

The long coming European energy crisis

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1 HOW WE GOT HERE

In the last two decades, the European Union has failed in its strategy to secure natural gas from the western Mediterranean region. Therefore the EU has continued to be dependent on Russian gas, which has proven catastrophic to the European energy market. During the exceptionally cold winter of 2021, demand for natural gas increased while the assumed leverage over the Russian gas market proved illusory, as Gazprom did not respond with increased export. Later, the Kremlin utilized its market leverage even further when it initiated what it claimed to be “a special operation” in Ukraine on the 24th of February 2022. And it comes as no surprise that the geopolitical landscape of early 2022 has worsened the energy situation even further. Surges in gas prices have spread across multiple markets like fuel, electricity, and other commodities. Although the primary concern of the war is humanitarian, this paper will only address the consequences in the energy market. Further, it has become clear that investing in more renewable energy technology is not only good for the environment but may also avoid international conflicts as most renewable energy sources are not bound geographically as fossil fuels are. And in the events of war, countries that are not dependent on fossil fuels will not have price surges to the same extent and may avoid a financial collapse.

2 THE UKRAINIAN SUPPLY ROUTE TO EUROPE

EU has long wanted to diversify its natural gas (NG) supply and routes, such that no European region would be solely dependent on Russian resources. If Europe remains dependent on Russian gas (and oil for that matter), this resource leverage is very likely to be used by Russia as a geopolitical weapon to maintain or regain control of former Soviet states. One example of how geopolitical relations has determined the trade of natural gas and oil is the disputes between Russia and Ukraine (more specifically between the Ukrainian gas and oil company Naftogaz Ukrayiny and the Gazprom) over the past two decades. The Ukrainian election in November of 2004 deemed the pro-Russian and corrupt Viktor Yanukovich victorious over Viktor Yushchenko but was later claimed by foreign election monitors to be rigged. This sparked massive protest among hundreds of thousands of Ukrainian citizens and ended in a fair re-election where Yanukovich instead lost to Yushchenko ([1]). The time that followed was marked by several gas price disputes between the Gazprom and Naftogaz Ukrayiny. That was until Yanukovich finally came to power again in 2010. The Russian president at the time, Dmitry Medvedev, and the newly elected Ukrainian president signed an agreement on a 30 percent price decrease in natural gas to Ukraine, in exchange for an extended lease of the Black Sea naval base in Sevastopol, Crimea [2]. The naval base was strategically important in many Russian “ventures” across the black sea, most notably in the country it was situated. In 2014 Crimea was annexed by pro-Russian separatists and Russian forces, which marked the beginning of the Russo-Ukrainian war.

3 NATURAL GAS FROM THE EAST

The European plan to diversify its natural gas imports was to introduce new actors from the middle-east and eastern Mediterranean regions by investing in new pipelines. One of those investments was the EU’s largest

infrastructure project to date named Nabucco, and was backed by several EU member countries and had been in the working for several years. In 2002 it was proposed to deliver natural gas mainly from Iran, but sanctions on Tehran from the west would make the European consortium favor the Shah Deniz gas field of Azerbaijan, situated in the southern Caspian sea. The pipeline was later canceled because the consortium that governs Shah Deniz (and was building Shah Deniz II) chose Nabucco's rival, the Trans-Adriatic Pipeline, or TAP. The planned routes of TAP and Nabucco can be seen in Figure 1. Only delivering the Azeri gas at half the volume of what Nabucco promised, the pipeline passed through the southern parts of Europe: through Turkey, Greece, and Albania to Italy, which already had a diverse selection of energy resources. As a consequence the north-eastern countries of Europe, most notably Bulgaria, Hungary, and Romania suffered since their dependency on Gazprom had not been alleviated [3, 4, 5].



Figure 1: *Planned Nabucco (red) pipeline was canceled in favor of TAP (orange).* source: Radiofree Europe Radio Liberty

In 2016 the promise of eastern Mediterranean gas reignited as UN sanctions on Iran was lifted and the Obama administration sealed the Iranian Nuclear Deal while other sanctions were eased or uplifted. Competing with the Russian gas supply, Russian actors were drawn to obtain stakes in the Iranian gas projects as well, to further strengthen their position in the market. No sooner than 2018 did the European consortium meet resistance once more as the Trump administration abandoned the Iranian nuclear deal. In addition, with an "America First" policy, the US wanted to establish a gas connection across the Atlantic to Europe. It never came into fruition because the Trump administration canceled the Iranian nuclear deal [5].

3.1 A Russian strategy

In recent years, several other pipelines have been established, many of whom are of Russian intent. Among these are most notably the Turkstream and NordStream II. While the demand for natural gas in Europe began to soar in Q4 2021, the question of why Russian suppliers didn't delivered larger volumes emerged. In their right, supply had remained on levels agreed upon in contracts, and one might reason that an opportunistic response to increasing demand is to increase the supply of gas. Some have, however, claimed that the stagnant delivery of resources is a sign of market and price manipulation by Gazprom and Russia [6].

4 THE RUSSIAN INVASION

In a rapid escalation of the Russo-Ukrainian war, Russian forces mobilized to the Ukrainian border, from which they advanced into the country. The move was self-proclaimed as a "special military operation", but later considered by the majority of all other countries as a war effort. The news of the invasion sent global gas prices up sharply as concerns about the future of Russian gas supplies among other commodities to Europe and all other parts of the world grew.

5 EUROPEAN OPTIONS IN THE EVENT OF RUSSIAN NATURAL GAS CURTAILMENT

In March 2022 Mike Fulwood, Jack Sharples, and James Henderson of The Oxford Institute for Energy Studies published a paper ([7]) regarding the current situation of the European gas market with respect to the Russian invasion of Ukraine. Fulwood et al. begin the paper by presenting up-to-date values for natural gas in terms of European production, storage, and imports. Of the total European natural gas supply, 85 percent comes from imports, which is more than domestic production (15 percent, excluding storage) and liquefied natural gas (LNG) imports combined, see Figure 2, for absolute values 2019 to 2021 [7].

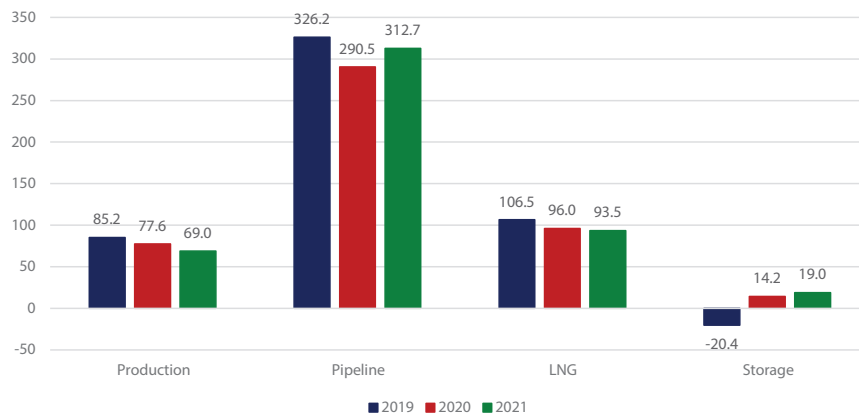


Figure 2: European (EU-27 plus UK) natural gas supply by source in Bcm per year. Data from ENTSOG Transparency Platform, Eurostat, Gas Infrastructure Europe, and Kpler. Graph by authors of [7].

As stressed earlier, the routes from which the imported natural gas is drawn are very important as geopolitical instabilities and agreements-not-met could affect the gas pressure in said pipelines. Prices across multiples markets would skyrocket and in the end affect the end users of each member countries negatively. The import of natural gas comes mainly from Russia, Norway, North Africa, and Azerbaijan, see figure ?? . In 2016 Russia stood for 55 percent of imports and 36 percent of European supply. Specifically, average imports from Russia between 2017 and 2019 were 473 MMcm/d (million cubic meters per day), and setting aside the Covid-19 pandemic (which halted industrial production), averages between October 2020 and June 2021 were 434 MMcm/d. In the period following, between July and December of 2021, the monthly average volume dropped substantially to

around 360 MMcm/d, and continued to decrease to 240 MMcm/d in January 2022; just above half of 2017 volumes. The conclusion drawn from these numbers is that in 2016, Russia accounted for slightly more than a third of the total natural gas supply in Europe. In January 2022, before the war, Russian gas imports had decreased by half of 2017 volumes. Since exports to Europe decreased before the Ukrainian invasion, there is no reason to suspect any increase as long as there is conflict, with sanctions being imposed back and forth. So with non-Russian supply routes already operating at max capacity, any further curtailment on Russian gas simply forces Europe to rely on storage and LNG in the short term [7].

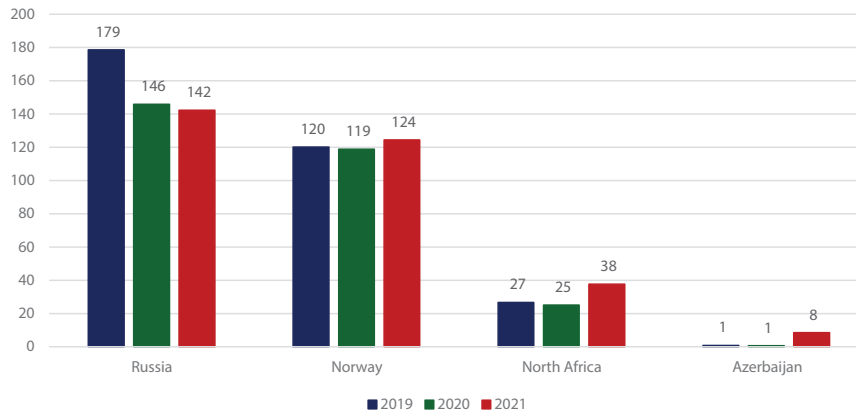


Figure 3: European natural gas imports by source in Bcm per year. Data from the ENTSOG Transparency Platform. Graph by authors of [7].

5.1 Liquefied Natural Gas Infrastructure

Liquefied natural gas (LNG) is not restricted by pipelines and can be delivered by large tankers, called LNG carriers. However, it presents its own complications as Maritime transport spans fewer countries and LNG needs to be transported further inland after reaching port. As the Mediterranean sea has a large European coast, accompanied by the Atlantic west coast, it is still a viable option for Europe. LNG as the name suggests is liquid, which means it has been cooled to cryogenic temperatures of about -160°C prior to transportation. LNG is then loaded onto large carriers in the liquid state. At the terminals, the product is reverted to its gaseous state from which it is transported further inland. This process requires expensive infrastructures and a lot of energy. It is also hard to upscale in a short period of time, say in response to sharply increased demand [8].

5.2 The Role of Liquefied Natural Gas in Europe

The question of whether a stationary pipeline of natural gas is more economically viable than its liquid counterpart LNG may become trivial if an embargo on Russian gas is applied. Several countries have already made such an embargo on Russian gas to make a stance, but frankly only because they can afford to do so. On the second of April, the Baltic states announced that they were no longer importing Russian gas ([9]). But these actions are dealt both ways: on the 27th of April Gazprom announced in a tweet [10] that they will stop delivering natural gas to Bulgaria and Poland as the countries

refused to pay for the gas in Rubels. But can LNG divert the loss of natural gas completely if the European market is to become completely independent of Russian gas? At the beginning of 2022, LNG imports accounted for the equivalent of 490 MMcm/d NG from 370 MMcm/d in Q4 2021. The increase of 120 MMcm/d was able to offset the decrease in Russian NG supply of about 100 MMcm/d. But the infrastructure of LNG terminals around the ports of Europe cannot handle these large volumes experienced in Q1 2022 in the long term and is thus unsustainable. How about domestic production then? With the green energy act, natural gas production is in a steady decline, from 83 bcm (billion cubic meters) in 2017 to 51 bcm in 2021, so there is little to no hope that European factories can ramp up production in the event of Russian NG curtailment. Lastly, we look at storage, which can do a good job at offsetting any decreases, but only for a very limited period of time. The European storage capacity is around 100 bcm, which is about one-fifth of annual demand, and assuming Russian imports account for about a third of total European NG supply, storage alone would only be able to replace Russian gas for seven months, after which it would be depleted. In summary, the goal of leaving Russian gas seems to be very hard to accomplish with current means. The means, however, is in constant change as the EU looks for alternative energy sources in the short, mid, and long term, be it LNG from Africa and USA, or the rapid development of renewable energy [7].

6 CONCLUSION

It is clear that being dependent on essential resources such as natural gas from a superpower poses great risks in terms of geopolitical and economical stability, as well as national security. While increased LNG imports were able to offset the slight decrease in Russian gas to Europe, the current energy infrastructure and energy production in Europe is not enough to sustain its industries and economy. It seems that a promising alternative is to increase the nuclear energy production to support the clean energy transition to phase out coal, oil, and natural gas (much of which has Russian origin). If Europe starts relying exclusively on renewable energy not only would there be a substantial decrease in greenhouse gases and air pollutants, but complications such as those presented in this report can be avoided in the future. One must however acknowledge that the EU cannot be completely isolated from the outside world, and there will always be a trade of commodities and products which may be used as geopolitical leverage. Luckily such strategies will be not as effective as leveraging natural gas. The events are still unfolding when this report is being written, but one thing is almost certain, Europe must become fully reliant on renewable energy, for the sake of the environment, its economical stability and security policy.

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