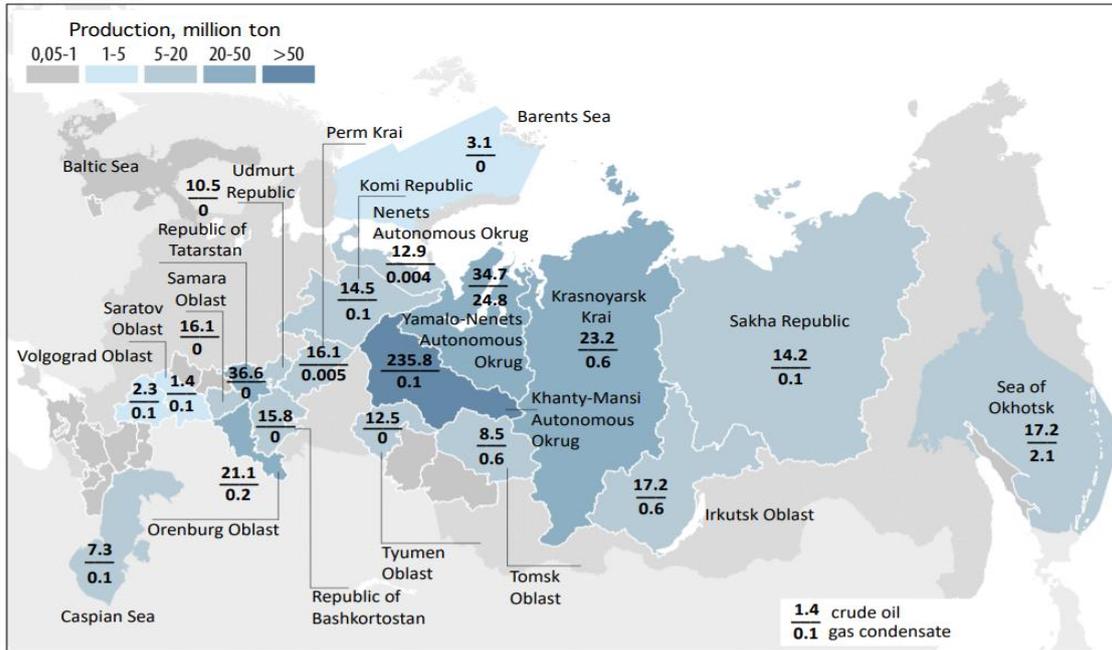


Figure 9: Russian crude oil and gas condensate production by region in 2019

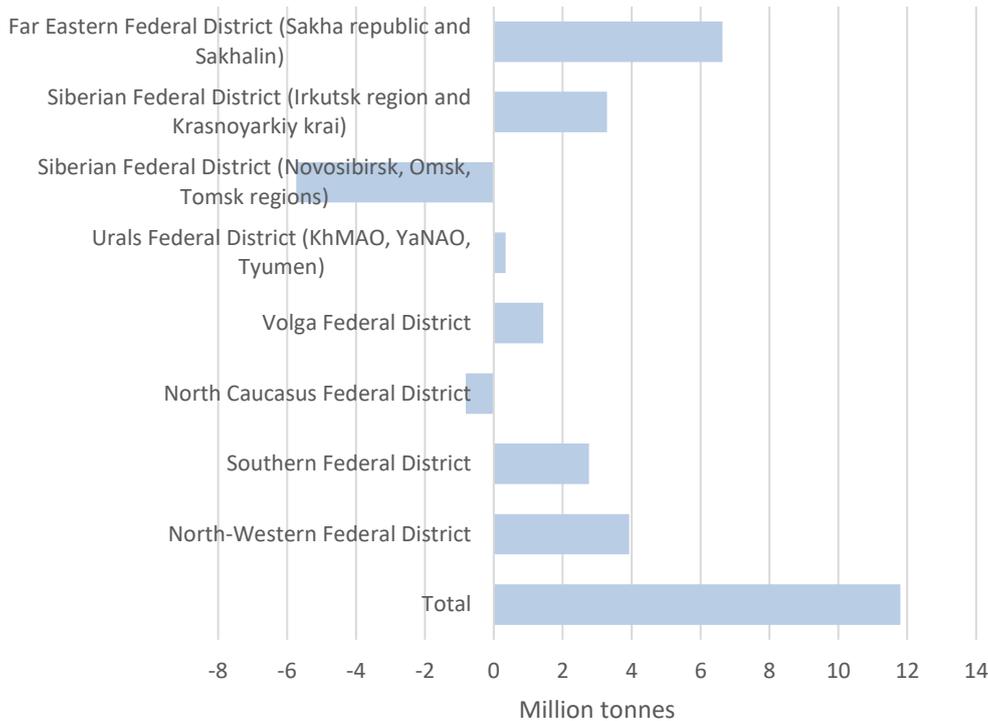


Source: Russia's Ministry of Natural Resources

The combined regional data series for liquids production is currently available through 2022.

Figure 10 demonstrates the incremental change in Russia's oil and condensate output by region over the decade ending in 2022.

Figure 10. Incremental change in reported Russia's regional oil and condensate production, 2022 over 2013 (million tonnes)



Source: Author, data from TEK Rossii magazine



It appears that in the past decade Russian oil companies have achieved good results in managing the decline rates of the so-called “old” oil in Russia, specifically in the Volga region and in Western Siberia, and secondly, that during the past decade most of the “new” oil additions to output were not from high-cost offshore or tight oil formations but from onshore fields on the northern and north-eastern periphery of the developed oil provinces in Western Siberia. These projects are logistically more challenging and more expensive but otherwise are conventional and do not require state-of-the-art Western technological solutions. Clearly, the modest national production increase from 2013 to 2022 happened against the backdrop of declining output in the Novosibirsk, Omsk and Tomsk regions, stable production in Western Siberia and growing output in Krasnoyarskiy krai and Russia’s Far East.

Finally, Table 5 provides an illustration of the “swing” period of 2019-2022 with regards to regional production.

Table 5: Russian liquids output by region

	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>% change</u>
Total	561.1	512.8	524.5	535.1	2.0%
European Russia	165.7	148.3	153.6	160.3	4.4%
<i>North-Western Federal District</i>	31.2	27.6	28.9	31.968	10.6%
Nenetsk Autonomous Okrug	16.0	14.1	15.1	17.3	14.4%
Komi Republic	14.6	13.0	13.3	14.3	7.7%
Other	0.6	0.5	0.5	0.4	-25.6%
<i>Southern Federal District</i>	14.6	13.6	12.6	12.4	-2.0%
<i>North Caucasus Federal District</i>	1.0	0.9	0.9	0.8	-16.2%
<i>Volga Federal District</i>	118.9	106.2	111.2	115.2	3.6%
Bashkortostan	16.1	11.1	11.9	14.3	20.4%
Orenburg region	21.7	20.7	21.3	20.739	-2.6%
Perm region	16.1	15.1	15.6	16.594	6.4%
Samara region	16.1	15.5	15.9	15.55	-2.2%
Tatarstan	36.7	32.7	34.5	35.923	4.1%
Udmurtiya	10.5	9.5	9.8	10.08	2.9%
Other	1.7	1.6	2.2	2.0	-7.8%
Western Siberia	319.6	292.4	300.4	310.3	3.3%
<i>Urals Federal District</i>	310.1	285.3	293.0	303.2	3.5%
KhMAO	236.1	210.8	215.8	223.1	3.4%
YaNAO	61.5	63.3	66.6	70.611	6.0%
Tuymen region	12.5	11.2	10.7	9.539	-10.9%
<i>Siberian Federal District</i>	9.5	7.1	7.4	7.1	-4.4%
Tomsk region	9.1	6.9	7.2	6.946	-3.5%
Other	0.4	0.2	0.2	0.1	-34.0%
Eastern Siberia and Far East	76.0	72.1	70.5	64.5	-8.5%
<i>Siberian Federal District</i>	41.8	37.5	36.9	36.3	-1.5%
Irkutsk region	17.9	17.3	17.2	17.0	-1.3%
Krasnoyarskiy krai	23.9	20.2	19.8	19.4	-2.2%
<i>Far Eastern Federal District</i>	34.1	34.5	33.5	28.2	-15.9%
Sakha republic	14.4	16.2	17.5	19.124	9.3%
Sakhalin	19.7	18.3	16	9.049	-43.4%

Source: Author, data from TEK Rossii magazine

Thus, while a sharp decline of Russia’s oil output by 2 mmbpd cannot be ruled out, an alternative scenario is also plausible: a managed output reduction by 0.5-0.7 mmbpd and stabilization in the near term with subsequent steady growth in the medium term once new giant onshore projects in Russia’s northeast take off.

1.8 Vostok Oil: Russia's flagship new oil project

The key area of future oil production growth for Russia is in the north of Krasnoyarsk kray, where Rosneft has been active for many years. The Vostok Oil project, promoted by Rosneft, is based on the production potential of 13 oil and gas fields on the Taimyr peninsula and in the northern part of Krasnoyarsk kray, some of them already producing, like the fields in the Vankor cluster, and some being new developments in the Payakha cluster (See Figure 11).

Figure 11: Vostok Oil Project



Source: Rosneft

According to Rosneft, the Vostok Oil project represents a massive undertaking that is going to lead to significant job creation (the total number of people involved in the work on the project is estimated at 400,000, including 130,000 Rosneft personnel and contractors) and a significant increase in Russia's GDP as a result of both direct and indirect economic effects. This is a flagship project for Rosneft with confirmed oil reserves of 6 billion tonnes (c.45 billion barrels) and expected combined hydrocarbons production from the project of 50 million tonnes (c. 1 million barrels per day) by the mid-2020s during phase one based on the Vankor and Payakha clusters and at up to 100 million tonnes (2 million barrels per day) during phase two, based on East-Taymyr fields development which is planned by the early 2030s²⁶.

²⁶ https://www.rosneft.ru/upload/site1/document_publication/Rosneft_Gazeta2020_RUS.pdf



Crude from the Vostok Oil fields has a very low sulphur content of 0.01-0.04%, making it more valuable and more environmentally friendly due to lower SOx emissions when it is refined²⁷. To protect the value of this crude quality, which should command a price premium in the market²⁸, Rosneft intends to build a dedicated 770-km pipeline from Vankor to a new seaport in Sever (North) near the existing port of Dixon. Rosneft has pledged to deliver up to 30 million tonnes of oil to the Northern Sea Route by 2024, and much more in the longer term²⁹. The Vostok Oil project could become a game-changer for the Northern Sea Route, ensuring extremely high levels of shipments in the 2030s and beyond.

However, the project also involves construction of new ships on a grand scale. In total, 50 vessels of different types, including oil tankers, LNG carriers as well as various support ships are expected to work on the project. The orders for 10 Arc-7 ice-class tankers have been placed at the Zvezda shipyard. This could cause delays as sanctions could undermine the ability of Russia to import key equipment from external sources, as has already been seen with the issues surrounding the construction of Arc-7 LNG tankers for Novatek.³⁰ Furthermore, shipping oil through the Northern Sea Route involves significant environmental risks, especially in the event of an oil spill, combined with the costs of operating in a very harsh northern climate. As such, although Rosneft has major ambitions for this project, some caution is required when forecasting future output.

1.9 Estimates of Russian oil output to 2030

Taking all the above factors into consideration, it would appear that Russia’s oil industry performance in 2022 and into 2023 has exceeded some earlier pessimistic expectations. In January 2023 Rosstat reported combined crude oil and condensate output of 46 million tonnes, or just below 11 mmbpd. In February 2024 daily production edged up 2 percent over January, to 11.05 mmbpd³¹ and following the cuts agreed with OPEC+ in March Russia has maintained stable output at around 10.5mmbpd (See Figure 12).

Figure 12: Monthly output of Russian liquid hydrocarbons



Source: Author, data from IEA, OPEC

²⁷ <https://www.rosneft.com/press/today/item/206597/>

²⁸ https://www.rosneft.com/upload/site2/attach/0/14/02/SPIEF_slides_2021_EN.pdf

²⁹ Minutes of the meeting of Russia’s President Vladimir Putin with Rosneft’s CEO Igor Sechin on 25 November 2020 <http://kremlin.ru/events/president/news/64493>

³⁰ <https://www.reuters.com/markets/commodities/lack-arctic-tankers-puts-russias-lng-development-dreams-ice-2023-12-22/>

³¹ <https://tass.ru/ekonomika/17205695> and

<https://tass.ru/ekonomika/17260773>. Note that OPEC revised Russia’s February output and used the 9.949 mmbpd figure for February 2023 on the basis of secondary sources, apparently accounting for condensate that is excluded from Russia’s OPEC+ quota.



The data is taken from the IEA and OPEC estimates because the Russian government decided to suspend releasing oil and gas statistics starting from March 2023 and Q1 2023 until April 1, 2024³². Regarding the available Russian numbers, crude oil production amounted to 9.8 mmbpd and condensate to about 1.1 mmbpd in the first two months of 2023. Russia then announced a 500 kbpd voluntary output cut for crude oil from March 2023³³, to be measured against the output in February 2023, and overall production fell to just above 10.5 mmbpd in March, as confirmed by Deputy Prime Minister Novak.³⁴

However, this is clearly just a short-term measure to help balance the oil market and to keep prices higher. Over the long-term, the production potential for the Russian oil sector remains driven by the fundamentals of its oil asset base, the availability of funds for investment, management of the fiscal system and the availability of appropriate technology, all of which have been discussed above.

Unfortunately, a reduction in the availability of data since the start of the war in Ukraine means that the longer-term outlook for Russian oil production is extremely uncertain. The IEA's World Energy Outlook 2022 postulates a 2 mmbpd drop for Russia's oil production by 2030 in their STEPs scenario. There is no supporting analysis for this assumption in WEO 2022 other than a short paragraph that states:

“Russia has been under sanctions since 2014 but the financial and technology restrictions bite much harder now. As access to technologies, oil field service expertise, equipment and assets is removed, Russia struggles to maintain production in existing fields and to develop large new fields in the Arctic, tight oil, and other offshore areas”³⁵.

However, as has been discussed earlier, this would seem to ignore some important considerations. Firstly, that in the past twenty years Russian oil companies have achieved very good results in managing the decline rates of so-called “old” oil in Russia, and secondly, that during the past decade most “new” oil additions to output were not from offshore or from tight oil formations but from onshore fields on the northern and north-eastern periphery of the developed oil provinces in Western Siberia. Russia may be running out of low-cost oil, but it will be many years until it would have to tap into high-cost oil. Presently, the cost structure for the bulk of Russia's oil output can be described as a combination of low lifting costs (with the rouble devaluation significantly reducing upstream costs), moderate and price-sensitive tax take, and relatively high logistical costs, resulting in the overall level of costs that are in the middle of the global supply cost curve.

So long as general economic conditions remain favourable, it is possible that Russian oil production will rebound from the declines imposed in 2023 and could continue growing in the medium term, to 2030, as new fields that are ramping up and expected to come onstream more than compensate for the ongoing overall decline from production at existing fields. The important signpost to watch is the progress of Rosneft's Vostok Oil flagship project, the sheer size of which could ensure future liquids production growth in Russia even if the rate of decline in production from current fields increases. As a result, while a sharp decline of Russia's oil output by 2 mmbpd cannot be ruled out, alternative scenarios should also be considered, including a managed output reduction by 0.5-0.7 mmbpd and/or the possibility of stabilization in the near term with subsequent steady growth in the medium term once new giant onshore projects in Russia's northeast take off the ground is entirely plausible.

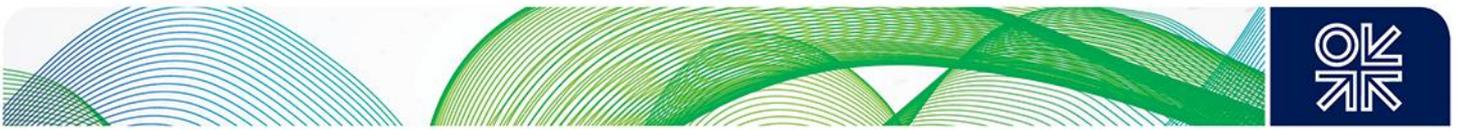
We have created three scenarios, shown in Figure 13, based on expectations of the performance of the Russian oil sector. In the base case total liquids output averages 10.5mmbpd in 2023 (implying oil production of around 9.2mmbpd) as compliance with the OPEC+ agreement curtails output into 2024. Output then gradually increases back to 10.6mmbpd by the end of the decade as the OPEC+ agreement is unwound, but output fails to fully recover to previous levels above 11mmbpd due to decline in older fields not being matched by new developments.

³² <https://tass.com/economy/1611395>

³³ <https://www.reuters.com/business/energy/russia-cut-oil-output-by-500000-bpd-march-2023-02-10/>

³⁴ https://www.rbc.ru/business/21/03/2023/6419c07c9a7947949f0386ac?from=from_main_12

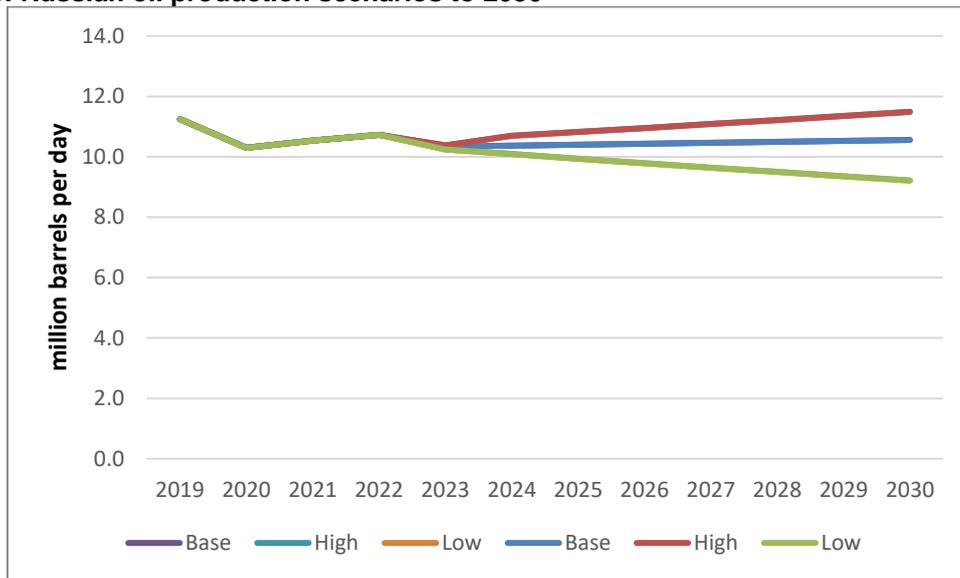
³⁵ IEA WEO 2022, p.338



In the high case, this rebound in production is enhanced by a successful development of Vostok Oil as well as by the addition of a number of smaller satellite fields in existing production regions. It also assumes a slightly slower decline in existing brownfield assets. Total production in 2030 reaches 11.5mmbpd, just marginally above the historic high seen in 2019.

In contrast the low case envisages a continued decline in production from 2023 as the Vostok Oil development takes longer to advance due to financial and technical constraints and is unable to match a slightly faster decline in other brownfield assets. In this case liquids production falls to just over 9mmbpd by 2030, implying crude oil output of around 8mmbpd. This is not quite as dramatic as the IEA forecast in WEO 2022 but does see a more than 2mmbpd fall in production compared with the highs seen in 2019.

Figure 13: Russian oil production scenarios to 2030



Source: Yermakov (2023)³⁶

1.10 Russian Oil Exports: Current Developments and Outlook

While the future of Russian oil production is clearly an important issue, the critical question for the Russian economy and the wider global oil market is the level of Russian crude oil and oil product exports. Over the past decade Russia has exported 7.4-9.1 million barrels per day (mmbpd) of oil combined (see Figure 14), with 5-6 mmbpd of this being crude oil and the remainder being oil products, in particular gasoline, diesel and fuel oil. The revenues generated from the sale of these hydrocarbons across the world have fluctuated with the oil price but have provided a very significant contribution both to Russian budget revenues and to the country's GDP.

³⁶ Yermakov, V., (2023), "Russian oil output increases in 2022 amid western sanctions: what next?" Oxford Energy Insight 132, Oxford Institute for Energy Studies

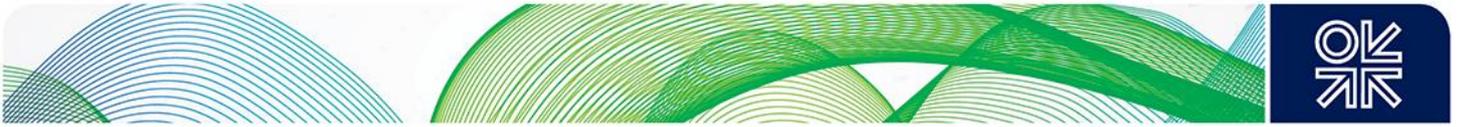


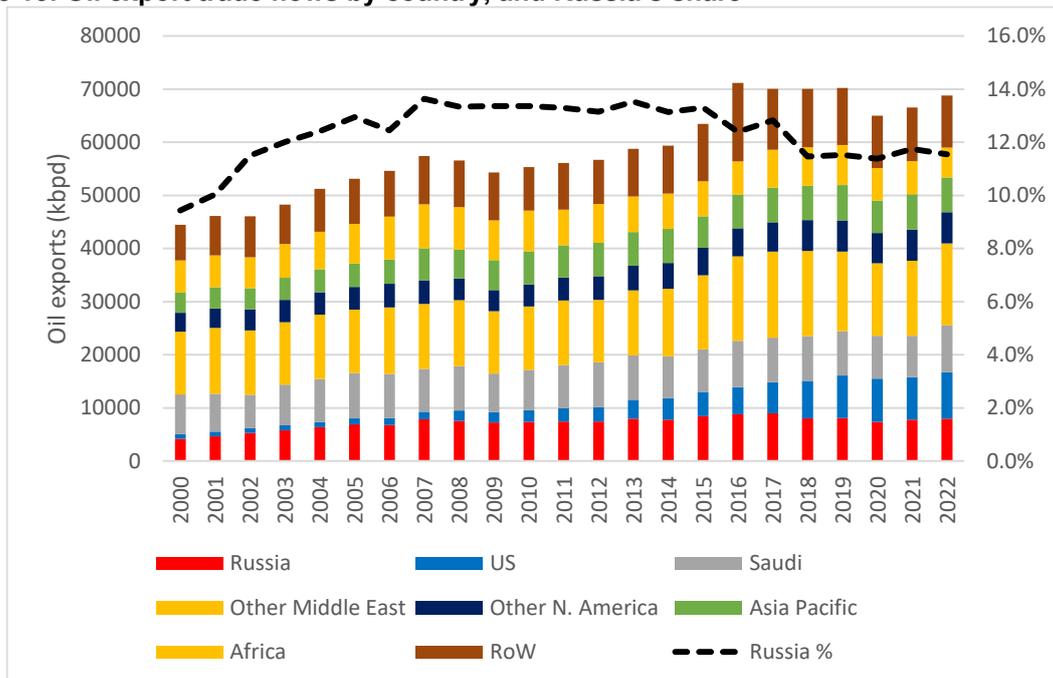
Figure 14: Russia crude oil and oil product exports



Source: BP Statistical Review of World Energy, Argus, IEA, OIES

As a result, when Russia invaded Ukraine in February 2022 there was a political consensus among leaders of those countries opposed to Russia's actions that this major source of revenues should be targeted with sanctions. However, it was also seen as important to do this without undermining the global oil market. As can be seen from Figure 15 below, since the mid-2000s Russia has accounted for around 12-14% of all oil traded across borders in the global oil market, and its production of 10-11mmbpd accounts for approximately 10% of total global oil consumption. Clearly, any sanctions which sought to completely remove this oil from sale on world markets would have caused a dramatic shock to the global oil supply-demand balance and would have led to a sharp increase in the oil price, almost certainly to historic highs. As a result, although there was enthusiasm for action to reduce oil revenues that could fund Russia's war efforts there was also concern about the wider impact on the global economy.

Figure 15: Oil export trade flows by country, and Russia's share

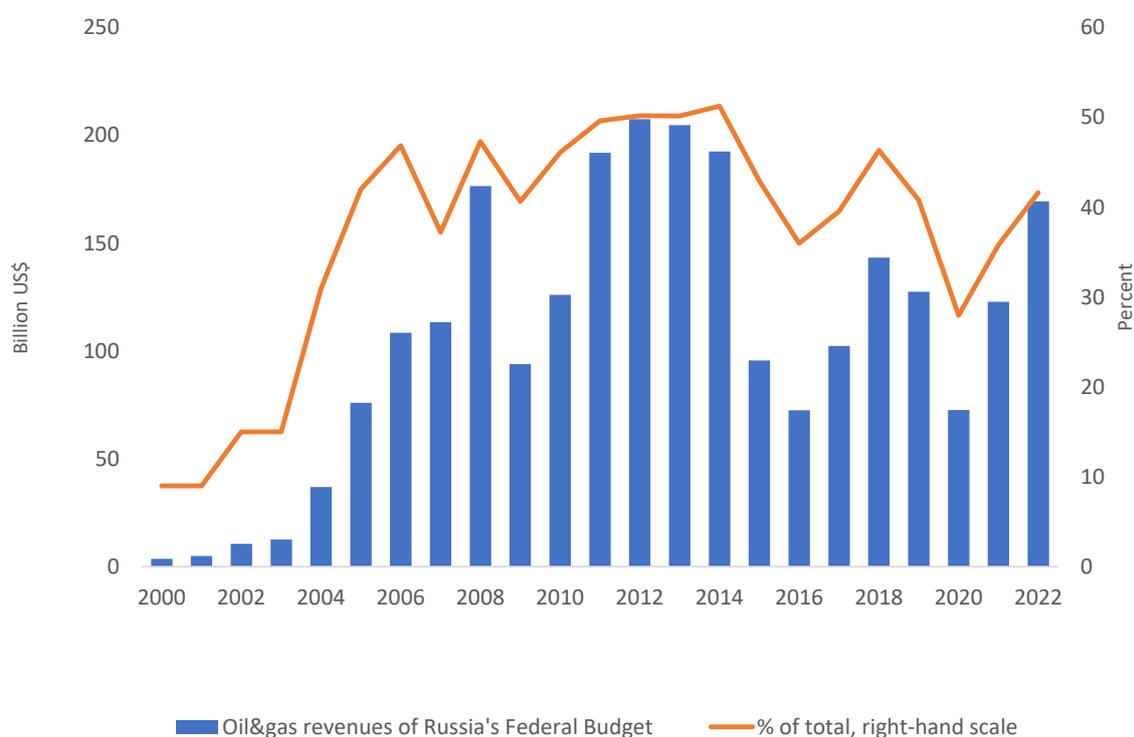


Source: Energy Institute Statistical Review of World Energy, 2023



The importance of oil exports to Russia’s economy can be seen in Figure 16, which shows oil export revenues in US\$ and also their share of the income for Russia’s Federal Budget. As can be seen, even in 2020, when the oil price collapsed during the COVID pandemic, oil exports provided around 30% of budget revenues, and this figure recovered to over 40% in 2022. It should also be noted that while the US\$ figures provide a good reference point for international comparison, Russia’s budget is actually managed in roubles and therefore the RUR-US\$ exchange rate is of enormous relevance to the debate about the income which the Russian government has available for critical expenditures. With the rouble having weakened significantly in 2023, reaching RUR102=US\$1 in August before recovering to RUR94=US\$1,³⁷ the rouble revenues generated for US\$ sales of Russian oil have increased sharply. This has helped not only the Russian government but also the profitability of the Russian oil producing companies. Although the wider economic impacts are likely to be negative over time, in the short term at least this means that the Russian budget is more secure than the US\$ figures would suggest.

Figure 16: Russia’s oil export revenues and their share of Russia’s Federal Budget



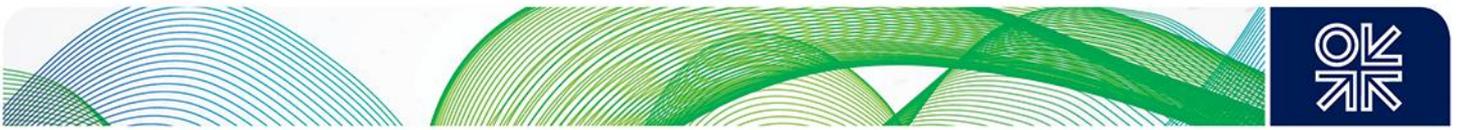
Source: Authors, data from Russia’s Ministry of Finance

With this context in mind, countries and companies have taken various actions to limit Russia’s access to oil revenues while trying to avoid a sharp rise in global oil prices. Initially, in March 2022, US President Joe Biden announced that the US would embargo imports of Russian crude oil and oil products.³⁸ However, while this was an important political statement it had no real physical impact as the US is largely oil independent and only imports small quantities of Russian oil products. More important was the decision of the EU to embargo the import of Russian crude and oil products. This was adopted in June 2022 but took effect from December 5th (for crude oil) and February 5th 2023 (for oil products) in order to allow time for the global market to adjust.³⁹ The sanctions ban the import of seaborne Russian oil to EU ports, but pipeline imports via the Druzhba pipeline to countries such as Hungary, Slovakia and the Czech Republic are exempt, although re-sale to other EU countries is banned. Previously

³⁷ Financial Times, 15 Aug 2023, “Russia raises interest rates to halt collapse of rouble”

³⁸ White House Press Release, 8 March 2022 at <https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/>

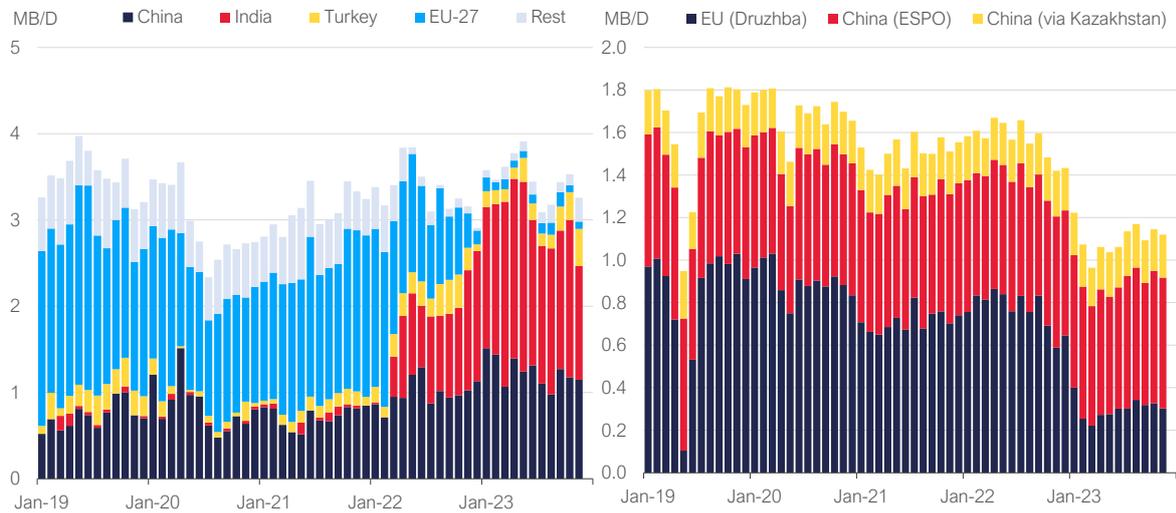
³⁹ Cahill, B., 8 June 2022, “European Union imposes partial ban on Russian oil”



Russia had exported around 3.1mmbpd of crude oil to Europe (0.75mmbpd of that via pipeline) plus around 1.3mmbpd of oil products, and the embargo implied a 90% reduction in oil imports to the EU from that source. The EU and the UK also imposed a ban on the provision of shipping insurance for tankers moving Russian crude in a further attempt to interrupt flows.

Although the EU embargo only came into effect from December 2022, many producing companies, traders, shipping companies and other oil industry players started to self-sanction months in advance in preparation.⁴⁰ However, although this had some impact, in reality it just accelerated the Russian search for alternative markets for its oil and oil products. The graphs in Figure 17 show this process in action. Pipeline crude exports remain stable until the start of 2023, when Germany and Poland cease their purchases, while seaborne exports remain remarkably flat in total, although the mix of destinations changes. The EU-27 is clearly dominant as a destination for Russian crude from 2019 through 2021, but is then replaced by China, Turkey and, most significantly, by India as tankers are re-routed towards the East.

Figure 17: Russia crude oil exports by destination via seaborne and pipeline routes
Seaborne Exports (mmbpd) *Pipeline exports (mmbpd)*



Source: Kpler data

The story for product exports is slightly more diverse, as shown in Figure 18, but again the main decline is in the EU-27, as well as the US, with the replacement markets being China, Turkey, India (albeit to a lesser extent than for crude oil) and other Asian, Middle Eastern and Latin American countries. Once again, though, the overall level of exports hardly moves, demonstrating that the sanctions and embargoes failed to reduce the volume of Russian oil exports in a significant way.

⁴⁰ Reuters, 3 March 2022, "Oil self-sanctioning is unstable weapon for West"

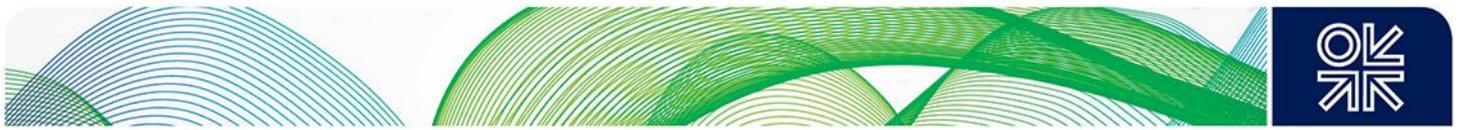
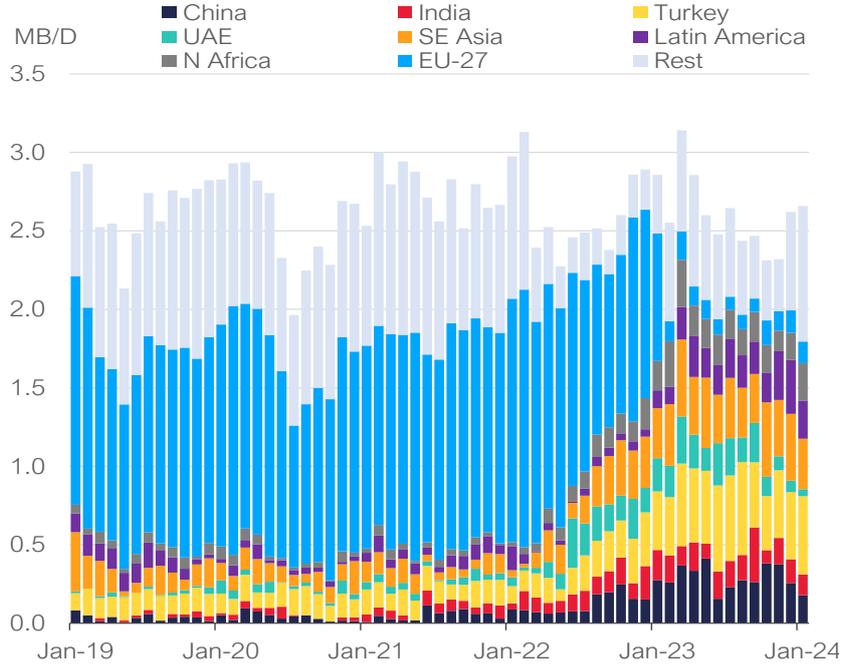


Figure 18: Russian product exports by tanker by destination



Source: Kpler data

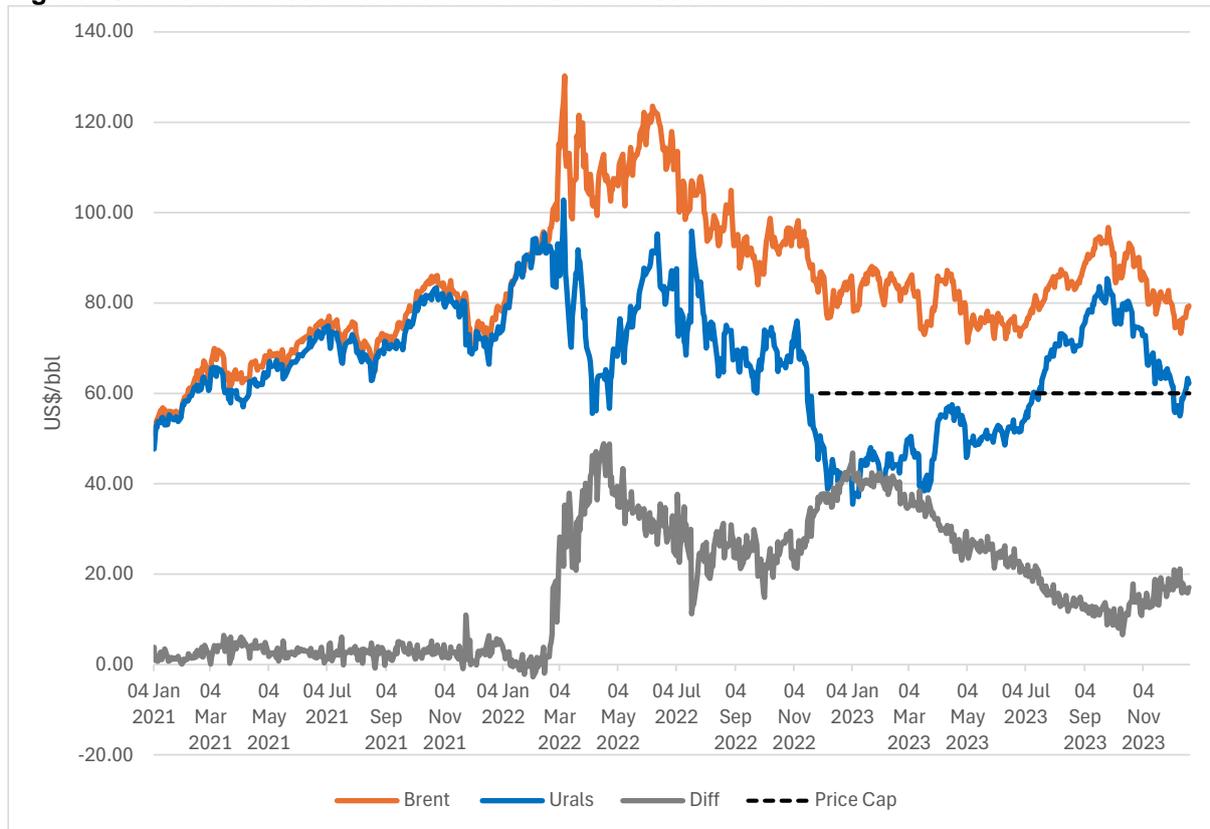
To an extent this outcome did not represent a failure of western sanctions policy because it was always the intention to avoid disruption to the global oil market. However, in order to undermine revenues arriving in Russia that could be used to finance the war effort it therefore became necessary to limit the price paid for Russian oil. The G7 group of countries, plus a coalition of countries such as Australia and EU member states, resolved to address this issue by imposing a price cap of \$60 per barrel on Russian crude oil and \$100 on Russian oil products based on the FOB price in the Baltic or Black Seas. The cap was introduced to coincide with the EU embargoes, namely 5th December 2022 for crude and 5th February 2023 for oil products.⁴¹

As can be seen in Figure 19, the price of the Russian Urals blend that is assessed on an FOB basis at Primorsk in the Baltic Sea was below the price cap when it was introduced in December 2022. This was because a large differential had opened up between the price quotations of Urals by Argus and the globally traded Brent benchmark price, due to the method of calculating the cost of freight and insurance in the absence of actual sales of Urals crude in Northwestern Europe. As can be seen from Figure 19, in late 2022 and early 2023 this differential between Brent and Urals quotations reached as much as \$40 per barrel due to the extremely high risk premia assumed in the calculation, although it has now fallen back to around \$10-15 per barrel. Clearly, Russia was forced to offer price discounts in order to find new buyers of its oil, but it seems unlikely that the actual price discount that the buyers of the Russian crude could obtain was as high as \$40/bbl. Nevertheless, while the information about the price of Urals in the actual sales that had migrated to Asia was not readily available, the synthetic calculation of the Urals price by Argus at a level below the price cap allowed for the continued purchase of Russian crude. This is because anyone involved in the trade of Russian oil is mandated to ensure that the hydrocarbons have been sold at below \$60 per barrel, and as long as they have been assured that this is the case then they can still be involved in the trading and delivery process. Once the price assessment is above \$60 per barrel, anyone involved with the purchase, transport, insurance or financing of the trade in Russian crude can only continue to facilitate delivery to ports in countries without a specific embargo on physical volumes (for example trade to China but not to the EU-27) and can make a significant margin on the provision of the service.

⁴¹ Ribakova, E., Hilgenstock, B., Guntram, W. (July 2023), "The oil price cap and embargo on Russia work imperfectly, and defects must be fixed", Bruegel



Figure 19: Price of Russian crude oil blends and discount to Brent



Source: Platts data

As noted above, the biggest beneficiary of this new trade at discounted prices has been India. As the country’s foreign minister noted in November 2022 in reference to the increased purchase of oil from Russia, “Russia has been a steady and time-tested partner...if it works to my advantage, I would like to keep that going.”⁴² As can be seen in Figure 20, this strategy has led to a marked shift in India’s oil import geography, with Russia accounting for as much as 40% of total imports in some months in 2023, while other suppliers such as the UAE, Iraq and Saudi Arabia have seen their shares decline. According to some commentators India may now have reached a limit of its exposure to Russian crude,⁴³ but there is no immediate sign of a return to previous low levels.

⁴² Reuters, 8 Nov 2022, “India says Russia oil deals advantageous as Yellen visits Delhi”

⁴³ CNBC, 17 July 2023, “India’s reliance on Russian oil may be ‘approaching a limit’” at <https://www.cnbc.com/2023/07/18/indias-reliance-on-russian-oil-may-be-approaching-a-limit.html>

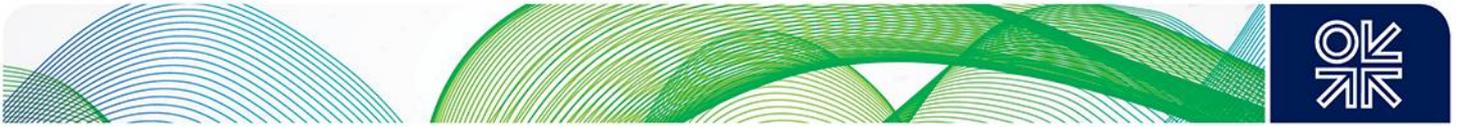
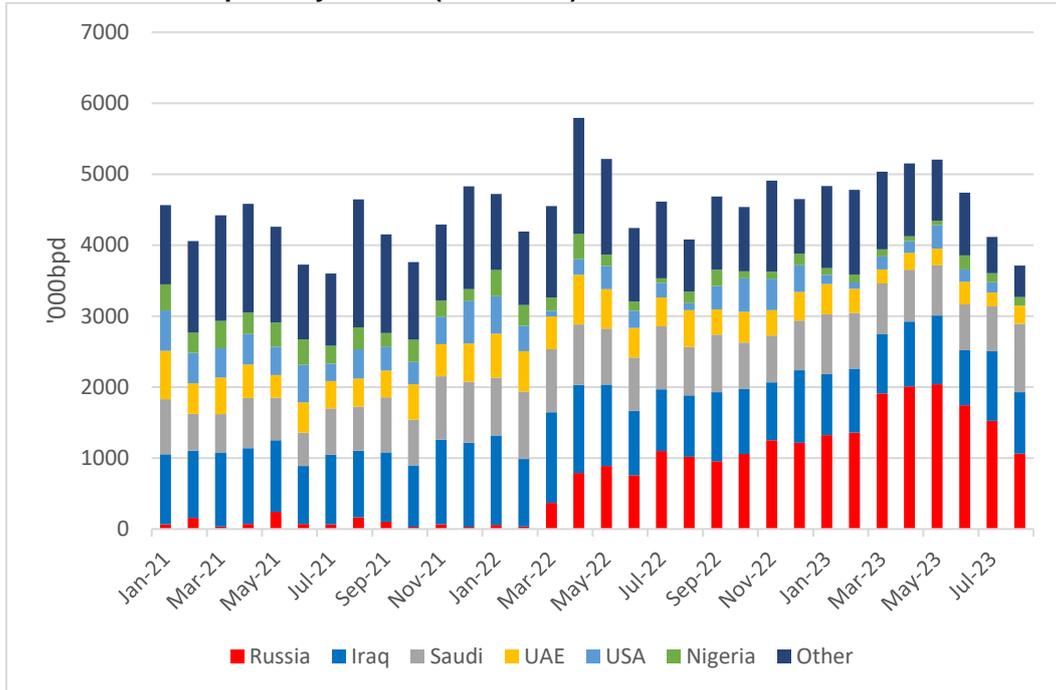


Figure 20: Indian oil imports by source (2021-2023)



Source: Platts data

While the obvious logic for increased Indian purchases of Russian oil is shown in Figure 19 by the large discount or Urals Blend to Brent, it needs to be remembered that this is based on the FOB price in the Baltic Sea. The discount has not only offered cheap oil to India but has also opened a huge margin to be made in the provision of transport and ancillary services to deliver the oil from northern Europe to Southern Asia. Figure 21 compares the delivered price of Russian oil to the west coast of India with the FOB price at Primorsk during 2023 and shows that although the differential has narrowed significantly over the last eight months the margin has ranged from a high of around \$23 per barrel to the current \$8 per barrel. This has tempted traders and tanker owners to get involved with the trade in Russian crude not only to India but also to other Asian destinations where similar margins have been on offer and has helped to facilitate the liquidity of the global oil market. This has underpinned the decline in the oil price from its high of over \$122 per barrel in May 2022 to the current level of around \$84 per barrel.⁴⁴

⁴⁴ Price from Bloomberg as of 5th October 2023

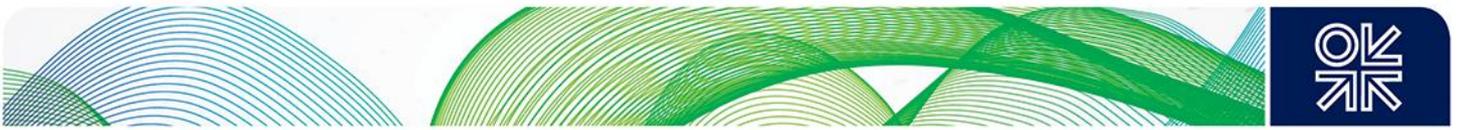
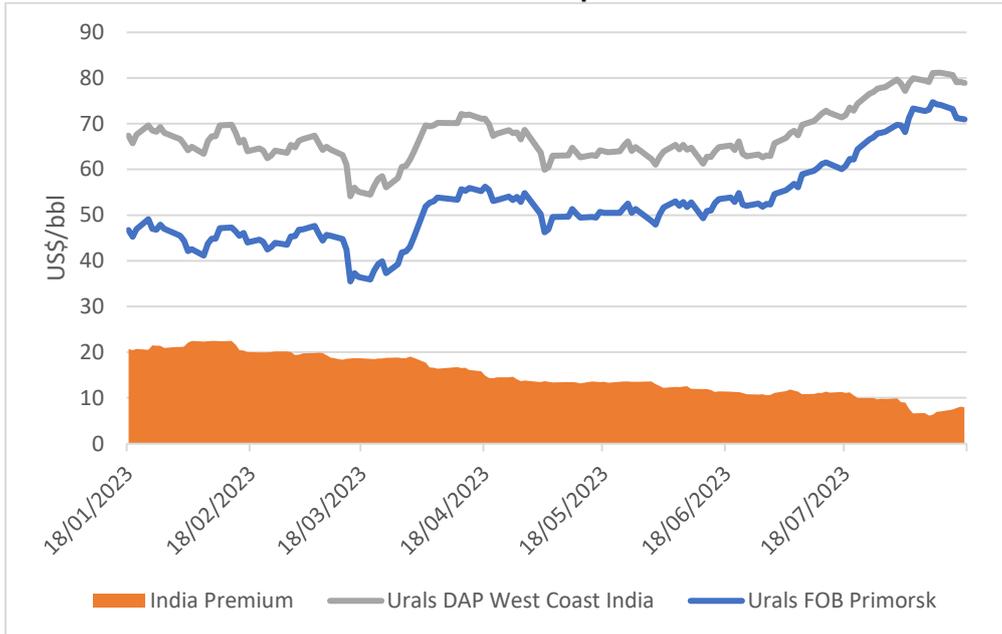


Figure 21: Price of Russian oil delivered to India compared to Urals FOB Primorsk



Source: Platts data

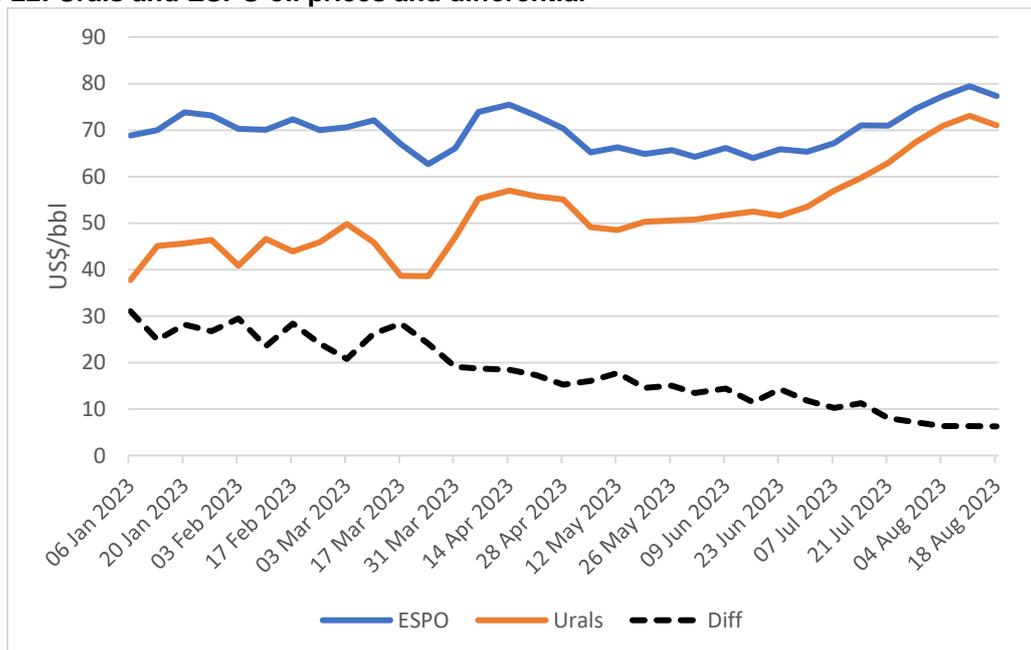
The flow of Russian oil has not only been made possible by price discounts and trading opportunities though. A number of companies have allegedly been involved in sanctions-busting activities, with the development of a “shadow” tanker fleet registered in non-sanctioning countries and insured by a variety of obscure financial entities the most well-reported.⁴⁵ Other options, such as the re-labelling of cargoes, trans-shipment and re-sale of oil, refining of Russian oil and re-delivery as oil products and the use of tankers that leave port without a destination have all been highlighted as means of avoiding embargoes and profiting from the large margins on offer.⁴⁶ Although many countries are now clamping down on the use of ageing and unregistered vessels, with a number now being refused entry to ports on safety grounds,⁴⁷ it would still appear that even some countries that continue to sanction Russia are prepared to see its crude and oil products retain a place in the world oil market in order to maintain the stability of the oil price.⁴⁸

One final point is worth noting on the price for Russian crude exports. The price cap only applies to oil traded out of European Russia, primarily in the Baltic Sea, and so it does not affect the price of Russian oil exported from the east of the country at Kozmino, where oil from the ESPO (East Siberia Pacific Ocean) pipeline is delivered for onward delivery via tanker to Asian markets. Figure 22 shows the spread between Urals Blend and the ESPO Blend sold into Asia, and again the differential has closed over the course of 2023 from a high of over \$30 at the start of the year to around \$6.50 in August 2023. This narrowing of discounts highlights the fact that the price of Urals Blend has risen sharply over the past few months and is now trading above the G7 \$60 per barrel cap. This has caused potential issues for banks, oil traders, insurance companies and tanker owners who are understandably nervous about angering the US authorities by breaking the price cap rules. However, in another demonstration of the double-edged nature of the sanctions, the US government has indicated that it will be applying “soft touch” enforcement of the rules via conversations with service providers rather than harsh implementation of the sanctions, in order to avoid “creating ripples in a market that could send rising global oil prices higher.”⁴⁹

⁴⁵ Energy Intelligence, 4 Aug 2023, “Russia’s ‘shadow’ fleet retains access to G& insurance”
⁴⁶ Bloomberg, 11 April 2023, “Russia’s murky measures keep its oil flowing despite sanctions”
⁴⁷ Bloomberg, 1 July 2023, “Russia’s rusty oil tanker fleet sets sail with newer ships”
⁴⁸ Wall Street Journal, 23 Feb 2023, “Russian oil is flowing, and that is what the West wants”
⁴⁹ Reuters, 27 July 2023, “As Russian oil crosses G7’s price cap, US eyes soft enforcement”



Figure 22: Urals and ESPO oil prices and differential



1.11 The Outlook

Given all the issues discussed above, and in particular the balance which countries sanctioning Russia are trying to make between limiting Russia’s oil revenues while keeping its oil on the global market to avoid any sharp price spikes, it would seem reasonable to assume that the volumes of oil and oil products leaving Russia will remain relatively stable for the foreseeable future. Some gradual decline might be expected in the medium term if and when oil production goes into gradual decline, as discussed earlier in this paper, and over the longer term the impact of the energy transition on global oil demand could also see Russian exports decline as the economics deteriorate. In the short-term though (to 2030) it would seem likely that exports will remain around current levels. The one caveat to this outlook in the short term is the impact of agreements made with the OPEC+ group to constrain production, which could have a knock-on impact on exports. The agreement to cut production by 500 kbpd in March and to reduce exports of crude oil and oil products by a similar amount from September has caused exports to slow, and indeed on 21st September Russia banned all gasoline and diesel exports in order to re-balance its domestic market and keep prices down.⁵⁰ However, this is likely to be a short-term phenomenon and should not change the longer-term outlook for overall exports.

Control of Russian revenues will therefore come via the price cap, which has been reasonably effective to date but where cracks already seem to be appearing. As seen in figure 19, Urals Blend has been trading above \$60, and although the US has stepped in to caution market participants not to deal in Russian oil above this level, it would seem reasonable to surmise that, as with many sanctions’ programmes, enforcement will weaken over time. In addition, it would also appear that Russian companies and other “shadow” organisations are making money in the margin between the capped FOB price at Primorsk and the delivered price in non-sanctioning countries such as India. In addition, Russian oil not delivered out of non-European regions (especially in the East) can avoid the cap and any embargoes altogether. As such, while it would seem reasonable to assume a continued discount for Russian crude and product exports over the rest of this decade, it is likely that the discount will narrow (as we have already seen in 2023) and may disappear altogether.

⁵⁰ Reuters, 21 Sept 2023, “Russia temporarily bans fuel exports to most countries in response to shortages”



2. Outlook for Russian gas

2.1 Gas production and exports

As noted in the Introduction, Russia's national gas output in 2022 amounted to 672.6 bcm, down 11.8 percent year-on-year, or by 90.2 bcm. This represented the largest year-on-year production decline since 1990 at a national level. It is also worth noting that Gazprom's output in 2022 was affected disproportionately, ending up at only 412.6 bcm, 20 percent less than in 2021, an annual decline of about 103 bcm, the largest in Gazprom's history⁵¹. Gazprom has traditionally undertaken a balancing role in order to deal with seasonal swings in demand, using its very flexible, super-giant Cenomanian gas fields. However, the situation in 2022 was extreme, requiring immediate adjustments to the production side of the balance on a scale that could only be managed by Gazprom due to the characteristics of its assets (super-giant Cenomanian fields) and customer base (significant share of residential users with very seasonal demand patterns). The trend continued in 2023, with total Russian gas production of 638bcm,⁵² and a Gazprom contribution of 404bcm.⁵³

There were several specific reasons why Gazprom has had to assume the burden of market balancing and sharply reduce output. Firstly, it has a monopoly on all pipeline gas exports, so it had to absorb all the decline in European nominations for Russian gas. Secondly, the associated gas production by Russian oil companies is a function of oil output, which in 2022 increased by about 2 percent year-on-year, to about 535 million tonnes (against initial expectations of a significant decline) and which has only declined by 2% in 2023. Since 2014, as part of the regulatory effort to reduce flaring, the Russian government has introduced measures that give priority access to the national gas pipeline network (owned and operated by Gazprom) to the dry stripped gas derived from processed associated gas, thus providing producers with an attractive alternative to flaring. As a result, oil companies' associated gas production has moved up to the top of the domestic sales merit order, ahead of any of Gazprom's domestic sales.

Russian gas independents expanded their market share in the early 2010s on the back of the improved economics of the domestic gas market, due to a series of hikes in Russian regulated prices. To explain the last point, the independents do not have to sell their gas at regulated prices in Russia, but an increase in the levels of the regulated prices charged by Gazprom gave the independents a chance to offer consumers discounts to prices being offered by Gazprom while still making a profit. Following the massive depreciation of the Russian rouble after 2014, however, the dollar value of domestic gas prices has shrunk, worsening the economics of many new gas developments which the independents were targeting at Russia's domestic market and resulting in project delays.

However, the key reason why the Russian independent gas producers managed to increase their share of the Russian domestic gas market in 2022 was the launch of a number of long-delayed upstream projects, which had been approved several years ago and which were secured by the portfolios of long-term contracts which Russian oil companies and independent gas producers had signed with end-users.

Rosneft, the largest Russian oil producer, has been targeting the expansion of natural gas production in its overall hydrocarbon portfolio for some time. In 2014 Rosneft released its gas strategy that stipulated the ambition to produce 100 bcma of natural gas by 2020, underpinned by several large new gas projects such as Rospan and Kharampur⁵⁴. The actual gas production in 2020 was only 63 bcm as the target was moved forward to 2022, due to oil production restrictions⁵⁵ introduced by the OPEC+ deal, and then further into the future. The company's latest corporate strategy, Rosneft-2030, released

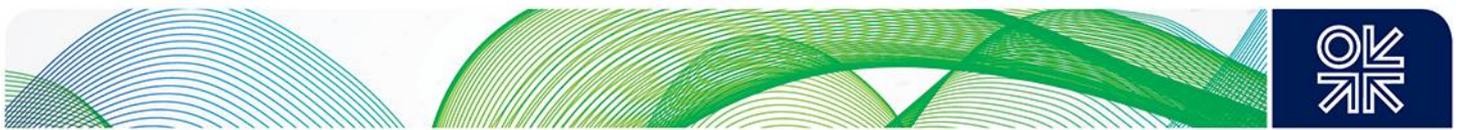
⁵¹ <https://www.gazprom.com/press/news/miller-journal/2023/405413/>

⁵² Rosstat data

⁵³ [https://www.reuters.com/business/energy/gazproms-gas-output-down-9-2023-kommersant-reports-2024-01-26/#:~:text=MOSCOW%2C%20Jan%2026%20\(Reuters\),newspaper%20reported%20late%20on%20Thursday.](https://www.reuters.com/business/energy/gazproms-gas-output-down-9-2023-kommersant-reports-2024-01-26/#:~:text=MOSCOW%2C%20Jan%2026%20(Reuters),newspaper%20reported%20late%20on%20Thursday.)

⁵⁴ https://www.rosneft.com/business/Upstream/Gas_Strategy/

⁵⁵ Rosneft's new projects are not pure gas but complex of reserves of oil, condensate, associated and free gas.



in 2021, aims at a 25 percent share of total hydrocarbons production by Rosneft for natural gas by 2030⁵⁶.

By 2022 the delayed Rosneft projects had gained new momentum. Output started to ramp up at the Rosspan project launched in the first quarter of 2021⁵⁷. In 2022 it grew by over 58 percent year-on-year, to 17.4 bcm. In September 2022 Rosneft started gas production at the Kharampur project, in spite of the exit of BP, which had 49 percent in the joint venture. By the end of December 2022 cumulative gas production at Kharampur in 2022 amounted to 4.7 bcm. Rosneft's overall gas output grew by 10.5 bcm (17.8 percent) year-on-year in 2022 to 69.1 bcm.⁵⁸

Another contribution to the growth of Russia's gas output in 2022 came from Novatek. Russia's largest gas independent increased its output in 2022 by 1.4 bcm (1.7 percent) year-on-year to 83.6 bcm. Some decline in production at the older Yurkharovskoye field which was earmarked for Novatek's deliveries to the domestic market was more than compensated by robust growth of output at the Tarkosaleneftegaz production subsidiary.

At Yamal LNG the three original trains (each with 5.5 mt nameplate capacity) and train four (with 0.94 mt nameplate capacity) have been operating well above their nominal maximum output, utilizing the advantage of the cold Arctic climate, and pushing the limits of the project's equipment and personnel. It is expected that from 2022 Yamal LNG will be able produce about 21 mt of LNG, utilizing about 32 bcm of natural gas.

The most noteworthy development for the project has been, undoubtedly, the apparent resolution of the initial production problems with the "Arctic Cascade" liquefaction technology. This is potentially important for ensuring Russia's continued progress with achieving its LNG ambitions, in spite of Western sanctions on large-scale liquefaction technology and equipment. Although Arctic Cascade is a medium-scale liquefaction technology and using it in place of the Western alternatives means losing efficiencies of scale, the combination of the extremely low cost of feed gas for Russian LNG projects, technological self-sufficiency (even with higher unit costs of liquefaction) and strong state support (via significant tax breaks) still gives Russia's LNG projects a strong competitive position in the global LNG market.

Finally, another big contributor to output growth for Russian gas in 2022 was Gazpromneft (part of the Gazprom group), which completed the construction of the pipeline link from its Novyi Port field to the UGSS (the Russia trunk pipeline system), unlocking the opportunity to increase gas output at the field. Production by Gazpromneft Yamal, a subsidiary which is developing Novyi Port and a number of other fields, reached 15.2 bcm, up 5.5 bcm (57.4 percent) year-on-year. Gazpromneft's overall production (including JVs Arcticgas and Northgas) in 2022 amounted to 50.6 bcm, up 6.6 bcm (14.9 percent).

As a result of these increases and the decline in export sales, Gazprom now has significant spare production capacity. It is possible to estimate the amount of Gazprom's total spare productive capacity in 2022, drawing on the incremental decline in Gazprom's output and previous research on the subject⁵⁹. We estimate that Gazprom had 117 bcm of spare gas productive capacity in 2022, although this is not a precise number. We do not have the data on the decline in production by individual Gazprom fields in 2022, in particular the older super-giants in Nadym-Pur-Taz, where natural decline due to diminishing pressure in the reservoir can be either allowed to take its toll or reduced/offset via a series of technical measures introduced by the operating company (e.g. by deploying booster compressor stations at the fields and tapping new productive zones). According to our estimates, in 2022 Gazprom had about 38 bcm of free productive capacity at Zapolyaroye, about 30 bcm at Urengoy, 15 bcm at Bovanenkov, and 15 bcm at Urengoy, with smaller amounts of capacity available at other fields (see Figure 23).

⁵⁶ https://www.rosneft.com/about/Development_prospects_and_strategy/

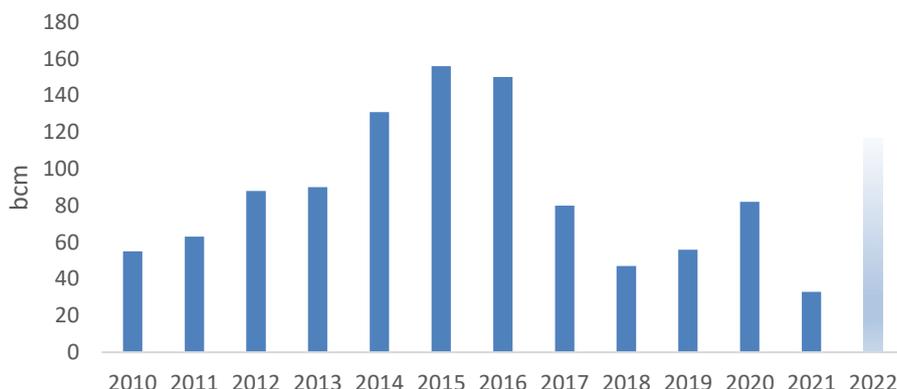
⁵⁷ We use Argus data for Russian gas production along with publications in Russian business newspapers that refer to leaked information from CDU that has been classified and not publicly available since 2022.

⁵⁸ <https://www.rosneft.com/press/news/item/212565/>

⁵⁹ See the OIES Energy Insight *Shrinking surplus: The Outlook for Russia's spare gas productive capacity* <https://www.oxfordenergy.org/publications/shrinking-surplus-outlook-russias-spare-gas-productive-capacity/> and the OIES Energy Insight *It Don't Mean a Thing if It Ain't Got That Swing: Why Gas Flexibility is High on the Agenda for Russia and for Europe* <https://www.oxfordenergy.org/publications/dont-mean-thing-aint-got-swing-gas-flexibility-high-agenda-russia-europe/>



Figure 23: Gazprom's spare gas productive capacity



Source: OIES estimates

It is worth noting that the 2022 crisis, which has led to the emergence of very significant spare productive capacity for Gazprom, followed a tight year in 2021 when its capacity was reduced to a bare minimum available only during the summer. The low 2021 base has meant that despite a record year-on-year increase, the absolute levels of spare productive capacity for Gazprom in 2022 were below the levels of around 150 bcm registered in 2015 and 2016. By implication, it meant that Gazprom management knew how to address the problems of balancing output in 2022 since it had dealt with similar and even larger challenges only a few years before.

In spite of all the negative consequences of a shrinking European export market for Russia, the emergence of a 'safety cushion' of massive spare gas productive capacity has some silver linings for Gazprom in the form of enhanced domestic energy security and flexibility of supply.

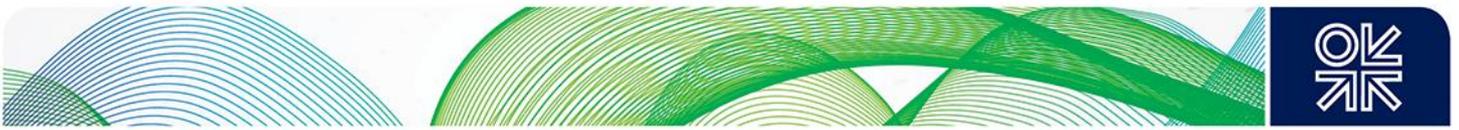
Firstly, Gazprom is now in a very comfortable position with regard to meeting winter demand peaks in Russia. It is going to have no problem conducting very thorough maintenance at its fields during summer time and will therefore be well prepared for winter. At the beginning of January 2023 most of the territory of European Russia, Urals, and Siberia experienced extreme cold weather, with temperatures 10-15 degrees C lower than the ten-year average. As a result, Russian domestic gas demand spiked, but Gazprom apparently has been able to meet all nominations without any extraordinary measures.

Secondly, Gazprom can optimize its upstream investment program by expanding the most profitable parts of its upstream portfolio and retiring marginal assets with inferior economics. This most likely means steeper decline rates for "old gas" fields in Nadym-Pur-Taz, and delayed development of new fields on Yamal. It is not clear at this point whether future productive capacity in NPT could be negatively affected if the shut-in period lasts many years. The recent evidence suggests that after shutting down a significant number of gas wells during 2015-16 at its balancing fields (in particular Zapolyaroye), Gazprom was able to revive the wells and return output to maximum levels in 2018-2019. A longer hiatus might be more harmful, but there is no clear-cut evidence that this is going to be the case.

Thirdly, Gazprom can re-allocate investments from upstream to midstream (in particular to the projects that help unlock new Asian gas markets). For example, with regard to the additional export supply to China Gazprom can focus on the midstream investment (Power of Siberia 2 pipeline) and worry less about developing new upstream fields since the available spare productive capacity is mostly sufficient.

Fourthly, easily available gas supply for users of gas at home might foster the creation of new demand, in particular for expanding domestic gas-intensive industries, for example, nitrogenous fertilizers, which could be considered as an alternative gas-embedded export commodity. Russia is the world's second largest producer of fertilizers with plans to expand the industry and increase its export share⁶⁰.

⁶⁰ <https://delprof.ru/press-center/open-analytics/rynok-mineralnykh-udobreniy-v-rossii-2020-uverennyi-rost-vopreki-krizisu/>



The geopolitical events of 2021-22 have highlighted conflicts between security and commercial issues in gas trade. For over 50 years, the Russia-Europe gas relationship has been underpinned by the concept of cooperatively managed interdependence producing mutual benefits. However, it could not remain immune to increasing geopolitical animosity and even before the war in Ukraine, the tensions in the Russia-Europe gas relationship were escalating. This is not surprising given that for Russia the infrastructure and major production investment decisions are very difficult to justify against sales into a market in transition to decarbonized energy with an uncertain outlook for unabated gas demand. At the same time, Russian decision-makers expressed a growing sense of urgency to secure alternative export markets in Asia, where energy transition is taking a different form and where the buyers continue to view security of supply in the traditional sense as an obligation to deliver physical molecules and consider long-term contracts as a viable insurance. Indeed, a new 10 bcma gas contract between Russia and China (in addition to the 38 bcma deal of 2014) signed at the beginning of February 2022 for gas from a new field offshore Sakhalin Island and the potential for a new 50bcma deal for Power of Siberia 2 from existing fields on the Yamal Peninsula through Mongolia to Beijing signal that Russia has stopped considering Europe as its main gas export market for the 2030s and has started to re-allocate investments away from the projects that target markets in the West.

Previously, Russia had intended to continue sizable gas exports to Europe underpinned by its legacy long-term contracts, some of which extend beyond 2030. In addition to providing significant revenues to the Russian budget and Gazprom, securing a continued niche in the European gas market was seen as an important leverage against monopsonistic dependence on China. The war in Ukraine, however, jeopardized these strategic considerations. Russia's invasion of Ukraine in February 2022 has resulted in the final disintegration of mutual confidence and goodwill between Russia and the EU and made an abrupt interruption of the gas trade irreversible, at least in the present geopolitical environment. At present, the official EU policy is to get rid of Russian gas as soon as possible via a series of measures combining infrastructure development, particularly construction of LNG regasification terminals, to bring in alternative gas supply on the one hand, with conservation and demand-side management on the other. Acceleration of the energy transition in order to move away from hydrocarbons altogether is an additional strand of the diversification plan which is aligned with the EU's Green Deal strategy.

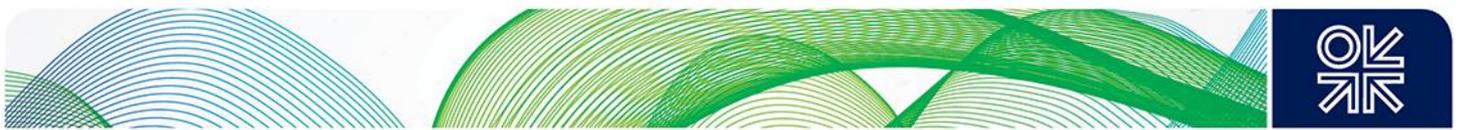
The hasty separation of Russia and the EU has imposed a heavy toll on both sides. Extremely high gas prices in 2022 initially threatened Europe's industrial competitiveness while aggressive diversification away from Russian gas in Europe has threatened Russia's future export revenues. Currently, scenarios of a radical energy transition in Europe and a fast diversion of Russia's gas exports towards Asia seem the most likely way forward, with Europe seeking alternative LNG supplies to replace Russian gas in the medium term as the transition progresses. While one cannot exclude the resumption of direct Russian gas deliveries to Europe in a limited format after the end of the Russia-Ukraine war, the scale of these exports remains speculative at present.

Nevertheless, Russia is apparently not ready to completely give up on recouping the big-ticket upstream and midstream investments which it made over the past twenty years. The abrupt disappearance of the European gas export market represents a significant problem for Gazprom and for the Kremlin. Russian gas strategists have formulated several ideas on how to mitigate the problem. It appears that the overhaul of the Russian export strategy boils down to three main ideas that have been advertised by Russian decision-makers during 2022 and 2023.

First and most important is the idea of urgently accelerating the expansion of gas trade with China by constructing a new pipeline from Yamal to China via Mongolia. The negotiations between Gazprom and CNPC on this project have been continuing for several years, with the latest round of talks taking place on January 11, 2023⁶¹.

Second is the idea of a gas partnership with Turkey based on Turkey developing a "gas hub" at which it could re-sell to Europe a mix of Russian/Azeri/Iranian gas (plus Turkey's own gas once the much hoped for production from the Sakarya field commences in 2024). Russian President Vladimir Putin proposed the idea of a Turkish gas hub to the Turkish President Tayyip Erdogan in October 2022, an

⁶¹ <https://www.gazprom.com/press/news/2023/january/article560557/>



idea that Erdogan has supported. On December 9, 2022, Gazprom's CEO Alexey Miller discussed the details of the proposal with President Erdogan.⁶² The apparent logic behind the idea is that if Europe were to impose sanctions on the sales of gas from the Turkish hub, it would risk alienating Turkey and Azerbaijan, since it would be practically impossible to legally differentiate gas molecules that might have originated in Russia from Azeri or Turkish molecules. The Russian gas would have been 'laundered' through the hub and become unidentifiable⁶³. From a Russian strategic perspective, while the "back door" route for Russian gas to Europe via Turkey cannot replace the lost capacity of Nord Stream, it still might help address the issue of the 'toxicity' of Russian gas for the European public for relatively limited volumes.

Third is the idea of a so-called "gas union" between Russia, Kazakhstan, and Uzbekistan, announced at the end of November 2022.⁶⁴ Since then the political aspects of closer cooperation in the gas business between the three countries have been played down by the parties. Instead, the practical aspects, such as improving the throughput of the Central Asia-Center (CAC) gas pipeline and covering the seasonal gaps in the gas balances of Kazakhstan and Uzbekistan so that they could honour their contracts for exports to China, have been brought forward⁶⁵. There appears to be some limited potential for expanding Russian gas exports to Kazakhstan and Uzbekistan for subsequent effective re-export to China, but it would require time and investment to realize it.

How should one evaluate the viability of these three ideas in Russia's latest gas strategy? Importantly, in none of them is Russia in control of the situation but will have to depend on other players. This is most critical in the case of the Russia-China negotiations regarding a new 50 bcm contract. The Chinese seem to be under no time pressure to negotiate, while Russia is sitting on a time bomb, facing a potential sharp reduction in gas export volumes, and wary of the fact that the counterbalancing effect on export revenues from today's high gas prices is likely to start dissipating in the next few years. A second point to make is that all three ideas are second-best options compared to the lost Gazprom sales to Europe. It should not be surprising to anyone that China, Turkey, Kazakhstan and Uzbekistan are likely to exploit their new negotiating leverage to secure significant price discounts and other concessions from Gazprom, which will ultimately reduce the Russian company's sales margin. A third and final point is that Russia has two, maximum three years to address the weak links in its gas export strategy. If solutions are not found, the risks of very negative developments on the export revenue side will become apparent, potentially forcing Russia to devalue the rouble further and hike domestic gas prices in order to be able to increase the state tax take, ultimately reducing Russia's macro-economic stability and shattering the historic social contract around gas supply to the domestic market.

2.2 Estimates of Russian gas output and exports to 2030

Given the analysis above, it is apparent that the future of Russian gas production will not be driven by resource availability but by market demand for Russian gas. Gazprom has significant spare capacity as a result of declining sales to Europe in the aftermath of the invasion of Ukraine, with the result that its production, and that of other Russian gas producers such as Novatek and Rosneft, will be managed to meet domestic demand in Russia, remaining pipeline sales to Europe, sales to countries in the FSU such as Belarus and Moldova, growing pipeline exports to China and the planned increase in LNG exports to the global market. We address each of these in turn below.

⁶² <https://www.reuters.com/business/energy/head-gazproms-miller-turkeys-erdogan-discuss-turkish-gas-hub-gas-supplies-2022-12-09/>

⁶³ <https://www.euractiv.com/section/energy/news/analysis-europe-wary-of-turkish-hub-to-hide-gas-made-in-moscow/>

⁶⁴ <https://fief.ru/en/media/news/rossiya-kazakhstan-i-uzbekistan-sozdadut-gazovyy-soyuz/>

⁶⁵ <https://thediplomat.com/2022/12/why-so-much-attention-on-russias-vague-proposal-for-a-gas-union-with-kazakhstan-and-uzbekistan/> and <https://www.agenzianova.com/en/news/lavrov-nessun-gioco-geopolitico-nellunione-del-gas-tra-russia-kazakhstan-e-uzbekistan/>

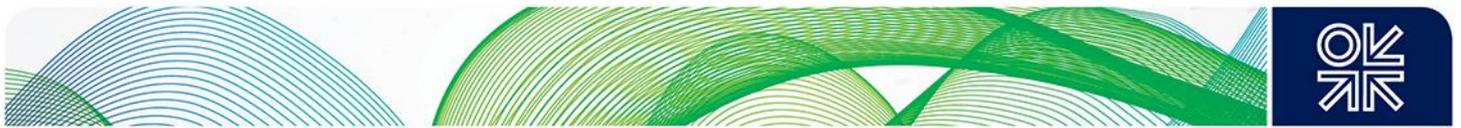
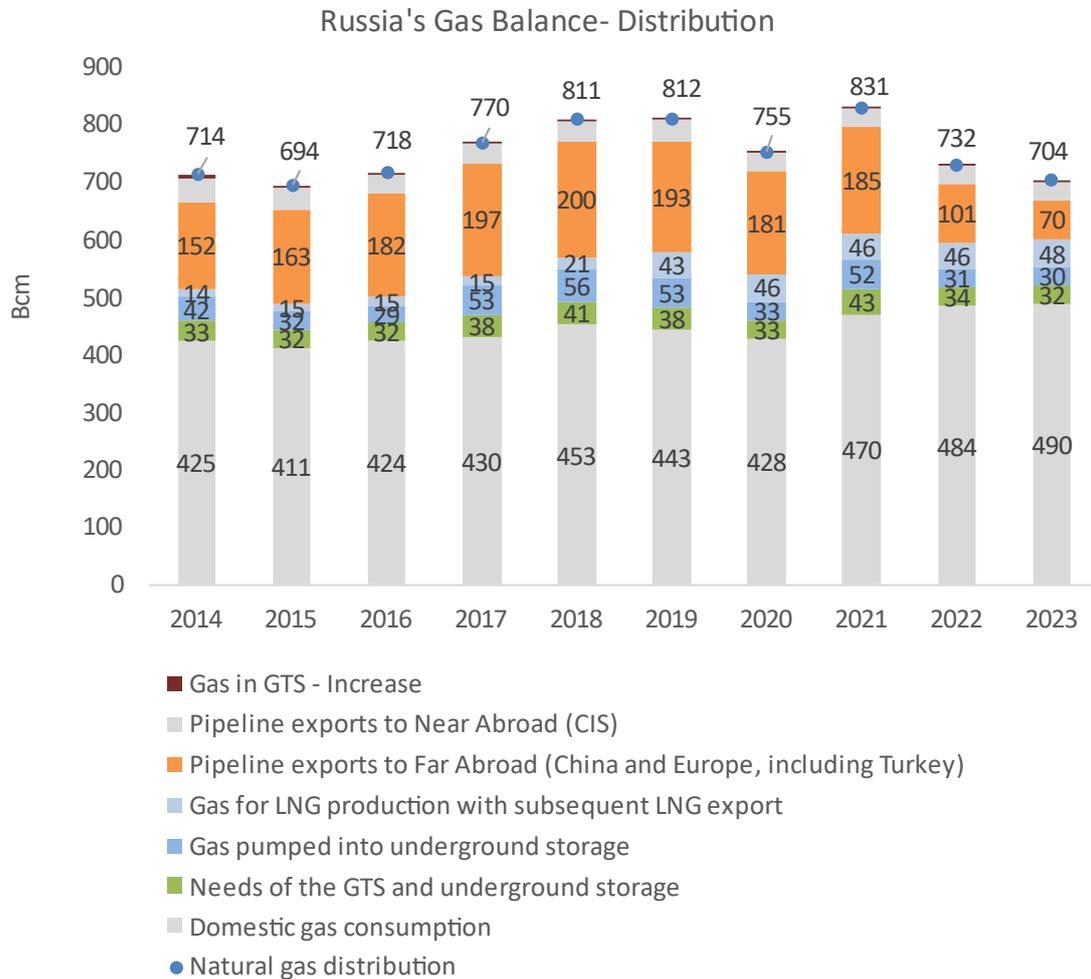


Figure 24: Russian gas supply and demand balance



Source: Yermakov (2023)

The overall balance for Russian gas is shown in Figure 24. As can be seen, the main component is demand from Russian consumers, which totaled 484bcm in 2022, two thirds of the overall use of Russian gas. Gas accounts for approximately 50% of Russia’s total primary energy needs and is used widely across the energy economy, being a vital input to power generation, a source of industrial heat and a critical source of residential heating demand during the freezing Russian winters. Indeed, one of Alexei Miller’s (the CEO of Gazprom) most important jobs is to report to the President on Gazprom’s preparations for winter each year, as any loss of gas for heating would be a political, as well as a human, disaster.

Consumption of gas in Russia fluctuates with weather patterns, falling in warmer winters, but as can be seen in Figure 24 the overall trend has been upwards over the past decade thanks to Russia’s slow, but steady, economic growth. The contraction in the economy since the start of the war in Ukraine, has been estimated at around -2.1% in 2022 by the Russian authorities but at around -4% by outside observers⁶⁶ but this has, somewhat surprisingly, not interrupted this gas demand growth. Also, expectations are for a slow economic recovery to 2030, with 1-1.5% per annum GDP growth seeing the economy recover to its pre-war size by the end of the decade.⁶⁷ Although there is a huge amount of

⁶⁶ Foreign Policy, 13 March 2023, “Don’t trust Russia’s economic numbers”

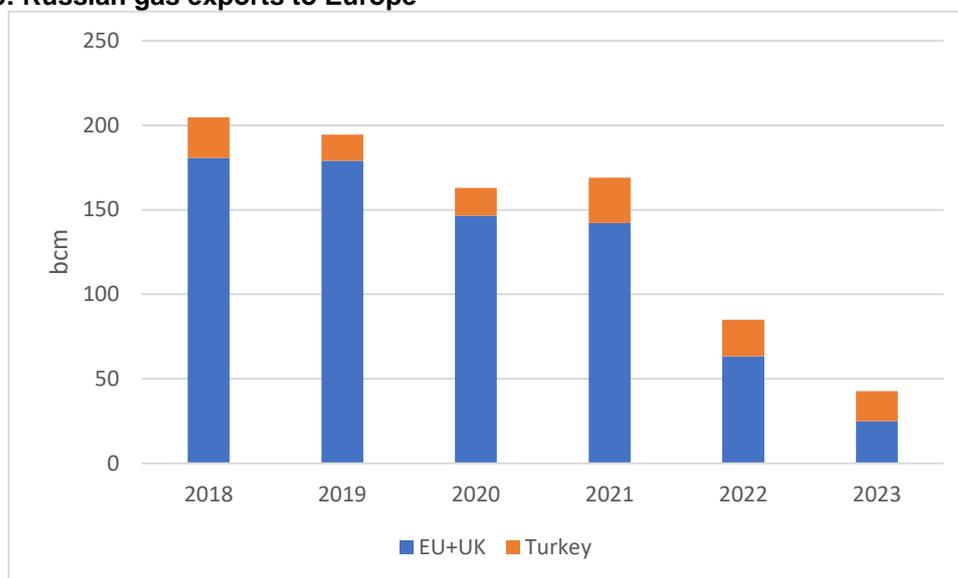
⁶⁷ Reuters, 16 Sept 2022, “Russian economy will not return to pre-war levels until 2030, Scope Ratings says”



uncertainty around these estimates due to doubt about the outcome of the war in Ukraine and also because of a lack of reliable data from Russia, it would seem that a reasonable estimate of future Russian gas demand would be for an increase slightly below that of GDP growth (to anticipate some increase in efficiency). Growth of 0.8% per annum, for example, would be equivalent to half the average 1.6% pa seen between 2014 and 2022 and would lead to domestic gas demand of 515bcm by 2030.

With this relatively stable platform likely to remain in place for the foreseeable future, any volatility in Russian gas production will be driven by export sales. The main component of these over the past two decades has been pipeline exports to Europe. Figure 25, which includes sales to the EU & UK as well as sales to Turkey and some other non-EU states, shows that these reached a peak of just below 200bcm in 2018, before declining slightly in 2019 due to a warm winter in Europe and then further in 2020 due to lower demand as a result of the COVID pandemic. 2021 was something of an anomaly, with a sharp increase in exports to Turkey as the pandemic eased, offset by a further decline in sales to the EU, mainly because Gazprom began to reduce sales on European hubs and its own electronic sales platform (the ESP) in the second half of the year. With hindsight this can now be interpreted as the first moves in the use of Russia's "gas weapon" to tighten the market in Europe ahead of the invasion of Ukraine in February 2022.

Figure 25: Russian gas exports to Europe



Source: Energy Institute Statistical Review of World Energy 2023, Argus data

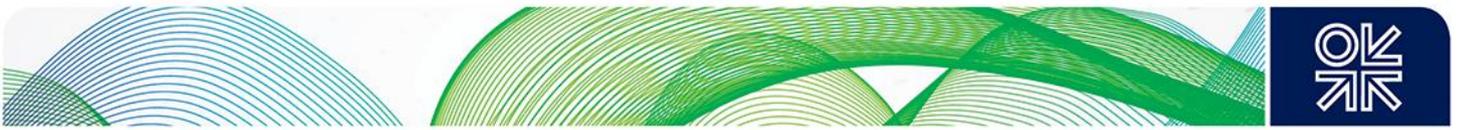
2022 then saw a much more dramatic decline in Russian exports, even though gas was deliberately excluded by the EU from its sanctions packages after the start of the war. There were a number of other reasons why exports fell sharply, though. These included the halting of all flows through the Yamal pipeline which is routed via Belarus to Poland, due to sanctions imposed by Poland on Gazprom and by the Russian authorities on EuroPolGaz, the company which manages the pipeline.⁶⁸ Also, Gazprom demanded rouble payment for all its export sales to Europe, in response to the blocking of the Russian Central Bank's foreign currency holdings in European banks.⁶⁹ The majority of Gazprom's customers refused to comply and therefore had their supplies cut off.

This situation was then compounded by maintenance issues on the Nord Stream 1 pipelines. Gazprom insisted that a number of the compressors required urgent maintenance, but this had to be carried out by the manufacturer Rolls Royce in a plant in Canada.⁷⁰ However, due to sanctions restrictions the return of the compressors was delayed and ultimately made more complex by Gazprom requests for

⁶⁸ Reuters, 29 Sept 2022, "Poland imposes sanctions on Russia's Gazprom Export"

⁶⁹ Financial Times, 28 April 2022, "Russian gas payment demands in breach of sanctions, EU says"

⁷⁰ The Guardian, 31 Aug 2022, "Nord Stream 1: Russia switches off gas citing maintenance"

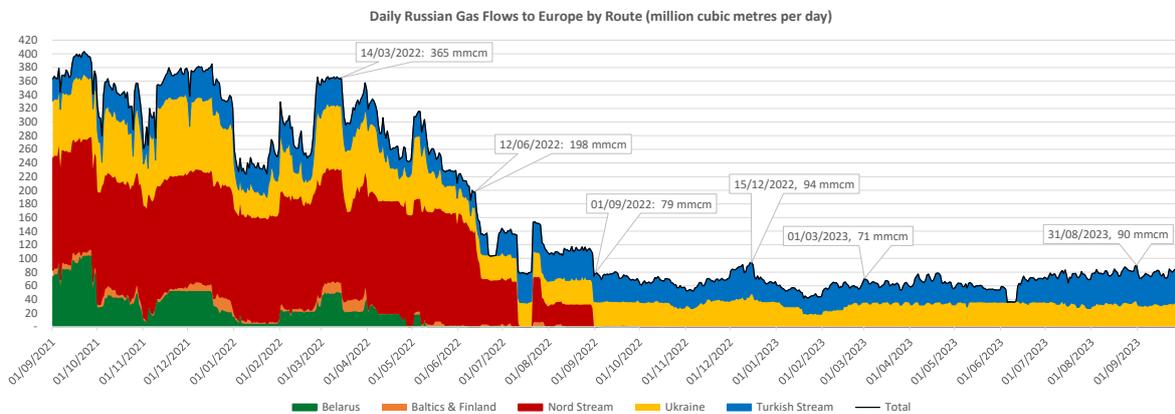


documentation and assurances about future procedures. Finally, a series of explosions put both the Nord Stream 1 pipelines out of action and also put a large hole in one of the two new Nord Stream 2 pipelines,⁷¹ which had been completed but delayed by the refusal of the German regulator to approve their use as tensions over the Ukraine situation increased throughout the second half of 2021.

The result of all these actions was that daily flows of Russian gas to Europe (EU + UK) fell from around 400mmcm/d in 2021 to half that level by the middle of 2022, and then declined further to around 80mmcm/d by the beginning of September 2022. Throughout 2023 the average flow was in a range of 42-79mmcm/d, equivalent to the take-or-pay range in the long-term contracts with European customers that still remain active. On an annualised basis, this would equate to delivery of 22-25bcm compared with 63bcm in 2022 and 142bcm in 2021. Gas now flows through only two routes – the Ukraine system from the entry point at Sudzha on the Russia-Ukraine border to Velke Kapusany on the Ukraine-Slovakia border; and the extension of the Turk Stream pipeline, which flows from Turkey to Bulgaria and then on into Serbia, Hungary and Austria.⁷² As can be seen in Figure 26, although there are fluctuations inflows by both routes the overall flow is now split almost equally between the two.

Looking to the future, although it is difficult to predict whether these flows will continue at current levels, decline further or even rebound in the event of an end to the Ukraine war, a few indicators can at least be identified. Firstly, of course, the flows through Ukraine could be interrupted at any time by the continuing military activity. Beyond this, though, the transit contract under which Russia is obliged to send 40bcm/a via the Ukraine system to Europe expires at the end of 2024. The contract is already under dispute, with the Ukraine system operator suing Gazprom for underpayment given the fact that current flows of gas are well below the contracted level, and the Ukrainian government has indicated that it is highly unlikely that the contract will be renewed beyond 2024. Gas could continue to flow based on weekly capacity auctions, but there is a clear risk that beyond 2024 flows through the Ukraine system could halt altogether. A more positive scenario, under which the Ukraine war ends in a manner that could allow Russian flows to increase to the contracted level, is clearly unlikely in the short-term and any estimate would be pure speculation.

Figure 26: Daily flows via pipelines from Russian to EU plus UK



Source: ENTSOG Transparency Platform

Flows through the Turk Stream extension to Europe appear to be at less risk, not least because a number of the countries to which it delivers gas are on more friendly terms with Russia and have agreed to pay for gas in roubles. The annual capacity of the system is around 20bcm, but flows were around 60% of that level in 2023 so there is clearly some upside in the medium term. This will, however, depend on demand for Russian gas in Turkey.

⁷¹ AP News, 9 Mar 2023, "What's known about the Nord Stream explosions"

⁷² OIES Gas Quarterly, July 2023, Issue 22 pp.6-9 at <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/07/OIES-Quarterly-Gas-Review-Issue-22.pdf>



Two pipelines take gas from Russia to Turkey – the Blue Stream line from the north-east and the Turk Stream line from the west. The combined capacity of these pipelines is 47.5bcm (16 for Blue Stream, 31.5 for Turk Stream), but this has rarely been fully used. Blue Stream was opened in 2002 and flowed at capacity in 2021 when Russian exports to Turkey reached a record 26.7bcm.⁷³ This means that the remaining 10.7bcm flowed through Turk Stream, which had been opened in late 2019,⁷⁴ along with other gas destined for southern Europe. A second Turk Stream link (with capacity for an extra 31.5bcm) has been proposed but, given the uncertainties around demand in Europe and Turkey, it has not yet been approved. Indeed, Turkey tends to manage its imports of gas between three sources – Russia, Azerbaijan (via the TANAP pipeline) and the global LNG market – based on price, meaning that it is difficult to estimate future demand for Russian gas.⁷⁵ Furthermore, Turkey’s overall gas strategy is also in flux, with domestic coal production and the construction of new nuclear and renewable energy sources potentially undermining gas demand. As a result, it is reasonable to assume that Russian exports to Turkey will remain in the 20-30bcm range for the foreseeable future.

While stability at much lower levels is likely to remain the story of Russian pipeline exports to Europe, the country’s “pivot to Asia” is already generating significant growth. Gazprom has been seeking to diversify its sales portfolio since the mid-2000s and in 2014 finally signed an agreement to export 38bcm to China via the Power of Siberia pipeline running from two fields in East Siberia (Chayanda and Kovykta) to North-East China. The pipeline opened in late 2019 and is now gradually ramping up to full capacity by 2025/26.⁷⁶ Flows reached 15.5bcm in 2022 and 22bcm in 2023, and once the 38bcm peak is reached around the end of 2025 it should stay at that level for the next twenty years at least. The profile can be seen in Figure 27, where the potential throughput of two other lines is also shown in shaded colours.

The first that could emerge is the Far East pipeline, which would run from offshore Sakhalin Island into North-East China via Vladivostok and would eventually carry 10bcm. A preliminary sales and purchase agreement was signed by Presidents Putin and Xi in 2022,⁷⁷ and first gas is expected around 2027, although issues with the development of South Kirinskoye field by Gazprom could delay this. The second pipeline, Power of Siberia 2, is much larger, with a potential capacity of 50bcm. It would run from the Yamal region through Mongolia into Northern China bringing some of the gas from West Siberia that would otherwise have been sent to Europe.⁷⁸ Gazprom and the Kremlin are very keen for this to progress, but their Chinese counterparts seem a little more reticent. Negotiations have been continuing for a number of years, but as with Power of Siberia 1 the sticking point is likely to be price and a Chinese reluctance to become over-exposed to Russian gas. Nevertheless, many observers believe that a deal to start exports by the end of the decade is possible, with full capacity being reached at some point in the 2030s. This is reflected in Figure 27, which suggests that Russian pipeline exports to China could reach almost 100bcm by 2035.

⁷³ Kuczynski, G., Jan 2022, “Russia supplies record natural gas to Turkey via Blue Stream”, Warsaw Institute at <https://warsawinstitute.org/russia-supplies-record-natural-gas-turkey-via-blue-stream/>

⁷⁴ <https://turkstream.info/>

⁷⁵ For an analysis of the Turkish gas market see Rzayeva, G., April 2022, “Turkey’s supply-demand balance and renewal of its LTCs”, Oxford Energy Insight, Oxford Institute for Energy Studies

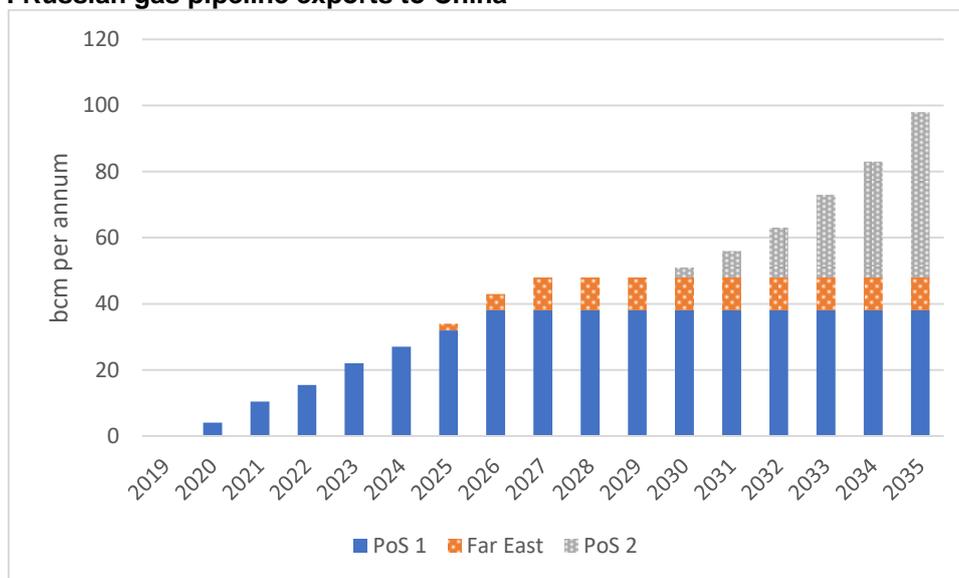
⁷⁶ S&P Global, 2 Dec 2019, “Russia starts gas deliveries to China via Power of Siberia”

⁷⁷ Energy Intelligence, 9 Feb 2023, “Russia, China sign intergovernmental gas deal”

⁷⁸ Financial Times, 24 May 2023, “Power of Siberia: China keeps Putin waiting on gas pipeline”



Figure 27: Russian gas pipeline exports to China



Source: Platts data, OIES estimates

The key issue with Russia’s pivot to Asia is that the pipeline element of it is focused on only one country – China. This leaves Gazprom very exposed to commercial risk and makes the pipelines a key element of the political relationship between the two countries – perhaps a positive in the current situation but a future risk for the Kremlin. The Russian authorities have recognised this risk and have been attempting to adopt another diversification strategy through increased LNG exports which can travel to multiple destinations all over the world.⁷⁹ The Sakhalin 2 project, developed by Shell and now operated by Gazprom, produced Russia’s first LNG in 2009 and continues to sell into the Asian market, but Novatek has now become the leader of Russia’s LNG strategy thanks to its Yamal LNG project (started in 2017) and its plans for two new projects (Arctic LNG 2 and Murmansk).⁸⁰ As can be seen in Figure 28, total LNG sales from Russia are currently split 50:50 between Europe and Asia, with around 14-15bcm coming from the Sakhalin project and the remaining 25-26bcm coming from Yamal LNG (which can send gas to eastern or western markets via the Northern Sea Route).

Prior to February 2022 Russia had plans to expand its LNG output to 100 million tonnes (c.140bcm) by 2030 through the development of various new projects by Novatek, Gazprom and state oil company Rosneft.⁸¹ However, much of the critical technology for the liquefaction process comes from international companies in the west and has been sanctioned, delaying progress. As a result, Novatek has had to adapt its Arctic LNG-2 project and this has pushed back the start-up by around one year. The first of three trains is now expected online in early 2024 with others to follow in 2025 and 2027 to take the capacity to 19.8mt (c.27bcm). However, a further complication has seen US sanctions expanded to include the sale and purchase of LNG from the project, meaning that western partners have been forced to pull out of the project.⁸² In addition, sanctions on the construction and financing of the ice-breaking LNG tanker fleet that will take the LNG through the northern sea route to Asia or Europe has created further logistical issues which mean that the project is unlikely to run at full capacity for some time, even if the liquefaction trains are built.⁸³

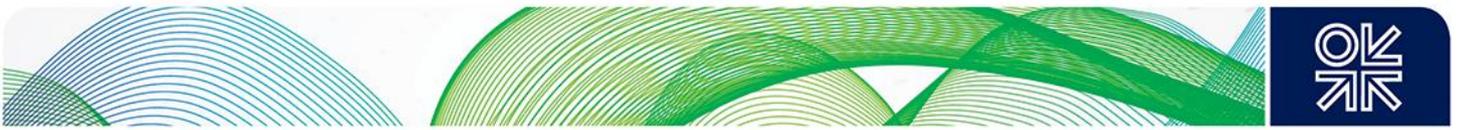
⁷⁹ Henderson, J. & Yermakov, V. (2019) “Russian LNG: Becoming a global force”, OIES Working Paper NG 154, Oxford Institute for Energy Studies

⁸⁰ Reuters, 13 June 2023, “Russia’s Novatek has developed its own LNG-producing technology”

⁸¹ High North News, 13 March 2023, “Russia to export 100m tons of LNG by y2030”

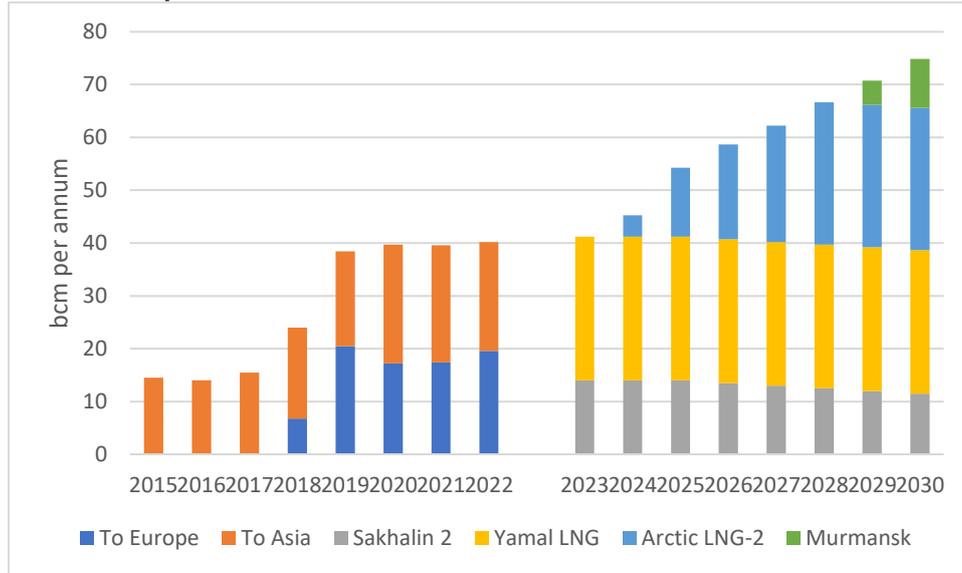
⁸² <https://www.reuters.com/markets/commodities/russian-arctic-lng-2-project-targeted-by-us-sanctions-2023-12-26/>

⁸³ <https://www.bloomberg.com/news/articles/2024-02-06/us-sanctions-halt-delivery-of-new-vessels-to-russian-lng-plant>



In response to sanctions, Novatek has expanded its existing Arctic Cascade technology (used for a 1 million tonne fourth train at Yamal LNG) to create a new “Arctic Mix” liquefaction process which it intends to use on concrete barges in the White Sea close to the ice-free port of Murmansk to create a 20.4 million tonne (28bcm) project by the end of this decade.⁸⁴ Figure 28 reflects a potential start-up date of 2029, although this remains speculative until final plans are announced. Overall though, Russia could be producing around 55 million tonnes (75bcm) of LNG by 2030 and as much as 64 million tonnes (87bcm) by 2035).

Figure 28: Russian exports of LNG



Source: Platts data, OIES estimates

2.3 Conclusions on future Russian gas production and exports

Putting together the analysis above it is possible to construct a notional outlook for Russian gas production based on the demand for its use. Figure 29 attempts to do this. The key assumptions are that domestic demand grows from 2022 levels at 0.8% per annum, that sales to the FSU remain flat and that net storage injections are small but stable. As far as exports are concerned, we assume that flows through Ukraine halt from 2025 onwards but that sales to Europe via Turk Stream increase slightly. This leads to exports to Europe of 15 bcm from 2025. Exports to China grow in line with those shown in Figure 27, assuming a new pipeline in the Far East and the development of Power of Siberia 2 by the end of the decade. Gas for LNG exports is based on the capacity of the plants described above plus a 15% allowance for losses and gas utilization at the liquefaction plants. Some gas is also used in the Russian high pressure transmission system in line with historical levels.

⁸⁴ Energy Intelligence, 24 Jan 2024, “Moscow boosts support to Murmansk LNG”

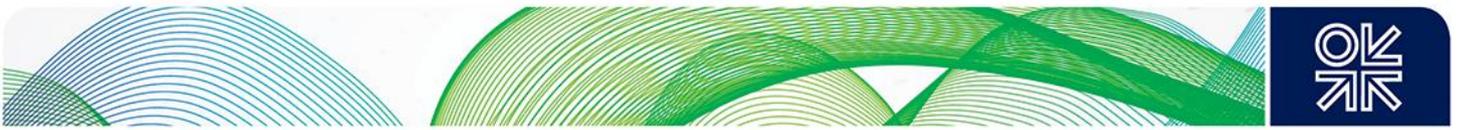
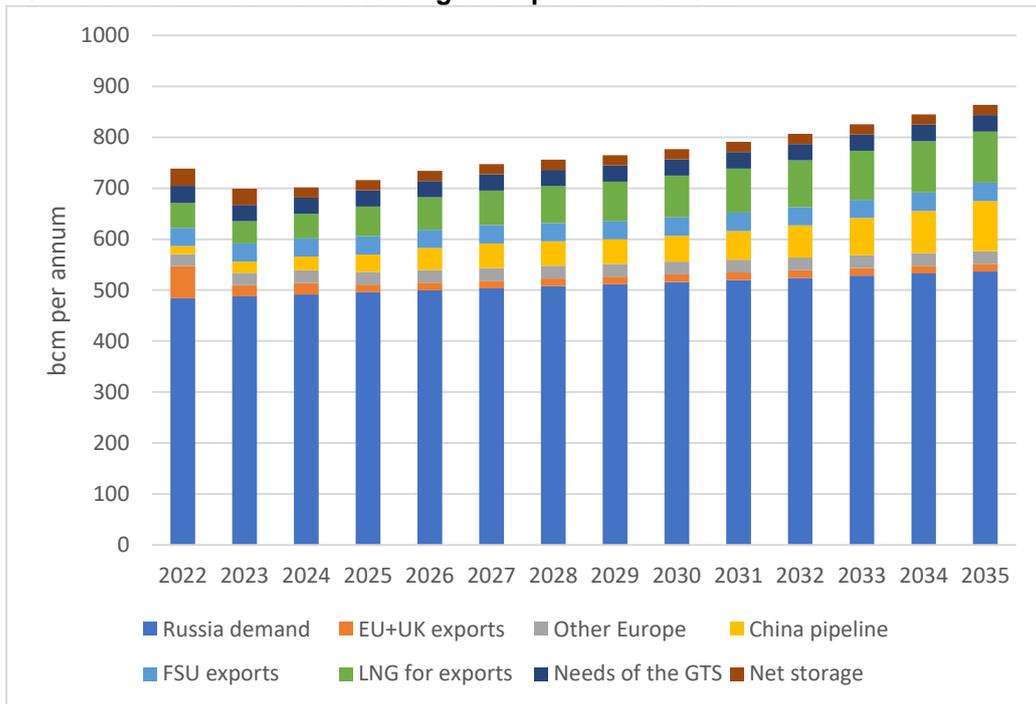


Figure 29: Potential outlook for Russian gas output and its uses



Source: OIES estimates

Overall, these trends lead to a gradual rebound in Russian gas production towards levels seen in the 2010s by 2030 and to around 850bcm by 2035. Of course, there could be significant variations around this figure. In a downside scenario exports to Europe could fall to zero by 2027 (the stated EU goal), the Power of Siberia 2 and Murmansk LNG projects could be significantly delayed or not happen at all, domestic Russian gas demand could be stagnant if the war in Ukraine continues and undermines economic growth, and sales to Turkey could slip as Turkey diversifies to other sources. In this case, shown in Figure 30, it is possible that Russian production could stay at close to 2022 levels just above 700bcm.

In contrast, an upside case could see Russian demand expanding at a faster rate if the economy recovers in a post Ukraine war scenario (we assume from 2025), exports to Europe could recover if the full 40bcm of contracted Ukraine capacity is used (assuming again an end to the war and a renegotiation of the contract), Power of Siberia 2 and Murmansk LNG could come onstream in line with the aggressive stated plans (two years earlier than assumed in the Base Case) and demand from Turkey could be at the top of the 20-30bcm range. In this case production from Russia would need to be around 950bcm to meet the demand for it.

Although these scenarios contain a large element of speculation and guesswork (especially around the outcome of the war in Ukraine) they nevertheless can help to put a boundary around possible outcomes and give a potential 250bcm range between the Low and High Cases.

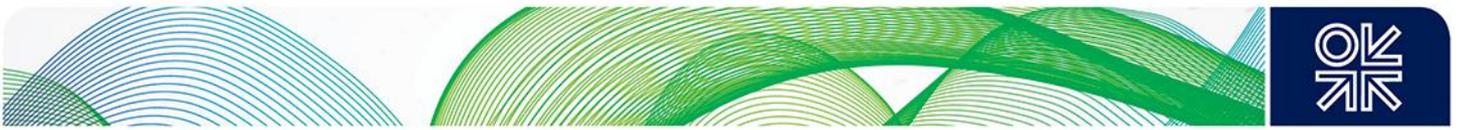
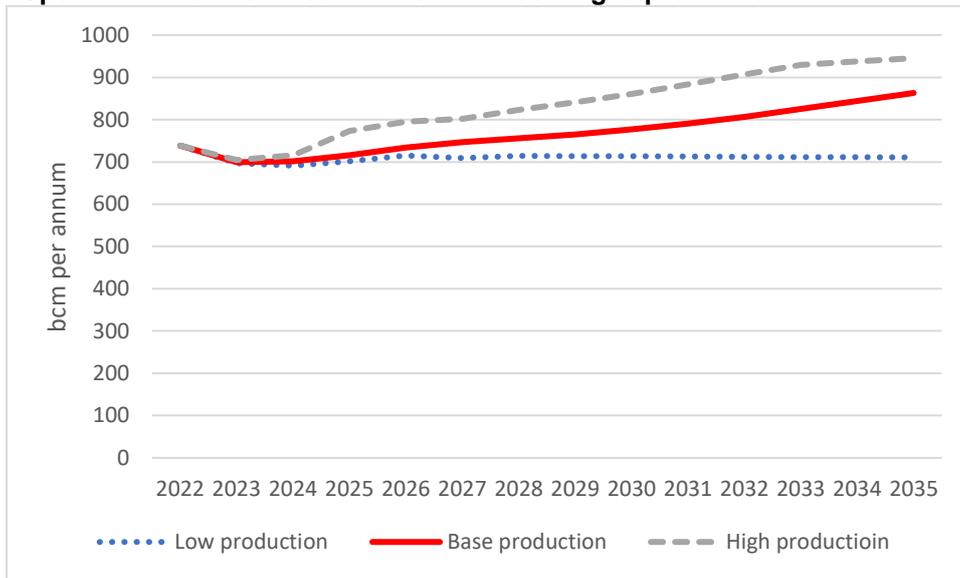


Figure 30: Upside and downside scenarios for Russian gas production



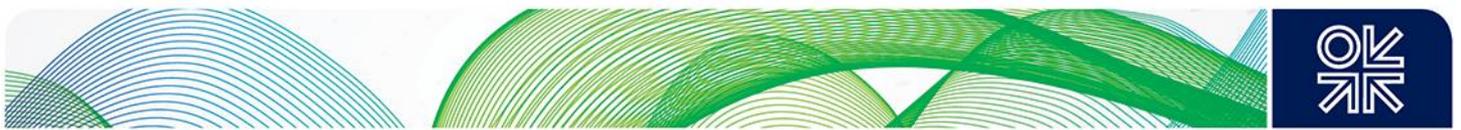
Source: OIES estimates

3. Modelling the implications for the Russian economy

In light of the analysis of the Russian oil and gas sector above, this section considers several possible trajectories of Russian economic performance in the period up to 2040. First, several stylised facts concerning the Russian economy are presented to contextualise the subsequent discussion of drivers of economic growth and possible scenarios. Second, the principal drivers of economic growth over the past decade are identified using a components of GDP analysis.⁸⁵ This is done to explain patterns of growth in the past, and to illustrate how these drivers may affect economic performance in the future. Third, two scenarios of economic performance until 2040 are presented, each based on different underlying assumptions concerning the volume and price of oil and gas exports.

The first scenario – labelled the ‘Limited Markets’ scenario -- is based on gas exports to Europe declining due to the war in Ukraine, and on Russia failing to replace European markets with other destinations, leading to prolonged decline in gas exports. The second scenario – the Pivot to Asia scenario – assumes that European markets for gas are gradually replaced by Asian markets, causing overall gas exports to still decline from 2022 levels, but to a higher level than in the first scenario. However, by 2040 export volumes decline due to changes in the global gas market. Both of these scenarios are adjusted according to whether the discounted price for Russian oil exports is temporary or permanent, with a consequent impact on oil revenues for the Russian economy.

⁸⁵ This involves identifying the sources of GDP growth by the components of final demand, which include: private consumption expenditure (C); investment (I); net exports (E); and government expenditure (G). Private consumption encompasses expenditure on durable goods (such as furniture and cars), non-durable goods (such as clothing and food), and services (such as banking, education, and transportation). Investment expenditure includes investment in private housing purchases (or residential investment), and business investment in non-residential structures, durable equipment, and computer software. Inventories at all stages of production are treated as investment. Consequently, changes in the inventory levels are also included when calculating GDP. Net exports equal the sum of total exports minus imports. Exports are the purchases of goods and services produced in Russia, while imports represent domestic purchases of foreign-produced goods and services. Exports make a contribution to GDP, while imports must be subtracted from the calculation of GDP. Finally, government expenditure includes expenditure on all areas of central, regional and local government spending, including defence spending.



3.1 The Russian Economy

3.1.1 Introduction

As with estimates of military expenditure, the choice over the unit of measurement is important. Employing PPP exchange rates yields significantly different estimates of the size of low- and middle-income economies. For Russia, the difference in estimated GDP is substantial. According to IMF data, at \$2.2 trillion, the Russian economy was the 11th largest in the world in 2022 when using market exchange rates.⁸⁶ However, using PPP exchange rates -- i.e., accounting for differences in relative costs -- the picture is strikingly different. Russian GDP in 2020 was over \$4.8 trillion. According to this measure, Russia was the sixth largest economy in the world, and the second largest in Europe, only slightly smaller than the German economy. While Russia is not an economic giant like the United States or China, it does belong in the second tier of regional heavyweights like Japan, India, Brazil and Germany.

To understand patterns of Russian economic performance over the past two decades it is necessary to outline a simplified model of Russia's existing system of political economy.⁸⁷ To illustrate how this system functions in Russia, it is useful to conceptualise the Russian political economy as being formed of three parts or sectors: the revenue-producing sector, the revenue-dependent sector, and the state. This is a deliberate abstraction of reality that is intended to illustrate the key factors that shape how resources are allocated in Russia, for what purposes, and by whom.

The revenue-producing sector

The first sector – the revenue-producing sector – primarily comprises enterprises from the natural resources sector of the economy (i.e., oil, gas, power generation, and mineral extraction). To this list, we might also add large agricultural conglomerates, and firms involved in the construction of nuclear power generation machinery. Firms in this sector tend to be globally competitive in so far as they sell their goods or services on global markets as well as within Russia. Because these firms have been able to generate substantial profits, both in Russia and on foreign markets, they do not ordinarily tend to require state subsidies to function. As a result of their high profitability and competitiveness, firms from within this sector account for a large share of tax revenues in Russia.⁸⁸ The volume of profits generated by this sector is extremely high. In 2019, for example, revenues from the sale of oil and gas exceeded \$250 billion. Indeed, according to Alexey Kudrin and Evsey Gurchik, between 2000 and 2013, cumulative surplus (i.e., compared to the base year of 1999) oil and gas revenues alone totaled \$2.1 trillion (in 2013 US dollars). This amounted to 7.5 times the dollar size of Russian GDP in 1999.⁸⁹

The revenue-dependent sector

A second sector – the revenue-dependent sector – comprises industries that should not be considered as globally competitive in so far as firms from within these industries are not generally successful in selling their goods or services on global markets, and as a result tend to focus their activities on the domestic market. Firms from within this sector tend to rely on other forms of support from the state (such as access to cheap finance), which may be direct (e.g. transfers from the state budget, favourable state procurement rules) or indirect (the use of regulatory mechanisms to suppress competition from other suppliers), and despite receiving support from the state, tend to struggle to generate consistent profits.

In Russia, such industries include the defence industry, automotive, machinery, shipbuilding, and oil and gas equipment manufacturing (e.g., drilling rigs, pipelines, etc.). In addition to industrial sectors, this category includes social groups dependent on government spending, most notably the so-called

⁸⁶ IMF *World Economic Outlook* April, 2023.

⁸⁷ The Russian system of political economy is described in greater detail in R. Connolly, *Russia's Response to Sanctions* (Cambridge and New York: Cambridge University Press, 2018)

⁸⁸ C. Gaddy and B. Ickes, "Resource Rents and the Russian Economy," *Eurasian Geography and Economics* 46, no.8 (2005): 559-583.

⁸⁹ A. Kudrin and E. Gurchik, "Novoy modeli rosta dlya rossiyskoy ekonomiki," [New model of growth for the Russian economy] *Voprosy Ekonomikim* 12, (2014): 6



byudzhethniki, i.e., pensioners or those employed in the vast state bureaucracy.⁹⁰ Together, industries within this sector encompass the vast majority of the population.

The state

The relationship between these two broadly defined sectors lies at the heart of the Russian political economy. Essentially, the revenues generated in the first sector are managed by the state to sustain economic activity in the revenue-dependent sector. This is done for a range of economic, social and political reasons. As a result, the primacy of the state – the third sector in this simplified model – in channeling the flow of revenues between various constituencies within Russia is of fundamental importance. The state and government use a variety of instruments to direct revenues from the most profitable and competitive firms to the least, with the objective of maintaining output and employment in the revenue-dependent sector.

This can be described as a ‘revenue management system’.⁹¹ The state uses its privileged position to restrict access to revenues and markets to politically and socially important groups. These instruments used by the state to ensure differential access to revenues include direct ownership or control of state-owned enterprises. In other instances the state can exert indirect influence over privately owned firms to ‘encourage’ them to perform social or political functions that lie beyond the usual profit-maximizing functions expected of a firm in a market economy.

By utilizing a mixture of direct transfers (e.g. by imposing reasonably transparent, formal taxes on the extraction and export of hydrocarbons to fund, for example, state procurement of defence-industrial equipment for Russia’s armed forces) and indirect transfers (e.g. revenue-producing sector enterprises supplying inputs, such as gas, at below market price to revenue-dependent enterprises), the state has been able to maintain production and employment in otherwise uncompetitive areas of the Russian economy. This has proven to be a politically and socially efficient system that has delivered comparatively high approval ratings and strong electoral performance for the ruling elite since 2000.

One of the key motivations for sharing revenues – whether formally or informally – by actors in the system described above is, according to Gaddy and Ickes, the belief that their property rights are strengthened by agreeing to share revenues with other claimants within the economy.⁹² After all, without the threat to the property rights of owners in the revenue-producing sector – always implicit and sometimes explicit – there would be very little incentive to permit the sharing of revenues with either the state (in the form of punitive taxation) or with other organizations (for instance, through incurring excess costs). This role of the state is in sharp contrast to the 1990s when the “oligarchs” effectively controlled the economy via their vast holding companies and the state had little control over the rents generated by them.

In this sense, the precarious nature of property rights is central to the operation of the revenue management system in Russia. What is true for formal owners within, say, the mining and minerals sector is also true for managers of state-owned enterprises or within government ministries who may not enjoy formal property rights but do enjoy access to substantial flows of income.

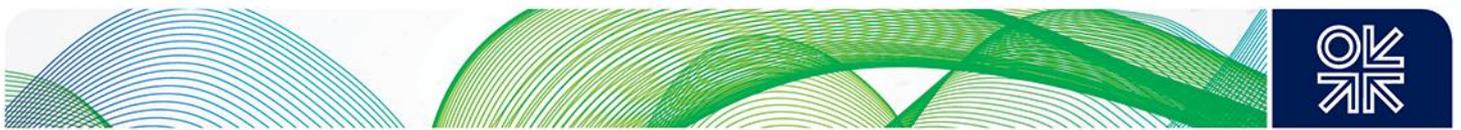
The state is dominant in both the revenue-producing and revenue-dependent parts of the economy. They account for most of the economic activity in Russia. Estimates from a range of different sources, including the IMF and the Russian Federal Antimonopoly Service, suggest that the state-controlled segment of the economy – which includes both the official public sector, state-owned enterprises, and enterprises with at least partial state ownership - steadily increased from 2005 to account for as much as 70 per cent of Russian GDP by 2015 and around the same proportion of total employment.⁹³ It is

⁹⁰ In English this word translates roughly as ‘budget people’. It refers to people who derive an income from the state, whether through transfers (e.g., pensions, welfare payments) or employment.

⁹¹ See, for example, Gaddy and Ickes, 2005 and 2009.

⁹² Gaddy and Ickes. 2005. p.564.

⁹³ A. Abramov., M. Radygin., and A. Chernova, “Kompanii s gosudarstvennym uchastiyem na rossiskom rynke: struktura sobstvennosti i rol’ v ekonomike” [Companies with state participation on the Russian market: the structure of ownership and role in the economy], *Voprosy Ekonomiki* 12, (2016): 61-87; Alexander Abramov, Maria Radygin., Alexander Chernova., and Revold Entov, “Gosudarstvennaya sobstvennost’ i kharakteristiki effektivnosti” [State ownership and characteristics of effectiveness], *Voprosy Ekonomiki*. 4, (2017): 5-37.



therefore clear that despite having undertaken a series of important market-creating reforms in the 1990s, the Russian state remains the single most important actor in the economy today.

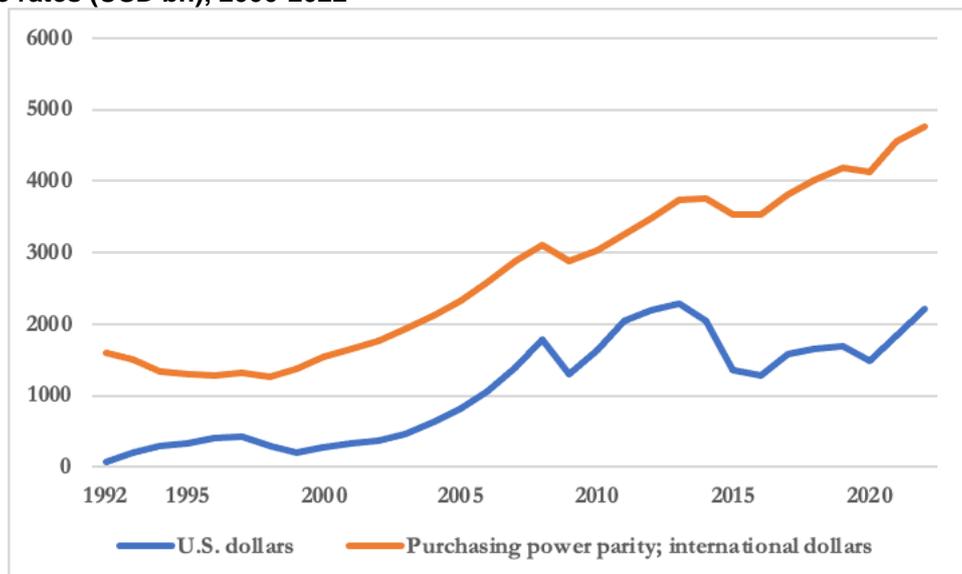
This system of political economy has resulted in several negative outcomes, one of which is *chronic underinvestment*. The level of investment in fixed capital in Russia has been low relative to other middle-income countries over the past two decades. This encompasses investment in factories, machinery, and other technology that boosts the productivity of a country’s workers. Investment as a proportion of GDP declined over the 1990s, reaching a post-socialist low of 14 per cent in 1999, before rebounding to a post-socialist high 22 per cent in 2008. It has remained at around the 20 per cent level ever since. This is problematic because low- and middle-income economies engaged in the ‘catch-up’ process are typically expected to register investment levels of 25–35 per cent. Future economic growth must be investment-based if Russia is to successfully diversify and modernise its economic base by replacing aging Soviet-era infrastructure and developing a more technically advanced industrial base.

The stylised facts presented above highlight that the Russian economy is based upon the distribution of revenues generated by the extraction and export of natural resources. This system has inhibited large-scale structural transformation. Nevertheless, it has proven effective at delivering economic growth for a period. The sources of this growth are considered in the next section.

3.2 Explaining economic growth to 2022

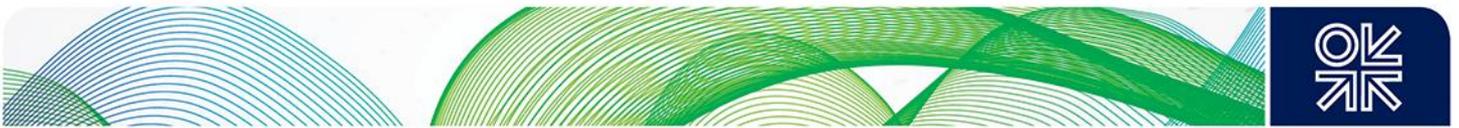
Figure 30 illustrates the change in the size of Russian GDP between 2000 and 2022. Several distinct periods are evident. In the first period, between 2000 and 2008, GDP grew at an average annual rate of over 6 per cent when measured at PPP. Measured at market exchange rates (current prices), annual GDP grew even faster as the rouble appreciated rapidly. In 2000 Russian GDP amounted to \$448 billion; by 2008, it totaled over \$1.6 trillion. This means that over a five-year period, the dollar value of the Russian economy grew by over three times. This observation illustrates the danger of estimating the size of the Russian economy in US dollars at market exchange rates as it results in dramatic fluctuations in the size of the economy over quite short periods of time. By contrast, the size of the Russian economy is much more stable when measured at PPP.

Figure 30: Russian gross domestic product measured using PPP exchange rates and market exchange rates (USD bn), 2000-2022



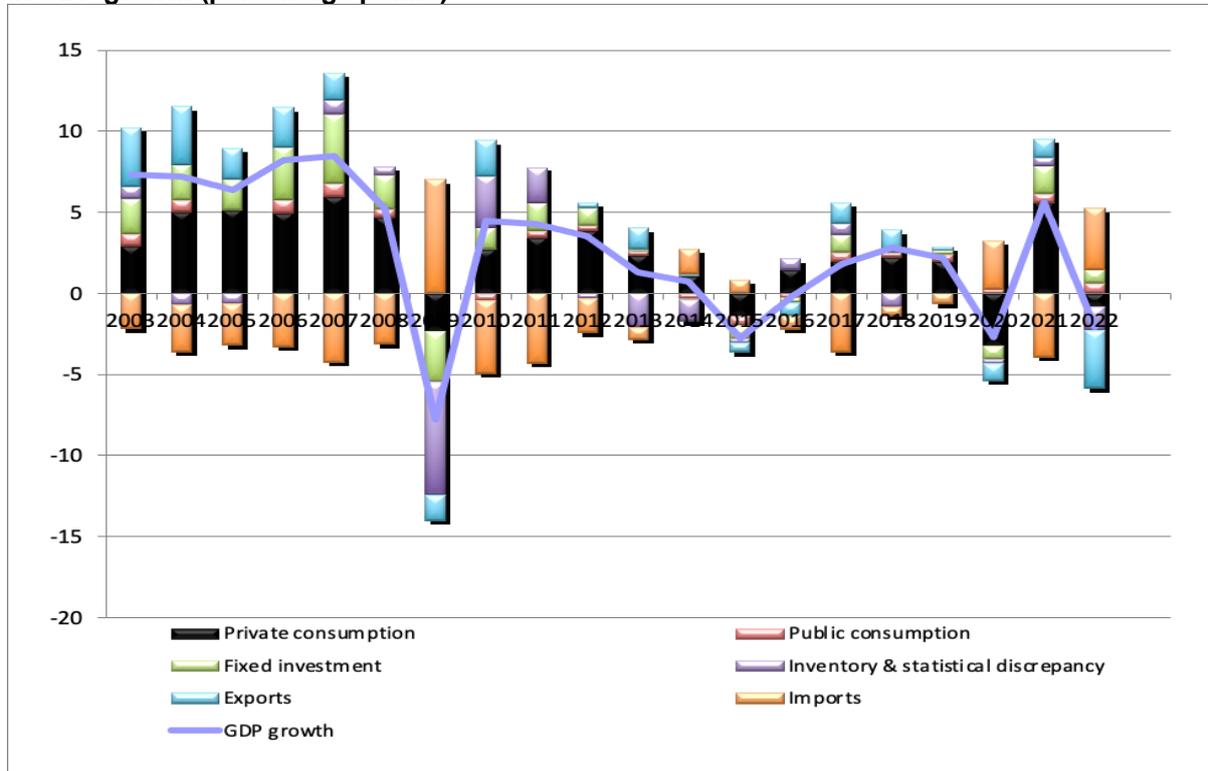
Source: IMF World Economic Outlook (2023)

Figure 31 shows the contribution of each component of final demand to GDP. During the first period, growth was driven primarily by rapid growth in private consumption, and to a lesser extent by growth in investment in fixed capital. Investment is particularly important to a middle-income economy like Russia because of the need to upgrade capital stock and infrastructure so that productivity levels can grow.



While investment did grow briskly between 2006-7, it was of secondary importance. This meant that even though the rate of GDP growth was impressive, the real structural transformation of the economy was more limited.

Figure 31: Annual changes in Russian GDP (%) and the shares of components of final demand in GDP growth (percentage points)



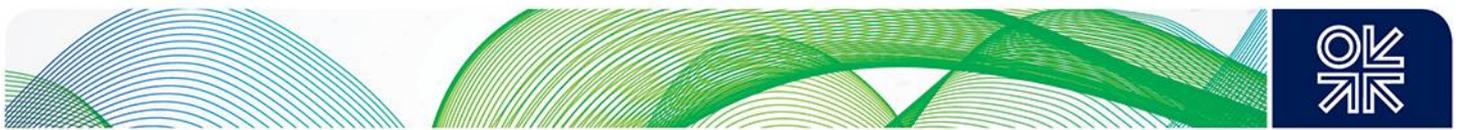
Source: Rosstat (2022); author's calculations

The expansion of oil production and the sharp rise in global prices between 2000-2008 boosted Russia's terms of trade, which in turn boosted consumer and business spending in Russia. However, what this does illustrate is that any rapid expansion in exports in Russia is quickly followed by a corresponding rise in the volume of imports, diluting the positive contribution to GDP played by exports. It is also worth noting that government expenditure made only a modest contribution to growth as the Ministry of Finance kept a tight rein over public spending.

This episode of economic growth was halted by the 2008-9 crisis.⁹⁴ The collapse in global commodity prices over the second half of 2008 and first half of 2009 caused the rouble to depreciate sharply, generating a sharp contraction in investment (including both the change in inventories and in investment in fixed capital) and consumption. Even though the value of Russian exports plummeted over this period, exports made a positive contribution to GDP in 2009 because imports declined even faster.

The 2008-9 crisis ended this first period of growth and was followed by a second period in which GDP grew at a slower average annual rate. While the rate of economic growth recovered briskly after 2009, it did not reach pre-crisis levels. Moreover, growth slowed in each year between 2011 and 2015,

⁹⁴ On reasons for this, see: C. Gaddy and B. Ickes, "Russia after the Global Financial Crisis," *Eurasian Geography and Economics* 51, (2010) 281-311; R. Connolly, "The Determinants of the Economic Crisis in Post-Socialist Europe," *Europe-Asia Studies* 64, no.1, (2012): 35-67.



culminating in the prolonged recession of 2015, from which Russia recovered only weakly.⁹⁵ During this period, growth was driven primarily by an increase in consumption. This was fueled by a rapid expansion of consumer credit and by rising terms of trade as the oil price rebounded from close to \$30 per barrel in March 2009 to over \$110 per barrel in 2011.

The recession of 2015-16 exhibited similar (although not identical) dynamics to the recession of 2008-09: a precipitous decline in the value of oil exports, and a correspondingly steep deterioration in Russia's terms of trade, caused a sharp contraction in domestic investment and consumption. The economy only returned to growth after oil prices began to recover in 2016.

Two further recessions took place over the past three years. The first occurred because of the global pandemic in 2020. Exports dropped in the first half of the year as global trade ground to a halt. Private consumption also plummeted due to restrictions on movements imposed by the government. Growth rebounded at a brisk rate in 2021 as lockdowns were eased and trade returned to pre-crisis levels. But the decision to embark on a full-scale invasion of Ukraine in February 2022 caused another recession. Unlike previous recessions, exports rose sharply as the price of oil and other Russian exports rose amid rising international tensions. This recession was characterised by a sharp decline in imports over the first six months of the war as Western (and allied) sanctions reduced the sale of a wide range of goods and services to Russia. Towards the end of the year, however, imports recovered and were near pre-war levels.

3.3 The central role of oil and gas exports

The single most important factor explaining economic performance in Russia over the past three decades is the value of oil and gas sales. On average, crude oil tends to account for around half of all oil and gas exports, with oil products accounting for a further quarter. Natural gas exports through pipelines leading to Europe and Turkey accounted for most of the remainder. The share of liquefied natural gas (LNG) has risen over the past decade and was projected to grow further as more LNG was expected to be exported from the giant Yamal LNG facility in the Arctic. However, Russia's future as a gas exporter is much more uncertain since the war began.

Fluctuations in the value of oil and gas exports affect economic activity in Russia in two main ways. First, oil and gas exports furnish the Russian state with the bulk of its revenues. Depending on the total value of oil and gas revenues each year, federal government income derived from the taxation of the extraction and export of oil and gas accounts for between one-third and half of Russia's federal budget receipts. As a result, an increase in oil and gas revenues is usually accompanied by an improvement in the federal government's budget balance, and vice versa. To weaken the vulnerability of the fiscal position to fluctuations in the price of oil, policymakers put in place a "fiscal rule" designed to ensure that tax revenues from oil at prices above a set level (usually \$40 per barrel) were not available for budget expenditure.⁹⁶ Movements in the value of oil and gas revenues were also closely correlated with the value of the rouble, exerting a strong influence over Russia's terms of trade. When oil and gas prices rose, Russian citizens and businesses were able to buy more goods and services from abroad. But when prices declined, Russian imports declined with them.

Second, oil and gas revenues also influence Russian economic performance through more indirect means. As described by Gaddy and Ickes in their schematic account of the relationship between oil and gas revenues and economic performance, oil and gas revenues are shared throughout the Russian

⁹⁵ For a detailed description of the nature of this slowdown, along with some possible explanations, see B. Zamaraev, A. Kiiutsevskaja, A. Nazarova and E. Sukhanov, "Zamedlenie e'konomicheskogo rosta v Rossii" [The slowdown of economic growth in Russia], *Voprosy Ekonomiki*, no.8, (2013): 4–34; Vladimir Mau, "Between Modernisation and Stagnation: Russian Economic Policy and Global Crisis" *Post-Communist Economies* 25, (2013): 448–464; and Vladimir Mau, "Challenges of Russian Economic Policy: Modernisation or Acceleration? (Perestroika or Uskorenie)," *Post-Communist Economies* 26, (2014): 437–458. A longer-term explanation is offered in G. Yavlinsky, *The Putin System*. (Columbia University Press, 2019) and S. Alekashenko, *Putin's Counter Revolution*. (Brookings Institution Press, 2019)

⁹⁶ P. Hanson, *Russian Economic Policy and the Russian Economic System: Stability versus Growth* (London: Chatham House, 2019) Russia and Eurasia Programme Paper, p.4, at: <https://www.chathamhouse.org/publication/russian-economic-policy-and-russianeconomic-system-stability-versus-growth>



economy via informal revenue sharing mechanisms.⁹⁷ These include a mix of direct and indirect transfers of oil and gas revenues to other parts of the Russian economy. Direct transfers can take the form of, for example, the taxation of oil and gas enterprises and then using those revenues to fund military expenditure or social welfare programs. Indirect transfers of oil and gas revenues might instead involve oil and gas companies supplying inputs to other Russian enterprises at below market price (e.g., supplying gas to a power generation firm or households), or by providing demand for goods and services produced in the country's large manufacturing sector.

This forces firms from within the manufacturing sector to rely on domestic demand, which in turn is driven by oil and gas export receipts. The close relationship between the oil and gas industry and the rest of the economy is illustrated by the close correlation between movements in the annual value of oil and gas exports and other key economic variables.⁹⁸ Because the wider economy is so dependent on the redistribution of oil and gas revenues, Russia has proven susceptible to any significant fluctuations in the price of oil.⁹⁹ It is instructive that four of the last five recessions in Russia – 1998, 2008–2009, 2014–2015, and 2020 – were all triggered by sharp declines in the price of oil. Annual changes in oil and gas revenues have served as an excellent predictor of Russian economic performance.

Russia's foreign policy since 2014 did not help, either. The annexation of Crimea and the subsequent conflict in eastern Ukraine led to a series of economic sanctions imposed by the West, weakening several drivers of economic activity.¹⁰⁰ These factors contributed to economic stagnation and limited opportunities for growth in the Russian economy.

The sanctions regime targeted key sectors of the Russian economy, including energy, finance, and defence. This limited access to international markets, technology, and capital, creating significant obstacles for Russian businesses. Foreign investors became hesitant to invest in Russia, leading to a decline in foreign direct investment (FDI). As a result, investment growth was tepid.

Russia's actions in Ukraine, as well its own response to Western sanctions in the form of 'counter sanctions' on European agricultural products, also damaged its reputation as a reliable trading partner with many European countries. Some countries reduced their economic ties with Russia, affecting trade volumes and creating economic uncertainty. Russian counter sanctions also led to higher food prices, reducing consumer choices for Russian citizens and driving up inflation.

Geopolitical tensions also contributed to currency depreciation and capital flight, especially at the end of 2014 and early 2015. The Russian rouble experienced significant devaluation, which caused inflation to rise due to the increased the cost of imports.

Taken together, the following stylised observations about the key drivers of economic performance in Russia can be made:

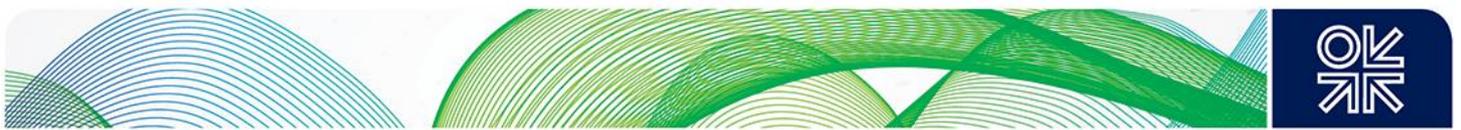
- It is the rate of change in exports of natural resource products – driven overwhelmingly by oil and, to a lesser extent, other hydrocarbons – that explains variation in economic output in Russia.
- When annual changes are positive, the Russian economy grows; when they are negative, the Russian economy contracts. Russia suffers from chronic underinvestment.¹⁰¹ The rapid expansion of investment in fixed capital that is essential to delivering real structural economic change (i.e., modernisation and diversification) has occurred only sporadically over the past 25 years.
- Periods of rapid export growth tend to fuel consumption in Russia and are quickly followed by a corresponding rise in imports that reduces the positive contribution of exports to GDP.

⁹⁷ C. Gaddy and B. Ickes 2005 and 2009.

⁹⁸ M. Bradshaw, R. Connolly, and P. Hanson. 2020. 'It's déjà vu all over again: ' *Eurasian Geography and Economics*,
⁹⁹ Connolly, 2018.

¹⁰⁰ Ibid.

¹⁰¹ See Clifford G. Gaddy and Barry W. Ickes, *Bear Traps on Russia's Road to Modernization*. (London and New York: Routledge, 2013)



- Government spending in Russia has not tended to make a meaningful contribution to GDP, apart from in 'crisis' years such as 2020 and 2022 when the government spent to support an ailing economy. The relatively orthodox macroeconomic policies pursued by Alexei Kudrin and then his successor, Anton Siluanov, have prevented public spending from playing an expansionary role in the Russian economy.

Taken together, these factors mean that there is little likelihood of the Russian economy growing at a rate that will deliver a substantially larger economy over the course of the next fifteen years or so. Generating a faster rate of economic growth will be even more difficult to achieve if (a) the world shifts slowly away from consuming current levels of hydrocarbons; and (b) Russia fails to diversify away from its excessive reliance on hydrocarbon exports.

Diversification away from dependence on hydrocarbon revenues in Russia would be a complex and challenging task and is unlikely to be solved overnight. However, there are several reasons to believe that there is some potential for progress in this direction.

The first key factor is the recognition by the Russian government of the need to reduce the economy's reliance on hydrocarbons. The country's leadership has acknowledged the risks associated with overdependence on oil and gas, and there have been concerted efforts to promote diversification. This has included the implementation of targeted policies and initiatives to support sectors such as technology, innovation, manufacturing, and agriculture.

Furthermore, despite suffering from a degree of 'brain drain' in recent years, Russia continues to possess a well-educated workforce and a strong scientific and engineering base, which can provide a solid foundation for technological development and innovation. The country has a history of scientific achievements and a pool of skilled professionals capable of driving diversification efforts, although an ageing population and shrinking workforce will provide challenges over the next two decades.

Most encouragingly, Russia has demonstrated some success in specific sectors that have the potential for future growth and diversification. For example, the information technology sector has seen significant progress, with Russian companies emerging as major players in areas such as software development, cybersecurity, and artificial intelligence.

Russia has also achieved significant success in agriculture. The country has experienced a notable increase in agricultural production and has emerged as one of the largest exporters of wheat globally. Favourable climate conditions, increased investments in agriculture, and government support have contributed to this success. Additionally, Russia has actively sought to expand its agricultural trade partnerships, particularly with countries in the Middle East and North Africa (MENA). However, challenges such as infrastructure limitations and quality control issues continue to impact the full potential of Russia's agricultural export sector.¹⁰²

Stronger performance in the non-oil and gas sectors of the economy has resulted in an average annual rate of non-oil and gas export growth of 4.5 per cent over the past decade.¹⁰³

Before the war, Russia also actively sought new foreign investment and partnerships to support diversification efforts. Since 2014, much of this effort has been directed towards countries in the non-West, such as China, India, and states from across the MENA region. This has not been as successful as Russia's leaders hoped, but progress has nevertheless been made.¹⁰⁴

There are, however, challenges that hinder diversification efforts. The size and complexity of the Russian economy, coupled with deeply entrenched interests in the hydrocarbon sector, pose significant obstacles. The state-controlled nature of some industries and the influence of vested interests has

¹⁰² S. Wegren, A. Nikulin, and I. Trotsuk. *Food policy and food security: Putting food on the Russian table*. Routledge, 2018.

¹⁰³ Rosstat.

¹⁰⁴ R. Connolly. 'Russia's Economic Pivot to Asia in a Shifting Regional Environment.' RUSI Briefing Paper, September 2021, at: <https://www.rusi.org/explore-our-research/publications/briefing-papers/russias-economic-pivot-asia-shifting-regional-environment>



impeded progress towards diversification. These factors look set to grow even stronger as a result of the war and the subsequent imposition of strict Western sanctions.

Furthermore, the global energy transition towards renewable and sustainable sources presents a long-term challenge for a country heavily reliant on hydrocarbon exports. Russia will need to adapt and invest in alternative energy sources to remain competitive in a changing global energy landscape.

Because of these factors, it is difficult to see how Russia can achieve the type of rapid economic growth observed in the decade before the global financial crisis of 2008. Without far-reaching structural reforms and the easing of Western sanctions, and while the hydrocarbon and wider natural resource sectors remain dominant, Russia's economic fortunes will continue to be driven principally by the value of oil and gas exports.

3.4 Scenarios to 2040

Forecasting economic trends involves considering a multitude of factors, including economic policies, global market conditions, political stability, and technological advancements. While it is impossible to forecast precise outcomes, we can outline some potential trends for the Russian economy.

Over the next decade, Russia is likely to continue diversifying its economy away from hydrocarbon dependence, albeit at a slow pace. Efforts to promote sectors like manufacturing, technology, agriculture, and services will contribute to this diversification. The government's focus on innovation and digitalization in response to Western sanctions should stimulate some growth and investment in targeted industries.

Foreign investment will need to play a significant role in driving economic expansion. However, due to the breakdown of relations with the West, Russia will need to attract capital inflows from countries outside the Western sphere. Trade partnerships with Asia, the Middle East, and Africa are likely to grow, and could provide new export opportunities. Whether this happens on a scale necessary to replace Western sources of trade and investment will be key.

A broad-based energy transition towards renewable sources will, if it takes place, present challenges to Russia's hydrocarbons sector. Although the country has significant potential to develop and export its renewable energy resources, such as wind and solar power, there is little evidence of this taking place at scale any time soon.¹⁰⁵

Demographic challenges, including an ageing population and shrinking workforce, will require measures to encourage labour force participation, improve education and skills training, and attract skilled immigrants.

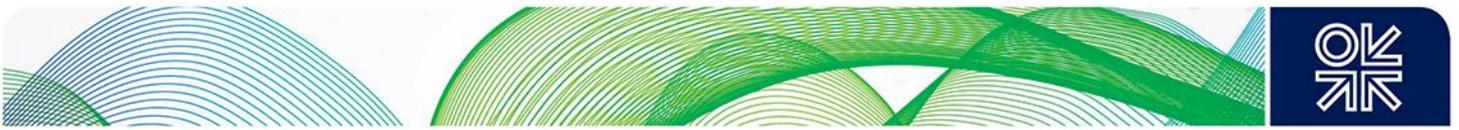
While the Russian economy is likely to experience growth despite the obstacles put in place by its own institutional environment and by Western sanctions, external factors will, as they have done for many decades, shape its trajectory. Global economic conditions, geopolitical tensions, and commodity price fluctuations will pose risks and ensure that growth will not be steady or linear in nature.

Four scenarios for the performance of the Russian economy are presented here. The scenarios differ in two ways: first, in the volume of gas exports that take place until 2040;¹⁰⁶ and second, in the value of oil exports.

The first scenario—labelled the **limited gas markets/temporary oil discount (LM-TD)** scenario—is based on gas exports to Europe declining due to the war in Ukraine, and on Russia failing to replace European markets with other destinations, leading to prolonged decline in gas exports. To account for the existence of the allied oil cap, and for the transaction costs associated with redirecting Russian oil sales to non-Western markets, Russian oil sales, both for crude and for products, are assumed to be

¹⁰⁵ T. Gustafson. *Klimat*. Harvard University Press, 2021.

¹⁰⁶ Steve Pye, Mike Bradshaw, Paul Dodds, Caroline Kuzemko, James Price, and Dan Welsby. 2023. 'The shifting geopolitics of natural gas following Russia's invasion of Ukraine and implications for the low-carbon transition.' Draft scenarios working paper, 18th January 2023. UKERC.



sold at a 20 per cent discount until 2025, and a 10 per cent discount is applied until 2030. After 2030, no discount is applied.

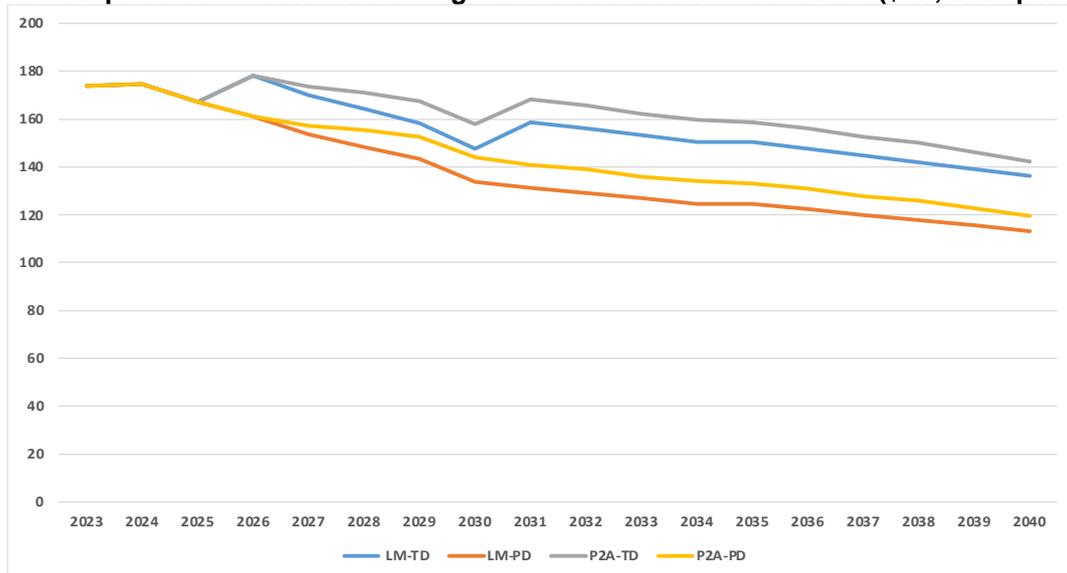
The second scenario—the **Pivot to Asia/temporary oil discount (P2A-TD)** scenario—assumes that European markets for gas are gradually replaced by Asian markets, causing overall gas exports to still decline from 2022 levels, but to a higher level than in the first scenario. However, by 2040 export volumes decline due to changes in the global gas market. Again, the discount applied to Russian oil exports is assumed to decline over time.

The third scenario—the **limited gas markets/permanent oil discount (LM-PD)** scenario—assumes the same gas export revenues as the first scenario but assumes that the discount applied to Russian oil exports stays at 20 per cent until 2040 rather than diminishing over time.

The fourth scenario—the **Pivot to Asia/permanent oil discount**—assumes the same gas export revenues as the second scenario but assumes that the discount applied to Russian oil exports stays at 20 per cent until 2040 rather than diminishing over time.

The revenues from the export of oil and gas under all four scenarios are shown in Figure 32.

Figure 32: Export revenues from oil and gas under four scenarios to 2040 (\$bn, 2022 prices)



Assumptions

The following assumptions are made to construct each scenario:

- The Limited Markets (LM) gas scenario sees a protracted conflict in Ukraine, resulting in continued decline in gas export levels to the EU, and challenges for Russia in establishing alternative export routes via LNG or pipelines to Asia.
- The Pivot to Asia (P2A) gas scenario sees Russian exports to Europe holding up at 2022 levels (~60 bcm) but never recovering to pre-conflict levels. This results in Russia pivoting towards China, partially making up for the shortfall in lost European demand via the build out of the Power of Siberia 2 pipeline.
- Both scenarios are considered in a global context where different regions are meeting their net-zero pledges, and an energy system is delivered by the end of the century that keeps temperature rise well below 2°C.
- Future gas prices are based on a linear forecast derived from historic prices between 2010 and 2020. Prices from 2021 and 2022 are excluded due to the impact that geopolitical tensions and the war in Ukraine exerted over prices over that period.



- *Russia's future oil production is based on the 'low' scenario contained in the official Russian Strategy to 2035.¹⁰⁷ The assumptions underpinning this scenario are:*
 - *Crude oil production to decline from 555 million tonnes in 2018 to 490 million tonnes in 2035.*
 - *Crude oil exports to decline from 260 million tonnes in 2018 to 244 million tonnes in 2035.*
 - *Refined oil product exports (including fuel oil and diesel fuel) to decline from 146.1 million tonnes in 2018 to 86.2 million tonnes in 2035.*
- *Global oil prices are based on the Brent futures curve from March 2023. Prices after 2028 are assumed to be flat.*
- *A shrinking labour market will have a negative impact on Russia's potential rate of growth. With a declining working-age population, there will be a reduced pool of available workers. A diminishing labour force may also affect domestic consumption and demand, as fewer people contribute to income generation.*
- *Sanctions are likely to cause technological regression in Russia by limiting access to advanced technologies, impeding innovation, and hindering knowledge transfer.¹⁰⁸ The absence of access to Western markets and expertise, as well as the growing footprint of the state in the economy, are likely to stifle innovation, leading to a decline in technological progress. Over time, the cumulative effects of sanctions are likely to result in technological regression.*

1. Economic performance in the limited markets/temporary oil discount (LM-TD) scenario

In this scenario, growth in the near term (i.e., to 2025) is driven by household consumption and by investment. Annual growth rates for both are well behind some of the higher rates of growth observed at other times over the past two decades due to (a) increased domestic investment to achieve import substitution in parts of the economy worst-affected by sanctions; and (b) household consumption growth based on higher wages and full (or close to) employment. Government spending makes a positive contribution to growth before 2025 as budget deficits fund expenditure to support the economy during wartime, but a conservative fiscal policy is resumed beyond that period.

¹⁰⁷ Energy Strategy to 2035. 2018 figures from Mitrova and Yermakov, pp.14-15, at: https://www.ifri.org/sites/default/files/atoms/files/mitrova_yermakov_russias_energy_strategy_2019.pdf

¹⁰⁸ RBK. 'Nabiullina zayavila ob ugroze zhestkogo razvitiya sobytiy v ekonomike mira.' [Nabiullina described the threat of a tough development of events in the world economy] RBK.ru. 8 November, 2022, at: <https://www.rbc.ru/economics/08/11/2022/636a0c5c9a7947329ec536b6>

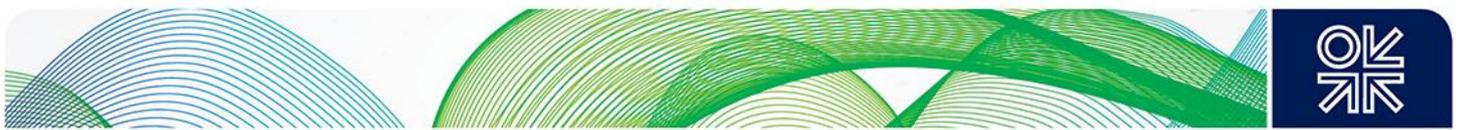


Table 6: Growth rates to 2040 under the limited markets/temporary oil discount (LM-TD) scenario

	2022 (actual)	Five-year average growth rates (%)		
		2023-2025	2026-2030	2030-2040
GDP	-2.1	1.6	1.7	1.8
Inflation	14.5	4.3	4	4
Government consumption	2.8	1	0	0
Household consumption	-1.4	2.6	2	2
Investment	-4.9	3.3	3	3
Exports	-13.9	-1.7	2.6	3.5
Of which:				
Oil and gas	40.9	-17.7	-2.3	-1.6
Non-oil and gas	-14.7	4.5	4.5	4.5
Imports	-15	2.8	1.7	1.8

Oil and gas exports decline, but this is concentrated in 2023 as abnormally high oil and gas exports in 2022 are replaced by significantly smaller revenues the year after. Gas export volumes to Europe plummet and the prices are weak. While the volume of oil exported is similar to 2022, the price realised by Russian sellers is reduced by a combination of the oil cap and by the discounts demanded by new, non-Western buyers. While the decline in oil and gas exports is slightly offset by continued growth in non-oil and gas exports, growth in imports as Russian firms source new supplies from non-Western providers means that net exports make a negative contribution to growth in this period.

After 2025, the pace of decline in oil and gas revenues declines but does not end. However, faster growth in non-oil and gas exports means that net exports exert a positive influence over growth rates in the future.

Growth rates remain well behind the rates observed between 1999 and 2013, and behind the Russian government's stated target – expressed before the pandemic and the war -- of 3 per cent. This scenario assumes that oil and gas sales follow a stable, linear trajectory. In practice, this never occurs. It is more likely that the modest rates of growth projected here are punctuated by recessions caused by fluctuations in the price of hydrocarbons.

2. Economic performance in the pivot to Asia/temporary oil discount (P2A-TD) scenario

As in the first scenario, growth in the near term (i.e., to 2025) is driven by household consumption and by investment. However, in the period after 2025, the overall rate of growth is slightly higher due to the positive impact of faster export growth and, as a result of this, a slightly faster rate of consumption and investment. Government spending plays a neutral role in this period, while import growth is also higher, dampening net export growth.



Table 7: Growth rates to 2040 under the Pivot to Asia/temporary oil discount scenario

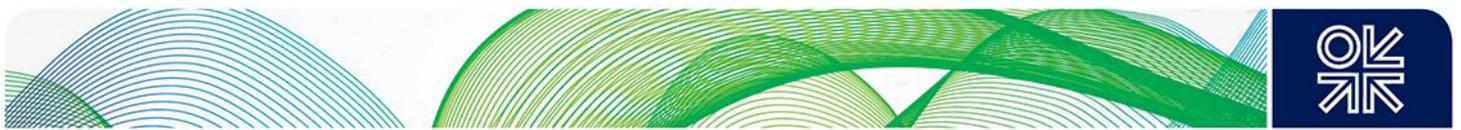
	2022 (actual)	Five-year average growth rates (%)		
		2023-2025	2026-2030	2030-2040
GDP	-2.1	1.6	2.2	2.3
Inflation	14.5	4.3	4	4
Government consumption	2.8	1	0	0
Household consumption	-1.4	2.6	2.5	2.5
Investment	-4.9	3.3	3.5	3.5
Exports	-13.9	-1.7	2.9	3.4
Of which:				
Oil and gas	40.9	-17.7	-1	-1
Non-oil and gas	-14.7	4.5	4.5	4.5
Imports	-15	2.8	2.2	2.6

3. Economic performance in the limited markets/permanent oil discount (LM-PD) scenario

As with the first limited markets gas scenario, growth is identical in the near term (i.e., to 2025) and is driven by household consumption and by investment. However, in the period after 2025, the overall rate of growth is slightly lower due to the negative impact of slower export growth caused by the existence of a permanent 20 per cent discount on the price of exported crude and oil products. A consequence of this is a slightly lower rate of growth in imports, consumption and investment. Growth rates for the period 2026-2030 average 1.3 per cent (cf. 1.7 per cent in the first scenario) and 1.4 per cent over 2031-2040 (cf. 1.8 per cent in the first scenario).

Table 8: Growth rates to 2040 under the Limited Markets/permanent oil discount scenario

	2022 (actual)	Five-year average growth rates (%)		
		2023-2025	2026-2030	2030-2040
GDP	-2.1	1.6	1.3	1.4
Inflation	14.5	4.3	4	4
Government consumption	2.8	1	0	0
Household consumption	-1.4	2.6	2	2
Investment	-4.9	3.3	3	3
Exports	-13.9	-1.7	2.2	3.4
Of which:				
Oil and gas	40.9	-17.7	-2.6	-1.6
Non-oil and gas	-14.7	4.5	4.5	4.5
Imports	-15	2.8	1.65	1.65



4. Economic performance in the pivot to Asia/permanent oil discount (P2A-PD) scenario

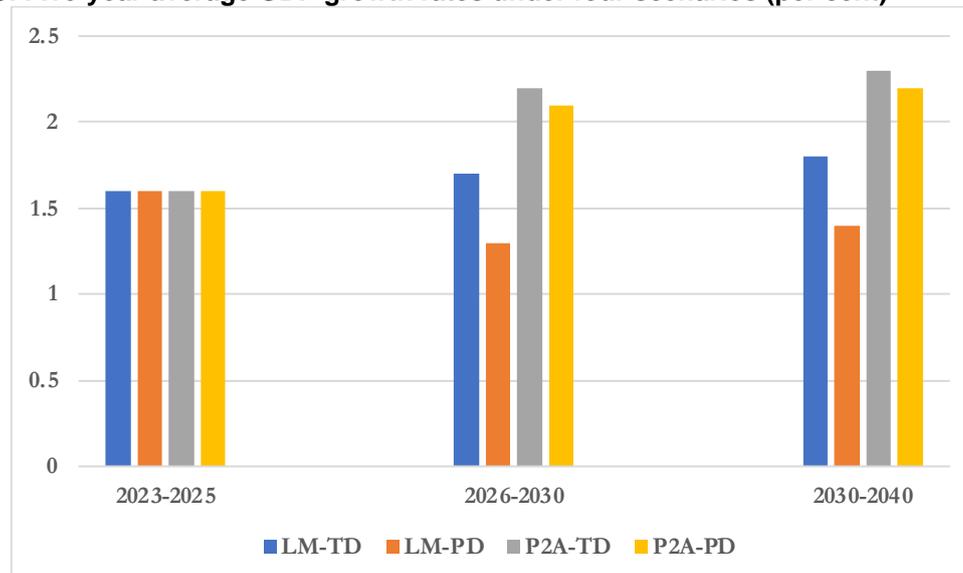
In this scenario, gas flows to Asia grow steadily. However, unlike the second scenario, where the discount offered on exported crude and oil products declines after 2025 and is eliminated from 2030 onwards, the discount remains at 20 per cent until 2040. This causes export growth to slow, and with its imports, consumption, and investment. Growth rates for the period 2026-2030 average 2.1 per cent (cf. 2.2 per cent in the second scenario) and 2.2 per cent over 2031-2040 (cf. 2.3 per cent in the second scenario).

Table 9: Growth rates to 2040 under the Pivot to Asia/permanent oil discount scenario

	2022 (actual)	Five-year average growth rates (%)		
		2023-2025	2026-2030	2030-2040
GDP	-2.1	1.6	2.1	2.2
Inflation	14.5	4.3	4	4
Government consumption	2.8	1	0	0
Household consumption	-1.4	2.6	2.25	2.25
Investment	-4.9	3.3	3.25	3.25
Exports	-13.9	-1.7	2.5	3.3
Of which:				
Oil and gas	40.9	-17.7	-2.9	-1.9
Non-oil and gas	-14.7	4.5	4.5	4.5
Imports	-15	2.8	2	2.5

The average growth rates for each scenario over three periods are presented in Figure 33. As is shown, all scenarios deliver the same average growth rates until 2025. Thereafter, the LM-PD scenario results in the slowest average rate of growth, while the P2A-TD delivers the fastest rate of growth.

Figure 33: Five-year average GDP growth rates under four scenarios (per cent)





3.5 Conclusions

The major overall conclusion from this analysis is that Russia and its hydrocarbon industry are not on the point of collapse. Oil production and exports may decline (in our low case scenario) but the decline is likely to be manageable. The loss of western technology is painful but not disastrous for overall output and export flows can be managed in a fungible global market. Price discounts may continue to be applied, and although this will obviously reduce revenues it will not cripple the economy unless the global oil price collapses.

From a gas perspective, the outlook for flows to Europe remains uncertain due to the question of how the war in Ukraine will end. Even in a benign scenario, though, flows to Europe seem very unlikely to return to previous levels, and our most optimistic scenario sees Russian gas exports to Europe by pipeline not even returning to 50% of their pre-war levels.

Russia's alternative gas export routes are via LNG and pipelines to Asia (primarily China). There are various scenarios for how these two options could progress, depending on negotiations with the authorities in Beijing and the development of domestic LNG technology, but the overall conclusion is that even in the best-case scenario total Russian gas exports will struggle to reach the levels seen in 2019 before 2035, if ever.

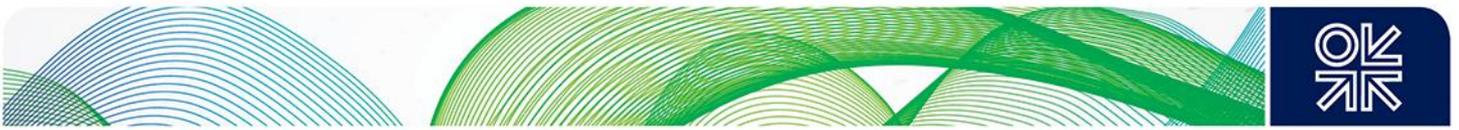
The result is a rather stagnant, but not disastrous, economic outcome, with GDP growth to 2040 in a range of 1.3%-2.3% per annum depending on the scenario. This points to a world in which Russia continues to see its relative economic strength diminish, while its reliance on hydrocarbon revenues remains under threat from short-term price volatility (especially oil price volatility) and long-term energy transition. Although we have not modelled a long-term energy transition scenario, this remains a clear risk to the position of Russia beyond 2030, as declining oil and gas demand will put pressure on hydrocarbon prices, to which the Russian economy is highly sensitive.

4. Overall Conclusions

The Russian oil industry has proved remarkably robust over the past three decades of the post-Soviet era, recovering from a dramatic decline in the 1990s to show consistent growth since 2000 thanks to a combination of increased technical proficiency, a huge asset base of relatively low-cost reserves and government support in the form of a flexible tax system. The gradual withdrawal of western companies since 2014, and especially since the invasion of Ukraine in 2022, has not significantly undermined this progress and the outlook for production looks stable. Gradual decline is certainly possible, but there is also a plausible case to be made for marginal growth over the next decade if some major new assets can be developed. The largest of these, Vostok Oil owned by Rosneft in the northern part of West Siberia, will be a bellwether that will indicate if production can revert to output levels of 11mmbpd last seen before the pandemic in 2020 or not.

Oil exports will also be critical, as they provide a significant share of government revenues. Embargoes by the US and EU since February 2022 have had little impact on volumes, but the \$60 per barrel price cap has somewhat limited revenues. The major change has been in trade flows, which has seen India and China become the major buyers of Russia crude oil, while sales to Europe have declined sharply. Russia's interactions with OPEC are also critical, as voluntary cuts of 500,000 and 300,000bpd in 2023 have led to a decline in production and exports. The extent of the economic impact will depend on the length of the cuts, of course, but Russia's role in the OPEC+ group will be important in determining the level of future output and export sales.

From a gas perspective, production is driven by the available markets for Russian gas. Output has fallen sharply in 2022 and 2023 due to the dramatic decline in sales to Europe, with exports to the EU+UK falling from around 150bcm in 2019 to around 25bcm in 2030. As a result, Turkey and China have become the largest markets for pipeline exports of gas, with China's role set to increase as new routes potentially come online. China could be importing as much as 100bcm of Russian pipeline gas in the 2030s. Exports will also be boosted by increased sales of LNG, although sanctions on new projects (starting with Arctic LNG 2) will slow progress. Nevertheless, the use of Russian LNG technology plus support from Asian customers could see sales double by 2030 in a benign scenario.



Sales to countries in the Former Soviet Union are likely to remain stable at around 30 bcma, while domestic sales in Russia will continue to be robust even in a relatively weak economic scenario, providing the foundation of Russian production overall. We would expect Russian gas output to reach 850bcm by 2035 (from around 700bcm in 2023) if the country's pivot to Asia is successful, possibly even exceeding 900bcm if sales to Europe can rebound in a post-Ukraine war scenario. However, even in the most pessimistic outlook we see production remaining flat at 700bcma. Gazprom will continue to play a dominant role, although its position has been somewhat undermined by the rise of independent producers and in particular by the emergence of Novatek as Russia's primary producer and developer of LNG.

As far as the economic impact of these developments is concerned, the overall conclusion is that Russia does not seem to be on the verge of a collapse under any scenario that does not involve a dramatic fall in the oil price. We model four scenarios, based on limited markets for gas exports or a successful pivot to Asia combined with a temporary implementation of the \$60 oil price cap or a permanent sanction. In all four cases some form of economic growth is seen over the next decade, with the most optimistic scenario (successful gas pivot to Asia and temporary oil price cap) seeing growth of over 2% pa from 2026. Even in the worst case (limited gas exports and a permanent oil price cap) growth of 1.3-1.4% is envisaged. As a result, although the economic outlook would certainly not be described as buoyant in the scenarios which we envisage (stagnant to moderate growth would be a better description), neither is the outlook one of economic collapse driven by falling hydrocarbon revenues.