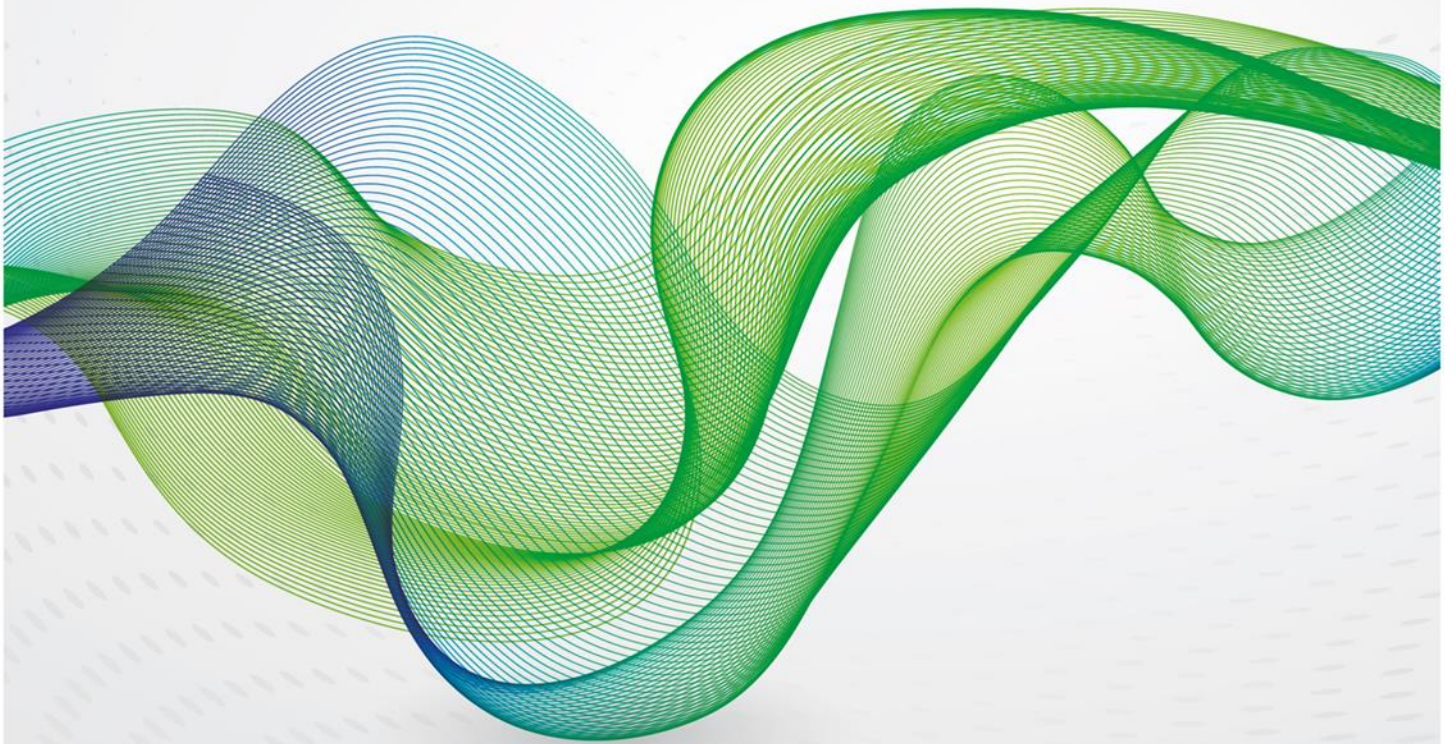


January 2023

“Catch 2022” for Russian gas: plenty of capacity amid disappearing market

Key Takeaways for Year 2022 and Beyond



Introduction

In 2022, following Russia's invasion of Ukraine and the unfolding of the de-facto trade war between the EU and Russia, Gazprom's gas exports to Europe contracted sharply, by a staggering 90 bcm in a single year. This raised questions about the risks to its future production potential, but more importantly about how, if at all, Russia can re-direct volumes to alternative markets under extreme time pressure.

Scarcity of Russian gas statistics, another casualty of war, has contributed to the overall uncertainty about assessing the situation with the Russian gas balance in 2022 and the outlook for the future.

This comment attempts to fill the information void at least partially by reviewing what we know and what we do not know about Russia's gas production in 2022.

The paper first examines Gazprom's and Russia's national gas output and Gazprom's productive capacity. The main arguments in this section are that in the overall gas output decline in Russia, Gazprom's own gas production in 2022 was affected disproportionately, while Russian oil companies and independent gas producers launched some of their long-delayed projects and actually increased gas production year-on-year. This has resulted in the re-emergence of very significant spare gas productive capacity for Gazprom, estimated at about 117 bcm for 2022 on an annual basis. It is worth noting that while this is one of the highest for a decade, it is less than the roughly 150 bcm of spare productive capacity that Gazprom had in 2015 and 2016. By implication, this means that in the absence of some key available statistics for 2022, especially regarding gas production at the company's main fields, the best guidance to how Gazprom has been managing the present crisis might be in the experiences of the previous years, for which we have better statistics.

The paper then concludes with a discussion about Russia's near-term gas strategy and its implications and argues that in addition to accelerating its "Pivot East" and re-allocating investments into projects that target Asian markets, Russia is toying with a 'sneak-through' approach to the European market, effectively offering Turkey an opportunity to re-sell Russian gas to Europe at a quasi-gas hub. The main argument in this section is that while Russia's gas production is likely to decline further in the near term, on the back of interrupted exports to Europe, there is tremendous uncertainty about the duration of the hiatus and the possibility for a bounce back. We attempt to unpack the problem and evaluate its components, such as the potential for growth in Russia's domestic gas market, the scheduled ramp up of gas exports to China under the existing SPAs, and whether additional Russian gas molecules could find their way to southern Europe via Turkey (stripped of their "title of origin" in the process).

Russian gas production dynamics in 2022

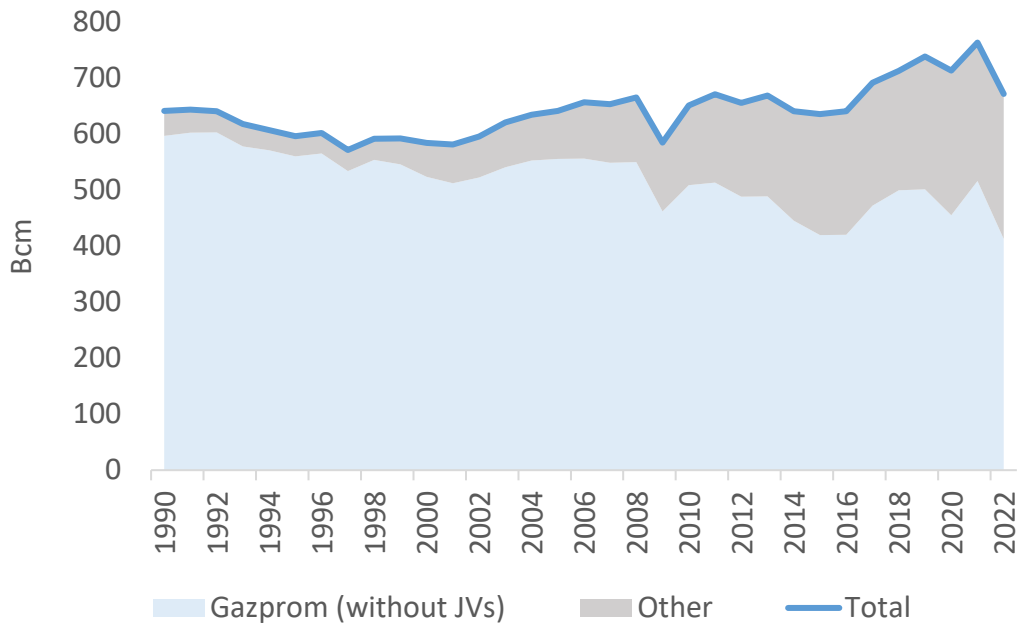
Russia's gas output is demand driven, with a significant exposure to external trends since almost one-third of the produced gas has gone to exports. According to our preliminary estimates, Russia's national gas output in 2022 amounted to 672.6 bcm, down 90.2 bcm, (11.8 percent) year-on-year. This represented the largest year-on-year production decline since 1990 at the national level. The second largest, 81 bcm, occurred in 2009 in the wake of the global financial crisis and recession, when Europe reduced its nominations for Russian gas and Russia's domestic economy went into a deep recession.

But an even bigger slump happened to Gazprom's output in 2022 when it ended up at only 412.6 bcm, 20 percent less than in 2021, an annual decline of about 103 bcm, the largest in Gazprom's history¹. There were several instances in recent years when demand for Gazprom's gas fell, most recently during the COVID-19 pandemic of 2020 (Gazprom's production that year fell by 46.5 bcm year-on-year), but the slump in the past year has been unprecedented. In a single year Gazprom lost its biggest export market in Europe, and Russia's pipeline exports to the so-called "Far Abroad" were only 100.9 bcm, down 85 bcm year-on-year. Since pipeline gas exports to China increased by 5.4 bcm year-on-year,

¹ <https://www.gazprom.com/press/news/miller-journal/2023/405413/>

from 10.1 bcm in 2021 to 15.5 bcm in 2022, the implied reduction in Russian pipeline gas exports to Europe including Turkey was about 90 bcm year-on-year (see Figure 1).

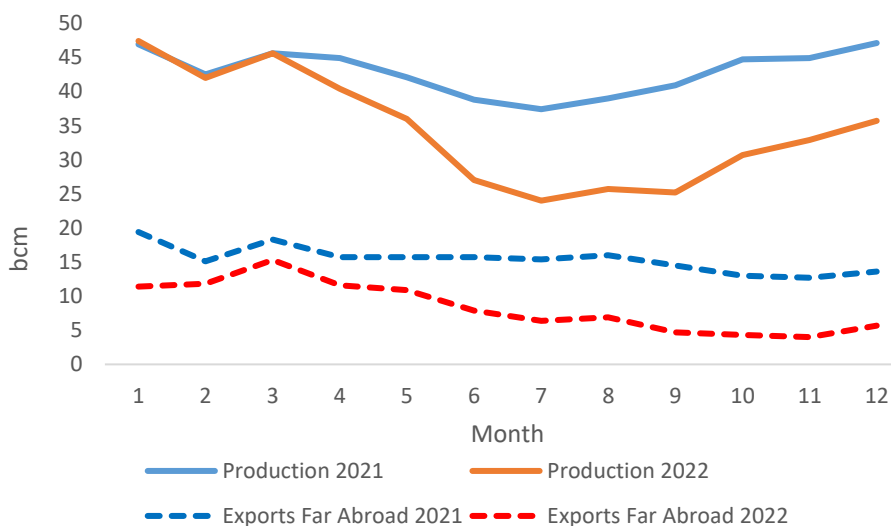
Figure 1: Russia’s gas output, 1990-2022



Source: OIES, data from Rosstat and Gazprom

It is also worth noting that Gazprom production in Q1 2022 was tracking the same high trajectory as in 2021, and so all of the decline is attributable to the new reality that started to unfold after Russia’s invasion of Ukraine. At present, Russian pipeline gas exports to Europe have been reduced to a trickle which means that export demand for Gazprom’s gas is going to be lower again on an annual basis in 2023 with a corresponding impact upon the company’s output (see Figure 2).

Figure 2: Gazprom’s monthly gas production and pipeline exports to Far Abroad, 2022 vs 2021

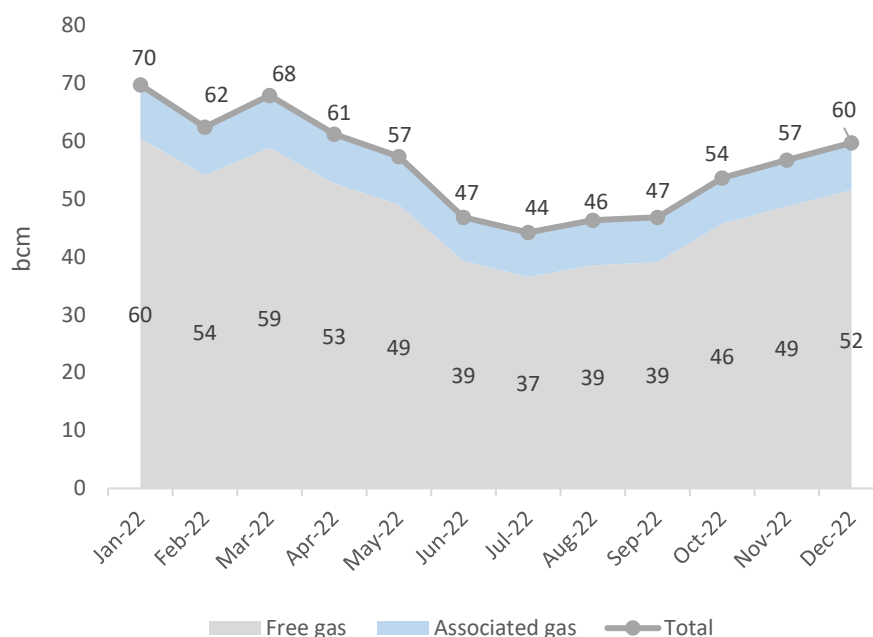


Source: OIES, data from Gazprom

But the export market was not the only area of decline for Gazprom in 2022. At home, non-Gazprom producers (Russian oil companies that produce both free and associated gas and independent gas producers) increased their output to 258.5 bcm, up 11.4 bcm (4.6 percent) year-on-year. Their share of total output thus accounted for almost 39 percent of total Russian supply, up from 32 percent in 2021. As a result, Gazprom's output was affected disproportionately in 2022, with declines in domestic as well as export demand. Gazprom's reported deliveries to domestic customers via the Unified Gas Transportation System (UGTS) in 2022 amounted to 243 bcm, down 14.8 bcm (5.7 percent) year-on-year².

Production of associated gas in Russia in 2022, according to Rosstat and our preliminary estimates, amounted to about 98 bcm, and was characterized by relatively little monthly variation, while production of free gas (mostly by Gazprom) experienced a drastic decline, especially during the summer (See Figure 3).

Figure 3: Monthly production of free and associated gas in Russia in 2022



Source: OIES, data from Rosstat

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 and extreme 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).

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 the decline in European nominations for Russian gas. Secondly, the associated gas production by Russian oil companies is the 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). Since 2014, as part of the regulatory effort to reduce flaring, the Russian government has introduced measures that gave priority access to the national gas pipeline network (owned and operated by Gazprom) to the dry

² <https://www.gazprom.com/press/news/miller-journal/2022/125087/>

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 these prices for 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 ruble 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 these long-delayed upstream projects, which had been sanctioned 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 its 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 bcm of natural gas by 2020, underpinned by several large new gas projects such as Rospan and Kharampur³. The actual gas production in 2020 was only 63 bcm as the target was moved forward to 2022, due to oil production restrictions⁴ introduced by the OPEC+ deal, and then further into the future. The company's latest corporate strategy, Rosneft-2030, released in 2021, aims at a 25 percent share of total Rosneft hydrocarbons production for natural gas by 2030⁵.

By 2022 the delayed Rosneft projects had gained new momentum. Output started to ramp up at the Rospan project launched in the first quarter of 2021⁶. 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.⁷

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 (with 5.5 mt nameplate capacity each) 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 in 2022 Yamal LNG will 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 ambition, in spite of the Western sanctions on large-scale liquefaction technology and equipment. Although Arctic Cascade is

³ https://www.rosneft.com/business/Upstream/Gas_Strategy/

⁴ Rosneft's new projects are not pure gas but complex of reserves of oil, condensate, associated and free gas.

⁵ https://www.rosneft.com/about/Development_prospects_and_strategy/

⁶ 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.

⁷ <https://www.rosneft.com/press/news/item/212565/>

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 and technological self-sufficiency (even with higher unit costs of liquefaction) still gives Russia's LNG projects a strong competitive position in the global LNG market.

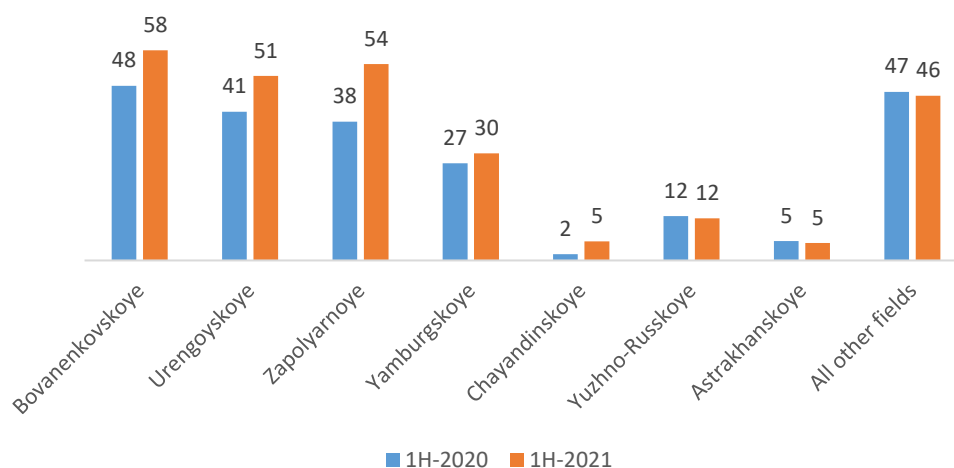
Finally, another big contributor to output growth for Russian gas in 2022 was Gazpromneft (part of the Gazprom group), which completed the construction of the pipeline link from its Novyi Port field to the UGTS, unlocking the opportunity to increase gas output at the field. Production from Gazpromneft 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).

Gazprom gas production by largest fields: history and estimates

Higher production by independents and oil companies in 2022 has forced Gazprom to assume a balancing role and to rein in the output from its fields. For a limited time, from Q1-2020 until Q2-2021, Gazprom was disclosing production data from its largest individual fields in so-called quarterly "emitent reports" available only in Russian language on its website. Unfortunately, the release of this data has been interrupted following the increasing animosity between Russia and the West, along with most other statistical information about the Russian oil and gas sector.

The quarterly data for 2020-21 is nevertheless useful for understanding which gas fields Gazprom was using for balancing output then, and might be instructive for estimating how Gazprom has been dealing with the more dramatic recent swing in demand, and consequently production, in 2022. Gazprom production in 2020 declined sharply year-on-year due to depressed demand during the COVID 19 pandemic, but then bounced back strongly in 2021, thus testing the lower and upper boundaries for Gazprom's output and its ability to adjust its output. During the winter of 2021 Gazprom had almost no spare peak capacity, as it was "firing on all cylinders" during colder weather, pushing its fields to their maximum production levels (See Figure 4).

Figure 4: Gazprom gas production by main fields in H1 2020 and 2021 (bcm)



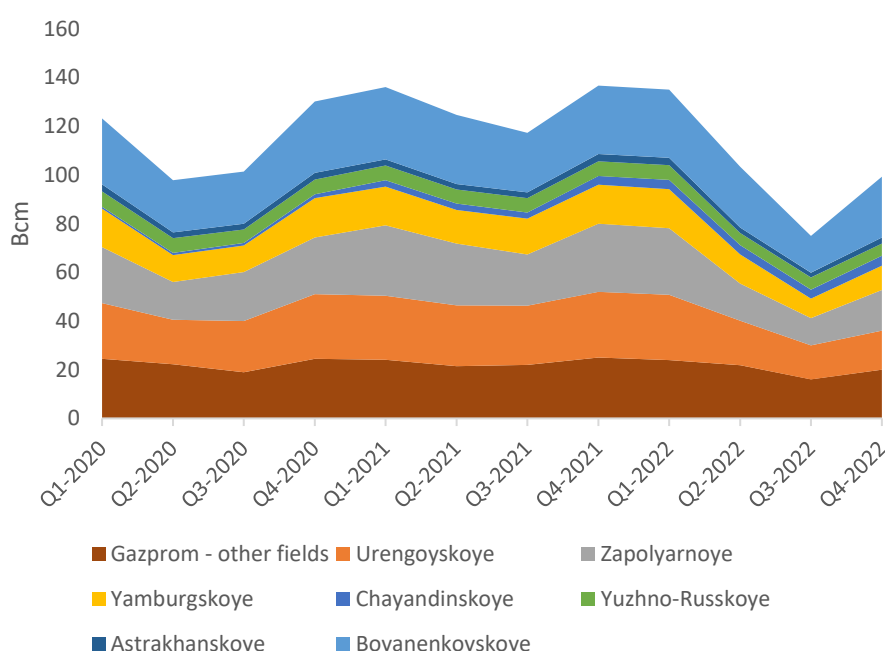
Source: OIES, data from Gazprom

Zapolyarnoye has been the key balancing asset for Gazprom during the past decade, and this was clearly the case in 2020-21. Urengoyenskoye, another NPT super-giant, played a supporting role. The 2020-21 crisis also forced Gazprom to reduce summer output at the Bovanenkovskoye field, the first super-giant on Yamal that was launched in 2012 and brought to its design capacity of 115 bcma in 2018.

During the summer of 2021 Gazprom output declined less than in previous years due to the economic recovery after Russia started to open for business again following the COVID lockdowns, and the launch of a domestic gasification program in 2020 that removed numerous administrative barriers and reduced the cost of the “last mile” connection to the network gas for residential users, resulting in additions to residential consumption. The combined effect of these drivers was a relative rebalancing of demand for Russian gas away from exports and in favour of the domestic market during 2021.

Total monthly and quarterly production by Gazprom for the second half of 2021 and the full year 2022 have been reported by the company, but not the production breakdown by the largest fields. We have attempted to estimate these missing numbers, using our understanding of the historical productive capacities of the fields and the merit order for balancing output that Gazprom used in the past (See Figure 5).

Figure 5: Quarterly production by Gazprom’s largest fields, 2020-22



Source: OIES, data from Gazprom from Q1-2020 through Q2-2021, author’s estimates for the period from Q3-2021 through Q4-2022

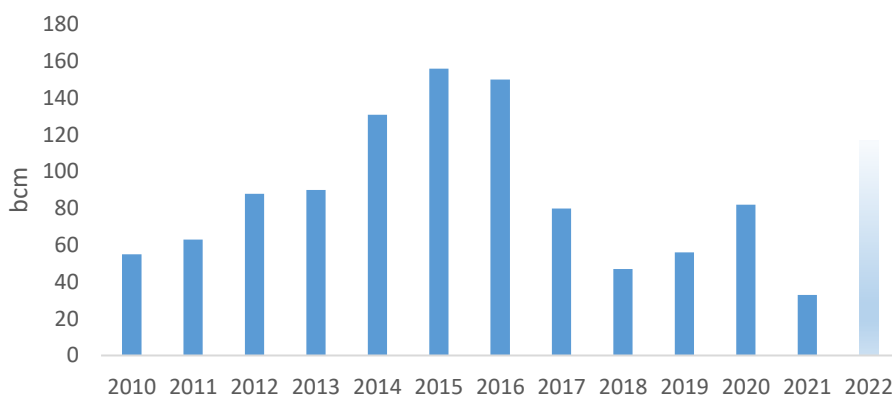
Gazprom’s spare gas productive capacity

It is also possible to estimate the amount of Gazprom’s total spare productive capacity in 2022, drawing on the incremental decline in Gazprom’s output and our previous research on the subject⁸. Clearly, the estimated 117 bcm of spare gas productive capacity for Gazprom in 2022 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

⁸ 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/>

productive zones). According to our estimates, in 2022 Gazprom had about 38 bcm of free productive capacity at Zapolyarnoye, about 30 bcm at Urengoy, 15 bcm at Bovanenkovo, and 15 bcm at Urengoy, with smaller amounts of capacity available at other fields (see Figure 6).

Figure 6: Gazprom’s spare gas productive capacity

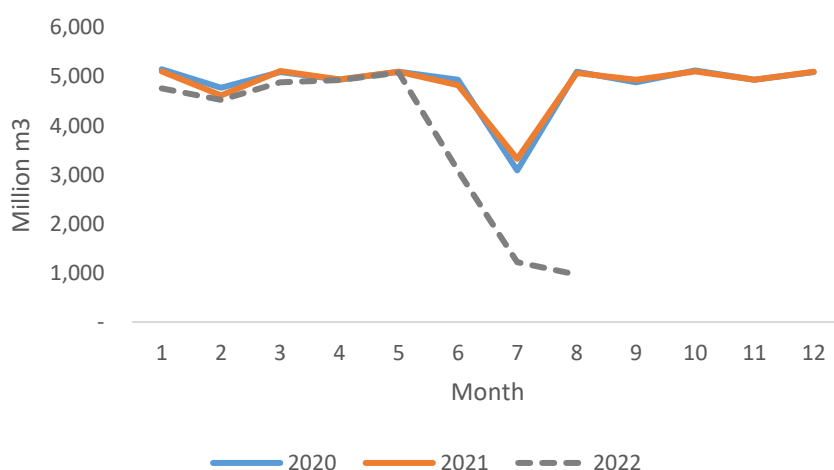


Source: OIES estimates

It is worth noting that the 2022 crisis, which has led to the emergence of very significant spare productive capacity for Gazprom, has 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.

A major unexpected factor has been the acts of sabotage at the Nord Stream pipelines on September 26, 2022 that completely interrupted the flow of Russian gas to Germany under the Baltic Sea. It is worth noting that the flows of gas via Nord Stream 1 declined progressively through the summer of 2022 following Russia’s decision to switch to the “gas for rubles” scheme and the dispute between Gazprom and Siemens over maintenance of gas turbines at the Portovaya compressor station. In August the monthly flow fell below 1 bcm, and by the time of the explosions it completely stopped (see Figure 7).

Figure 7: Monthly gas flows through Nord Stream pipeline



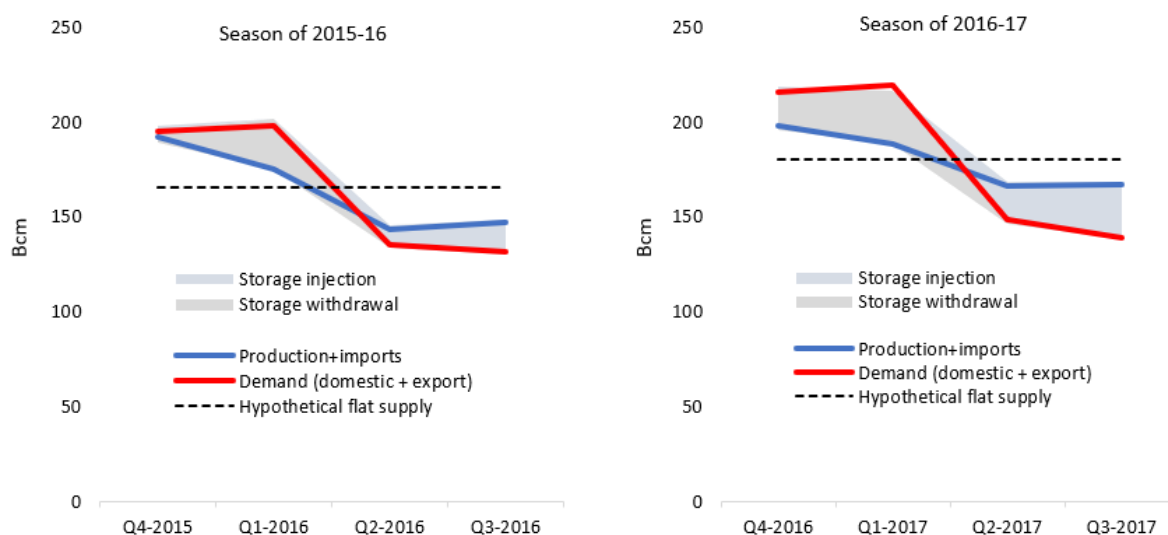
Source: OIES, data from ENTSOG

As a result, for the whole of 2022 the volumes of Russian gas delivered at Graifswald in Germany via Nord Stream were just shy of 30 bcm, and about 28 bcm lower than in 2021. This created a serious complication for maintaining production volumes at Bovanenkovo in Q4-2022, since the Bovanenkovo-Ukhta-Gryazovets-Vyborg-Greifswald line was then the default route for most of the gas produced by Gazprom on the Yamal peninsula. It must be assumed that a re-routing of some of these volumes took place towards the domestic market and towards Turk Stream but there is no way to establish the exact parameters for the adjustment since no data has been made available. In any case, any rearrangement of the flows within Russia's GTS could not fully compensate for the loss of the offtake capacity in the end markets and had to cause idling of some production at Bovanenkovo well above the levels of regular seasonal balancing. The effects of the interruption of the flows on gas output at Bovanenkovo will be greater in 2023, because they are going to apply to a full year, not just to one half, as in 2022.

In addition to measuring the amount of annual spare productive capacity which Gazprom now has, it is also important to understand how the company's spare peak capacity fared against peak demand. For Russia, with its climatic pattern of extremely cold winters and hot summers, the peaks are exacerbated, leading to wide seasonal swings in gas consumption. The variations in temperature drive industrial and residential natural gas demand owing to the needs of space heating and - to much lesser degree for Russia as a northern country - cooling.

The typical seasonal shape for Russian gas deliveries determines the amount of the seasonal flexibility requirement that is usually provided by a combination of production swings and gas withdrawal from storage. During the cold months the production profile is higher than the average for the year and storage is used for withdrawal. During the warm months production declines and the amounts of gas produced over and above demand are injected into storage. In the past, during the years when Gazprom had a lot of spare gas productive capacity (e.g. during the cold months of 2015-2016 heating season) it did not have to rely as much on gas in storage, using available spare productive capacity instead. In contrast, in the relatively "tight" 2016-2017 heating season gas storage withdrawal and injection were significantly higher (see Figure 8).

Figure 8: Typical seasonal shapes of Russian gas demand, supply, and storage dynamics

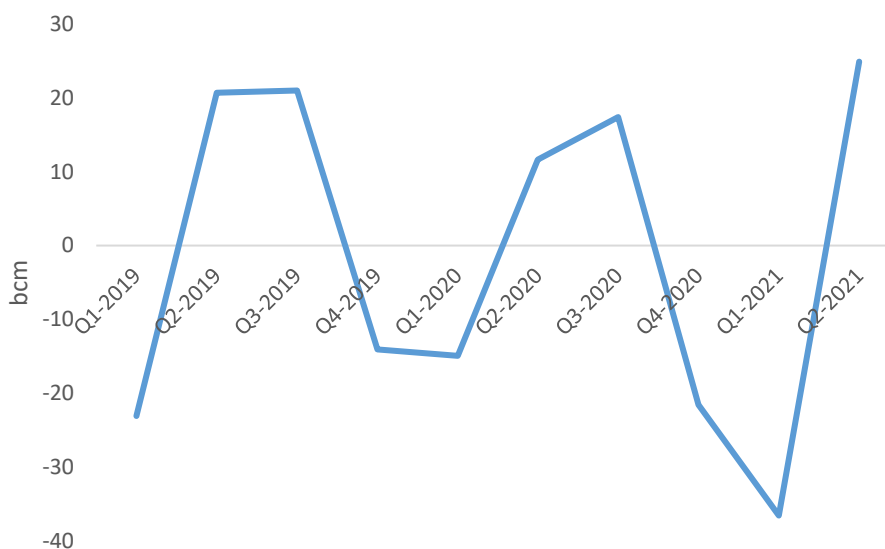


Source: OIES, data from CDU TEK

Unfortunately, very limited information on storage injections and withdrawal is available for 2022. Normally, the quarterly dynamics for the past year are disclosed in Gazprom's annual report, which is

normally released in the following summer. We do know, however, that in Q4-2020 and Q1-2021 gas withdrawals from storage were much higher than in the previous season, resulting in a requirement for higher-than-usual injections into storage in Q2-2021 and, apparently, in Q3-2021 (see Figure 9)⁹.

Figure 9: Net injection into Gazprom storage by quarter



Source: OIES, data from Argus

Gazprom entered the winter of 2021-22 with 72.6 bcm of gas in storage, the highest amount on record. There is no available detailed information on storage movements during 2022, but the overhang of the productive capacity obviously eased the challenge of storage refilling for Gazprom. Russian energy minister Nikolai Shulginov said that on 21 July 2022 gas storage sites were 81 percent full. Further, Gazprom said on 24 August that sites were 91.4 percent full¹⁰. Both statements imply that storage injection was progressing ahead of schedule in 2022.

The practical implication of the above analysis is that 30 to 40 bcm of spare productive capacity on an annual basis (the range provides for a mild vs cold winter demand differential) is a must have minimum for Gazprom to allow it to meet seasonal peaks in demand. This leaves the overhang of an “extra” spare productive capacity of about 80 bcm for Gazprom in 2022.

Export revenues and the opportunity cost for Gazprom

This calculation allows us to make a related ball-park estimate of the opportunity cost of the idled investment and unrealized sales. Hypothetically, had Gazprom been able to sell 80 bcm at a discounted price of \$300/mcm (whereas average actual hub prices in Europe in 2022 were around \$1,300/mcm) the loss of value because of the idled capacity could be estimated at \$24 billion in a single year¹¹. The real problem, of course, is that Gazprom may have to operate with extremely high levels of spare gas productive capacity for many years to come, and the opportunity costs are going to mount.

⁹ The data series from Argus are available only through Q2-2021. During Q3-2021 Gazprom was citing the need to replenish domestic storage up to the levels stipulated by Russian regulatory requirements as an explanation to its inability to offer additional gas to the European buyers on a spot basis at its gas trading platform in Saint Petersburg.

¹⁰ <https://www.interfax.ru/business/853266> and <https://www.interfax.ru/business/858402>

¹¹ There is little doubt that in a hypothetical case of large-scale sales of Russian gas to Europe in 2022 the downward pressure on hub prices would cause equilibrium price to settle at the level of full cost of US LNG supply, or about \$8-9/mmBtu.

In reality, though, Europe's decision to reduce purchases of Russian gas has resulted in very high gas prices across the global gas market in the short term, especially in Europe. As a result, even with reduced volumes of export, Russia will have received record revenue for its gas exports in 2022. According to the EC quarterly gas market report, in the first two quarters of 2022 the EU payment to Russia for gas imports amounted to almost €50 billion¹². In the second part of the year (for which the data is not yet available) the volumes of Russian gas delivered to the European market shrunk but prices through the summer and into the autumn were extremely high, driven by the need to put sufficient amounts of gas into European gas storage facilities. Given the need to replenish storage in 2023 with even lower annual volumes of Russian gas, Europe may have to offer a price premium to LNG suppliers, with TTF prices potentially remaining elevated (at least compared to average 2021 levels) for most of the year and significantly higher than for the five previous years. It is interesting to note that even during the current warm winter in Europe prices are averaging 2-3 times more than the levels seen during 2018 to mid 2021. Under these circumstances even sharply reduced volumes of Russian gas exports to Europe and Turkey could still provide Russia with an export revenue stream comparable with what it was receiving on average on an annual basis over the past decade (see Figure 9).

The available long-term data series on Russia's pipeline gas export revenues are derived from the aggregated volumes and prices for sales to Europe, Turkey and China under the so-called 'Far Abroad' classification and the FSU countries under the "Near Abroad" classification minus the revenues from re-imports of Central Asian gas. These are bundled together into data released publicly by Russian Customs (there is no separate revenue data for "Near Abroad" and 'Far Abroad') and also published by Russia's Central Bank (CBR). Russian Customs has interrupted the public release of its data series since February 2022, and it is not clear whether CBR is going to publish the annual statistics for 2022.

Broadly, the sales to the Near and Far Abroad markets have been happening under three pricing mechanisms: gas hub pricing, oil indexation, and fixed prices under special arrangements. The special prices could be extremely low, as in the case of Belarus, or represent some mix between hub index and oil index to grant an effective discount, as in the cases of Serbia¹³ and Hungary,¹⁴ with which Russia has relatively friendly relationships. Oil indexation, once the dominant pricing arrangement in Gazprom's contracts, is currently used in the Russia-China gas contract that stipulates the ramp up of sales from the reported 15.5 bcm in 2022 to 48 bcm by 2025 under the existing SPAs. The average Brent price was about \$100/bbl in 2022, and, assuming a 9-11 percent level of oil indexation, Gazprom's average annual sales prices in this segment might be assessed in the range of \$320-390/mcm (actual effective prices are impacted by time lags in the contract formulae and might be different, especially if oil price developments in the previous year were volatile and differed substantially from the current year).¹⁵

Until 2022 Gazprom sales to Turkey were subject to oil-indexation, but at the end of 2021 this was replaced by hub indexation. (Turkey insisted on the change hoping it would receive lower prices, probably in reference to 2020, but has been shocked by the tremendous gas hub price spikes through the end of 2021 and into 2022 and 2023. Turkey has since asked Gazprom for a postponement of

¹² https://energy.ec.europa.eu/system/files/2022-10/Quarterly%20report%20on%20European%20gas%20markets%20Q2_2022_FINAL.pdf

¹³ In May 2022 Serbia signed a 3-year gas supply contract with Gazprom for 3 bcm per annum. 2.2 bcm are priced under oil indexation, and 0.8 is priced under hub indexation with a special discount. As a result, Serbia was reported to pay \$400/mcm to Gazprom during the summer of 2022 when hub prices in Europe were testing \$4,000/mcm levels.

¹⁴ In September 2021 Hungary's MVM and Gazprom signed a 15-year contract on gas supply of 4.5 bcm per annum with 3.5 bcm to be supplied via Turk Stream-2 and via the Transbalkans pipeline, and 1 bcm through Austria. This channeled some of Russian gas supplies to Hungary away from the Ukrainian transit route. In August 2022 Hungary agreed additional 0.7 bcm per annum gas supplies from Russia via Turk Stream-2.

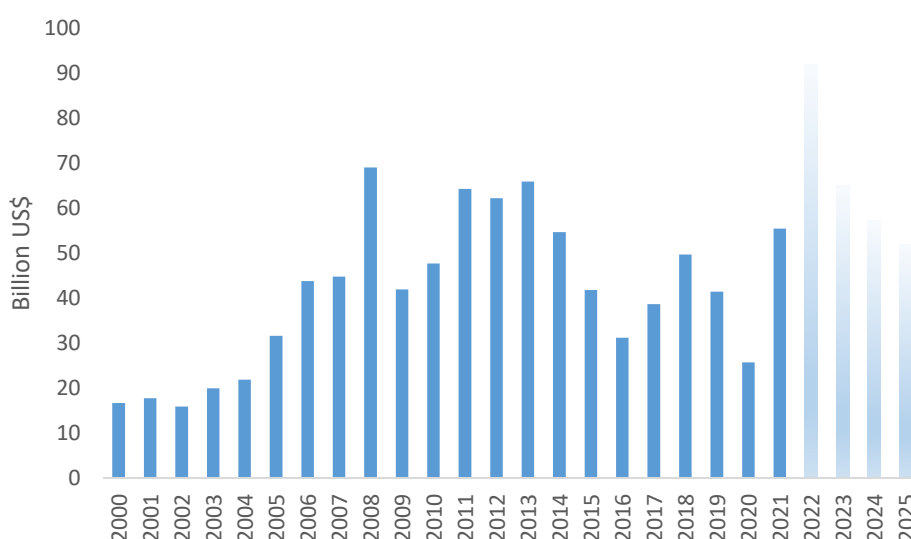
¹⁵ Sales to China is a case in point. Due to a 9 month time lag in the price formula, the calculation of the price for most of 2022 was still on the rolling basis of the oil index of 2021, when Brent averaged \$71/bbl. On December 20, 2022 China Customs reported that in 11 months of 2022 the value of Russian pipeline gas imports was \$3.546 billion, without indicating the supplied volume (see <https://tass.ru/ekonomika/16644169>). Gazprom also did not disclose the volumes of gas supplied to China by month but given the target of c.15 bcm for the whole year of 2022, the estimated volume for 11 months was in the area of 13.5 bcm. The effective average price of Russian gas at the Chinese border in 11m2022 was, then, about \$260/mcm.

payments and begged for discounts). There are no final statistics on the volume of exports of Russian gas to Turkey or the effective sales price at the time of writing, but on the assumption that Gazprom supplied Turkey with 20 bcm in 2022 (27 bcm in 2021) at a discounted average hub price of \$1,000/mcm, the sales revenue would amount to \$20 billion (this calculation is merely a hypothetical example).

Russia's pipeline gas exports to FSU states provide another example of the mixed arrangements. At one extreme, Russia supplies about 20 bcma to Belarus at a fixed price of \$128.5/mcm¹⁶, with implied revenue of just over \$2.5 billion in 2022. At the other extreme, Russia exported about 2.4 bcm of gas to Moldova in 2022 at an average annual price of \$980/mcm under a mixed hub/oil-index formula, implying essentially the same level of revenues for Gazprom as from the sales to Belarus in spite of an 8-fold difference in supplied volumes¹⁷.

The outlook for Gazprom's revenues from pipeline exports post-2023 is very uncertain, with continued decline in Russia's gas export revenues as a base-case scenario (See Figure 10).

Figure 10: Russian revenues from pipeline gas exports



Source: OIES, data from the Central Bank of Russia for 2000-2021 and author's estimates for 2022-25

Even with sharply reduced gas exports to Europe (excluding Turkey) Russia will continue to earn revenues from sales of its gas abroad comparable with the long-time average. Firstly, Turkey will continue importing Russian gas through two existing pipelines, Blue Stream and Turk Stream, within an expected range of 20-25 bcma.

Secondly, and more importantly, Russia's gas exports to China are scheduled to ramp up to 48 bcm by 2025 (secured by existing SPAs for 38 bcm via Power of Siberia 1 and 10 bcm via the so-called Far Eastern route), providing Russia with an alternative export revenue stream¹⁸. But while the upstream and midstream developments in Eastern Siberia have been proceeding to plan, with gas production at the Chayanda field at slightly over 15 bcm in 2022, and volumes from the Kovykta field starting to flow to Power of Siberia via the recently completed Kovykta-Chayanda section of the pipeline since

¹⁶ The price of Russian gas for Belarus in 2023-25 will continue to be around the current level – see <https://www.vedomosti.ru/business/articles/2022/12/20/956244-rossiya-belorussiya-soglasovali>

¹⁷ <https://www.interfax.ru/world/879616>

¹⁸ See the OIES Insight *Russia and China Expand Their Gas Deal: Key Implications*, March 2022 <https://www.oxfordenergy.org/publications/russia-and-china-expand-their-gas-deal-key-implications/>

December 2022¹⁹, the prospects for a radical gas output increase from Sakhalin are less certain. The SPA with CNPC signed in February 2022 did not mention specific gas fields as sources of supply. But a review of the options available to Gazprom narrows the choice of options to the Sakhalin 3 project, and, more specifically, to the South Kirinskoye field as the only one with sufficient uncommitted gas reserves. Yuzhno-Kirinskoye is a true crown jewel, the largest field discovered so far in the offshore Sakhalin acreage. According to Russia's Ministry of Natural Resources, its A+B1+C1 gas reserves equal 584.5 bcm (roughly corresponding to proven and probable reserves under international classifications). Gazprom reports that total C1+C2 reserves in the field comprise 711.2 bcm of gas, 111.5 mt of recoverable gas condensate and 4.1 mt of recoverable oil. The expected annual gas output for Yuzhno-Kirinskoye is 21 bcm²⁰.

Bringing South Kirinskoye into production, however, became problematic after the US introduced the specific sanctions against this project in 2015²¹. The development plan for South Kirinskoye involves subsea technology, a remotely operated subsea manifold, that was originally supposed to be provided by US-based companies. The interruption of these supplies has resulted in a lengthy delay since Gazprom has been trying to figure out ways to procure alternative domestic technological solutions and offshore equipment that until recently was almost entirely imported. In April 2021 Gazprom was saying that the start of production at South Kirinskoye had been postponed until 2024²². The signing of the additional SPA with China in February 2022 clearly has provided Gazprom with all possible incentives to move full speed ahead on Sakhalin but in the present atmosphere of utmost secrecy surrounding current Gazprom production plans no public disclosure about the South Kirinskoye production schedule has been provided. The launch of the field is an important future signpost and a litmus test of Russia's ability to produce advanced undersea production technologies on its own.

Even in the most pessimistic scenario of the EU attempting to reduce purchases of Russian gas to zero, Russia is likely to export to the Far Abroad (net of Europe) significant amounts of pipeline gas in the next few years at prices that are likely to be significantly higher on average than during the previous decade. In a more benign scenario, exports to Europe could remain at current low, but not insignificant levels, or even rebound if a positive political conclusion to the war in Ukraine can be found.

Furthermore, 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 the European Russia, Urals, and Siberia experienced extreme cold weather, with temperatures 10-15 degrees Celsius 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),

¹⁹ <https://www.ogj.com/pipelines-transportation/pipelines/article/14287593/gazprom-starts-18tcm-kovyktinskoye-natural-gas-field-power-of-siberia-leg>

²⁰ Ibidem

²¹ https://www.federalregister.gov/documents/2015/08/07/2015-19274/russian-sanctions-addition-to-the-entity-list-to-prevent-violations-of-russian-industry-sector?utm_content=header&utm_medium=slideshow&utm_source=homepage

²² <https://www.kommersant.ru/doc/4763179>

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, the 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 share²³.

Conclusion: implications for Russia's gas export strategy

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. But it could not remain immune to the increasing geopolitical animosity between the great powers and the emergence of extreme bargaining positions. 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 in the beginning of February 2022 and the potential for a new 50 bcma deal for Power of Siberia 2 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 the 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. The acts of sabotage against the Nord Stream pipelines have become a symbol of the destroyed relationship. 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 has imposed a heavy toll on both sides, as extremely high gas prices have been undermining Europe's industrial competitiveness and an effective ban on Russian gas in Europe has threatened Russia's future export revenues. Currently, scenarios of a radical energy transition in Europe and a fast diversification of Russia's gas exports towards Asia seem the most likely way forward, in spite of the tremendous destruction of wealth for both sides that will result from the rupture of trade ties.

²³ <https://delprof.ru/press-center/open-analytics/rynok-mineralnykh-udobreniy-v-rossii-2020-uverenyy-rost-vopreki-krizisu/>



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 a speculative proposition at present.

At the same time, 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 the Russian decision-makers during 2022.

First and most important is the idea of urgently accelerating the expansion of gas trade with China by way of 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, 2023²⁴.

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 idea that Erdogan has supported. On December 9, 2022, Gazprom’s CEO Alexey Miller discussed the details of the proposal with President Erdogan.²⁵ 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, as the Russian gas would have been ‘laundered’ through the hub and become unidentifiable²⁶. 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 2022.²⁷ 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 on exports to China, have been brought forward²⁸. 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 very 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

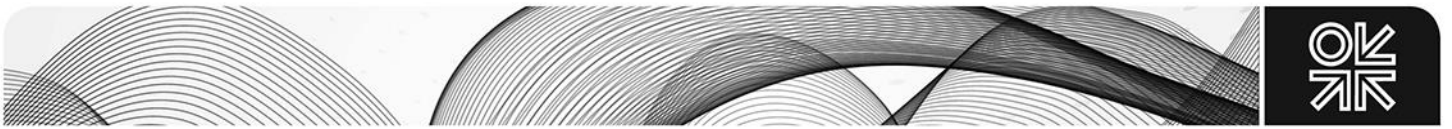
²⁴ <https://www.gazprom.com/press/news/2023/january/article560557/>

²⁵ <https://www.reuters.com/business/energy/head-gazproms-miller-turkeys-erdogan-discuss-turkish-gas-hub-gas-supplies-2022-12-09/>

²⁶ <https://www.euractiv.com/section/energy/news/analysis-europe-wary-of-turkish-hub-to-hide-gas-made-in-moscow/>

²⁷ <https://fief.ru/en/media/news/rossiya-kazakhstan-i-uzbekistan-sozdadut-gazovyy-soyuz/>

²⁸ <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/>



concessions from Gazprom, which will ultimately reduce the Russian company's sales margin. A third and a 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 very apparent, potentially forcing Russia to devalue the ruble 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.