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Energy Security in Europe More than Two Years into Russian Invasion on Ukraine

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INSTITUTE FOR DEFENSE ANALYSES

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Anna B. Mikulska

Executive Summary

Russia's invasion of Ukraine on February 24, 2022 and the events that followed have exposed serious deficiencies in the energy security of the European Union and its member countries. As noted in my 2023 testimony to the Senate Committee on Energy and Natural Resources for the "Hearing to examine the impact of the Russian Federation's war in Ukraine on European and global energy security one year after the invasion," Europe failed on all aspects of security of energy supply: (1) availability, (2) accessibility, (3) affordability, and (4) acceptability (Mikulska 2023a).

For nearly 3 years, Europe has been able to avoid a major energy crisis by relying on efficiency measures, demand curtailment, and vast amounts of capital flowing toward subsidies, renewables, and non-renewable energy deployment. The buildup in renewable energy, especially in wind and solar power, has helped the region progress on its energy transition goals. Given that most renewable energy is produced domestically, increases in generation have provided some energy security benefits.

However, at least in the short to medium term, access to fossil fuels will remain critical. In the case of natural gas, this could provide Russia an opening into the European energy market—in particular, for the Russian liquified natural gas supply. This is not an innocuous development, given Russia's previous willingness to use natural gas to extract geopolitical benefits. High prices of natural gas as well as crude oil have also supported the Russian economy and the ability to wage the war against Ukraine, as Russia was able to avoid at least some of the effects of Western sanctions. Russia's position has been supported by closer ties with China, including in energy, a partnership that could become problematic geopolitically going forward.

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1. Opening Remarks

The following talking points were delivered at the U.S. Helsinki Commission Briefing at the panel on “The Future of European Energy Security,” on October 16, 2024. Chapters 2 through 4 of this publication include the analysis upon which the opening remarks have been based.

1. Russia’s invasion of Ukraine on February 24, 2022 and the events that followed have exposed serious deficiencies in the energy security of the European Union (EU) and its members. As I testified a year and a half ago to the Senate Committee on Energy and Natural Resources for the “Hearing that examined the impact of the Russian Federation’s war in Ukraine on European and global energy security,” Europe failed on all aspects of security of energy supply as defined by its: (1) availability, (2) accessibility, (3) affordability, and (4) acceptability.
2. Those deficiencies in energy security were tied directly to the EU’s overdependence on Russia for energy supply and Russia’s willingness to use that supply to exert geopolitical pressure.
3. Natural gas has been the most geopolitically sensitive of the fuels due to the need for extensive infrastructure to move gas volumes between markets (e.g., pipelines, liquified natural gas [LNG] import and export terminals, storage). Russia knows this all too well. In the year preceding the invasion, Russian exports of natural gas to Europe were already decreasing steadily.
4. Ever since, the growth in LNG trade and buildup of LNG infrastructure in Europe have helped address some of the deficiencies. However, the supply still does not match the potential demand needed to avoid an energy crisis in case of a major supply disruption to the expected gas flows or if demand increases based on exceptionally cold weather.
5. The supply of LNG globally has been steadily increasing with the United States as a major player. This is important since U.S. LNG volumes are flexible in terms of destination and, hence, can help balance global markets. With no destination clause, any buyer of U.S. LNG can send the fuel anywhere in the world. Oftentimes the supply goes to whoever can pay the highest price. Since the Russian invasion of Ukraine, European buyers have usually been the highest bidders.
6. High prices of energy in Europe have contributed to increases in energy efficiency and strong development of renewables. However, high prices have also contributed

- to inflationary pressure and a decrease in industrial activity and investment. The latter is particularly true for “hard-to-abate” sectors, such as steel, cement, and glass manufacturing, or the fertilizer industry.
7. Renewable power has been often seen as more secure in terms of supply given that it is generated domestically. However, because of its intermittent nature, it cannot yet support the energy system in the same way traditional electricity generation does. In addition, there is the concern of becoming dependent on China for critical minerals and rare earths needed for renewable energy infrastructure.
 8. Natural gas is usually seen as a good backup for intermittent renewables as it is less emission intensive than coal and its generation is flexible; it can also quickly assist the grid when renewable power is inadequate. Given strong renewable deployment in Europe, natural gas will continue to be an important fuel there.
 9. Despite Europe’s attempts to avoid using Russian energy, large shares of natural gas that it consumes continue to come from Russia. For some countries—especially Austria, Slovakia, and Hungary—Russian gas still comprises the majority of natural gas flows via pipeline. The supply of gas from the Russian pipeline, especially to those countries, is likely to decrease when the Ukraine-Russia transit contract concludes at the end of this year. This will increase Europe’s call for LNG this winter and beyond.
 10. Paradoxically, Russian LNG imports into Europe have been increasing. In fact, they have recently increased whereas all other LNG suppliers have noted a slowdown. Given the high price of natural gas, the revenues the Russian state garners from those sales are contributing to the Russian economy and its ability to wage war. A recent report by the International Energy Agency (IEA) has noted that Russian gas production has increased 9% year over year for the first quarter of 2024.
 11. Similarly, revenues from sales of oil support the Russian state as Russia is able to exploit the lack of universal adherence to sanctions as well as the loopholes in those sanctions. Russian oil flows via pipelines to some of the EU states and is blended with oil from other origins to be either sold directly or refined into oil products. The latter is not subject to sanctions.
 12. China has become Russia’s main energy export destination, particularly for natural gas, which Russia is sending there via pipeline (Power of Siberia 1) and as LNG. With the lack of other markets, Russia is hoping for an even greater share of the Chinese market with Power of Siberia 2. This will make the country dependent on China as a demand center.
 13. Closer ties between Russia and China could become problematic in general as well as with respect to energy flows. Both countries combine the powers of the world’s

major fuel supplier and the world's largest energy consumer. This creates potential for geopolitical interference.

2. Revisiting My 2023 Testimony

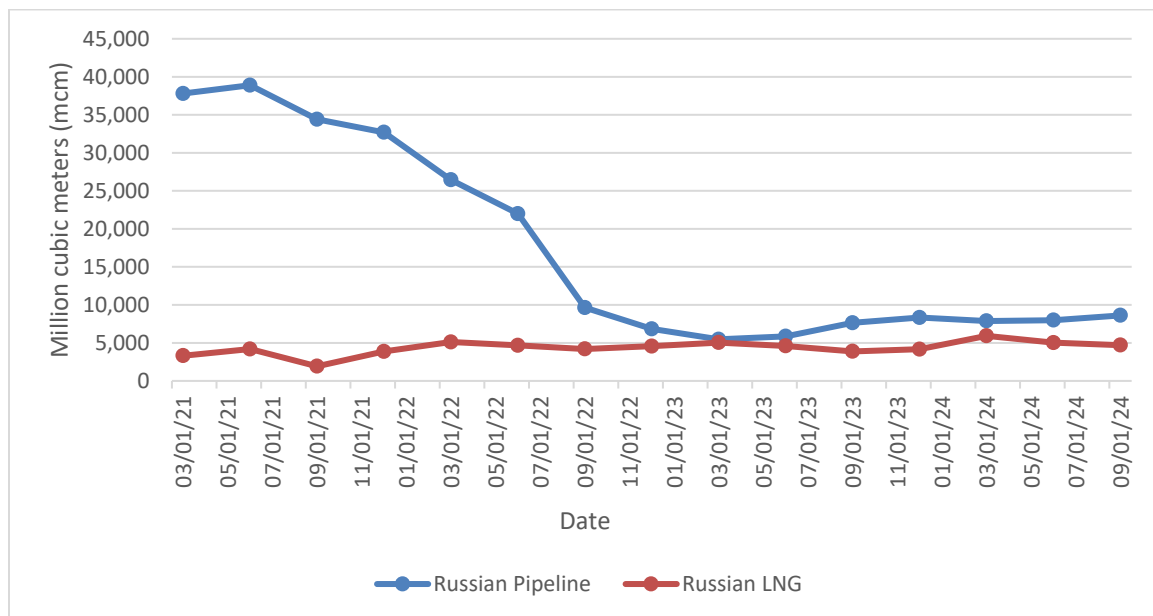
On February 16, 2023, I testified to the Senate Committee on Energy and Natural Resources regarding the “Hearing to examine the impact of the Russian Federation’s war in Ukraine on European and global energy security one year after the invasion” (Mikulska 2023). This is a great opportunity to revisit that testimony with more insights from the year and a half that followed. I will continue using the “*Four A’s*” of energy security framework as determined by four building blocks: (1) availability, (2) accessibility, (3) affordability, and (4) acceptability of energy supply (APEREC 2007).

As I detailed in 2023, Europe was unable to deliver on any of those four elements when Russia invaded Ukraine on February 24, 2022. Since then, to make sure European citizens and businesses have uninterrupted access to energy, Europe has relied on efficiency measures, has curtailed demand, and has disbursed vast amounts of capital. The spending included, among other things, subsidies to control growth of energy prices and investment in new sources of energy supply, most importantly renewable energy. The latter has helped the region to move forward on its energy transition goals.

Thanks to efficiency measures, renewable deployment, and relatively warm winters, Europe has been able to avoid a major energy crisis but not without negative consequences. High energy prices have had a significant impact on Europe’s economic, social, and political life, including inflationary pressure (albeit, core inflation for the EU is down since it peaked in March 2023; European Central Bank 2024); downturn in industrial activity and investment related to lower competitiveness (European Commission 2024); and social dissatisfaction that has often contributed to electoral losses of the governing parties and higher support for political extrema (Associated Press 2024; Politico 2024a). In addition, Russian aggression has resulted in a tighter supply of energy globally. While Europe has been able to afford the significant increase in energy prices, this has not been the case for many developing countries, which suffered shortages and turned often to cheaper, more accessible fuels, including coal (Politico 2022).

Russia has suffered some setbacks delivered by Western sanctions on Russian oil and coal, and from its own curtailment of natural gas exports to Europe. However, the effects have been less than anticipated due to several interrelated factors: the lack of universal commitment to sanctions and difficulties with enforcement; the ability of Russia to circumvent some of the sanctions or their effects; the long-term nature of sanctions and time needed for the sanctions to work; and the relatively low sensitivity of the dictatorial government to the sanctions and their effects. At least in the short term, Vladimir Putin

does not need to be concerned about popular support as he does not face free elections and can use (and has used) repression to suppress dissent. (Mikulska 2023b). In the longer term, however, sanctions are likely to expose weaknesses in the Russian economy (Ribakova 2023). To prevent some of the negative long-term impact of sanctions, Russia is hoping to rely on China, including for exports of natural gas. However, consolidating exports into a single major customer is likely to lead to economic and geopolitical dependency. Besides exports to China, at least for Russian LNG, the markets have been open. Paradoxically, as pipeline gas exports to Europe have dwindled, LNG trade between Russia and Europe has not suffered similar setbacks (Figure 1), a development that should be watched closely given Russia's record on natural gas flows to Europe (Mikulska and Finley 2023).



Source: Williams, Sgaravatti, and Zachmann (2021)

Figure 1. Russian Natural Gas Exports to Europe: Pipeline Gas vs. LNG

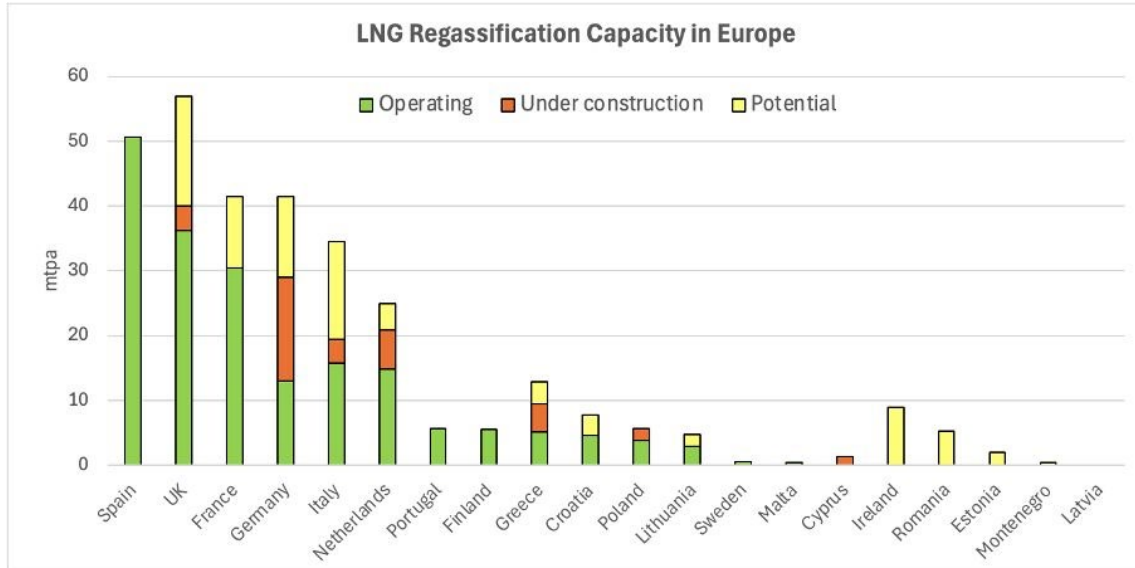
3. European Energy Security: Opportunities and Challenges in the Context of Energy Transition

A. Europe's Near Term Energy Access: Natural Gas Continues to Be an Issue

Europe had set ambitious goals for greenhouse gas emissions reduction far before the Russian invasion of Ukraine. Following the invasion, the region has continued to achieve substantial reductions in fossil fuel use and growth in new renewable energy generation. EU countries reduced emissions by 15.5% in 2023 vs. 2022. The power sector, via increase in solar and wind generation, drove the decline with 24% emission reductions in 2023 compared to 2022 levels. Industry emissions have also declined—not only due to efficiency gains but also due to reduced output (European Commission 2024b)

Despite the improvements, Europe faces significant challenges ahead. In particular, natural gas is difficult to replace as both industry feedstock and as a reliable backup for intermittent renewable generation. Meanwhile, natural gas supply continues to be difficult to rebalance in cases of major disruption. This is because natural gas flows require specialized infrastructure (i.e., pipelines, liquefaction, and regasification capacity at export and import terminals) or storage. These need considerable time and vast capital investment.

Europe has achieved significant progress in making LNG more **accessible** with new LNG terminals entering service in France, Finland, Germany, Greece, and Italy (Figure 2), and new natural gas interconnections between Poland and Lithuania, Hungary and Romania, and Bulgaria and Serbia. However, the infrastructure requires further expansion to meet the needs of EU states at any given time. Meanwhile, there are also delays on the **availability** side of the energy security equation. This includes, in particular, the buildup in U.S. LNG export capacity, which will enter global markets with a year delay in 2025. Thus, cold weather and unfavorable geopolitical circumstances could create conditions for tight natural gas markets and high prices in the winter of 2024–2025 and possibly into the 2025 refilling season (Medlock, Mikulska, and Min 2022).



Source: Cedigaz (2024). Figure posted with author's permission.

Figure 2. LNG Regasification Capacity in Europe

Increase in natural gas demand in China could also become a factor. China is now the largest LNG importer globally. The country has been very active contracting for long-term LNG supply, including from the United States. Due to lower industrial demand over the last two winters, China was willing to resell some of its volumes to Europe and elsewhere (Chen, Chow, and Rashad 2023). If China ceases to do so in the future, gas markets may tighten and energy prices will increase. While Europe could avoid a crisis by paying extraordinarily high prices, the same cannot be expected from emerging economies.

Europe's ability to avoid shortages is not without severe negative consequences. High energy prices have led to efficiency gains but also to decreases in industrial activity and industrial investment in the region. Especially affected are the aforementioned hard-to-abate sectors. High prices of energy have also contributed to inflationary pressure and generally weaker economic performance (European Commission 2024a). The latter is critical for energy security as it determines Europe's ability to continue to procure expensive energy and ability to invest in and switch to new energy sources (wind, solar, geothermal, nuclear power), and new energy carriers and storage (e.g., hydrogen).

B. Europe's Renewable Revolution and "4 As" of Energy Security

The European Climate Law Regulation (EU 2021/1119) requires the EU to reduce emissions by 55% by 2030 (when compared to 1990) and become climate neutral by 2050. The law also requires the EU to set a binding intermediate emission target for 2040. In February 2024, the European Commission recommended a 2040 target of 90% (vs. 1990 emission levels). The target necessitates a reduction in primary consumption of fossil fuel by 75% vs. 2019 (European Commission 2024c).

A switch from fossil fuels to other energy sources could be positive for EU's energy security. In aggregate, European countries are net importers of all fossil fuels (crude oil, natural gas, and coal) while renewable energy from wind, solar, hydro, or geothermal resources can be generated domestically to a much greater extent. This makes the supply, in principle, more **accessible**. Wind and solar are viewed widely as most scalable in the near term through buildup of offshore wind and photovoltaic farms (IEA 2024a). However, intermittency of wind and solar is a significant challenge to overcome. Wind and solar **availability** depend on season and geographical location (Sun exposure, access to sea or mountains, etc.) In addition, the less favorable the location, the lower the performance of renewable resources and thus the more infrastructure necessary to deliver the same amount of energy—including fossil fuel backup to stabilize the supply.

Need for vast grid expansion is especially problematic as it can also create a serious impediment to **affordability** of the renewable electricity sources (Rystad 2024). Thanks to technological advancement, levelized costs of wind- and solar-based electricity have fallen significantly. In some cases, wind and solar resources have become more **affordable** than fossil fuel generation, especially when supported by policies such as the EU Emission Trading System (Florence School of Regulation 2024). However, in most cases, the price calculus does not include the cost of transmission buildup; its inclusion would likely make the resource less affordable (Reuters 2024).

Relatively high levels of income in Europe allow much of the population discretionary spending, and focus on values and goods that go beyond daily necessities. This includes incorporating value of future benefits (such as climate benefits) into current decisions (at higher income levels, lower discount rates are tolerated). Thus, the high present costs of developing renewable energy sources become more **acceptable** than the low present costs of fossil fuel consumption. However, the **acceptability** does differ based on country and individual income levels (Mikulska 2018a). It is also likely to move with the business cycle. In addition, the acceptability of renewables has limits. The EU population is not likely to accept breaks in the provision of electricity and heat in the winter. In fact, in response to Russia's invasion of Ukraine and the concomitant disruption to energy markets, the EU accepted natural gas and nuclear power as transition fuels (European Parliament 2022) and several countries allowed previously retired coal generation to reenter their energy systems (e.g., Deutsche Welle 2022).

4. The Role of Russian Energy in European Energy Security

Russian aggression has changed the **acceptability** of Russian fuels in the European energy mix. European countries have widely acknowledged that dependence on Russian energy is a significant energy security risk and should be avoided.¹ However, the extent to which it should be avoided differs among EU countries. This creates openings for Russia to both profit from sales of its fuels to Europe and, more importantly, to potentially exert geopolitical and economic influence using energy flows.

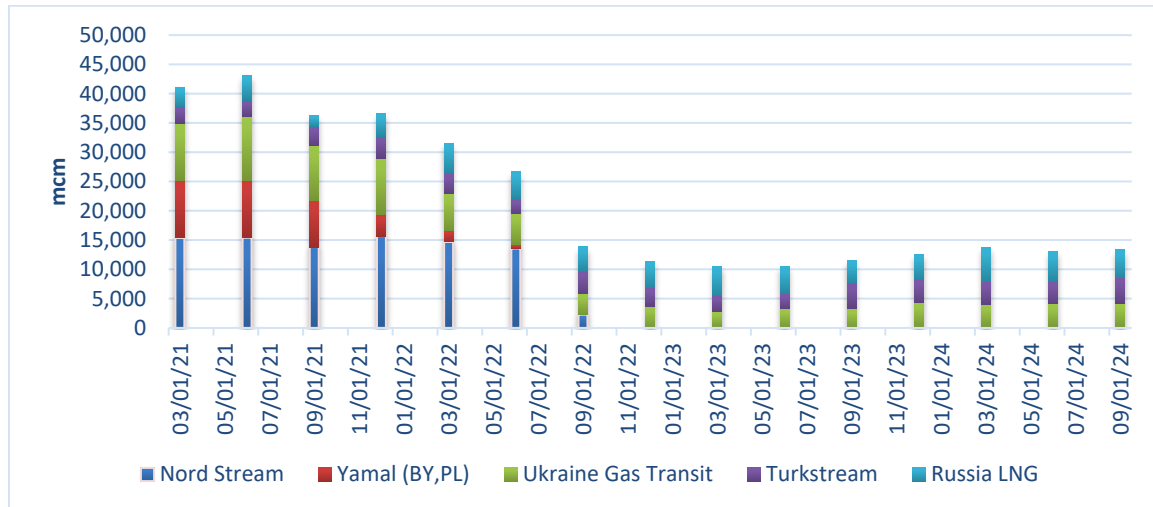
Cuts in Russian gas supplies have been mostly a Russian decision or have been a result of a sabotage (Nord Stream 1). The EU could hardly afford to sanction Russian gas imports without exposing itself to a major energy crisis (McHugh 2024). Thus, paradoxically, as Russia wages war on Ukraine and intentionally damages the country's domestic energy infrastructure, Russian pipeline gas still flows through Ukraine per a contract both countries signed before the invasion (Figure 3). With Ukraine objecting to the renewal of those contracts in 2025, EU countries that have been receiving the majority of their gas from Russia—Austria, Hungary, and Slovakia—may have difficulties finding a sufficient substitute supply.²

Russian gas flows continue through Turkey reaching southeast Europe, in particular Hungary, Bulgaria, and non-EU Serbia. Turkey also announced in August 2024 that it will also export natural gas to Bulgaria under a new brand of *Turkish Blend*, which will include Russian gas in the mix (Politico 2024b). This will make it more difficult to track how much Russian natural gas actually reaches Europe. Further, imports of Russian LNG to Europe have increased since March 2024 even while flows of non-Russian LNG have decreased (Figure 4). This underscores how persistent Russian gas is in European markets. It also demonstrates continuation, and a success, of Russian strategy for LNG where “Novatek’s position as a newcomer from the ‘Russian team’ completes its adaptative process within a more liquid and competitive gas market in the EU, where LNG has an increasingly

¹ This was not the case before the aggression toward Ukraine. In general, countries in Western Europe have seen Russian energy flows as innocuous and Russia as a typical trade partner. On the other hand, countries that had a history of Russian influence under the Soviet Union have seen Russian energy as a geopolitical tool and have sought diversification of their supply away from Russia (Mikulska 2017; Mikulska 2018b)

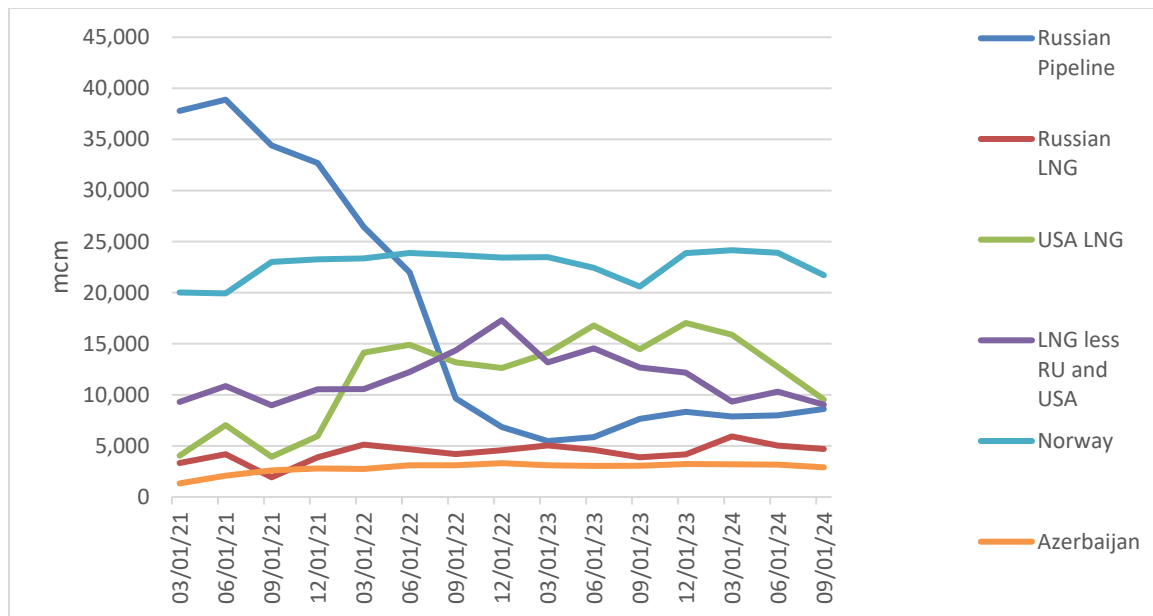
² See the Politico article, “Most of Europe is fine without Russian gas.”
<https://www.politico.eu/article/russian-gas-deal-europe-ukraine-pipeline-energy-market-lng/>

significant role” (Mikulska and Jakubowski 2020). Also, formally unrelated to the Russian state, as an “independent” provider Novatek can be easier to justify by EU companies as a trade partner than the state-owned Gazprom.



Source: Williams, Sgaravatti, and Zachmann (2021)

Figure 3. Russian Natural Gas Flows to Europe



Source: Williams, Sgaravatti, and Zachmann (2021)

Figure 4. Europe's Natural Gas Imports by Supplier

Russian natural gas exports to Europe, however reduced, remain significant in size and the uptick in demand typical of the winter should present in the coming months a challenge to Europe and the LNG-consuming world. Russia has previously constrained the

flow of natural gas to Europe when it was least expected or most inconvenient, even before its invasion of Ukraine.³

Going forward, the global LNG supply will increase as new projects (including in the United States) begin operations in 2025. However, concerns about the coming winter and the next storage refilling season remain. Access to and availability and affordability of natural gas could be negatively affected by exceptionally cold weather, a longer than normal heating season, or further increases in geopolitical tensions. Since the supply is tight globally, any of these factors anywhere in the world will affect countries that import gas. Even if Europe is able to pay high prices to support uninterrupted supply of energy within its borders, the prices will further impact its industry and economy. Less wealthy nations that would be exposed to energy shortages similar to those they experienced during the 2022–2023 winter will struggle (Politico 2022; IEA 2024b).

Meanwhile, Russia will enjoy windfall profits from high gas prices, just as it did in June of 2022, when Russia exported a quarter of the volume compared to the year prior but was still earning the same profit. And, as per IEA, Russia's gas production is going strong again with 9% year-on-year growth for the first three quarters of 2024 (IEA 2024b). In addition, profits from crude oil exports also continue to flow with some oil still flowing to Europe via pipeline and some reaching countries in Europe or the United States after being blended with other foreign oil or refined into diesel or gasoline (PBS 2023). To assist its oil sales, Russia has also developed a fleet of shadow tankers (Sauer 2024; Mikulska 2023b). Even when Russia needs to discount its oil, it still turns a profit because of generally high prices for oil globally. Due to devaluation of Russian currency, any oil transactions (which are customarily executed in USD) would provide the Russian economy with a significantly higher supply of rubles to support the Russian state and its ability to wage war against Ukraine.

A major development in Russian energy policy and energy flows has been increasing dependence on China for natural gas (Downs and Mitrova 2023). This includes both pipeline gas and LNG. While Russia's dependence on China as a demand source has increased, China has ensured its sources of natural gas are not only diversified but also backed up by other resources, including renewable generation and coal. The deepening and increasingly unequal relationship between the countries could be problematic on several levels, including for Russia, which would need to be increasingly wary of its dealings with China and, potentially, more accepting of China's demands related to both pricing and

³ For example, in 2021 and into 2022 Russia constrained flows of its gas to Europe and has been able to create an environment of high prices and uncertainty of gas supply not only in Europe but also around the world. In response to criticism, Russia stated that it was delivering on its contractual commitments, which was true. However, Russia omitted to add that under regular circumstances and a high price environment, it would have been sending more gas to Europe as it customarily did for many years prior. Earlier, in 2006, Russia cut gas supplies to Ukraine at the end of a cold, long winter.

geopolitics. For Europe and its allies, a China-Russia alliance in energy could also spell problems, if both countries decide to collaborate to achieve geopolitical ends by manipulating demand and supply.

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Abbreviations

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| EU | European Union |
| IEA | International Energy Agency |
| LNG | Liquified natural gas |
| mcm | million cubic meters |