Interreg Programme
Danube Region

Co-funded by
the European Union

DANUBE REGION
strategy
Energy

MINISTRY OF
FOREIGN AFFAIRS AND TRADE
OF HUNGARY

Study on Energy Crisis Management Experiences in the EUSDR Countries

The Study was prepared for the Ministry of Foreign Affairs and Trade of Hungary

This paper was supported as part of DRP-PAC-PA2, an Interreg Danube Region Programme project co-funded by the European Union with the contribution of partner states and institutions. The content of this paper reflects the opinion of their authors and does not in any way represent opinions of the European Union.

KPMG

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1 Executive summary

KPMG has prepared a coherent and comprehensive analysis of the natural gas markets in the EUSDR countries, with a particular focus on consumption, storage, infrastructure, and market conditions during the winter periods of 2023–2024 and 2024–2025 following the energy crisis (hereinafter referred to as "the Study"), with the contents detailed in the contract with the Ministry of Foreign Affairs and Trade (later on KKM).

As part of the assignment

1. Gas market data across the EUSDR countries was thoroughly assessed
2. The roles of these countries within the regional and wider European gas landscape were analysed in an integrated context
3. Key challenges stemming from the energy crisis were examined, along with their market implications
4. National responses to the past two winter periods (2023–2024 and 2024–2025) were reviewed and synthesized
5. Potential future infrastructure developments with the capacity to reshape market dynamics were explored

The findings clearly indicate that gas prices increased across the region following the 2022 crisis and the gradual decline of Russian supply. Although certain countries - primarily Romania and Croatia, which benefit from relatively high domestic production in proportion to their consumption - were less sensitive to these price hikes, it is evident that the shifts in market conditions compelled all countries to adapt and respond. One of the most visible outcomes of this adjustment is the decline in natural gas consumption, a trend was observed across all EUSDR countries. Additionally, in those countries where gas storage is available, a marked increase in storage utilization has been recorded. Several countries responded with local regulatory adjustments- such as price caps, tax incentives, and various forms of subsidies. At the same time, regulatory changes also occurred at the EU level, including initiatives like REPowerEU, AggregateEU, mandatory storage obligations, and voluntary demand reduction measures. In parallel, a

number of infrastructure developments supported the transformation of the EUSDR countries' supply portfolios, notably through the integration of LNG sources.

In addition to the detailed overview of recent developments, it is also clear that ongoing and planned infrastructure projects - ranging from the expansion of European LNG import capacity to the increase in U.S. export capabilities, the development of the Vertical Gas Corridor, and the integration of new European production fields into the continental market - collectively point to a significant opportunity for further diversification of supply sources. This applies not only to Europe as a whole, but also specifically to the EUSDR countries, enhancing their resilience and flexibility within the evolving gas market landscape.

2 Background

The European energy landscape has undergone profound and rapid changes in recent years, driven primarily by the geopolitical shockwaves following the 2022 energy crisis and the accelerated decline in Russian gas imports. These developments have brought the question of energy security - and within it, the role of natural gas - to the forefront of both national and EU-level policy agendas. Within this broader European context, the Danube Region (EUSDR) holds a strategically important position. It includes both gas-producing and gas-transit countries, as well as several that are heavily import-dependent. This diversity makes the region a unique microcosm for analyzing the structural challenges and opportunities arising from the reconfiguration of European gas markets.

Natural gas, as a transitional fuel in the path toward decarbonization, remains essential for ensuring supply security, balancing intermittent renewable sources, and supporting industrial competitiveness. However, the abrupt shift away from Russian pipeline gas has created an urgent need for alternative sourcing strategies, demand-side adjustments, and infrastructure enhancements across the continent - challenges that are particularly pronounced in the EUSDR countries due to their historical dependency on Russian supply routes and their varying levels of market integration and infrastructure readiness.

In this context, analysing the responses to the crisis - ranging from short-term demand reduction and regulatory interventions to long-term diversification of supply sources - is not only timely but critical. It allows for a clearer understanding of regional vulnerabilities, adaptation strategies, and the emerging patterns of cooperation and investment.

This study aims to provide such an analysis, offering evidence-based insights into how the EUSDR countries have navigated the recent period of disruption, how their gas markets are evolving, and what role they may play in shaping a more resilient and integrated European gas system.

Consequently, the Ministry of Foreign Affairs and Trade initiated a comprehensive assessment of how the EUSDR countries have responded to the energy crisis, with the overarching goal of gaining an in-depth understanding of the potential phase-out of

Russian natural gas in the Danube Region. This includes examining the impacts of this shift and the resulting structural changes across the region.

As a first step in this effort, KPMG has developed a state-of-the-art study that explores the responses of Danube Region countries to the energy crisis. The study analyses how regulatory measures and infrastructure developments have contributed to managing the reduction of Russian gas supplies, while also identifying the key strengths and vulnerabilities within the region's current gas market framework.

3 Our approach

This analysis focused on the gas market adaptation experiences of the Danube Region during the 2023-2024 winter period, with particular attention to the impact of EU-level measures such as REPowerEU and related policy initiatives. The goal was to understand how these interventions influenced natural gas consumption patterns and usage across EUSDR countries.

A central element of our methodology was the collection, interpretation, and synthesis of data from Eurostat, ENTSOG, AGSI, IEA and other relevant data sources. These datasets allowed for a comprehensive evaluation of recent developments in gas consumption, storage utilisation, and price trends. Based on this quantitative foundation, we assessed the evolving role of EUSDR countries in the European gas market - examining their past trajectories, current positions, and potential future relevance.

Building on this data-driven insight, we analysed key regulatory changes both at the EU and national levels to understand how the European countries responded on a policy level. In parallel, we reviewed completed and planned infrastructure developments to assess the extent to which physical connectivity and diversification efforts have enhanced the region's resilience to supply shocks and market volatility. This integrated approach ensured a thorough understanding of both the structural and strategic shifts shaping the Danube Region's energy landscape.

4 EUSDR country analyses

The following chapter provides a detailed data-driven analysis of the changes related to natural gas consumption, supply patterns, storage utilization and market prices in the EUSDR countries during the past two winter seasons (2023–2024 and 2024–2025). Drawing primarily on data from Eurostat and the Aggregated Gas Storage Inventory (AGSI), the analysis explores the situation and roles of individual countries within both the regional and broader European gas markets. This includes an assessment of their functions in gas transit, production and storage capacity, as well as their overall impact on market dynamics at the regional and EU levels. This assessment aims to identify structural shifts in gas supply consumption patterns and storage utilization, evaluate the resilience of national energy systems, and understand the implications for cross-border energy security challenges. Special attention is given to demand-side adaptations, storage fill levels ahead of the heating seasons, and the extent to which coordinated EU measures-such as demand reduction targets and joint procurement mechanisms - have influenced national-level outcomes.

Throughout this chapter, the country-specific one-pagers present key gas market indicators based on the following methodologies and data sources:

- Consumption: Defined as inland natural gas consumption, as reported by Eurostat.
- Import Dependency: Measured as the annual ratio of natural gas imports to inland consumption for the respective country.
- Storage Levels: Based on data provided by Gas Infrastructure Europe (GIE).
- Prices: Derived from Eurostat's official gas price statistics.

4.1 Summary of the EUSDR countries

In this section, we present how the EU Strategy for the Danube Region (EUSDR) countries responded to the 2022 energy crisis and how they adapted during the subsequent winter periods. We examine both the macro-level transformations in the regional natural

gas markets and the shifts in market operation that emerged in response to the crisis through the most relevant key performance indicators.

KPMG has

- Analysed the evolution of gas consumption across the region, the potential drivers behind these changes, and how they may influence the region's long-term strategic role within the broader European energy and natural gas landscape.
- Furthermore, we have assessed the extent to which storage infrastructure was effectively utilized, and identify the potential challenges posed by extreme weather conditions, particularly in anticipation of the 2025–2026 winter period.
- Last, we have reviewed the development of regional wholesale gas prices in relation to the benchmark European market index on TTF. This analysis highlights how the unprecedented price spikes translated into wholesale markets during the crisis period and evaluates the extent to which these dynamics shaped the relevant EUSDR markets.

4.1.1 Consumption

Consumption data reveal a clear downward trend within the EUSDR countries, with aggregate consumption across the region decreasing by approximately 19% from around 148 billion cubic meters (bcm) in 2021 to roughly 120 bcm in 2024. This decline is one of the most visible consequences of the 2022 energy crisis, and it highlights both immediate and longer-term structural shifts in regional gas demand. **Germany**, as the region's largest consumer, recorded the most significant absolute drop in consumption, falling from nearly 90 bcm in 2021 to around 75 bcm in 2024. This contraction reflects a combination of industrial demand reduction, fuel-switching in power generation, and widespread energy efficiency measures. Other large economies such as **Italy** and **France** also registered notable reductions in consumption, aligned with national decarbonization targets as well as crisis-induced demand management policies. Smaller economies in Central and Eastern Europe including **Austria**, **Hungary**, **Czechia**, **Romania**, **Slovakia**, and **Bulgaria** followed a similar, albeit more moderate trajectory. While the absolute consumption levels have been lowered in these countries, relative declines signal that

crisis-response measures were broadly adopted across the region. In many cases, the most significant reduction occurred between 2021 and 2022, immediately following the Russian invasion of Ukraine, with record-high wholesale prices, and mounting concerns about winter supply security. However, what is particularly noteworthy is that demand remained suppressed throughout the following years, i.e. in 2023 and 2024, implying the possibility that lowered consumption levels will remain in the adjusted European energy consumption mix.

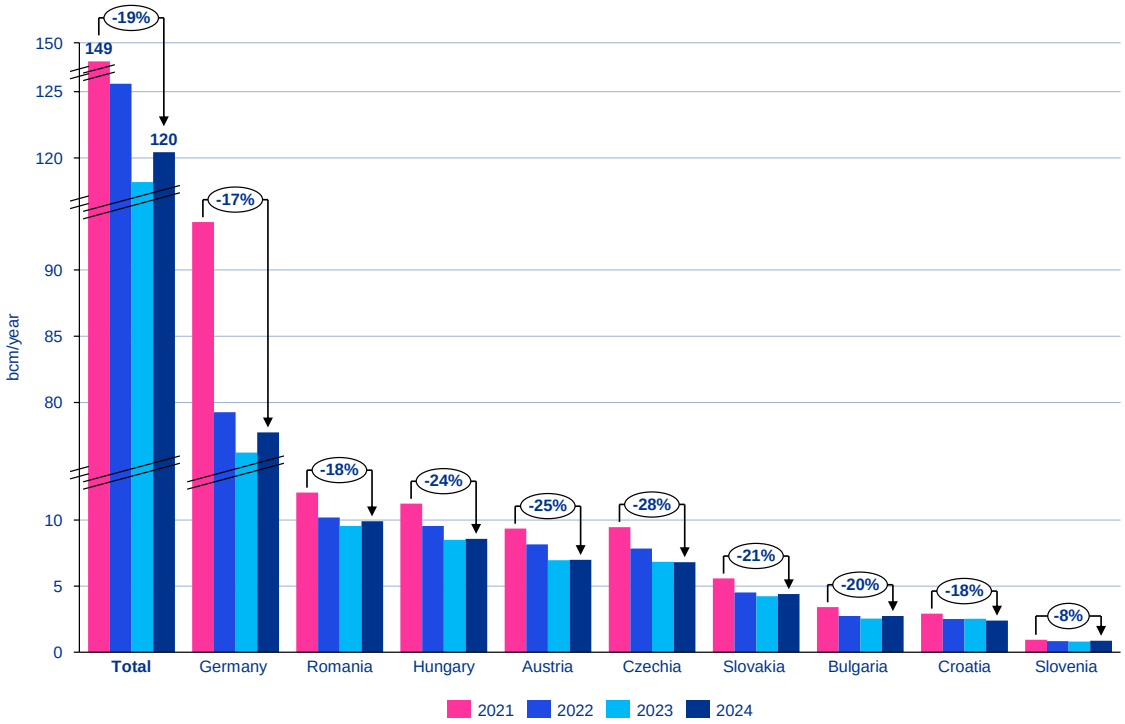


Figure 1: Natural gas consumption of the EU member state EUSDR countries for 2021-2024 (bcm)[10]

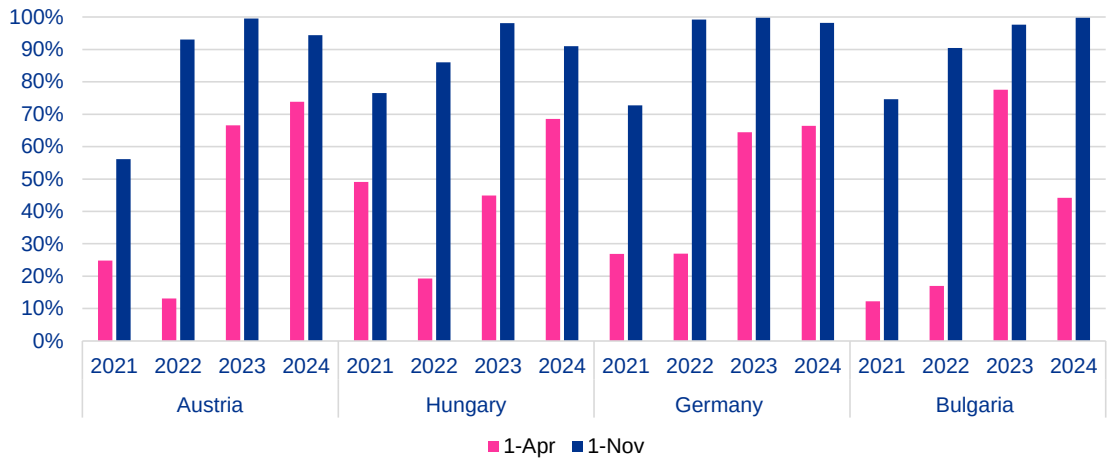
Demand-side shifts have significant implications for the region's future position within the European energy system. As total consumption declined so did the import dependency, which have altered the configuration of cross-border flows, LNG terminal utilization, and long-term contractual commitments and partnerships. For policymakers and infrastructure developers, the prospect of a potentially continuously decreasing gas demand raises fundamental questions about the economic viability of major transmission expansions and about how to best calibrate strategic storage and flexibility options. The potential of colder-than-average winters particularly in 2025–2026 could temporarily reverse the recently declining demand trend. Additionally, in case of industrial production

rebound or intensification of coal phase-out efforts, without sufficient renewable capacity integration, natural gas could further increase its role as a transitional fuel. Finally, the geopolitical landscape remains volatile, therefore any major disruption could yet again redefine the regional demand dynamics.

In summary, the EUSDR region seems to be in a transition, one that has absorbed the shock of the 2022 crisis with remarkable speed and resilience, and which is now in the process of redefining its structural role in the European gas market under new economic and supply security realities.[10]

4.1.2 Storage

Charts below displays the natural gas storage fill levels for selected EU member states of the EU Strategy for the Danube Region (EUSDR), recorded on two critical dates: 1st of April (marking the end of the heating season and the beginning of the storage injection season) and 1st of November (representing the official start of the winter stprage withdrawal season). Data cover four consecutive years from 2021 to 2024 and allow an important insight into how the countries have adapted their storage strategies in response to the energy crisis and growing security-of-supply concerns during this period.



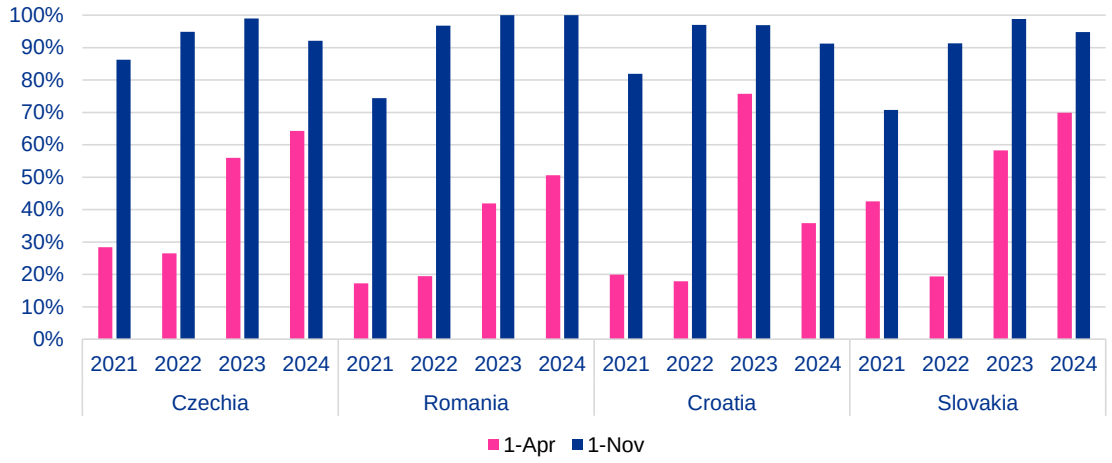


Figure 2: Natural gas storage levels in the EU member state EUSDR countries for 2021-2024[12]

From a regional perspective, the most remarkable trend is the consistent achievement of exceptionally high storage fill levels by 1st of November in each year from 2022 onwards. Following the 2022 crisis and the resulting disruption of Russian pipeline flows, all EU countries have reached an approximately 90–100% storage capacity filled with natural gas ahead of the winter period. This coordinated effort to maximize pre-winter stored reserves indicates a shift in approach across the region, where storage is no longer seen merely as a buffer for seasonal demand but as a **strategic asset for market resilience and crisis management**.

On the other hand, the 1st of April values, reflecting post-winter residual storage levels, offer a useful proxy for winter gas usage and consumption pressure on stored volumes. In 2022, the region entered the injection season with relatively low residual levels (e.g. Hungary and Germany at around 20%, while Bulgaria below 15%), reflecting high winter withdrawals and limited ability to preserve strategic reserves. However, by 2023 and especially 2024, April values increased significantly across the countries, which can be attributed to three key market changes:

1. **Demand-side adjustments**, including structural consumption reductions and improved efficiency
2. **Mild winters**, limiting withdrawal needs

3. **Market awareness**, as part of which countries sought to maintain higher end-of-winter storage reserves to be prepared for potential late-season supply shocks or injection difficulties.

For instance, **Hungary** and **Slovakia**, both with extensive storage infrastructure, recorded post-winter storage levels well above 40% in April 2024, compared to roughly 20% in 2022. **Germany**, despite being a large consumer, followed a similar trajectory, demonstrating stronger coordination between demand reduction, import diversification, and storage management strategy. **Austria**, **Czechia**, and **Croatia** also maintained sufficient storage level, often above 30–40% at the end of winter, due to the above-mentioned mild winter seasons.

By contrast, countries with more limited storage capacity, such as **Bulgaria** and **Romania**, continue to show more volatile April storage levels. Nevertheless, even in these cases, the November fill levels reached near-maximum across all years post 2022, reflecting a solid compliance with EU storage obligations well-functioning, integrated European gas market.

In overall, past winter periods underscore an **increasing strategic role of underground gas storage** within the EUSDR region. The consistently high pre-winter levels from 2022 onward reflect strong political support, regulatory compliance (including the EU's storage mandate), and an increasing perception of storage as a well-established instrument to respond to both market volatility and geopolitical instability. Rising April reserves further imply that countries are transitioning from a model which utilises capacities for handling seasonal consumption differences to one where countries are more cautious about their storage usage and flexibility options.

Looking forward, these trends might point to a more storage-dependent regional gas strategy, whilst the shifting approach would require further investments in storage infrastructure, development of cross-border balancing mechanisms and demand-side flexibility, especially in light of potential challenges posed by extreme weather conditions, infrastructure bottlenecks, in the 2025–2026 winter and beyond.[12]

4.1.3 Market price

The below chart provides a comparative overview of the price spreads between key global natural gas market benchmarks between 2020 and 2024, with a particular focus on the evolution of Europe's position relative to other global hubs. It highlights the spread dynamics between the European Title Transfer Facility (TTF) used as a Baseline, with a value of zero, and other significant gas exchange indexes, such as the Henry Hub (USA), JKM (Asian LNG spot), as well as regional European hubs including THE (Germany), CEGH (Austria), and CEEGEX (Hungary).

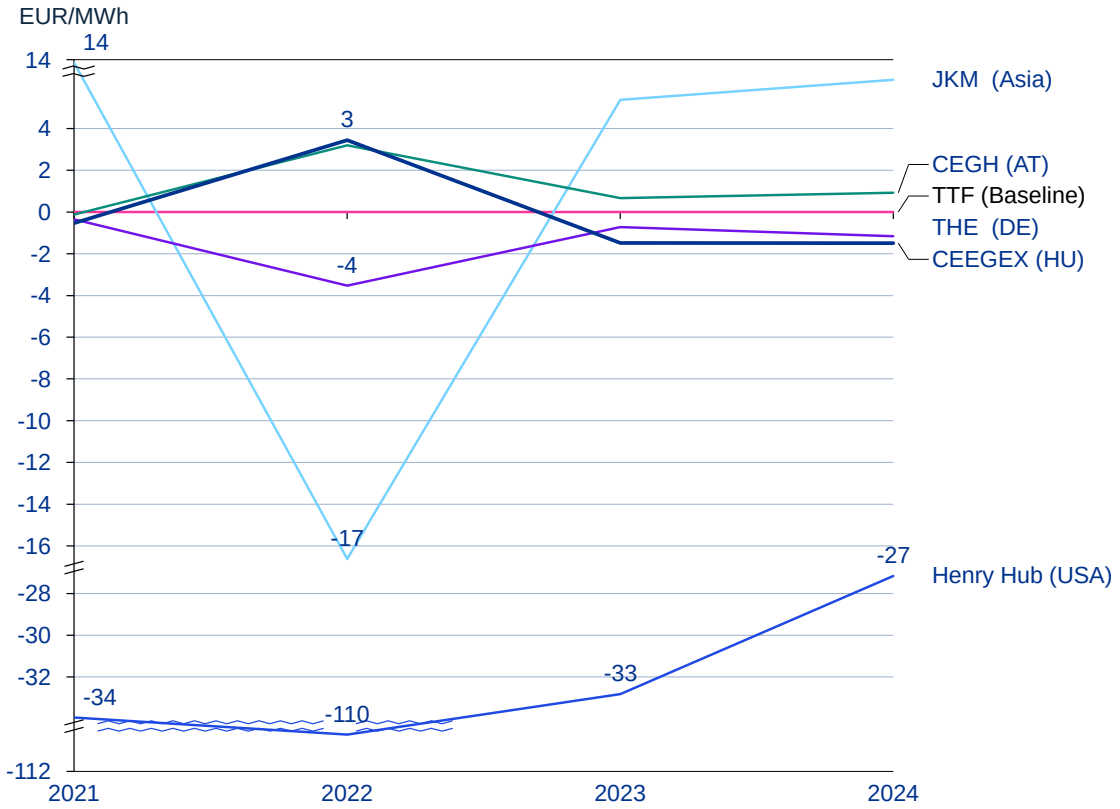


Figure 3: Price indexes compared to TTF baseline, 2021-2024

In the period prior to the 2022 crisis, the spreads between TTF and most of the other indexes remained modest, indicating relatively integrated and balanced global gas market operation and conditions. Regional European hubs such as the THE, CEGH, and CEEGEX traded in close alignment with TTF, reflecting the interconnected nature of the European gas infrastructure and the high level of price convergence within the EU internal market. On a global level, **TTF–JKM spread** was relatively narrow, with Asia and

Europe often competing in similar price bands for LNG cargoes. On the other hand, the **TTF–Henry Hub spread** was negative, yet relatively stable, representing the transatlantic cost differential driven largely by domestic production surpluses and limited export infrastructure in the United States.

The 2022 energy crisis introduced a structural detachment of the above price alignments and connections. Triggered by the reduction in Russian pipeline flows, the European market experienced a profound supply shock that forced the TTF benchmark to soar to unprecedented levels. For the first time, **TTF prices exceeded those of the JKM**, a clear indication that Europe was compelled to outbid Asia on the spot LNG market to secure immediate deliveries and compensate for lost pipeline volumes. This phenomenon underscores how Europe's short-term security of supply imperatives had an impact on restructuring global LNG trade flows, making TTF the most important price setting trading hub. At the same time, the price **spread between TTF and other European hubs** widened slightly, but these regional divergences remained between manageable limits. Despite supply pressure and volatility, the EU internal market cohesion held firm, supported by storage reserves, demand reductions, and cross-border solidarity mechanisms. The spreads between TTF and CEGH, THE, and CEEGEX remained relatively narrow even at the height of the crisis, showing that while European energy markets faced certain economic challenges, it remained internally integrated.

As local markets began to stabilize and emergency dynamics receded from 2023 onwards, price spreads narrowed across the board:

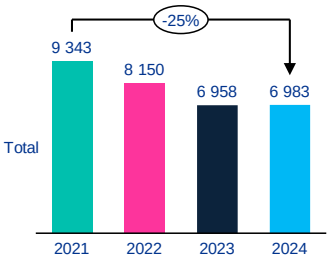
- Connection between **TTF and regional European hubs**' price levels returned to more typical, pre-crisis levels, aligning with restored flow levels, normalized storage cycles, and lowered overall volatility.
- The **TTF–Henry Hub spread** remained negative, underlining the structural cost disadvantage that Europe faces post-crisis compared to the United States. As the US domestic gas remains cheap and abundant, while European buyers continue to rely on costly LNG imports, this spread has become a persistent reflection of Europe's exposure to global marginal gas pricing.

- In parallel, the **TTF–JKM spread** rebalanced but remained volatile, suggesting ongoing competition between Europe and Asia for flexible LNG supplies, while this also means that the European gas market and its price level are much more dependent on the global LNG market than it was before the crisis

In summary, price spread dynamics of the recent years reflect a clear structural shift on the market. Prior to 2022, natural gas pricing was regionally anchored and relatively balanced within Europe, the crisis temporarily disrupted this equilibrium, elevating Europe to a premium market whilst putting pressure on it to absorb global LNG at record high levels. Although the wide spreads have since stabilized to a manageable level, the underlying message remains: Natural gas on the European markets remains significantly more expensive than in North America, while its supply has become increasingly dependent on the import of flexible LNG, exposing it to global gas markets and price volatility. This might create a fundamental competitive disadvantage, particularly when benchmarked against gas-rich regions like the United States.

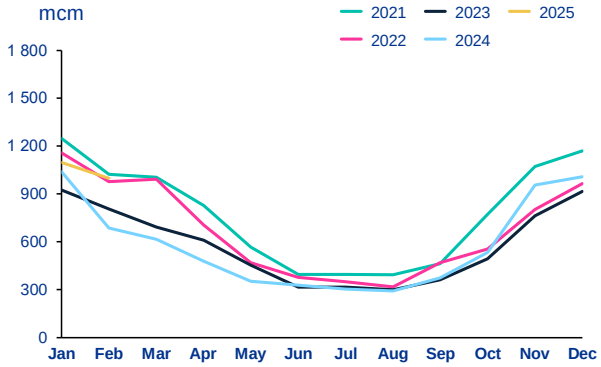
4.2 Austria

Consumption

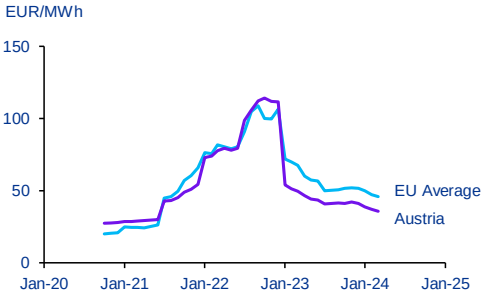


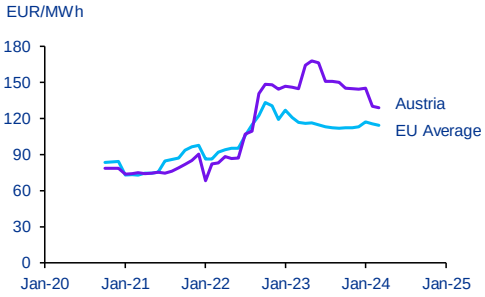
2 360 mcm

Total consumption decrease to 2024 compared to 2021



Prices





Industrial Consumer Prices

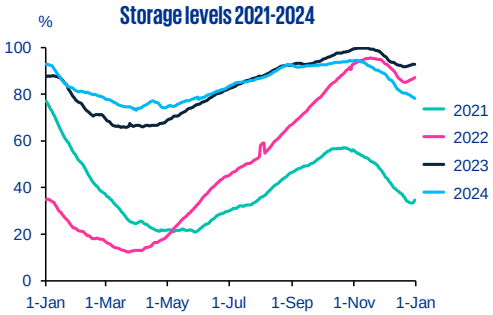
In Austria industrial natural gas prices largely followed the European average, as the country's heavy reliance on Russian pipeline delivered gas made the domestic market vulnerable.

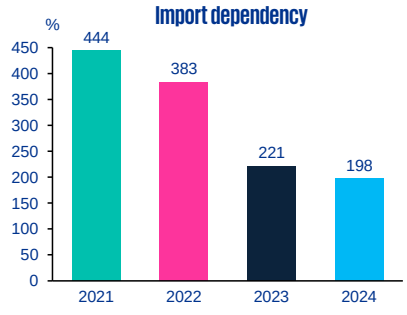
Household Consumer Prices

Residential gas prices in Austria followed a similar trend as the industrial sector but from September 2022 remained consistently above the EU average.

The most significant recent change in the Austrian gas market has been the sharp decline in its transit role. Once a major node on the Brotherhood pipeline and a key supply hub for Central and Eastern Europe, Austria's transit importance has waned considerably due to reduced Russian gas flows..

Import dependency and storage





Austria plays a **crucial balancing role** within the EUSDR gas markets. Its local **gas market exchange**, the Central European Gas Hub (CEGH) at the Austrian Virtual Trading Point (VTP), ranks as the second most liquid market in the region[1], following the German Trading Hub Europe (THE) in terms of traded volume and market activity[2].

Prior to the Russian–Ukrainian war, Austria was a key transit country due to significant gas volumes arriving via the Brotherhood pipeline[3], as well as inflows from Germany originating from the Nord Stream and Yamal corridors. These steady gas imports positioned Austria as a major supplier to Italy and neighboring countries such as Hungary and Slovenia for decades.[4]

The onset of the war in February 2022 led to a sharp and sustained **reduction in Russian gas supplies**. Russian gas deliveries to Austria had already begun to decrease from June 2021, but the conflict exacerbated this trend. By May 2022, gas flows via the Yamal pipeline had ceased entirely, and Nord Stream deliveries fell by 60% from peak capacity between late May and June 20, 2022, eventually reaching zero by September.[5] Although physical gas flows shifted significantly, Austria successfully maintained high market liquidity, and the CEGH price indexes continued to function as essential regional price references.

Residual transit volumes from Ukraine persisted temporarily, but these flows had also ceased by early 2025[6]. Despite the substantial loss of Russian gas, Austria sustained its role in regional market balancing through diversified imports. These included increased

[1] Central European Gas Hub AG. (2025, January 22). *CEGH VTP reached its third-highest trading volume in its history*. https://www.cegh.at/en/cegh-result-year-2024/?utm
[2] Pontenagel, P. (2025, March 14). *All you need to know about the German gas market – Trading Hub Europe*. Time2Market. https://www.time2market.net/blog/all-you-need-to-know-about-the-german-gas-market-trading-hub-europe
[3] Reuters. (2024, May 23). *Austria's significance as gateway to Europe for Russian gas*. https://www.reuters.com/business/energy/austrias-significance-gateway-europe-russian-gas-2024-05-23/
[4] Hess, M. (2025, April 22). *How Eastern Europe overhauled its natural gas market*. Carnegie Endowment for International Peace. https://carnegieendowment.org/research/2025/04/how-eastern-europe-overhauled-its-natural-gas-market?lang=en
[5] Keliauskaitė, U., McWilliams, B., Sgaravatti, G., & Zachmann, G. (2021). *European natural gas imports*. Bruegel Datasets. https://www.bruegel.org/publications/datasets/european-natural-gas-imports/
[6] Reuters. (2025, January 1). *Russian gas exports via Ukraine cease as transit deal expires*. Reuters. https://www.reuters.com/business/energy/russia-halts-gas-exports-europe-via-ukraine-2025-01-01/

volumes of Norwegian pipeline gas via Northern Europe[7], North African gas (primarily from Algeria) through Italy[8], and LNG delivered to Western European terminals[9].

Austria achieved a marked reduction in **domestic gas consumption** over recent years. By 2024, consumption had declined by approximately 25% compared to 2021, falling from 9.34 bcm to 6.98 bcm.[10] This reduction was largely driven by the extreme price surges during the summer of 2022, when industrial gas prices exceeded €100/MWh. Although prices fell back to the €50–70/MWh range in early 2023, demand did not rebound to pre-crisis levels.[11] Contributing factors included persistently high gas prices relative to historical averages, mild winter temperatures, and EU policies promoting demand reduction through regulatory and subsidy frameworks.

Historically, Austrian **gas prices** have been strongly influenced by Russian flows and the established European supply structure. Industrial gas prices dipped below the EU average in early 2023, while household gas prices, which spiked above the EU average in 2022, remained elevated throughout 2023 and 2024. This price trajectory reflected both the changing supply landscape and broader European pricing trends.[11]

Austria's **gas storage infrastructure** has proven reliable, supported by mild winter conditions in 2022–2023 and 2023–2024. This stability allowed storage levels to remain above 60% at the onset of summer injection seasons, consistently meeting the EU-mandated 90% storage target before the heating season. The 2024–2025 winter, although

[7] Reuters. (2023, September 27). *Norway's Equinor signs 5-year gas supply deal with Austria's OMV*. MarketScreener UK. https://uk.marketscreener.com/quote/stock/OMV-AG-6492022/news/Norway-s-Equinor-signs-5-year-gas-supply-deal-with-Austria-s-OMV-44928949/

[8] European Network of Transmission System Operators for Gas (ENTSOG). (2024). *Physical flow and firm technical capacity data for IT-AT border points*. Retrieved from https://transparency.entsog.eu/#/points/data?from=2024-09-30&indicators=Physical%20Flow%2CFirm%20Technical&points=it-tso-0001itp-00040exit%2Cat-tso-0003itp-00040entry

[9] Al-Mansoori, M. (2024, November 8). *The Austrian model: Analyzing Europe's options for facing an imminent disruption of Russian gas flow via Ukraine*. FutureUAE. https://www.futureuae.com/en-US/Mainpage/Item/9817/the-austrian-model-analyzing-europes-options-for-facing-an-imminent-disruption-of-russian-gas-flow

[10] Eurostat. (n.d.). *Database*. European Commission. Retrieved April 24, 2025, from https://ec.europa.eu/eurostat/en/web/main/data/database

[11] European Commission. (2024). *Dashboard for energy prices in the EU and main trading partners 2024*. Retrieved from https://energy.ec.europa.eu/data-and-analysis/energy-prices-and-costs-europe/dashboard-energy-prices-eu-and-main-trading-partners-2024_en

colder than the preceding two years, did not result in supply bottlenecks due to stable LNG and other regional pipeline supplies. Nevertheless, increased gas withdrawals led to storage levels being 14% lower in January 2025 compared to the previous year.[12]

The phase-out of Russian gas supplies has profoundly impacted Austria and the broader European gas market, resulting in historically high gas prices from 2022 to 2024 and significantly increased market volatility.[11] This transition prompted fundamental changes in risk management strategies and supply diversification efforts among market participants.

Amid heightened volatility, trading companies prioritized hedging while leveraging market dynamics. For consumers, the new market environment translated into higher prices, shorter contract durations, more stringent payment terms, and less favorable contractual conditions. The withdrawal of Russian gas from the Western European market led to a supply bottleneck, which was partially offset by increased LNG imports. However, the European gas market has become more sensitive to global factors, including Asian demand, geopolitical risks, and disruptions such as labour strikes, reflecting the inherently global nature of LNG trade.[13]

Market Overview and Outlook

Looking ahead, the expansion of LNG supply from the United States and other sources may alleviate pressure on the European gas market. Nevertheless, challenges persist for the 2025/2026 winter season and beyond, as lower starting storage levels could drive significant domestic price increases. As global LNG prices fluctuate, Austria's reliance on diversified imports will remain a critical factor in maintaining market stability.

[12] Gas Infrastructure Europe. (n.d.). *Data Overview*. Retrieved April 14, 2025, from https://agsi.gie.eu/data-overview/AT

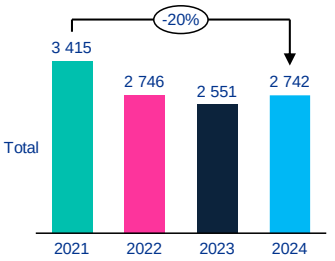
[13] Adolfsen, J. F., Lappe, M.-S., & Manu, A.-S. (2023). Global risks to the EU natural gas market. *Economic Bulletin, Issue 1/2023*. European Central Bank. Retrieved April 14, 2025, from https://www.ecb.europa.eu/press/economic-bulletin/focus/2023/html/ecb.ebbox202301_01~6395aa7fc0.en.html

Austria’s gas market is expected to remain exposed to global price volatility, given the growing interconnectivity of gas supply chains. While the increased availability of alternative gas sources has strengthened Austria’s energy security, the potential for geopolitical disruptions, particularly related to LNG supply chains or regional conflicts, poses an ongoing risk. Despite these uncertainties, Austria's proactive diversification and strategic adjustments place it in a relatively resilient position compared to the onset of the energy crisis in 2022.[14]

[14] International Energy Agency. (2025). *Gas Market Report, Q2-2025*. International Energy Agency. Retrieved April 14, 2025, from https://www.iea.org/reports/gas-market-report-q2-2025

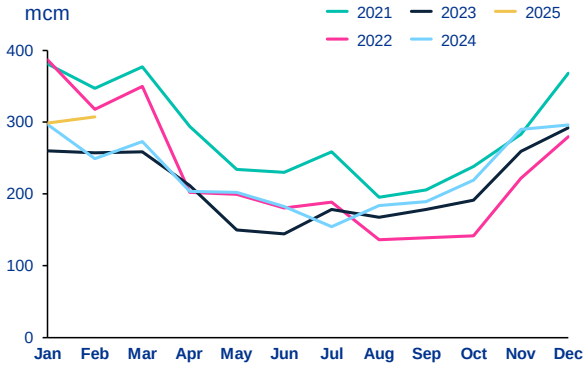
4.3 Bulgaria

Consumption

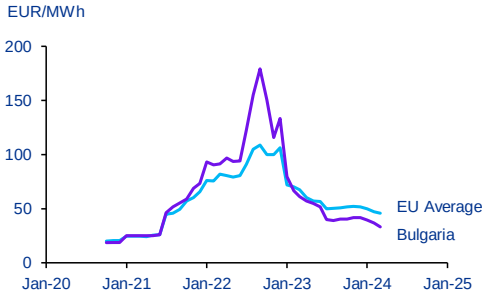


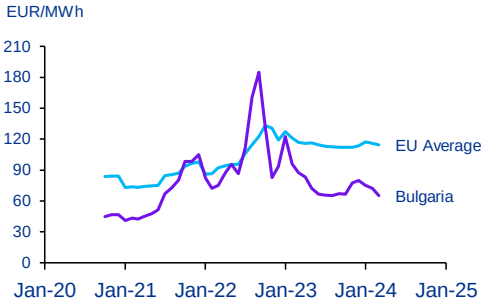
673 mcm

Total consumption decrease to 2024 compared to 2021



Prices





Industrial Consumer Prices

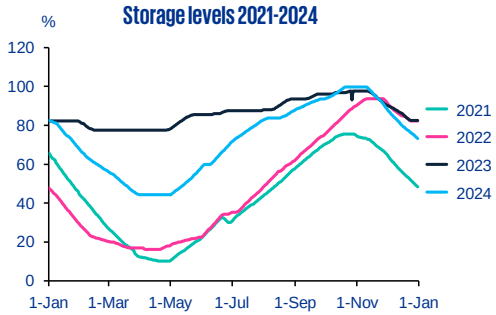
In Bulgaria, industrial natural gas prices peaked above the EU average, reaching around 180 EUR/MWh in September 2022. However, by the second half of 2023, prices had fallen below the EU average.

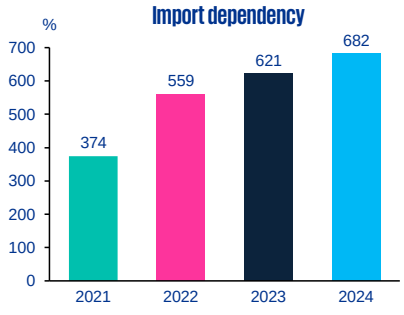
Household Consumer Prices

Residential prices followed a similar trend as the industrial sector, peaking above the EU average in September 2022 and remaining highly volatile during the years of the crisis.

In contrast to Austria, Bulgaria's role in Central and Eastern European gas supply grew significantly by the end of 2024. With the prominence of the TurkStream pipeline and the Greek Alexandroupolis LNG terminal, Bulgaria has become a key player in the gas supply to the Balkans.

Import dependency and storage





Bulgaria has emerged as a pivotal **transit hub within Southeast Europe's gas network**. The country hosts the entry point of the Balkan Stream pipeline (the European leg of TurkStream) at Strandzha 2, situated on the Turkish–Bulgarian border. This pipeline, comprising two parallel strings each with a capacity of 15.75 billion cubic meters (bcm), serves as a conduit for gas from Turkish transit and production, facilitating flows into Europe via Bulgaria.[15]

Following the **expiration of the long-term Russian transit agreement** in 2024, coupled with the suspension of deliveries through the Yamal and Nord Stream pipeline routes, TurkStream has become the primary Russian pipeline connection to Europe.[5] Bulgaria's gas infrastructure also connects westward into the EU through interconnections with Greece, Serbia, and Romania. The Greece–Bulgaria Interconnector (IGB), operational since 2022, enables imports from Greece's liquefied natural gas (LNG) and Trans Adriatic Pipeline (TAP) supplies, thus enhancing supply diversity.[16]

Bulgaria's **domestic gas market** remains relatively small and is historically state-dominated, with Bulgargaz as the primary supplier.[17] Despite recent governmental initiatives to liberalize the market and promote a gas exchange, private trading activities remain limited. As Bulgaria lacks a significant independent trading hub, local market liquidity is low, with traded volumes remaining minimal. This absence of a domestic hub constrains hedging opportunities for end-users, creating extrinsic location spread risk, particularly in relation to storage hedging. [18]

Since the commissioning of TurkStream in 2016, Bulgaria has become a critical transit bridge for Russian gas from Turkey (domestic string) to Europe (western string). In 2021–2022, approximately 40% of Bulgaria's gas imports were sourced from Russia through

[15] TurkStream. (n.d.). *Benefits*. TurkStream. Retrieved May 13, 2025, from https://turkstream.info/project/benefits/
[16] ICGB AD. (n.d.). *IGB project*. Retrieved May 13, 2025, from https://www.icgb.eu/about/igb-project/
[17] Bulgargaz EAD. (2022, January 9). *Press release*. https://www.bulgargaz.bg/en/news/279
[18] Charisi, E. (2024, January 22). *Bulgarian gas market needs more competition: Overgas*. Argus Media. https://www.argusmedia.com/en/news-and-insights/latest-market-news/2530210-bulgarian-gas-market-needs-more-competition-overgas

TurkStream, supplemented by smaller volumes from Azerbaijan via TAP and limited domestic production.[19]

Following the Russian invasion of Ukraine in 2022, **gas imports** via Ukraine ceased. From January 2025, TurkStream remained the sole Russian pipeline supplying gas to Europe, with annual flows through Strandzha 2 (Turkey–Bulgaria) totaling approximately 15.5 bcm, divided between the domestic (Turkey) and European (Bulgaria) strings.

In April 2022, Bulgaria abruptly ceased direct gas purchases from Gazprom, as the Energy Ministry aligned its policies with EU directives. Consequently, the country rapidly tried to diversify its gas supply portfolio, increasing LNG imports via the Revythoussa terminal in Greece and establishing supply routes for Israeli and Azerbaijani gas. The commercial operation of the IGB pipeline from mid-2022 enabled Azerbaijani TAP gas and LNG to enter Bulgaria. Additionally, Bulgarian companies secured spot or short-term LNG contracts (including U.S. and Qatari LNG) delivered via Greece.[20]

Despite the cessation of their direct Russian contracts, and their dispute over the taxation of Russian transit gas back in 2023,[21] indirect Russian gas flows persisted through brokered deals and Bulgaria is still a relevant part of the Russian transit as a vital part in the TurkStream route towards Europe.

Bulgaria's annual **gas consumption** was approximately 3.4 bcm in 2021. However, demand decreased significantly after the onset of the crisis, driven by higher prices, efficiency measures, and milder winters, reducing consumption to 2.7 bcm by 2024 showing a decline of 20%.[10]

Wholesale gas prices in Bulgaria mirrored the volatility of the broader European gas market. Prices for industrial consumers peaked at around 180 EUR/MWh in September 2022, later declining to below 70 EUR/MWh in 2023. Due to the lack of a domestic hub

[19] World Bank. (2025). *Bulgaria natural gas in gaseous state imports by country, 2022*. Retrieved May 13, 2025, from https://wits.worldbank.org/trade/comtrade/en/country/BGR/year/2022/tradeflow/Imports/partner/ALL/product/271121

[20] LNG Prime Staff. (2023, January 18). *DESFA: Greece received record 78 LNG cargoes in 2022*. LNG Prime. https://lngprime.com/lng-terminals/desfa-greece-received-record-78-lng-cargoes-in-2022/71066/

[21] "Bulgaria's Tax on Russian Gas Sparks Diplomatic Tensions." *OilPrice.com*. Retrieved from https://oilprice.com/Energy/Natural-Gas/Bulgarias-Tax-On-Russian-Gas-Sparks-Diplomatic-Tensions.html

index, contract prices remained linked to TTF or CEGH benchmarks. In response to price volatility, the government implemented consumer support measures, including capping household tariffs and issuing subsidies, while industrial consumers continued to face prices closer to wholesale levels. By February 2023, prices had fallen below the EU average and remained among the lowest within the Union.[11]

Bulgaria's only underground **gas storage** facility, Chiren, has a working gas capacity of 550 million cubic meters (mcm). Before the crisis (August 2022), storage levels were relatively low, at 61.7% of the capacity. To improve energy security, Bulgaria accelerated its storage injections, reaching a 100% filling level by October 28, 2024, surpassing the EU's 90% target well ahead of the deadline. This achievement significantly strengthened Bulgaria's energy security for the winter of 2025.[12]

Market Overview and Outlook

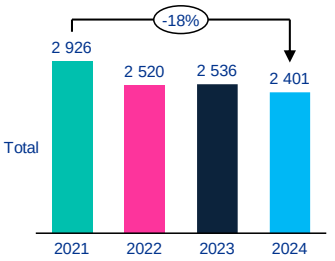
The 2022 energy crisis exposed the volatility and limited resilience of Bulgaria's gas market. In response, Bulgarian traders and utilities faced substantial price fluctuations and supply uncertainties, mitigated to some extent by government interventions, including fixed tariffs and budgetary support. Small private companies, however, struggled with hedging and financial sustainability.

By 2024, with diversified supplies and normalized market prices, the impacts of volatility had diminished. Entering the winter of 2025/2026, Bulgaria's energy security is considerably stronger due to full storage and diversified supply routes (IGB, TurkStream), although dependence on a single pipeline (TurkStream) remains a potential vulnerability. In the event of disruptions to TurkStream, Bulgaria would rely on newly established alternative corridors, including LNG imports and TAP gas.

Future price trends are expected to align with EU market dynamics, remaining moderately higher than 2021 levels but significantly below the peaks observed in 2022. Nevertheless, geopolitical factors, such as potential disruptions to TurkStream or new sanctions, could necessitate further diversification. Although Bulgaria's gas security has improved, maintaining low regulated prices could impose fiscal challenges in the long term.

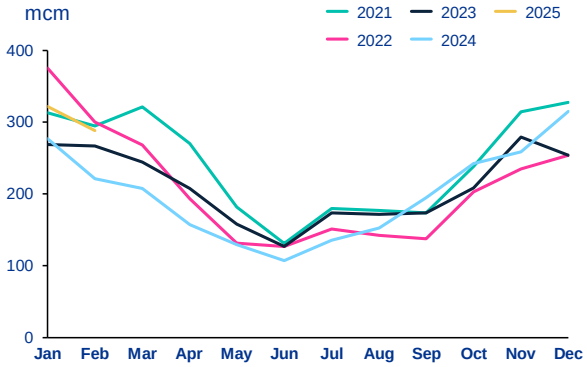
4.4 Croatia

Consumption



525 mcm

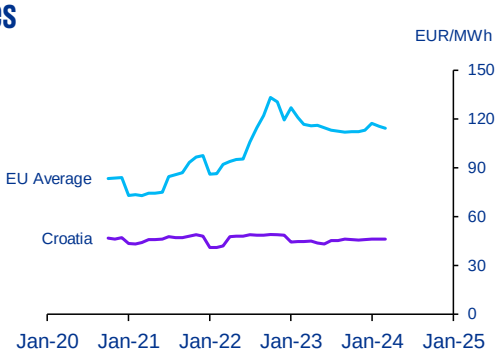
Total consumption decrease to 2024 compared to 2021



Prices

KrK LNG

- **January 2021**: The Krk FSRU LNG terminal commenced its commercial operations
- **February 2022**: 1.9 bcm of gas delivered; 23 LNG carriers received
- **September 2023**: Over 6 bcm delivered; 9.7 mcm regasified; 30 ships transshipped
- **September 2024:** A total of 8.3 bcm delivered; 13.7 mcm regasified; 100 LNG carriers received
- **Current situation**: The terminal has an annual capacity of 2.9 bcm, with plans to expand to 6.1 bcm by 2025

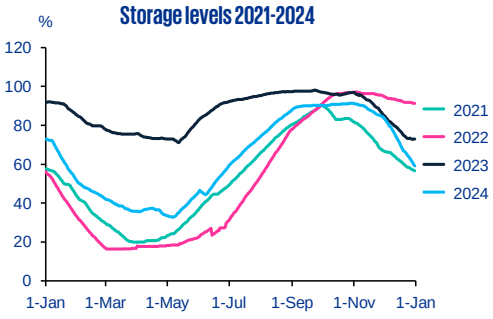


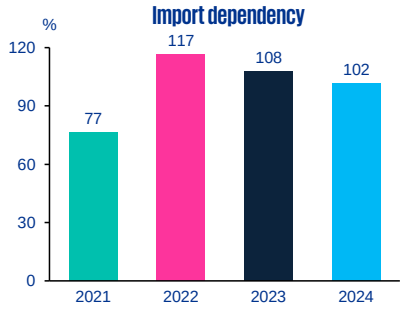
Household Consumer Prices

Due to higher share of domestic production and government intervention, residential gas prices in Croatia remained consistently below the EU average, even during the energy crisis.

During the energy crisis, Croatia's role shifted significantly from being a stable importer towards becoming a net exporter of natural gas. This transformation was driven by increased domestic production volumes and the commissioning of the Krk FSRU terminal in 2021. However, cross-border export capacity remains a bottleneck and requires further development to fully leverage Croatia's potential..

Import dependency and storage





Croatia traditionally plays a modest role in regional gas transit, being primarily an end-user country. Its gas network is interconnected with Slovenia and Hungary. A critical infrastructure element is the LNG terminal on Krk Island, operational since January 2021, which links Croatia to the international LNG and gas market.[22] Additionally, Croatia has some domestic gas production, estimated at around 0.7–1 bcm per year.[10] Ongoing exploration projects led by Canadian Vermilion and Croatian INA aim to further diversify the supply mix.[23]

The Croatian gas market is relatively small, with annual consumption of approximately 2.5 bcm.[10] Historically, the market has been dominated by state-owned INA, which also leads local gas production.[24] Supply contracts were traditionally established with Gazprom[25] via Ukraiane/ Serbia and Hungary. Although Croatia hosts a regional market platform (CROPEX), its liquidity remains limited, and in practice, most commercial gas trading occurs bilaterally or through the use of Austrian and Italian gas hubs (CEGH, PSV) as benchmark price indexes. After 2022, wholesale contract structures increasingly shifted toward spot-linked pricing, primarily based on regional gas hubs.

Unlike other countries in the region, Croatia has **not historically served as a major transit corridor for Russian gas**. Instead, gas inflows primarily came from Hungary (connected via the Balkan Stream to Serbia and Turkey) and Italy (through the TAG pipeline). Some Russian gas deliveries in the 2010s occurred via Ukraine–Slovakia–Hungary–Croatia routes. Since the commissioning of the Croatian–Hungarian interconnector in 2021, reverse flows from the **Krk LNG terminal** to Hungary have

[22] European Commission. (2021, January 29). *First Croatian LNG terminal officially inaugurated in Krk island*. European Commission. https://cinea.ec.europa.eu/news-events/news/first-croatian-lng-terminal-officially-inaugurated-krk-island-2021-01-29_en
[23] INA, d.d. (2024, March 6). *INA and Vermilion set to become partners in the onshore exploration block SAVA-07 in Croatia*. INA, d.d. https://www.ina.hr/en/announcement/ina-and-vermilion-set-to-become-partners-in-the-onshore-exploration-block-sava-07-in-croatia%EF%BF%BC/
[24] HSUP. (2024, May 10). *The 39th International Scientific and Expert Meeting of Gas Professionals was successfully held in Opatija on 8–10 May 2024*. Croatian Gas Centre Ltd. https://susret.hsup.hr/en/news/the-39th-international-scientific-and-expert-meeting-of-gas-professionals-was-successfully-held-in-opatija-on-8-10-may-2024/
[25] Reuters. (2017, September 15). *Russia's Gazprom says signs 10-year gas supply deal with Croatia's PPD*. https://www.reuters.com/article/world/russias-gazprom-says-signs-10-year-gas-supply-deal-with-croatias-ppd-idUSKCN1BQ1RS/

become possible. Consequently, Croatia transitioned from being primarily a gas consumer to becoming a secondary LNG supplier.[26,27]

Croatia **proactively diversified its gas supply routes and sources**. The Krk LNG terminal began importing global LNG to meet domestic demand and support exports. During 2022 and 2023, Croatia supplied neighboring countries primarily there were flows towards Hungary and to a limited extent towards Slovenia.[28,29] The country also secured additional gas volumes from the Western European market, particularly through Italy and Austria.[30]

Croatia's supply mix became more diversified, relying on domestic production (approximately 1.2 bcm per year), LNG imports (up to 2.9 bcm per year), and pipeline gas via Hungary and Italy (via Slovenia). By 2024, Croatia's reliance on direct Russian pipeline gas had significantly diminished, with the country emerging as a secondary LNG supplier.

Croatia's annual **gas consumption** decreased from around 2.9 bcm in 2021 to 2.4 bcm in 2024. The decline was primarily attributed to the mild winter of 2022–2023 and elevated gas prices, which curtailed local demand. Residential and SME consumption remained largely stable due to fixed contracts and regulatory caps, although consumption rebounded slightly during the summer of 2024 as prices eased. Overall, the demand trend

[26] Budapest Business Journal. (2020, June 10). *MVM unit to get Krk LNG only from W European market players*. https://bbj.hu/economy/energy/energy-trade/mvm-unit-to-get-krk-lng-only-from-w-european-market-players/
[27] Embassy of Hungary Washington. (2020, June 16). *Another energy diversification milestone reached by Hungary*. https://washington.mfa.gov.hu/eng/news/another-energy-diversification-milestone-reached-by-hungary
[28] ENTSOG. (n.d.). *Transparency Platform: Physical Flow and Firm Technical Capacity Data between Croatia and Hungary (2022–2023)*. Retrieved from https://transparency.entsog.eu/#/points/data?from=2022-01-01&indicators=Physical%20Flow%2CFirm%20Technical&points=hr-tso-0001itp-00011exit%2Chu-tso-0001itp-00011entry&to=2023-12-31
[29] ENTSOG. (n.d.). *Transparency Platform: Physical Flow and Firm Technical Capacity Data between Croatia and Slovenia (2022–2023)*. Retrieved from https://transparency.entsog.eu/#/points/data?from=2022-01-01&indicators=Physical%20Flow%2CFirm%20Technical&points=hr-tso-0001itp-00042exit%2Csi-tso-0001itp-00042entry&to=2023-12-31
[30] ENTSOG. (n.d.). *Transparency Platform: Physical Flow and Firm Technical Capacity Data between Slovenia and Croatia (2022–2023)*. Retrieved from https://transparency.entsog.eu/#/points/data?from=2022-01-01&indicators=Physical%20Flow%2CFirm%20Technical&points=si-tso-0001itp-00042exit%2Chr-tso-0001itp-00042entry&to=2023-12-31

from 2021 to 2025 was characterized by gradual decline, driven by climatic factors, economic conditions, and shifts in energy efficiency.[10]

Wholesale **gas prices** in Croatia initially mirrored the European TTF and PSV peaks during 2022. Following the commencement of LNG imports, Croatia's weighted wholesale price decoupled from the extreme price levels observed in Poland and Turkey, aligning more closely with Mediterranean hub prices. The government provided limited subsidies, leading to significant price increases in 2022 and 2023. Nevertheless, household gas prices remained below the EU average between 2021 and 2024, supported by state interventions and an increasing share of domestic production.[11]

Croatia has limited **gas storage** capacity, primarily located at the Okoli UGS (Central Slavonia), with a working capacity of around 0.5 bcm. Small storage caverns are under development to enhance capacity. In 2022, Okoli storage reached 78% of capacity at the start of winter and met the EU target of 81% by November. In 2023, favorable autumn prices facilitated strong injections, reaching approximately 90% by November. Due to limited storage, Croatia relies on continuous imports, yet it has consistently met EU minimum storage requirements. Additionally, the Krk LNG terminal acts as a flexible supply buffer, mitigating the risks associated with limited underground storage.[12]

Market Overview and Outlook

By integrating LNG imports into its gas supply portfolio, Croatia successfully avoided the severe spot shortages that impacted neighboring pipeline-dependent countries in 2022. However, the interlinked European gas market dynamics still affected Croatian wholesale prices, leading to indexation of domestic contracts to the Dutch TTF and Austrian CEGH. Energy firms utilized regional gas hubs and over-the-counter (OTC) markets for hedging, thereby minimizing the risk of insolvency among small suppliers. Consequently, Croatia managed to navigate market volatility effectively through supply diversification.

As of 2024, the dependency on Russian gas had dropped below 5%, significantly reducing geopolitical risk.[4] The expansion of the Krk LNG terminal, with additional floating

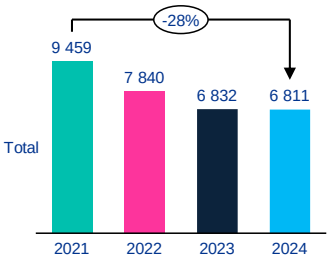
storage and regasification unit (FSRU) capacity expected by 2029, will further strengthen supply security. [31] Croatia's domestic production is also set to increase, with new gas fields expected to contribute an additional 0.5–1 bcm per year. For winter 2025/2026, the combination of Okoli storage and LNG capacity is projected to ensure a reliable gas supply. Price trends will likely align with global LNG dynamics and EU gas prices, which remain lower than the peaks of 2022.

The main risks involve potential disruptions in LNG supply or pipeline congestion, but the establishment of multiple import routes places Croatia in a relatively secure position. As a result, the Croatian gas market is expected to remain predictable and well-supplied in the near to medium term.

[31] **Gas Infrastructure Europe (GIE).** (2025). *GIE LNG Database – Public Version (January 2025)* [Excel spreadsheet]. Retrieved from https://www.gie.eu/wp-content/uploads/filr/10655/28012025_GIE_LNG_Database_2025.xlsx

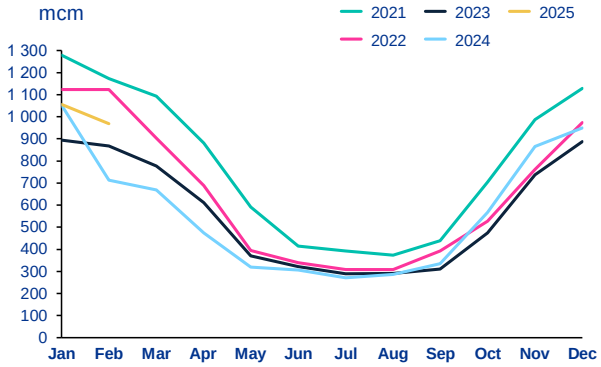
4.5 Czechia

Consumption

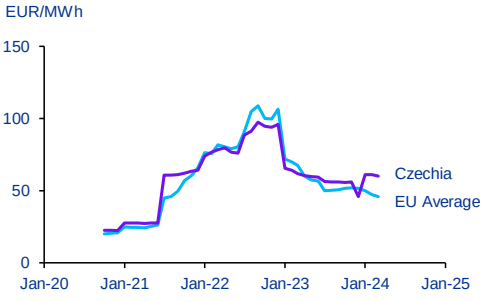


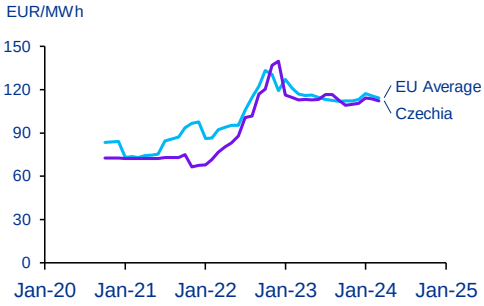
2 648 mcm

Total consumption decrease to 2024 compared to 2021



Prices





Industrial Consumer Prices

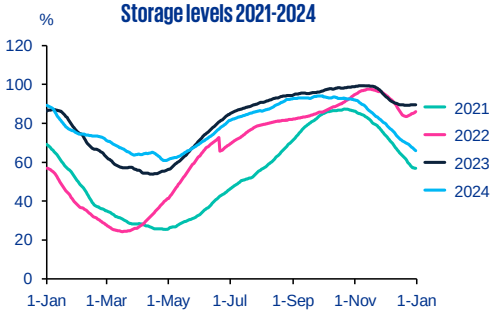
Industrial gas prices in the Czech Republic closely followed the European average, but with significantly lower fluctuations and volatility compared to other countries in the region.

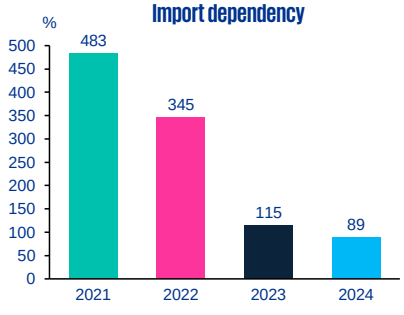
Household Consumer Pric

Similar to industrial prices, household consumer prices in the Czech Republic closely mirrored EU average price movements. Here too, prices were characterized by lower volatility compared to regional peers

The Czech Republic's role in regional gas supply has declined, similar to other countries that were heavily reliant on Russian sources and were unable to transition to southern supply routes such as TurkStream. While it was previously a key transit hub in Central and Eastern Europe, this role has significantly diminished.

Import dependency and storage





For decades, prior to the 2022 energy crisis and the onset of the Russian-Ukrainian war, the Czech Republic **occupied a strategic transit position within the European gas network**. This was primarily due to its geographic location at the crossroads of Russian gas routes from Ukraine towards Western Europe (notably Austria and Germany). The Czech natural gas network is highly interconnected, featuring links to Poland to the north, Germany to the west, and Austria and Slovakia to the south.[32]

The Czech Republic operates its own **virtual trading point** with a centralized balancing hub managed by the state-owned transmission company, EGÚ Brno. While the Czech gas trading market is moderately liquid relative to its size, most consumers utilize Austrian CEGH price indexes for contracts, given Austria's stronger connectivity and greater market liquidity. Following 2020, market liquidity in Czechia improved due to the entry of foreign suppliers and the rise of spot trading. However, liquidity remains lower than that of more established hubs in Germany and the Netherlands. Czech market liberalization and robust connectivity, including links to the Nord Stream and Yamal routes via Germany and Poland respectively, have provided moderate yet stable liquidity.

Historically, the Czech Republic **served as a key transit corridor for Russian gas**, receiving gas from Ukraine (via Slovakia) and forwarding it to Germany. After 2010, gas began arriving through the Nord Stream pipeline (via Germany) and Yamal (via Poland). Beyond transit, the Czech gas system primarily supported domestic consumption with some re-exports to Austria. Prior to 2022, approximately 55–60% of Czech gas imports originated from Russia (via Ukraine/Slovakia or Nord Stream), supplemented by Norwegian supplies (via Germany) and Azerbaijani gas (via Italy/TAP).[32]

Following the Russian-Ukrainian war in February 2022, gas flows from Ukraine ceased, while remaining Russian volumes (mainly via Nord Stream) continued until the pipeline's shutdown in September 2022. Since then, Czech **gas imports have diversified**, with supplies arriving from Norway, LNG imports via Germany, Azerbaijan (via Italy/TAP), and spot market purchases.

[32] **International Energy Agency (IEA).** (2022). *Czech Republic Natural Gas Security Policy*. Retrieved from https://www.iea.org/articles/czech-republic-natural-gas-security-policy

Since 2022, the Czech Republic has **significantly reduced its dependency on Russian gas.** The expiration or cessation of long-term Gazprom contracts accelerated the shift towards Western gas sources. Czech companies increased procurement from Norway and U.S. LNG (via German terminals at Wilhelmshaven and Brunsbüttel). Reverse-flow capabilities from Germany to Czechia were enabled, securing greater supply flexibility. In 2024, Czech imports from Poland and Germany increased following the decline of Ukrainian transit, marking a substantial diversification from Russian to European, Norwegian, and LNG supplies.

Gas **consumption** in the Czech Republic, which stood at 9.4 bcm in 2021, has significantly decreased since then. While the cold winter of 2021–2022 kept demand high until February 2022, subsequent milder weather and rising prices prompted a substantial reduction. By 2024, consumption had dropped by 28% compared to 2021, totaling 6.8 bcm annually. Industrial users (notably in steel, glass, and chemical sectors) shifted to alternative energy sources such as fuel oil and biomass or reduced their output. Power generation increasingly relied on coal and renewables, while households partially adopted electric heat pumps. This structural shift prevented consumption from rebounding to 2021 levels between 2022 and 2024.[10]

Czech wholesale **gas prices** initially mirrored the volatility of the broader European market. Spot prices surged from 20 EUR/MWh in 2021 to approximately 100 EUR/MWh by the winter of 2022. To mitigate consumer impacts, the government introduced retail price caps for households and subsidies during 2022–2023. As EU prices stabilized in the second half of 2023, these price caps were lifted. By the first half of 2024, Eurostat data indicated that household prices were around the EU average (0.11 EUR/kWh), while industrial prices (excluding VAT) were 0.082 EUR/kWh—lower than the EU average but still above prices in Hungary and Croatia.[11]

The Czech Republic has moderate **gas storage** capacity of approximately 3.7 bcm. During the summer of 2022, storages were filled efficiently, reaching 91% by November, well above the EU's 80% target. Storage levels were similarly robust in 2023, reflecting the successful implementation of storage injection strategies. No shortages occurred

during the winters of 2022–2023, as the gas infrastructure functioned as expected. Seasonal storage injections were primarily supported by imports from Germany.[12]

Market Overview and Outlook

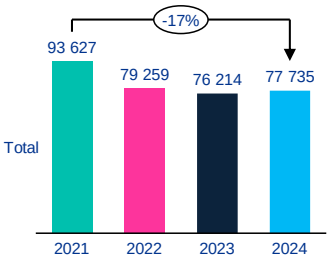
Czech market participants faced heightened price volatility in 2022, prompting utilities and industrial firms to adopt forward hedging and secure stocks. The government intervened by introducing regulated contracts at capped prices for specific consumer groups. Large industrial users shifted to spot market contracts or entered into long-term agreements indexed to liquid European hubs such as TTF and THE. Market participants increasingly sourced gas from liquid Northwest European markets, primarily Norwegian volumes delivered via Germany and LNG from Western European terminals.

The Czech gas market appears stable for winter 2025/2026, drawing on successful storage management from previous years and enhanced connectivity with diversified sources. Key supply routes include potential reverse flows via Austria (Nord Stream), Baltic Pipe connections via Poland, LNG imports from Germany, and a forthcoming German–Czech pipeline. The significant reduction in domestic consumption since 2021 has decreased market vulnerability. Policymakers remain focused on phasing out long-term Russian contracts while further aligning domestic prices with broader European trends.

Potential risks include severe cold spells or disruptions leading to increased gas-fired power generation, yet overall security of supply remains robust. The ongoing diversification efforts, combined with successful adaptation to market changes, position Czechia as a more resilient and flexible gas market within the EUSDR region.

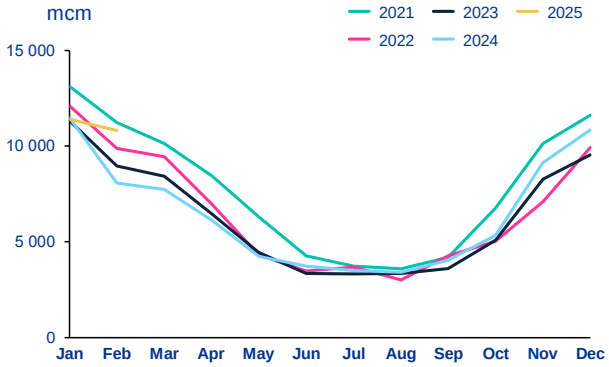
4.6 Germany

Consumption

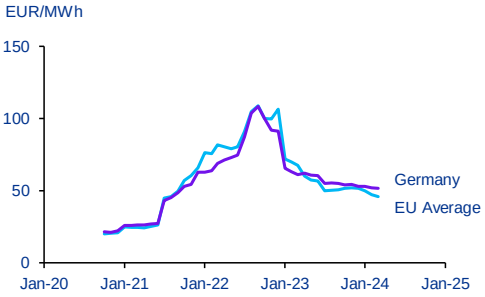


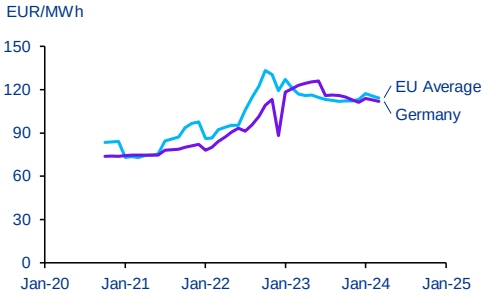
15 892 mcm

Total consumption decrease to 2024 compared to 2021



Prices





Industrial Consumer Prices

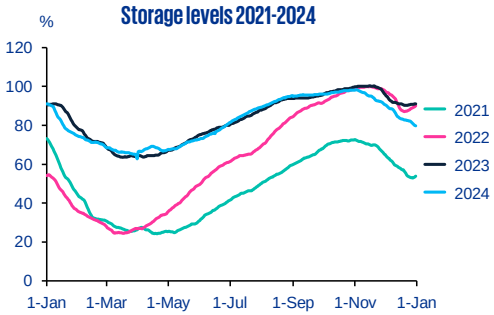
As a leading EU economy, Germany's natural gas demand fundamentally influences EU price levels, and thus its prices have closely followed the EU average.

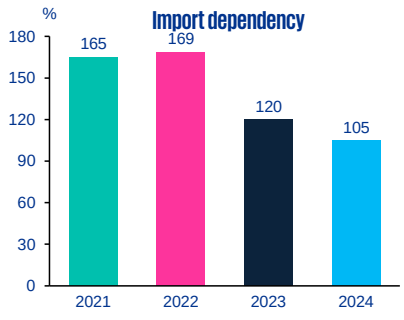
Household Consumer Prices

Residential prices in Germany managed to stay below European levels from October 2020 to March 2023, due to local governmental interventions.

Managing the energy crisis became a top priority for Germany. In response to the loss of Russian supplies, the country cut gas demand by around 20% from 2021 levels - helped by mild winters in 2022/23 and 2023/24 - and significantly diversified its sources through increased imports of U.S. LNG and Norwegian gas.

Import dependency and storage





Germany is the **largest gas market within the European Union**, with an annual consumption exceeding 93 bcm in 2021, and historically served as a central transit hub. Prior to the 2022 energy crisis, Germany was heavily reliant on Russian pipeline gas imports.[10] Direct connections between Russia and Germany were established through Nord Stream 1, with a capacity of 55 bcm per year, while Nord Stream 2, despite being installed, did not commence commercial operations. Additional Russian gas inflows were received via the Ukraine–Slovakia–Czechia route and through Poland via the Yamal pipeline.[5]

Germany's gas network is extensive, integrating Norwegian gas flows via Denmark, gas from the Netherlands through the North Sea, LNG imports, and eastern interconnectors. In 2021, Germany consolidated its national gas market by forming the Trading Hub Europe (THE), merging the NCG and Gaspool zones to enhance market liquidity.[33] This structural change improved the liquidity of Germany's gas market, positioning THE as a key contracting benchmark in the region, although the Dutch TTF remains the primary reference for wholesale pricing in Europe and for the LNG market.[34]

Before 2022, Germany was the **primary entry point for Russian gas into Europe**. Nord Stream 1 delivered substantial volumes until September 2022, while the Yamal pipeline facilitated gas transit towards Austria and Czechia. However, in June 2022, Russia suspended gas supplies through Yamal, and in September, Nord Stream deliveries also ceased. This abrupt cessation forced Germany to rapidly shift its gas supply strategy.[5]

In response, **Germany diversified its gas sources**, increasing imports from Norway via the Baltic Pipe (operational since October 2022) and significantly expanding LNG infrastructure. Key developments included the commissioning of floating storage and regasification units (FSRUs) at Wilhelmshaven (2023), Brunsbüttel, and Stade. Additionally, the government secured emergency LNG deliveries from Western European countries (notably France and the Netherlands) and established long-term

[33] **ENTSOG (European Network of Transmission System Operators for Gas).** *ENTSOG Transparency Platform – Interactive Map*. Retrieved May 13, 2025, from https://transparency.entsog.eu/#/map?loadBalancingZones=false.
[34] **Argus Media.** (2023, June 21). *Germany's THE hub fails to dent TTF predominance*. Retrieved May 13, 2025, from https://www.argusmedia.com/zh/news-and-insights/latest-market-news/2570882-germany-s-the-hub-fails-to-dent-ttf-predominance

contracts with Norway and Qatar. With the discontinuation of Nord Stream, Germany increased domestic storage withdrawals and relied more on pipeline imports from Czechia and Austria. Although Russian pipeline gas has been virtually eliminated from Germany's supply mix, indirect Russian LNG imports still occur.[35]

Germany's **gas consumption** has significantly declined in recent years, falling from approximately 90 bcm in 2021 to 77 bcm by 2024 with a decrease of around 20%. This reduction was driven by energy-intensive industries (such as steel, chemicals, and paper manufacturing) curtailing production, while power generation shifted towards coal and renewable energy. Household gas consumption, particularly for heating, also decreased substantially as energy-saving measures took effect.[10]

Germany's wholesale **gas prices** experienced significant volatility during the crisis due to the country's substantial dependency on Russian imports and its high consumption levels. The TTF benchmark, which heavily influences German gas prices, surged from 20 EUR/MWh to over 100 EUR/MWh in 2021. By late 2023, industrial consumer prices had stabilized at around 50–60 EUR/MWh.[11]

To mitigate the impact on households and small and medium-sized enterprises (SMEs), the government introduced the Gas Price Brake (Gaspreisbremse) in 2023, capping gas prices and limiting consumer bill increases. Although wholesale spot prices at THE mirrored TTF trends—peaking in mid-2023 and easing in early 2024—governmental subsidies largely shielded households from extreme costs. By 2024, gas prices had normalized, falling below the 50 EUR/MWh threshold and aligning with EU averages. While German industrial end-users faced elevated gas bills in 2022, substantial governmental subsidies mitigated the financial burden, resulting in a gradual decrease in industrial gas prices to the 50 EUR/MWh level by 2024. In contrast, household gas prices remained relatively higher, stabilizing around 110 EUR/MWh—significantly lower than the peak observed in 2023 but still above industrial levels—reflecting a slower normalization process despite governmental interventions.[11]

[35] **Deutsche Umwelthilfe (DUH).** (2025, January). *Hintergrundpapier: Russisches LNG in der EU – Liefermengen, Abnehmer und politische Handlungsoptionen*. Retrieved May 13, 2025, from https://www.duh.de/fileadmin/user_upload/download/Pressemitteilungen/Energie/LNG/Hintergrundpapier_Russisches_LNG_in_der_EU.pdf.

Germany possesses the largest **gas storage** capacity in Europe, with approximately 26 bcm, accounting for around 20% of the EU's total. Despite the energy crisis, storage levels reached 84.3% by August 2022, well above the EU average. This achievement was partly due to the German government's strategic focus on storage injections and financial support for affected companies, including the EU Commission-approved recapitalization of Uniper (up to 34.5 billion EUR). Consequently, Germany managed to maintain robust storage levels during the mild winter of 2022–2023 and continued effective injection during subsequent periods. [12]

Market Overview and Outlook

The energy crisis significantly impacted major German utilities, including Uniper, VNG, and EWE, which faced substantial financial losses from disrupted Russian contracts and high spot prices. For instance, Uniper required a €15 billion bailout in late 2022.[36] In contrast, household consumers were largely protected by subsidies and price caps, allowing most contracts to be settled at fixed prices.[37]

In response to the volatile market, German risk management strategies emphasized diversification. Energy companies such as E.ON and RWE shifted fuel procurement towards LNG and increased contractual flexibility.[38] The government offered guarantees for pipeline capacities and compensation for business losses. This combination of state intervention and market-based hedging prevented potential market collapse, securing the stability of supply.[39]

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[36] **European Commission.** (2022, December 19). *Commission welcomes political agreement on the Market Correction Mechanism: a temporary instrument to protect EU businesses and households from excessive gas prices*. Retrieved May 13, 2025, from https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7830.

[37] **Die Zeit.** (2023, November 10). *Bundestag verlängert Strom- und Gaspreisbremse bis Ende März*. Retrieved May 13, 2025, from https://www.zeit.de/politik/deutschland/2023-11/strom-gas-energiepreisbremse-verlaengerung-bundestag

[38] **Clean Energy Wire.** (2023, May 5). *Liquefied gas: Does LNG have a place in Germany's energy future?* Retrieved May 13, 2025, from https://www.cleanenergywire.org/factsheets/liquefied-gas-does-lng-have-place-germanys-energy-future

[39] **Die Bundesregierung.** (2022, September 30). *Protective shield: Securing energy supply – strengthening purchasing power*. Retrieved May 13, 2025, from https://www.bundesregierung.de/breg-de/service/archiv/protective-shield-2131014

By 2025, Germany's gas supply security is among the most robust in the EU, underpinned by diversified imports and expanded LNG infrastructure. The three FSRUs at Wilhelmshaven, Brunsbüttel, and Stade provide a combined LNG regasification capacity exceeding 20 bcm per year.[40] Enhanced pipeline capacities through EUGAL and Balticconnector further bolster supply reliability. While the dependency on Russian gas has diminished significantly, approximately 10 bcm per year of Russian LNG still remains in Germany's energy mix.

For the winter of 2025/2026, storage levels are expected to be adequately filled, reflecting the successful practices of previous years. LNG imports and enhanced infrastructure mitigate the risks of sudden supply disruptions, and wholesale price forecasts remain moderate, barring significant geopolitical disturbances.

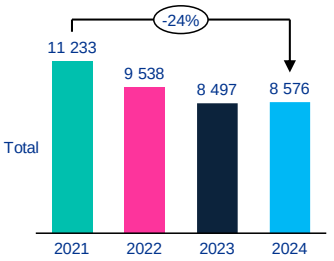
Germany plans to permanently phase out Russian pipeline gas and is actively investing in green gas production, focusing on biomethane and hydrogen.[41,42] By enhancing LNG imports and domestic renewable gas production, Germany is gradually detaching from its former dependence on Russian supplies, ensuring a secure and diversified energy future.

In summary, Germany's gas market has transformed from a Russian-dependent system to a diversified, resilient network. Strategic investments in LNG infrastructure, strengthened supply agreements, and comprehensive governmental interventions have solidified Germany's energy security, mitigating risks associated with past supply disruptions. The focus on sustainable gas sources further aligns with the EU's long-term energy transition objectives.

[40] **Natural Gas Intelligence.** (2023, May 15). *Germany expanding LNG import capacity despite drop in FSRU utilization rates*. Retrieved May 13, 2025, from https://naturalgasintel.com/news/germany-expanding-lng-import-capacity-despite-drop-in-fsru-utilization-rates/.
[41] **BMWK – Federal Ministry for Economic Affairs and Energy.** (2020, June 10). *National Hydrogen Strategy*. Retrieved May 13, 2025, from https://www.bmwk.de/Redaktion/EN/Hydrogen/Dossiers/national-hydrogen-strategy.html.
[42] **Renewable Energy Institute.** (2024, November 28). *Germany's Renewable Energy Transition: Challenges and Opportunities*. Retrieved May 13, 2025, from https://www.renewable-ei.org/pdfdownload/activities/Germany_Boemeke_241128.pdf.

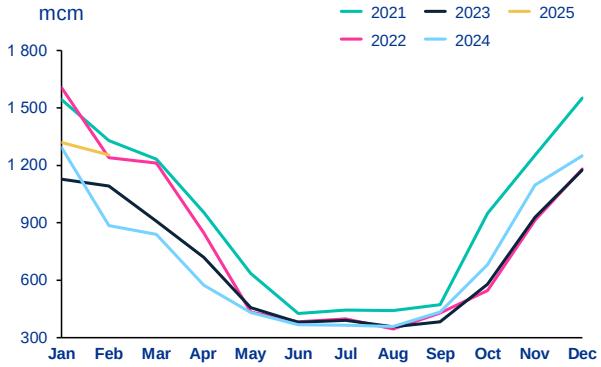
4.7 Hungary

Consumption

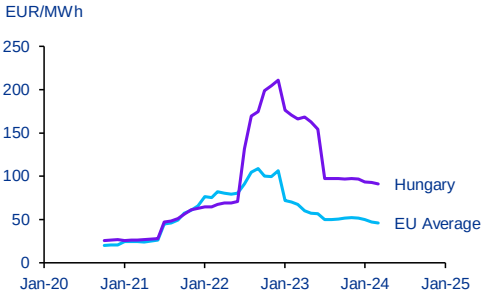


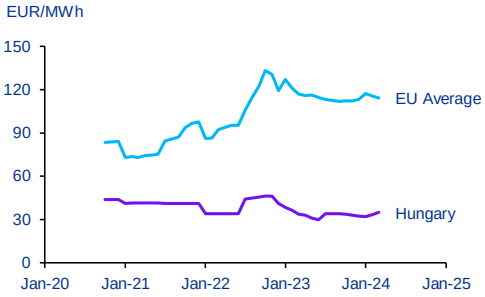
2 657 mcm

Total consumption decrease to 2024 compared to 2021



Prices





Industrial Consumer Prices

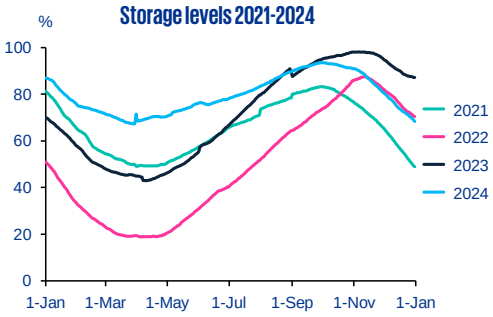
Following the onset of the Russia–Ukraine war, industrial gas prices in Hungary generally exceeded the EU average, peaking at approximately 210 EUR/MWh in December 2022.

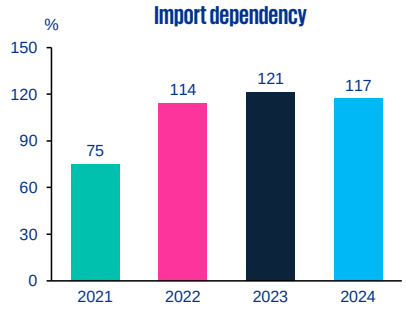
Household Consumer Prices

Household gas prices in Hungary are typically significantly lower than the EU average. This is primarily due to national legislation that sets regulated price caps for residential consumers, resulting in more resilient prices.

Despite cutting its natural gas consumption by over 20% since 2021, Hungary remains heavily reliant on Russian imports. Since the start of the Russia–Ukraine war in 2022, gas transit routes shifted significantly, with the Ukrainian corridor and Yamal pipeline largely supplanted by flows via TurkStream.

Import dependency and storage





Hungary is **one of the most interconnected countries** in the EUSDR region in terms of natural gas pipelines, participating in several strategic gas corridors. The Hungarian gas network connects to Ukraine, Croatia, and Serbia, facilitating transit towards Austria and other Western destinations. Additionally, Hungary's gas grid is linked with Romania, Croatia, Serbia, Austria, Slovakia, and Ukraine, forming a dense interconnection network. Hungary also hosts part of the Balkan Stream network.[33]

The country operates its own **gas exchange**, CEEGEX, which allows trading of spot and futures products. While the liquidity of CEEGEX has increased since 2021, only spot products are regularly traded. Hungary also utilizes the Austrian CEGH hub as a key price reference, particularly for wholesale and industrial contracts. The Hungarian gas market exhibits moderate liquidity by Central European standards. Domestic households and small businesses (with annual consumption below 1,729 cm) benefit from regulated prices and caps.[43] In contrast, the wholesale and industrial sectors predominantly rely on CEGH-indexed contracts. The Hungarian wholesale market is dominated by a few large players, including the state-owned MVM, German utility E.ON, and Swiss-based MET, alongside numerous smaller trading companies active on the OTC market.

Historically, Hungary's gas transit primarily involved the Ukrainian route towards Croatia, Serbia, and Bosnia. Prior to 2022, approximately 60% of Hungary's gas supply originated from Russia (through contracts with Gazprom, mainly via Ukraine), 10% from Austrian networks, and 30% from spot or short-term purchases from Romania, Serbia, or other sources.

Despite the 2022 energy crisis, Hungary **maintained imports from Russia via Serbia** and began receiving LNG volumes through the Croatian Krk LNG terminal.[27] In September 2021, Hungary secured a long-term, 15-year contract with Gazprom for 4.5 bcm/year, effective from October 2021.[44] As of 2024, over 70% of Hungary's gas consumption still relied on Russian imports. To enhance supply diversification, Hungary

[43] **MVM Next Energiakereskedelmi Zrt.** (n.d.). *Részletes információk a földgázszámláról* [Detailed information about the natural gas bill]. Retrieved May 13, 2025, from https://www.mvmnext.hu/lakossagirezsi/reszletes-informaciok-a-foldgazszamlarol.

[44] **Kormany.hu.** (2021, September 27). *Szijjártó Péter: Aláírásra került az újabb hosszú távú gázvásárlási szerződés a Gazprommal* [Péter Szijjártó: A new long-term gas purchase agreement with Gazprom has been signed]. Retrieved May 13, 2025, from https://kormany.hu/hirek/szijjarto-peter-alairasra-kerult-az-ujabb-hosszu-tavu-gazvasarlasi-szerzodes-a-gazprommal.

also imported gas from the Krk LNG terminal and via the HAG interconnector, along with additional volumes from Romania.

Hungary's **gas consumption** decreased significantly from approximately 11.2 bcm in 2021 to 8.5 bcm in 2024, representing a 25% reduction. This decline was largely attributed to high industrial consumer prices, which suppressed demand. Although prices began to stabilize in 2024, demand did not return to pre-crisis levels due to sustained high commercial prices on the Hungarian retail market.[10] Industrial gas prices peaked at 210 EUR/MWh in December 2022, significantly above the EU average.

Throughout the energy crisis, Hungary maintained the lowest household **gas prices** within the EU, driven by substantial government subsidies and regulated tariffs. As a result, household consumers experienced minimal price volatility. In contrast, industrial consumers faced considerably higher costs, influenced by the global gas price surges.[11]

Despite being well connected to the European gas market, Hungary's relatively low domestic production and high dependency on both Russian pipeline gas and Western European price benchmarks exposed it to significant price increases during the crisis.[11] Although Hungary secured physical gas supply through long-term contracts with Gazprom, the country was still vulnerable to price spikes linked to TTF and CEGH indexes due to the connected European markets

Hungarian trading companies adapted to the elevated price environment by adjusting their product portfolios and risk management strategies. This shift involved introducing prepayment contracting structures and phasing out fixed-price flexible products. Industrial consumers faced higher costs as traders increased risk premiums, and some retail companies concluded contracts at inflated prices out of concern for further market escalation. In contrast, regulated household and micro-sized business consumers remained insulated from these price fluctuations.[43]

Hungary possesses substantial **gas storage** capacity of approximately 6.5 bcm, including 1.5 bcm designated for strategic reserves. Despite this capacity, storage levels were relatively low in the summer of 2022, reaching only 62.5% in August. This shortfall was partly due to continuous gas consumption during the summer, as filling storages was

considered commercially non-viable. Unlike other Western European countries, Hungary did not implement governmental interventions to support storage injections.[12]

Following the EU mandate requiring an 80% storage level by November 2022, Hungary increased injections, reaching 87% by October 2022. Throughout the mild winter of 2022/2023, storage levels remained above 90% with minimal withdrawals. By the autumn of 2023, Hungarian storage levels once again exceeded 80%. These substantial storage capacities, including strategic reserves, ensure Hungary's ability to manage seasonal demand variations and maintain supply security.[12]

Market Overview and Outlook

Hungary's gas supply strategy on one hand focuses on maintaining long-term contracts with Russian suppliers meanwhile also diversifying its supply portfolio extensively, through infrastructure developments of the past 10–15 years, primarily by establishing new cross-border entry points and expanding existing capacities. The 15-year Gazprom contract, effective until 2036, ensures continued Russian volumes. However, potential EU regulations phasing out Russian gas could force Hungary to accelerate diversification efforts.

Future diversification plans include the expansion of the existing Krk LNG Terminal in Croatia, expected to become operational by 2029.[31] Hungary also seeks to strengthen interconnections with Croatia, Romania, and Austria. The potential production from Romania's Neptun Deep field, projected to start in 2027, could provide Hungary with an additional regional gas source.

By winter 2025/2026, Hungary is expected to achieve the EU storage target of 90%, drawing on past experience to maintain secure storage levels. The country's favourable long-term contract pricing with Russia could help stabilize industrial market prices, keeping them below Western European benchmarks.

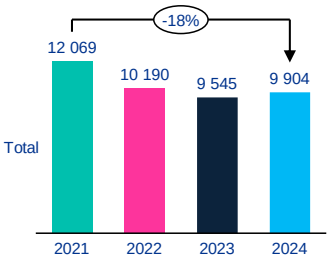
Nevertheless, Hungary remains more geopolitically exposed than its Western neighbors. A hard phase-out of Russian gas could significantly disrupt Hungary's energy security. To mitigate this risk, the country plans to further integrate LNG imports and expand

regional pipeline connections. Although current supply security is robust, Hungary's reliance on Russian gas poses a long-term challenge as the EU moves towards energy diversification.

In conclusion, Hungary's strategic approach to energy security has centered on maintaining stable Russian supplies and protecting domestic consumers through regulated tariffs. While this strategy has ensured short-term stability, the ongoing geopolitical context and EU diversification policies may necessitate a more flexible and resilient energy strategy in the coming years.

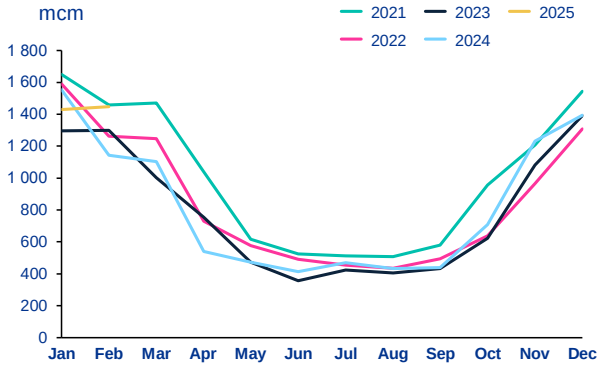
4.8 Romania

Consumption

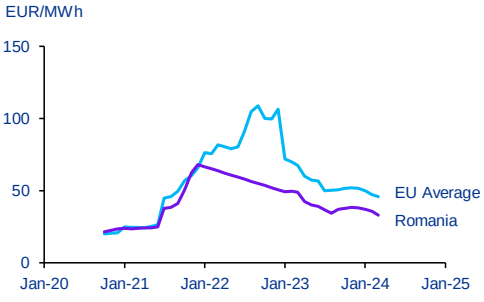


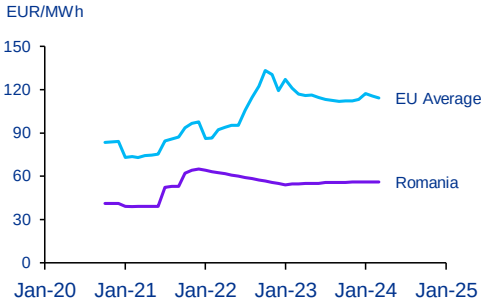
2 165 mcm

Total consumption decrease to 2024 compared to 2021



Prices





Industrial Consumer Prices

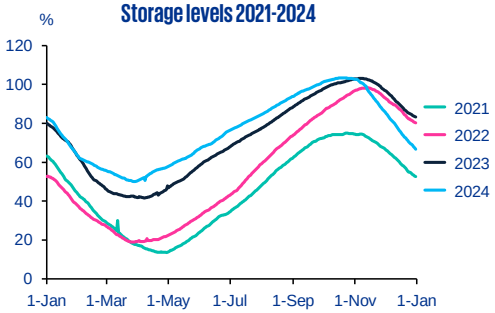
In Romania, price levels have remained consistently below European levels from October 2020, thanks to the fact that a large portion of their supply relies on domestic production.

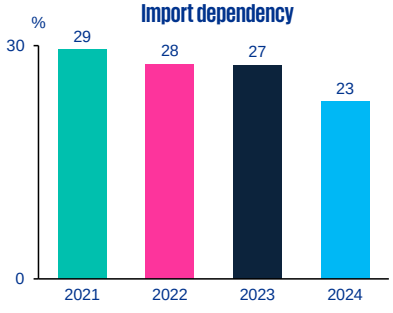
Household Consumer Prices

The same can be said for residential prices. They remained stable below the EU average, which meant that the households of Romania faced less pressure during recent years compared to other countries within the EU.

Romania's role as the CEE region's largest gas producer,has gradually increased with the reduction of Russian supplies. This role is expected to grow further in the upcoming years, especially with the planned extraction of the Neptune field, which could provide significant volumes available for export.

Import dependency and storage





As the European Union's **largest domestic gas producer**[10], Romania occupies a unique position within the Southeast European energy landscape. In 2023, Romania's gas production reached approximately 9.3 bcm, reflecting its substantial natural gas reserves and strategic role as a key regional supplier. The country's gas production is set to further expand with the development of the Neptun Deep project, expected to add around 8 bcm per year once operational.[45]

Situated at the intersection of the Balkan and Central European gas networks, Romania's gas grid is highly interconnected, linking with Hungary, Ukraine, and Bulgaria. Notably, the BRUA pipeline (Bulgaria–Romania–Hungary–Austria) segment between Romania and Hungary, completed in 2022, enhances cross-border capacity by 1.75 bcm per year.[33] Romania also operates a small domestic Virtual Trading Point (VTP) managed by Romgaz, primarily catering to local trade, while participating in regional exchanges such as Vienna's CEGH and the Hungarian gas exchange CEEGEX through OPCOM.[46]

Since 2010, Romania's natural gas market has functioned under a liberalized framework overseen by the National Regulatory Authority for Energy (ANRE). The market is predominantly shaped by two key domestic producers, Romgaz and OMV Petrom, which hold significant market shares. Despite the introduction of a domestic trading platform (OPCOM), market liquidity remains moderate, mainly due to Romania's consistent domestic production, which covers approximately 90% of national demand. As a result, trading activities are primarily domestic swaps, with limited cross-border transactions. To enhance flexibility, Romania has facilitated increased spot and short-term trading, including exports to neighbouring countries. However, despite these efforts, the gas sector remains primarily a producing supplier rather than a major trading hub within the region.

Historically, Romania was **not a major transit country for Russian gas**, instead positioning itself as a net exporter within Southeast Europe. Although the old Trans-Balkan pipeline passed through Romania, most Russian gas bypassed the country since

[45] **OMV Petrom.** (2025, March 25). *OMV Petrom and ROMGAZ spud the first gas production well of Neptun Deep project*. Retrieved May 13, 2025, from https://www.omv.com/en/media/press-releases/2025/250325-omv-petrom-and-romgaz-spud-the-first-gas-production-well-of-neptun-deep-project.
[46] **OPCOM – Operatorul Pieței de Energie Electrică și de Gaze Naturale S.A.** (n.d.). *Pagina principală* [Homepage]. Retrieved May 13, 2025, from https://www.opcom.ro/acasa/ro.

2003. Romania's pipeline network has primarily transported domestic production outward to neighboring countries, including Bulgaria, Moldova, Ukraine, and Hungary. Romania's reliance on Russian gas was minimal even before the 2022 energy crisis, with Russian imports constituting less than 5% of total supply. These volumes were contracted under an oil-indexed agreement that expired in 2020. After 2021, Romania ceased Russian gas imports entirely, fulfilling its needs through domestic production and limited imports from Azerbaijan (via Turkey/BRUA) and LNG (via Greece).[5]

During the crisis years (2021–2022), Romania **diversified its import sources further**, procuring Azerbaijani gas through the BRUA pipeline and utilizing reverse flow from Bulgaria.[47] Romania also signed agreements to export surplus gas to Hungary during regional shortages, generating revenue. By 2024, Romania had re-established its status as an exporter, supplying gas to Bulgaria and Moldova.[33]

Romania's **gas consumption**, which stood at approximately 12 bcm per year in 2021, declined to 9.9 bcm by 2024, mirroring the EU average decrease of around 20%. Industrial demand fell marginally, while power generation remained stable or increased slightly. Residential and heating consumption levels remained comparable to those of 2020.[10]

Romanian natural **gas prices** consistently rank among the lowest in the EU, driven by robust domestic production. Household gas prices are the second lowest in the Union, only surpassed by Hungary, while industrial gas prices also remain significantly below the EU average. Unlike many other EU countries, Romania did not impose comprehensive price caps during the 2022 crisis, opting for a market-driven approach. Prices rose towards the end of 2022 but remained considerably lower than those in Western Europe. To support vulnerable consumers during the winter of 2022–2023, the government introduced targeted subsidies.[11]

Wholesale spot prices generally aligned with European benchmarks, yet domestic production tempered fluctuations. By 2024, prices had stabilized, and Romanian

[47] Neagu, B. (2023, February 3). *Romania signs new gas delivery contract with Azerbaijan*. EURACTIV. https://www.euractiv.com/section/politics/news/romania-signs-new-gas-delivery-contract-with-azerbaijan/

consumers faced comparatively moderate price pressures relative to neighbouring countries.

Romania has one of the more substantial **storage capacities** in the region, totalling around 3 bcm. During the summer of 2022, storage levels reached 73%, higher than Bulgaria (61.7%) and Hungary (62.5%). By November 2022, Romania comfortably met the EU-mandated 90% storage target. Thanks to proactive filling strategies and stable domestic production, Romania consistently exceeded EU storage goals during subsequent winters, maintaining high levels of reserves.[12]

Romanian energy companies demonstrated considerable resilience compared to Western counterparts during the crisis. Domestic producers, particularly Romgaz and OMV Petrom, effectively managed risks through forward contracts on CEGH and TTF, securing stable volumes. These strategic practices, along with increased exports during market volatility, mitigated domestic price rises. Romania introduced gas futures trading on OPCOM in 2022 to support corporate hedging.

Unlike other regional markets, no Romanian gas companies faced insolvency during the crisis. Consumers experienced some price increases, but due to the stability of domestic production and strategic exports, the impacts remained manageable. The absence of major supply disruptions or corporate failures highlighted the effectiveness of Romania's risk management strategy.

Market Overview and Outlook

Romania’s gas supply outlook remains robust for the winter of 2025/2026. The anticipated production from the Neptun Deep offshore fields (8–11 bcm per year) by the late 2020s will further enhance self-sufficiency. Additionally, Romania’s storage capacity and cross-border connections through BRUA ensure reliable and flexible gas flows. Future plans include developing new interconnections, such as a pipeline extension with Hungary for Azeri gas.

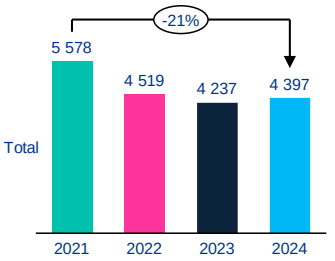
While gas prices are expected to remain moderate, potential surpluses could be directed towards Austria or Hungary. Conversely, in the event of unusually cold winters,

Romania’s diversified import capacity would provide necessary support. Due to its early exit from Russian gas dependence and focus on diversification (Azerbaijan, LNG, renewables), Romania’s geopolitical risk profile remains one of the safest among Southeast European countries.

In summary, Romania's gas market is characterized by a high degree of self-sufficiency, moderate price stability, and resilient market management. As the country continues to strengthen its production capacity and interconnection infrastructure, its role as a key Southeast European gas producer and supplier is expected to grow, underpinned by diversified supply sources and strategic export potential.

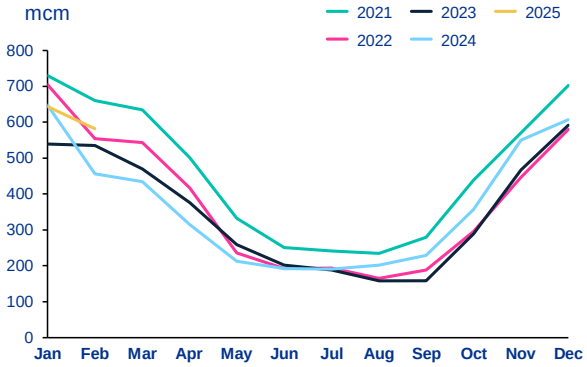
4.9 Slovakia

Consumption

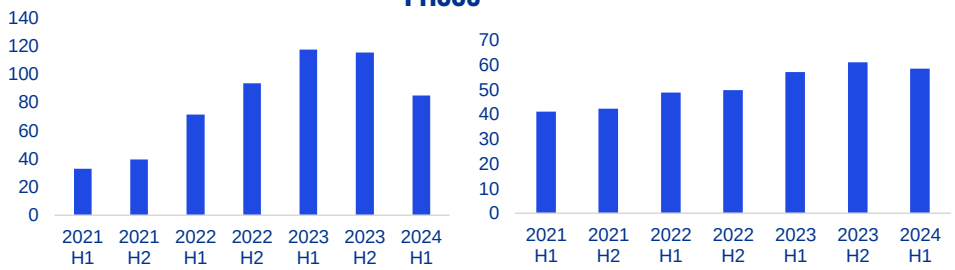


1181 mcm

Total consumption decrease to 2024 compared to 2021



Prices



Industrial Consumer Prices

Slovakian Industrial prices moved with the European market and increased during the energy crisis from 2022 to 2023, and peaked around 120 EUR/MWh in the first half of 2023.

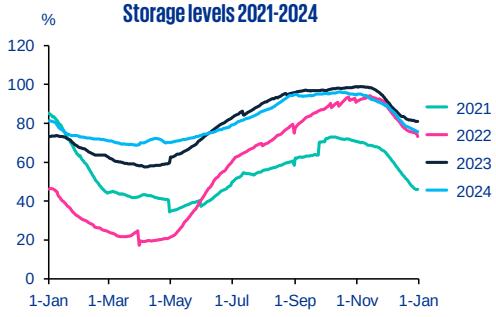
Household Consumer Prices

Household gas prices in Slovakia did not change significantly during the energy crisis and peaked just above 60 EUR in the second half of 2023.

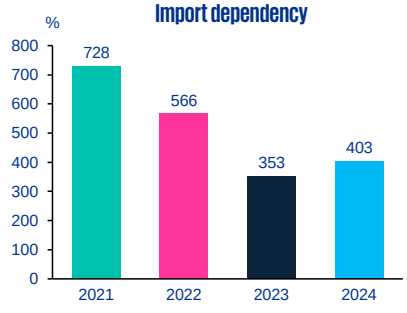
Before the Russia–Ukraine war, Slovakia was a key transit country for Russian gas via the Brotherhood pipeline. With the decline of these flows, it lost its related role in the region. However, shifting of supply sources and routes have repositioned the country to become a transit hub along the new flow directions.

Import dependency and storage

Storage levels 2021-2024



Import dependency



Slovakia has historically played a **pivotal role as a natural gas transit country**, primarily serving as a major conduit for Russian gas transported from Ukraine to Western Europe. This transit function was facilitated through two major pipelines entering Slovakia at Veľké Kapušany. Slovakia's gas infrastructure is highly interconnected, linking with Ukraine, Czechia, Germany, Austria, and Hungary.[33] The country operates a Virtual Trading Point (Slovak VTP), managed by Slovenský plynárenský priemysel (SPP),[48] and participates in the Central European Gas Hub (CEGH) in Austria.

Slovakia's gas market exhibits a relatively high level of liquidity compared to its size. The Slovak VTP supports both spot and forward trading, while numerous cross-border contracts are facilitated through the Baumgarten hub. The trading platform is actively utilized by local utilities and international firms, positioning Slovakia as a moderately liquid gas hub with a strong regional trading presence. Retail market liberalization is complete, with multiple suppliers operating. Market liquidity increased significantly in 2022 due to the openness of cross-border trading.

Before 2024, **approximately 75% of Russian gas exports to Western Europe passed through Slovakia's pipeline network**. The Brotherhood pipeline alone transported around 36 bcm per year via Slovakia, linking Ukrainian gas inflows with destinations in Austria and Czechia. However, the geopolitical landscape shifted dramatically after 2022. Following the expiration of major transit contracts in January 2025, Russian pipeline supplies via Ukraine significantly declined, and Slovakia's traditional role as a transit corridor diminished.[5]

While some gas continued to flow via Nord Stream through reverse flows from Germany, Slovakia increasingly diversified its supply sources. The country began importing more gas from Hungary, Austria, and Poland. Notably, Azerbaijan emerged as a new supplier, with Slovakia contracting 2 bcm of Azeri gas via Hungary in early 2023. Domestic production, including fields such as Matra, contributed approximately 3 bcm per year. Slovakia also activated reverse-flow capabilities on the Ivat pipeline to Ukraine, further enhancing supply flexibility.

[48] EUSTREAM, a.s. (n.d.). *Title Transfer*. Retrieved May 13, 2025, from https://www.eustream.sk/en/products-services/transmission/title-transfer/

Slovakia's **gas consumption** decreased significantly from 5.5 bcm in 2021 to 4.3 bcm in 2024, reflecting a 21% reduction. The decline was driven by a combination of factors, including industrial cutbacks, energy efficiency measures, and the structural loss of energy-intensive industries. Seasonal demand reductions, especially in household heating, also contributed to the lower consumption. By 2024, demand had stabilized at approximately 4.5 bcm per year, with a gradual downward trend expected as Slovakia increases its reliance on electrification, nuclear power, and renewable energy sources.[10]

Wholesale **gas prices** in Slovakia typically align with those in Germany and Austria. In 2022, SPP secured some volumes under fixed Russian pricing, providing temporary stability. However, most market transactions were indexed to European hubs, exposing Slovak traders to the same price surges experienced across the EU. Retail prices remained partially regulated, with households experiencing gradual rather than abrupt price increases. By 2024, household gas prices in Slovakia were near the EU median, while industrial prices remained mid-range, reflecting a balanced response to the energy crisis.[11]

To mitigate market volatility, the Slovak government introduced measures to stabilize consumer prices.[49] SPP's strategic purchasing in 2022, including LNG volumes from ExxonMobil[50],. Nonetheless, some private suppliers faced financial difficulties, leading to insolvency for several smaller firms.

Slovakia's **gas storage** capacity is relatively high compared to its consumption, with approximately 3.5 bcm available. During the summer of 2022, storage levels reached 75%, and by November, they exceeded the EU's 80% target, reaching around 90%. These robust storage levels are integral to Slovakia's national energy security strategy, allowing for calibrated withdrawals during the winter of 2022–2023 to maintain above-minimum levels. Slovakia also assisted neighbouring countries, supplying 0.5 bcm to Ukraine in 2023 under transit agreements.[12]

[49] International Energy Agency. (n.d.). *Policies and Measures Database*. Retrieved May 13, 2025, from https://www.iea.org/policies

[50] Reuters. (2022, September 8). *Slovak gas importer SPP signs LNG supply deal with Exxon*. Retrieved May 13, 2025, from https://www.reuters.com/business/energy/slovak-gas-importer-spp-signs-lng-supply-deal-with-exxon-2022-09-08/

In subsequent years, Slovakia maintained strong storage management practices, consistently achieving high fill levels by autumn. The reliable performance of the storage system during the crisis years ensured no significant disruptions, even amid shifting supply patterns.[12]

Market Overview and Outlook

Slovakia's large storage facilities and the revenues generated from transit fees helped cushion the economic impact of market volatility. The state-owned SPP managed risks strategically, leveraging stored gas to optimize pricing and supply stability. In early 2022, SPP capitalized on lower pre-invasion prices for Russian gas, preserving these volumes for later use when prices surged. In contrast, private suppliers struggled with sudden price hikes, leading to a wave of insolvencies.

Industrial consumers in Slovakia managed risk through futures contracts and cross-border swaps, while the government's intervention in residential supply mitigated the impact on households. By maintaining diversified supply sources and leveraging state-controlled risk management, Slovakia successfully avoided severe market disruptions or energy shortages.

Slovakia's outlook for winter 2025/2026 remains stable, supported by high storage levels and diversified supply routes. Anticipated sources include imports from Poland, Austria, Hungary, and potentially Ukraine (if reverse flows are reactivated). The expansion of reverse capacity on the Poland–Slovakia interconnector is expected to further alleviate flow constraints.

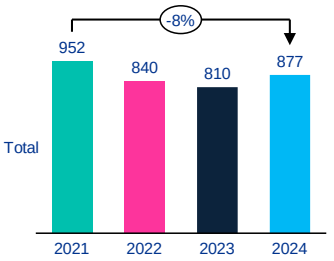
While future demand is projected to remain below pre-2022 levels, easing pressure on the network, Slovakia will continue to follow EU market price trends. Political developments, such as potential EU embargoes on Russian gas, may influence the remaining contracts. However, no immediate supply shocks are anticipated due to the diversification already achieved.

Despite the robust supply situation, Slovakia remains geopolitically exposed, particularly if the EU were to enforce a complete phase-out of Russian gas. Such a shift would not only impact Slovakia but also its regional partners, such as Hungary, which remains more dependent on Russian supplies. Slovakia's ability to maintain stability will depend on the continued diversification of supply routes, successful storage management, and coordination with neighbouring countries.

In conclusion, Slovakia's gas market has successfully transitioned from a transit-dependent model to a diversified import structure. High storage capacity and proactive government interventions have safeguarded energy security during the crisis. As Slovakia continues to integrate with Western European gas networks and reduce dependency on Russian volumes, its strategic positioning as a Central European hub is likely to be reinforced, albeit with ongoing vigilance against geopolitical disruptions.

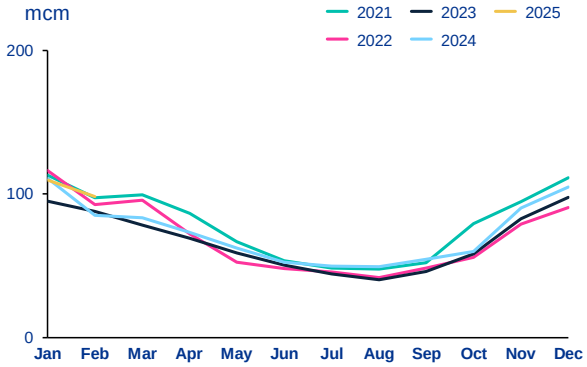
4.10 Slovenia

Consumption

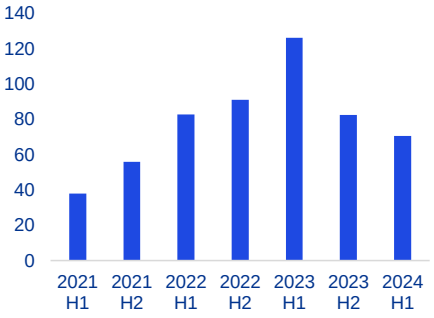


74 mcm

Total consumption decrease to 2024 compared to 2021

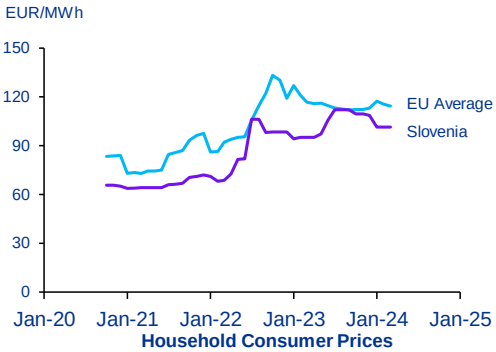


Prices



Industrial Consumer Prices

Industrial prices peaked in the first half of 2023 around 120 EUR/MWh. After that prices quickly pliumetted and at the first half of 2024 they were already below 80 EUR.



Household Consumer Prices

Throughout the energy crisis, household consumer prices in Slovenia remained below the EU average. Although the country relies entirely on imports and its prices moved in line with the European market, it consistently managed to stay the EU average.

Slovenia has relatively low consumption and import needs among the EUSDR countries. While it benefits from strong interconnectivity with cross-border capacities to Austria, Italy, and Croatia, it doen not play a pivotal role the region's gas market operations.

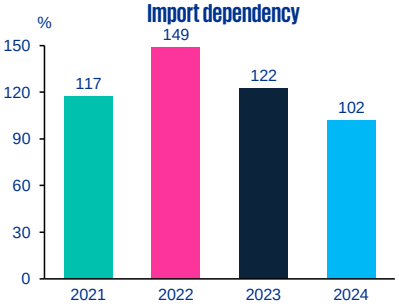
Import dependency and storage

Storage levels 2021-2024

N/A

Slovenia does not have storage facilities.

Import dependency



Slovenia represents one of the **smallest natural gas markets within the EUSDR EU countries**, both in terms of total domestic consumption and wholesale market liquidity.[10] Although the country's cross-border gas transmission capacity is limited, Slovenia is integrated into the European gas system through connections with three of its four neighboring countries: Croatia, Austria, and Italy. Prior to the 2022 energy crisis, Slovenia maintained a well-supplied position due to this regional connectivity.[33]

However, the combination of small domestic gas production, the absence of gas storage facilities, and limited cross-border capacities left Slovenia vulnerable to disruptions affecting larger European markets. Consequently, during the energy crisis, price movements in Slovenia mirrored broader European trends, with significant price surges during the winter of 2022–2023. During this period, gas prices for both industrial consumers and households exceeded 100 EUR/MWh.[11]

The Slovenian gas market is characterized by the dominance of a few key players, with Geoplin d.o.o. being the most significant. Geoplin acts as the primary supplier and the largest wholesale trading entity within Slovenia. The company also maintains a regional presence, being active in the Croatian and Hungarian markets.[51]

During the energy crisis, media reports suggested that Geoplin maintained an ongoing supply contract with Gazprom, purchasing Russian gas. However, on May 5, 2024, Geoplin issued a public statement clarifying that it had terminated its contract with Gazprom as early as 2022 and that Slovenia had ceased receiving Russian gas by 2023. The company emphasized that it had **replaced Russian volumes** with Algerian gas under a new contractual agreement. Furthermore, Geoplin assured that any potential supply shortages could be addressed through established European routes and virtual trading points, thereby qualifying as EU-origin gas under European regulations.[52]

Similar to other EUSDR countries, Slovenia has experienced a reduction in natural **gas consumption**, albeit at a slightly lower rate compared to its regional counterparts. In 2021, the country's domestic gas consumption was approximately 952 million cubic meters (mcm), which declined to 877 mcm by 2024—a decrease of around 8%.[10]

[51] Geoplin d.o.o. Ljubljana. (n.d.). *Company profile*. Retrieved May 13, 2025, from https://www.geoplin.si/en/about-geoplin/company-profile
[52] Geoplin. (2024, May 20). *Slovenia no longer relies on Russian gas*. Retrieved May 13, 2025, from https://www.geoplin.si/en/news-and-reports/slovenia-no-longer-relies-on-russian-gas

While **gas prices** for households remained consistently below the EU average from 2021 to 2024, general price levels increased in line with the broader European market trends. This upward movement in prices—particularly industrial consumer prices and wholesale prices—played a significant role in reducing overall gas demand.[11]

Unlike many other European countries, Slovenia lacks domestic **gas storage** facilities. As a result, the country depends entirely on cross-border import capacity to meet demand spikes, particularly during winter months. The interconnection points with Austria, Croatia, and Italy serve as critical supply routes, with Italian imports. During periods of stable European market conditions, Slovenia's interconnector capacities are generally sufficient to meet increased winter demand. However, any disruptions in the European gas market could significantly impact Slovenia's ability to secure necessary volumes.

Market Overview and Outlook

Looking ahead to winter 2025 and beyond, Slovenia's gas security remains highly dependent on its European partners. Due to the lack of domestic storage infrastructure, the country's ability to navigate potential supply disruptions relies on the continued availability of gas through cross-border interconnections.

While Slovenia's strategic role in the wider European and EUSDR gas markets is relatively limited, it does benefit from access to diverse supply sources, including. Maintaining this diversification and ensuring robust interconnector operations will be crucial to safeguarding Slovenia's energy security.

In conclusion, Slovenia's gas market is small and inherently dependent on European infrastructure and partnerships. Although Slovenia does not possess significant transit capabilities, its connections to Croatia, Austria, and Italy provide access to diversified supplies during periods of normal market function. Nonetheless, the absence of storage facilities poses a persistent risk, particularly during supply interruptions. Strengthening interconnectivity and maintaining reliable cross-border agreements will remain key priorities for enhancing Slovenia's energy resilience.

4.11 EU candidate EUSDR countries

4.11.1 Bosnia and Herzegovina

The Bosnian natural gas market is among the smallest within the countries of the EUSDR. Natural gas constitutes less than 5% of Bosnia's overall energy mix, highlighting its relatively minor role in the country's energy portfolio. As a net gas consumer, Bosnia does not hold a strategic position within any major gas transit corridors and exhibits limited potential for diversifying its natural gas import sources.

Bosnia's **gas supply** is predominantly sourced from Serbia, with nearly all imported volumes originating from Russian gas supplied through the TurkStream pipeline. Consequently, Bosnia remains highly dependent on Russian pipeline gas, as no significant diversification of supply routes has been established.

Furthermore, Bosnia lacks domestic natural gas **storage** facilities, which necessitates reliance on neighboring countries, particularly Serbia, to manage increased gas demand during the winter months. This reliance on external storage capacity underscores Bosnia's vulnerability to supply disruptions and regional supply chain dynamics.

4.11.2 Republic of Moldova

Moldova lacks domestic natural **gas production** and possesses very limited **storage** infrastructure, relying primarily on Romania's storage system to meet its needs. Consequently, the country is entirely dependent on regional transit routes and import capacities to secure its gas supply.

Prior to 2022, Moldova sourced its natural gas predominantly from one of the major branches of the Ukrainian transit corridor, resulting in near-complete reliance on Russian imports. However, following the 2022 energy crisis, Moldova initiated efforts to diversify its supply portfolio. The country began procuring gas volumes from the European Union while maintaining a degree of dependence on Russian supplies, which were redirected through the TurkStream pipeline.

In terms of consumption patterns, Moldova experienced a significant contraction in gas demand between 2021 and 2024, with consumption levels declining by approximately

50%. This reduction brought the annual gas consumption to around 0.6–0.7 bcm, largely driven by substantial price increases during the energy crisis.

4.11.3 Montenegro

Montenegro's natural gas market is relatively small and shares similarities with those of Bosnia and Moldova. The country predominantly relies on Russian gas supplies, facilitated through regional transit partners, particularly Serbia.

Montenegro's annual natural **gas consumption** remains modest, at less than 0.4 bcm. This demand continues to be met primarily through Russian pipeline gas delivered via the TurkStream corridor, reflecting Montenegro's continued dependence on traditional supply routes.

4.11.4 Serbia

Following the 2022 energy crisis, Serbia **emerged as one of the most strategically important transit countries in the Balkans and Eastern Europe**. This shift occurred as the flow of Russian pipeline gas to Western Europe ceased, positioning the TurkStream pipeline as the primary supply route. Consequently, Serbia's significance within the regional gas transit network has increased considerably.

Historically, Serbia has played a pivotal role in supplying the Balkan region, particularly since the commencement of TurkStream operations in January 2020. However, following the energy crisis in 2022, long-term gas contracts between Hungary, Croatia, and Gazprom were redirected from the traditional Ukrainian transit route to the TurkStream pipeline. This transition substantially augmented Serbia’s role as a critical transit hub, given the increased supply volumes through its territory.

Currently, the Serbian-Hungarian cross-border point represents one of the key entry points for the remaining Russian pipeline gas entering the European Union, thereby supporting gas supplies to the CEE region.

Despite its transit importance, Serbia's domestic **storage** capacity remains limited, with only 450 million cubic meters (mcm) available compared to the country’s annual consumption of 4–5 bcm. During the winter periods of 2022–2023 and 2023–2024, gas

flows from Hungary to Serbia indicated that Serbia is reliant on Hungary's more substantial gas storage infrastructure. This cross-border cooperation provides additional import capacity during peak demand in winter.

4.11.5 Ukraine

Prior to the 2022 energy crisis and the onset of the Russian-Ukrainian conflict, Ukraine was one of the most critical transit countries for Russian pipeline gas destined for Europe. The "Brotherhood" pipeline, in particular, played a pivotal role in ensuring gas supplies to Central and Central Eastern Europe.

In addition to its strategic transit function, Ukraine also exhibited significant domestic **gas consumption**, exceeding 27 billion cubic meters (bcm) per year in 2021. The country is distinguished by its substantial domestic production capacity, estimated at approximately 20 bcm annually.[10]

Furthermore, Ukraine possesses one of the most extensive natural gas storage infrastructures in Europe, with a working gas capacity of around 31 bcm. This storage capability not only supports domestic energy security but also plays a vital role in regional gas supply management. [12]

5 Challenges arising from phasing out Russian gas

Prior to 2022, the primary source of natural gas for the EU Strategy for the Danube Region (EUSDR) countries, as well as for the European Union as a whole, was Russian pipeline gas. In 2021, Russian pipeline gas accounted for approximately 40% of the EU's total gas imports. Within the EUSDR region, reliance on Russian supplies was even more pronounced, with countries such as Bosnia and Herzegovina, Serbia, and North Macedonia importing 100% of their gas from Russia. Other countries in the region, including Hungary, Bulgaria, and Slovakia, also exhibited high dependency rates, with Russian gas constituting around 90% of their total consumption.[5]

Given this substantial reliance, it is evident that Russian gas - particularly pipeline deliveries - played a critical role in the energy security of the EUSDR countries. The decline of Russian gas exports (and near-total cessation in Western Europe) following the onset of geopolitical tensions posed a formidable challenge to the region.[5]

The challenges stemming from the reduction in Russian gas were multidimensional. The primary issue was not merely the physical replacement of unavailable gas volumes with alternative supplies but also the need to address the concurrent and unprecedented surge in gas prices resulting from the supply shock.[53]

The rapid escalation in gas prices placed immense pressure on the economies of Europe, including those within the EUSDR. In February 2022, the TTF Front Month average gas price exceeded the 100 EUR/MWh mark, and by August 2022, it had surpassed 200 EUR/MWh.[54] This sharp increase in energy costs threatened to destabilize economic performance, amplify inflationary pressures, and, in severe cases, precipitate waves of corporate bankruptcies and significant unemployment.[54]

The first and most urgent priority was to secure the physical supply of natural gas. In response, both the EUSDR region and the wider European Union undertook a series of

[53] Council of the European Union. (n.d.). *Energy prices and security of supply*. Retrieved May 13, 2025, from https://www.consilium.europa.eu/en/policies/energy-prices-and-security-of-supply/
[54] Losz, Á., & Corbeau, A.-S. (2024, March 18). *Anatomy of the European Industrial Gas Demand Drop*. Center on Global Energy Policy, Columbia University. Retrieved May 13, 2025, from https://www.energypolicy.columbia.edu/publications/anatomy-of-the-european-industrial-gas-demand-drop/

diversification measures aimed at reducing dependency on Russian imports. Key strategies included:

1. **Increasing Pipeline Imports from Norway:** Norway emerged as a primary alternative supplier, significantly expanding its pipeline gas deliveries to the EU.
2. **Developing LNG Infrastructure:** Western Europe rapidly expanded its LNG regasification capacity, resulting in a sharp increase in LNG imports. This infrastructure development was crucial for integrating global LNG supplies into the European gas network.
3. **Sourcing Additional Volumes from Azerbaijan and Turkey:** The Southern Gas Corridor, including the Trans-Adriatic Pipeline (TAP), became increasingly important as Azerbaijan's role as a supplier grew. Additionally, Turkey served as a strategic transit hub, enabling gas flows from the Caspian region and beyond.[5]

Addressing the second challenge—the skyrocketing gas prices—required targeted economic and regulatory interventions. European economies, along with national governments, implemented measures to stabilize energy markets and shield consumers from the most severe impacts. Without such interventions, the rapid escalation in energy costs could have significantly undermined economic stability, increased inflation, and, in extreme scenarios, led to widespread corporate insolvencies and mass unemployment.[54]

The decline in Russian gas supplies posed a dual challenge for EUSDR countries: ensuring physical supply security while mitigating the economic fallout from escalating gas prices. Through diversification of gas sources, the expansion of LNG infrastructure, and increased imports from alternative suppliers, Europe took decisive steps to address the supply gap. Simultaneously, economic policies aimed at controlling price volatility helped to maintain economic stability and protect consumers.

By proactively managing both supply and price challenges, EUSDR countries have taken significant steps toward greater energy resilience and reduced dependency on Russian gas, aligning with the broader EU objectives of diversification and security of supply.

6 Experiences of 2023-2024 and 2024-2025 winter periods related to the Energy Crisis

The following chapter presents the responses of EUSDR countries to the energy crisis that began in 2022. Like other European nations, countries within the EUSDR region were compelled to address the risks and challenges triggered by the crisis. A critical component of these responses was the introduction of regulatory changes at both the EU and national levels. At the EU level, key regulatory initiatives included the REPowerEU strategy, the Aggregated EU gas procurement platform, mandatory storage obligations, and the framework for voluntary demand reduction. At the national level, policy responses were marked by the implementation of various support schemes for residential and industrial consumers, designed to mitigate the effects of surging energy prices and heightened supply uncertainty.

In parallel with regulatory adjustments, the energy crisis also catalyzed a fundamental restructuring of the EU's gas supply mix, with significant implications for EUSDR countries. Total Russian pipeline and LNG exports have declined towards the EU significantly - from approximately 50% of total imports of 157 bcm in 2021 to around 18%, i.e. 54 bcm by 2024 - primarily due to deliberate supply reductions via the Nord Stream, Yamal, Ukrainian transit, and TurkStream routes. In response, the EU significantly diversified its supply portfolio by increasing Norwegian pipeline imports - which have become the EU's largest source -, expanding LNG imports from the United States and other global suppliers, and increasing volumes supplied from North Africa and the Caspian region, particularly Algeria, Egypt, and Azerbaijan.

Moreover, reverse flow mechanisms and improved regional interconnectivity, such as reverse flows through Ukraine and upgraded interconnectors between Poland–Slovakia and Slovakia–Hungary, have enabled more flexible distribution of non-Russian gas across Central and Eastern Europe. By 2024, LNG accounted for approximately one-quarter of EU gas imports (up from less than 10% in 2020), while non-Russian pipeline sources supplied the majority of the remainder. Elevated storage fill levels, consistently above the five-year average, combined with ongoing infrastructure development, have

significantly strengthened the EU's supply security and resilience, marking a decisive shift away from historical dependence on Russian gas.

6.1 Regulatory framework[49]

The loss of physical gas supplies from Russia introduced significant risks to the European energy landscape, particularly concerning supply security during prolonged cold periods, commonly referred to as cold spikes. One of the primary challenges was the potential emergence of infrastructure bottlenecks, which could impede the continuous supply of gas during such high-demand periods.

To address this risk, the European Union implemented **mandatory gas storage obligations** to strengthen supply resilience. Regulation (EU) 2022/1032, which entered into force in 2022, mandated that all EU Member States ensure their underground gas storage facilities reach at least 90% capacity by November 1st of each year. Initially scheduled to remain in effect until the end of 2025, the regulation was subsequently extended for an additional two years, with specific adjustments, to maintain a robust security of supply framework. This regulatory measure reflects the critical role of gas storage in ensuring the Union's energy security, particularly given that approximately 30% of the EU's winter gas consumption is sourced from the European storage infrastructure. By enforcing these storage requirements, the EU aimed to mitigate the risk of supply shortages during peak demand periods, thereby enhancing the resilience of the energy system against external supply disruptions.

In addition to securing alternative sources of gas supply and optimizing the utilization of storage infrastructure, European countries pursued strategies aimed at **reducing overall gas consumption** as a means to mitigate the impact of disrupted supply flows. A portion of this demand reduction occured due to increasing market prices, i.e. the supply shock induced a rise in gas prices, which, according to the principle of price elasticity, resulted in decreased demand as household and industrial consumers industries adjusted their consumption in response to higher costs.

On the other hand, recognizing that demand reduction might prove to be insufficient, the EU also adopted a regulatory approach to manage consumption levels. Under Council

Regulation (EU) 2022/1369, the EU introduced a coordinated framework to promote voluntary demand reduction while enhancing coordination, monitoring, and reporting of national gas reduction initiatives. This regulation, initially introduced in response to Russia's war against Ukraine in the spring of 2022, aimed to secure gas supplies by fostering voluntary demand reduction measures.

The regulation also established a legal mechanism for declaring an EU-wide alert, which could trigger a mandatory demand-reduction obligation applicable across all Member States. Initially adopted for one year from August 9, 2022, the regulation was subsequently extended through Amending Regulation (EU) 2023/706, prolonging the voluntary demand-reduction target by an additional year. The extended framework retained the Council's authority to declare an EU alert, thereby preserving the possibility of activating binding reduction measures if circumstances necessitate.

In the context of disrupted supply chains, the European Union faced an additional challenge related to the negotiation efficiency of individual Member States. Governments at the national level often lacked the bargaining power required to **secure favourable gas contracts with international suppliers**. To address this issue and streamline procurement processes, the EU introduced Council Regulation (EU) 2022/2576, known as the "Solidarity Regulation".

This regulation established **AggregateEU**, a mechanism aimed at aggregating gas demand and enabling joint gas purchasing at the European level. Managed by PRISMA, AggregateEU allows Member States and eligible market participants to consolidate their gas requirements, thereby enhancing the EU's collective negotiating power. Through coordinated purchasing strategies, AggregateEU contributes to improved supply security and reinforces the EU's position within global gas markets.

By fostering both demand reduction and coordinated procurement, the EU sought to address the dual challenges posed by supply shocks and fragmented negotiation capacities. These regulatory measures underscore the EU's commitment to maintaining energy security through both consumption management and strategic collective action in the gas market.

In response to the energy challenges encountered during the 2023/2024 and 2024/2025 periods, the **EUSDR EU countries implemented a series of policy measures** aimed at stabilizing the energy market. These responses encompassed not only the natural gas sector but also extended to the electricity and heating markets, given the intrinsic interconnection between these sectors.

It is important to recognize that the policy interventions were designed to address the complex and multifaceted nature of the crisis, and therefore, analyzing gas market measures in isolation would not adequately capture the holistic approach undertaken. The integrated nature of gas, electricity, and heat markets necessitated comprehensive strategies that simultaneously addressed supply security, market stability, and consumer protection across the energy spectrum.

In this context, the policy measures introduced should be evaluated as part of an interconnected framework, reflecting the regional and cross-sectoral dynamics that shaped the EUSDR countries' responses during this period.

Table 1: Policy changes in the EUSDR countries past 2022

Country	Policy title	Year	Status
Austria	Austria's REPowerEU	2024	In force
Austria	Energy subsidies for households and companies	2023	In force
Austria	City of Vienna's protective shield	2023	Announced
Bulgaria	Electricity price ceiling of BGN 200/MWh for non-household consumers	2023	In force
Croatia	Croatia - REPowerEU	2024	In force
Croatia	EUR 900 million for power producer HEP	2023	In force
Croatia	Energy Package 4	2023	Ended
Czechia	Czech Republic - REPowerEU	2024	In force
Czechia	2023 cap on electricity and gas prices	2023	In force
Czechia	Subsidy for Czech electricity TSO ČEPS	2023	Ended
Czechia	Cap on electricity and gas prices for large companies	2023	In force
Czechia	Compensation mechanism for electricity suppliers affected by the electricity price cap	2023	
Czechia	Subsidy for heat producers	2023	In force

Germany	Electricity, gas and heating price brakes	2023	Ended
Germany	Support scheme to rail transport operators	2023	Ended
Germany	National Security Strategy: Integrated Security for Germany	2023	In force
Germany	Emergency Plan for Gas	2023	In force
Hungary	Hungary - REPowerEU	2024	In force
Hungary	REPowerEU - Electricity network development and digitalisation	2023	In force
Hungary	EUR 109.6 million to pay municipal energy bills	2023	Ended
Hungary	Fixed price of natural gas and electricity for public sector	2023	In force
Hungary	Support for energy intensive SMEs extended to 2023	2023	In force
Hungary	HUF 5 billion in fuel subsidies for municipal residents	2023	Ended
Romania	Subsidy for household energy bills	2023	Ended
Romania	Modified RRF	2023	In force
Romania	Continuation of State Aid up to 2025	2023	Announced
Slovakia	Slovak Republic - REPowerEU	2024	In force
Slovakia	Electricity and gas subsidies	2023	In force
Slovakia	Freezing of tariff for electricity transmission losses	2023	In force
Slovakia	State loan to cover energy prices	2023	In force
Slovakia	Electricity and gas price caps for small energy off-takers	2023	In force
Slovakia	Compensation for electricity and gas providers of small off-takers	2023	In force
Slovakia	Heat price cap for households	2023	In force
Slovakia	Electricity and gas price caps for households	2023	In force
Slovakia	Emergency Plan	2023	In force
Slovenia	Slovenia - REPowerEU	2024	In force
Slovenia	Regulation on setting the price of electricity for micro, small and medium-sized enterprises	2023	In force
Slovenia	2023 Aid to the Economy Due to High Prices of Electricity and Natural Gas	2023	Ended

In summary, the EUSDR countries have taken versatile approaches to tackle the energy crisis and reduce dependency on Russian gas. The following key observations outline common practices, pioneering actions, and unique measures undertaken across the region

A significant number of EUSDR EU countries have focused on **energy price regulation and consumer protection** as a primary strategy to mitigate the impact of rising energy costs. The most common practices include:

- **Price Caps and Subsidies**: Countries like Austria, Czechia, Slovakia, and Slovenia have implemented price caps on electricity and gas, targeting both households and industries. This approach aims to directly shield consumers from volatile market prices.
- **Financial Support to Public Utilities and Key Industries**: Governments, such as those in Hungary and Croatia, have provided substantial financial aid to state-owned entities to ensure continued supply and mitigate operational losses.
- **Social Subsidies for Vulnerable Consumer Groups**: Many countries have introduced direct subsidies or compensation mechanisms for households and SMEs to prevent energy poverty, as seen in Romania and Hungary.

In addition, several countries, including Austria, Croatia, Czechia, Hungary, Slovakia, and Slovenia, have adopted the REPowerEU plan as a long-term strategy to reduce fossil fuel dependency and enhance energy security. These plans typically involve infrastructure development and adjustments to energy market regulations to stabilize supply and prices for certain consumer groups.

Among the non-EU EUSDR countries the adoption of policy measures in response to the energy developments of 2023/2024 and 2024/2025 **has been limited**. Based on the available source material, Bosnia and Herzegovina stands out as the only non-EU EUSDR country that implemented targeted policy actions during this period to limit electricity price increase and to reduce wholesale gas prices.

6.2 Infrastructure developments and efforts to phase-out Russian gas supplies

Between 2022 and 2025, Europe undertook a substantial expansion of its natural gas infrastructure to enhance supply security, ensure continuity, and reduce dependency on Russian imports. This strategic initiative involved the development of both offshore and

onshore facilities, significantly increasing the region's gas import and processing capacity.

One of the most notable developments was the addition of approximately 50 billion cubic meters per year (bcm/y) of regasification capacity. This expansion was primarily achieved through the construction of new floating storage and regasification units (FSRUs) and the establishment of onshore LNG terminals. These facilities have significantly bolstered Europe's ability to receive and process liquefied natural gas from diversified global sources.

In addition to LNG infrastructure, Europe saw the commencement of several major offshore and onshore gas field projects, further enhancing domestic production capacities. Key pipeline projects aimed at improving regional interconnectivity also progressed, strengthening resilience by enabling flexible gas flows between Member States.

This comprehensive infrastructure upgrade reflects Europe's strategic shift towards securing energy supplies from multiple sources, thereby diminishing the risks associated with reliance on Russian gas imports.

In the following sections, we outline the most significant developments and initiatives related to LNG infrastructure, pipeline projects, and other related enhancements within the European natural gas sector. These projects represent critical components of Europe's strategy to strengthen energy security, diversify supply sources, and reduce dependency on Russian gas imports.

By focusing on the expansion of regasification capacity, the establishment of new pipeline corridors, and the enhancement of regional interconnectivity, these initiatives collectively contribute to a more resilient and flexible European gas market.

6.2.1.1 LNG Regasification Units[31]

The following summary outlines the key LNG terminals that were commissioned or upgraded during this period, detailing their nominal annual capacity, start-up year, and investment type:

- **Belgium:** The Zeebrugge LNG Terminal underwent a capacity expansion, adding 3.90 bcm per year, with commissioning expected in 2024.
- **Finland:** A new LNG terminal was established in Inkoo utilizing the Exemplar FSRU, which became operational in 2023, providing 4.50 bcm per year.
- **France:** The Fos Cavaou LNG Terminal capacity was increased by 1.50 bcm per year through an expansion completed in 2022. Additionally, the new Le Havre FSRU (Cape Ann) was commissioned in 2023, adding 5.00 bcm per year.
- **Germany:** Three new floating storage and regasification units (FSRUs) were introduced:
    - *Brunsbüttel (FSRU Höegh Gannet):* 3.10 bcm per year, operational in 2023
    - *Wilhelmshaven 1 (FSRU Höegh Esperanza):* 4.89 bcm per year, operational in 2023
    - *Mukran FSRU Neptune – 2nd:* 6.50 bcm per year, scheduled for commissioning in 2024
- **Greece:** The Alexandroupolis LNG terminal, an onshore facility, is set to add 5.50 bcm per year upon commissioning in 2024.
- **Italy:** The Piombino terminal (FSRU Golar Tundra), a newly established facility, became operational in 2023, contributing 5.00 bcm per year.
- **Netherlands**: Two major developments were realized:
    - *Gate Terminal (Rotterdam):* Expanded in 2022, adding 4.00 bcm per year
    - *EemsEnergyTerminal (Eemshaven):* A new terminal commissioned in 2022, offering 8.00 bcm per year.
- **Spain**: The Gijón (Musel) LNG terminal, initially constructed but unused, was activated in 2023 as a crisis response measure, increasing Spain's regasification capacity by 7.00 bcm per year.

These developments represent a crucial enhancement of Europe's LNG infrastructure, significantly boosting regasification capacity and enabling greater flexibility in gas supply management. By establishing new FSRUs and expanding existing terminals, European countries have increased their ability to import LNG from diversified global sources, thereby reinforcing energy resilience in the face of disrupted pipeline supplies.

6.2.1.2 New Gas-Production Projects

To diversify gas sources and bolster supply security, several major gas field projects have been initiated or expanded within and beyond Europe. These projects represent strategic efforts to enhance production capacities and reduce dependency on traditional gas suppliers. Below are the most significant gas field developments:

- **Neptun Deep (Black Sea, Romania)**[45]**:** This joint project between OMV Petrom and Romgaz is projected to unlock approximately 100 bcm of natural gas reserves. Production is scheduled to commence in 2027, with initial exports of 0.8 bcm per year directed to Moldova under a three-year contract. This development marks a significant step in leveraging Romania's offshore potential to strengthen regional supply security.
- **Leviathan (East Mediterranean, Israel)**[55]**:** In 2025, a consortium led by NewMed Energy, Chevron, and Ratio Energies reached a Final Investment Decision (FID) on a two-stage expansion of the Leviathan gas field. The project aims to increase production capacity from 12 bcm per year to 23 bcm per year by late 2025. This expansion significantly enhances the role of the Leviathan field as a key energy supplier to the Eastern Mediterranean and Europe.
- **Johan Sverdrup Phase 2 (North Sea, Norway)**[56]**:** Commissioned in 2022, the second phase of the Johan Sverdrup project adds approximately 1.041 bcm per year of gas production. Additionally, the project is expected to yield around 184

[55] Offshore Technology. (2025, February 24). *Leviathan partners propose expansion to increase gas production*. Retrieved May 13, 2025, from https://www.offshore-technology.com/news/leviathan-natural-gas-expansion/

[56] Equinor. (2022, December 15). *Johan Sverdrup Phase 2 on stream*. Retrieved May 13, 2025, from https://www.equinor.com/news/20221215-johan-sverdrup-phase-2-on-stream

million barrels of oil. Notably, Johan Sverdrup Phase 2 is distinguished by having some of the lowest CO_2 intensities among North Sea oil and gas projects, reflecting its alignment with both energy security and sustainability goals.

These strategic gas field developments enhance Europe's energy portfolio by increasing domestic production, fostering regional cooperation, and promoting the integration of diverse supply sources. As these projects come online, they will play a crucial role in reducing European dependency on traditional pipeline imports, particularly from Russia.

6.2.1.3 Other Key Infrastructure Developments

To strengthen supply security and facilitate diversified gas flows, Europe has made substantial investments in pipeline and interconnector infrastructure. These projects aim to enhance cross-border gas transmission capacity, improve regional interconnectivity, and reduce reliance on traditional supply routes. Below are some of the most significant pipeline and interconnector developments undertaken between 2020 and 2025:

- **Baltic Pipe**[57]**:** Inaugurated on September 27, 2022, the Baltic Pipe is a strategic gas transmission project that connects Norwegian gas supplies to Poland via Denmark. The pipeline has a northward transmission capacity of 10 bcm per year, with an additional reverse flow capacity of 3 bcm per year. This bidirectional feature enhances supply flexibility for Central and Eastern Europe.
- **Greece–Bulgaria Interconnector (IGB)**[58]**:** Operational since October 1, 2022, the IGB is a bidirectional pipeline linking Greece and Bulgaria. It currently facilitates gas flows of 3 bcm per year, with the potential for expansion to 5 bcm per year. The IGB is a critical component of the Southern Gas Corridor, enabling the transport of Azerbaijani gas from the Trans-Adriatic Pipeline (TAP) to Bulgaria and beyond.

[57] GAZ-SYSTEM. (n.d.). *Baltic Pipe*. Retrieved May 13, 2025, from https://www.gaz-system.pl/en/transmission-system/eu-support/investments-co-financed-with-eu-funds/baltic-pipe.html
[58] ICGB AD. (n.d.). *ICGB AD Bulgaria*. Retrieved May 13, 2025, from https://www.icgb.eu/

- **Trans-Adriatic Pipeline (TAP)**[59]**:** Commissioned in December 2020, the TAP transports approximately 10 bcm per year of Azerbaijani natural gas to Italy. The pipeline is a key element of the Southern Gas Corridor, connecting to the Greece–Bulgaria Interconnector (IGB) and the Revythoussa LNG terminal, thereby enabling diversified gas imports to Southern and Southeastern Europe.
- **Revythoussa (Greece)**[60]**:** The Revythoussa LNG terminal underwent an expansion to increase its capacity to 5.5 bcm per year. This upgrade allows it to meet both domestic Greek demand and support the emerging vertical gas corridor through Bulgaria, enhancing supply security in the Balkans and beyond.

These infrastructure projects represent pivotal advancements in Europe's strategy to secure diversified gas supplies and strengthen interregional connectivity. By facilitating both north-south and east-west gas flows, these pipelines and interconnectors support the EU's long-term objective of reducing dependency on Russian gas and enhancing the resilience of the European energy system.

[59] Trans Adriatic Pipeline AG. (n.d.). *Trans Adriatic Pipeline (TAP)*. Retrieved May 13, 2025, from https://www.tap-ag.com/
[60] DESFA S.A. (n.d.). *LNG Facility*. Retrieved May 13, 2025, from https://www.desfa.gr/en/infrastructure/lng-facility/

7 Planned Infrastructure Developments and Their Anticipated Impacts

The following chapter explores the prospective infrastructure developments from 2025 onwards that are prospected to significantly reshape the European natural gas market and contribute to the ongoing diversification of the continent's gas supply mix. These projects are strategically aligned with the EU's objective of reducing dependence on Russian gas and enhancing long-term energy security. The analysis focuses on three core dimensions: the expansion of LNG infrastructure, the creation of new regional supply corridors, and the integration of additional domestic production sources.

First, the chapter examines the continued expansion of European LNG infrastructure, including the commissioning of new regasification terminals that will further increase the EU's import capacity. Parallel attention is given to developments in upstream infrastructure globally - particularly in the United States, where growing liquefaction capacity is set to reinforce transatlantic LNG flows. These supply-side investments are assessed in terms of their potential to strengthen Europe's access to diversified gas volumes and stabilize market dynamics during periods of geopolitical or demand-driven stress.

Second, the chapter analyses the emerging role of the Vertical Gas Corridor, which aims to improve supply security in Southeast and Central Eastern Europe by facilitating bi-directional gas flows between Greece, Bulgaria, Romania, Hungary, and other countries in the region. By enhancing regional interconnectivity and unlocking access to diversified LNG and pipeline sources, the Vertical Corridor represents a critical component in the architecture of a more resilient European gas grid.

Third, the chapter explores new upstream developments within the EU itself, with a particular focus on the Neptun Deep offshore gas project in Romania. With an estimated production potential of up to 8.5 bcm annually, the project is poised to become a major contributor to regional supply security and a pivotal element in reducing the EU's structural reliance on external sources.

7.1 Further expansion of LNG infrastructure[31]

Between 2024 and 2030, Europe is set to significantly enhance its LNG regasification capacity through a series of new facilities and expansions across both EU Member States and associated regions. This ambitious development strategy primarily focuses on Germany, Southern Europe, and the Baltic region, with additional strategic projects planned in North Africa and the United Kingdom. Many of the newly established or expanded terminals, such as those in Stade (Germany), Gdańsk (Poland), and Ravenna (Italy), are high-capacity facilities. Concurrently, smaller-scale expansions aim to support regional diversification and resilience.

These investments reflect Europe's ongoing commitment to reducing dependency on Russian pipeline gas while building a robust, interconnected LNG supply infrastructure. Below is a summary of key LNG terminal projects scheduled for commissioning or expansion between 2024 and 2030:

- **Belgium:** Zeebrugge LNG Terminal - Expansion adding 1.80 bcm/year, start-up in 2026.
- **Croatia:** Krk LNG Terminal - Expansion adding 2.60 bcm/year, start-up in 2029.
- **Estonia:** Paldiski LNG Terminal - New facility with 2.50 bcm/year, start-up in 2025.
- **France:** Fos Cavaou LNG Terminal - Expansion adding 2.00 bcm/year, start-up in 2030.
- **Germany:**
    - Stade LNG Terminal (FSRU Energos Force) - New facility with 4.32 bcm/year, start-up in 2024.
    - Wilhelmshaven 2 (FSRU Excelerate Excelsior) - New facility with 3.14 bcm/year, start-up in 2024.
    - Mukran FSRU Energos Power - New facility, capacity unspecified, start-up in 2024.

- Wilhelmshaven LNG Terminal - New facility with 2.20 bcm/year, start-up in 2025.
- Stade LNG Terminal (onshore) - New high-capacity terminal with 13.30 bcm/year, start-up in 2027.

- **Greece:**
  - Argo FSRU - New facility with 5.20 bcm/year, start-up in 2024.
  - Thessaloniki FSRU - New facility with 4.82 bcm/year, start-up in 2028.
- **Ireland:** Mag Mell FSRU - New facility with 2.60 bcm/year, start-up in 2024.
- **Italy:** Ravenna (FSRU BW Singapore) - New facility with 5.00 bcm/year, start-up in 2024.
- **Morocco:** Morocco FSRU - New facility with 3.00 bcm/year, start-up in 2025.
- **Netherlands:** Gate Terminal, Rotterdam - Expansion adding 4.00 bcm/year, start-up in 2026.
- **Poland:**
  - Gdańsk LNG Terminal - New facility with 6.10 bcm/year, start-up in 2025.
  - Świnoujście LNG Terminal - Expansion adding 2.10 bcm/year, start-up in 2024.
- **United Kingdom:** Isle of Grain LNG Terminal - Expansion adding 5.00 bcm/year, start-up in 2025.

The United States is also poised to significantly increase its LNG export capacity, reinforcing its position as the world's leading LNG supplier. Currently, the U.S. exports approximately 118 bcm/year of LNG, with a peak capacity of 144 bcm/year. However, ongoing and planned projects could potentially triple or quadruple this capacity by 2035, reaching an estimated 400–500 bcm/year.

This surge in LNG production is driven by the development of new onshore trains, expansions of existing terminals, and offshore Floating LNG (FLNG) facilities. The Department of Energy (DOE) has authorized LNG export capacity totaling approximately 500 bcm/year. Below are some key U.S. LNG export projects scheduled between 2024 and 2035:

- **Corpus Christi LNG – Stage III (Texas)**
    - Expansion of the existing Corpus Christi terminal with seven new mid-scale trains.
    - Capacity: 13 bcm/year, start-up in 2025.
- **Golden Pass LNG (Sabine Pass, Texas)**
    - New plant (Exxon/Qatar joint venture) with three trains.
    - Capacity: 24 bcm/year, start-up in 2026.
- **Freeport LNG – Phase 2 (Texas)**
    - Expansion of the existing facility with two new trains.
    - Capacity: 13 bcm/year, start-up in 2027.
- **Magnolia LNG (Louisiana)**
    - New greenfield terminal (FERC-approved).
    - Capacity: 6 bcm/year, planned start-up between 2027 and 2030.
- **Driftwood LNG (Louisiana)**
    - New export complex (five-train project by Tellurian/Woodside).
    - Capacity: 37 bcm/year, start-up in 2028 (FID pending).
- **Rio Grande LNG (Texas)**
    - Phase 1 capacity of 23 bcm/year, total planned capacity of 36 bcm/year.
    - Start-up between 2027 and 2029.
- **Calcasieu Pass LNG (Louisiana)**

- Existing facility expanding from two to six trains, with additional capacity of 28 bcm planned.
- Current capacity: 17 bcm/year, expansion ongoing (2022–2025).

- **CP2 and CP3 LNG (Cameron Parish, Louisiana)**
  - New export plants by Venture Global, with capacities of 27 bcm/year (CP2, by 2030) and 40 bcm/year (CP3, mid-2030s).
- **Plaquemines LNG (Louisiana)**
  - Multi-phase project, Phase 1 capacity of 27 bcm/year, first LNG production in December 2024.
  - Total of 36+ trains planned.
- **Delfin FLNG (Gulf of Mexico, offshore Louisiana)**
  - First U.S. offshore LNG export port with up to three FLNG vessels.
  - Capacity: 17.6 bcm/year, start-up in 2026.
- **Sabine Pass LNG – Stage 5 Expansion (Louisiana)**
  - Expansion with two new trains adjacent to the existing six-train plant.
  - Capacity: 19 bcm/year, planned by 2035

These developments in both Europe and the U.S. represent a strategic response to the global energy crisis, aiming to enhance gas supply security through diversified LNG production and regasification infrastructure. As these projects come online, they are expected to play a pivotal role in reducing Europe's dependency on traditional pipeline gas while positioning the U.S. as a dominant force in global LNG supply.[61]

[61] U.S. Energy Information Administration. (n.d.). *U.S. Energy Information Administration (EIA)*. Retrieved May 13, 2025, from https://www.eia.gov/

7.2 Advancement of the "Vertical Corridor"[62]

The Vertical Gas Corridor is a strategic infrastructure initiative aimed at linking Greece's gas system with those of Bulgaria, Romania, Hungary, Slovakia, Moldova, and Ukraine. This collaborative project involves several Transmission System Operators (TSOs) from participating countries, including DESFA and Gastrade (Greece), ICGB and Bulgartransgaz (Bulgaria), Transgaz (Romania), FGSZ (Hungary), Eustream (Slovakia), Vestmoldtransgaz (Moldova), and GTSOU (Ukraine).

The primary objective of the Vertical Gas Corridor is to repurpose the traditional Trans-Balkan pipeline to facilitate the northward transmission of gas. Upon completion, the corridor is expected to carry approximately 10 bcm per year of LNG sourced from Greek terminals, as well as Caspian gas delivered via the Trans-Adriatic Pipeline (TAP), to Eastern Europe.

The Vertical Gas Corridor represents a pivotal effort to strengthen regional gas diversification, reducing reliance on any single supplier. By providing access to LNG from Greece and gas from the Southern Corridor, the initiative significantly enhances the security of supply for Central and Eastern Europe. Notably, Moldova and Ukraine, both highly dependent on Russian gas, will gain access to non-Russian gas sources, thereby diversifying their import portfolios and enhancing their energy independence.

Moreover, the corridor serves as a flexible and resilient North–South gas artery, integrating the energy networks of Southeastern and Central Europe. Its design also anticipates future energy transitions, with the infrastructure being suitable for the transmission of hydrogen and renewable gases.

Key infrastructure elements of the Vertical Gas Corridor are already operational, reinforcing its strategic capacity:

- **IGB Greece–Bulgaria Interconnector:** A 182 km pipeline with a capacity of 3 bcm per year, expandable to 5 bcm per year, operational since October 2022.

[62] "Ukraine, Moldova, Slovakia Join 'Vertical Corridor' European Gas Transportation Scheme." *Euractiv*, 22 Jan. 2024, https://www.euractiv.com/section/eet/news/ukraine-moldova-slovakia-join-vertical-corridor-european-gas-transportation-scheme/. Accessed 13 May 2025.

- **Alexandroupolis FSRU (Greece):** A floating LNG terminal with an initial capacity of approximately 2.25 bcm per year, designed to expand to 5.5 bcm per year in its first phase.

Additional projects aimed at increasing the corridor's northbound capacity are currently underway. These include pipeline loopings, new interconnectors, and compressor stations. For instance:

- **Bulgaria:** Construction of pipeline loops from Kulata to Kresna and Rupcha to Vetrino to increase Greece–Bulgaria flow from 2.3 to approximately 3.6 bcm per year, and Bulgaria–Romania flow from 5 to 10 bcm per year.

To ensure the corridor's capacity meets future demand, all involved TSOs have committed to conducting a binding market test in July 2024. This assessment will gauge commercial interest and may trigger additional capacity expansion initiatives.

Expected additional capacities through the Vertical Corridor:

Table 2: Vertical Corridor development projects

Project	Additional capacity (bcm/year
IGB Expansion (3→5)	2.0
Kulata–Kresna Loop	1.3
Rupcha–Vetrino Loop	5.0
Alexandroupolis FSRU (Phase I)	2.25
Alexandroupolis FSRU Phase II (future)	5.0
Hungary–Slovakia Upgrade	0.8
Romania–Ukraine Interconnector	2.8
Ukraine Compressor Expansion	10.0

7.3 Integration of new production capacities into the supply mix

Beyond developing new LNG and pipeline connections to enhance it's current infrastructure, Europe is actively pursuing new natural gas exploration and production projects, with the goal of significantly increasing domestic gas output by 2030–2035.

Despite the projected decline in overall gas demand due to decarbonization policies, strategic investments in domestic production are essential to bolstering supply security and reducing reliance on imports.

These initiatives are particularly vital for Central and Eastern Europe, where regional supply vulnerabilities persist. While Europe's long-term climate goals foresee a substantial decrease in gas demand (estimated at around 117 bcm/year by 2040), the ongoing development of domestic gas fields will play a crucial role in stabilizing the energy supply, mitigating risks associated with declining production from mature fields, and reducing strategic dependency on external suppliers.

Key Projects and Their Strategic Impact

1. **Neptun Deep (Domino & Pelican Sud) – Romania**[45]
    - **Start Date:** 2027
    - **Capacity:** 8.0 bcm/year
    - **Type:** New offshore field
    - **Details:** A joint OMV Petrom–Romgaz project with approximately 100 bcm of recoverable reserves. Following the Final Investment Decision (FID) in 2023, production is expected to commence in 2027, with a planned plateau output of 8 bcm/year. This project will nearly double Romania's current gas production, potentially transforming the country into a net exporter. Neptun Deep will integrate into regional networks such as BRUA and the Balkan pipeline system, significantly enhancing regional gas supply.
2. **Tyra II (Tyra Hub Redevelopment) – Denmark**[63]
    - **Start Date:** 2024
    - **Capacity:** 2.8 bcm/year

[63] TotalEnergies. (n.d.). *Tyra: a state-of-the-art offshore gas hub in the North Sea*. Retrieved May 13, 2025, from https://totalenergies.com/company/projects/gas/tyra-state-art-offshore-gas-hub-north-sea

- **Type:** Redevelopment and expansion
- **Details:** As Denmark's largest gas field, the Tyra II project is critical for restoring national gas production. Full capacity is expected by Q1 2024. The project will primarily serve domestic consumption while also supporting exports to Germany, contributing to North Sea gas supply continuity.

3. **Victory Field – United Kingdom**[64]
    - **Start Date:** 2025
    - **Capacity:** 1.5 bcm/year
    - **Type:** New North Sea field
    - **Details:** Approved by Shell, Victory Field will deliver gas onshore at Shetland. This project will enhance the UK's domestic supply and reduce import dependency, representing a key element in maintaining energy stability.
4. **Penguins Field (FPSO Restart) – United Kingdom**[65]
    - **Start Date:** 2025
    - **Capacity:** 0.8 bcm/year
    - **Type:** Redevelopment with FPSO unit
    - **Details:** Shell's redevelopment of the Penguins Field using a new Floating Production, Storage, and Offloading (FPSO) unit will reinstate production. The project is expected to meet the gas needs of approximately 700,000 UK households.

[64] Bousso, R. (2024, January 17). Shell approves plan to develop North Sea gas field. *Reuters*. Retrieved May 13, 2025, from https://www.reuters.com/business/energy/shell-approves-plan-develop-north-sea-gas-field-2024-01-17/

[65] Wright, B. (2025, February 7). Shell restarts Penguins field in the North Sea. *Journal of Petroleum Technology*. Retrieved May 13, 2025, from https://jpt.spe.org/shell-restarts-penguins-field-in-the-north-sea

5. **Midia Gas Development (Ana & Doina) – Romania**[66]
    - **Start Date:** 2022
    - **Capacity:** 1.0 bcm/year
    - **Type:** New offshore development
    - **Details:** Marking the first major Black Sea gas project in decades, Midia delivered around 0.5 bcm in its first operational year and will reach peak production of 1 bcm/year in subsequent years. This project is essential for Romania's strategy to boost indigenous gas output.

Norway currently is Europe's largest gas supplier, continues to maintain a dominant position through various sustaining projects and new offshore exploration. Notable developments include smaller North Sea tie-backs and Barents Sea projects (e.g., Halten East starting in 2025), each contributing between 0.1 and 0.5 bcm/year. These incremental additions support Norway's objective of maintaining an annual export level near 100 bcm, ensuring continued supply reliability for Europe.

By adding approximately 13–15 bcm/year of new gas production capacity by the mid-2030s, Europe will not achieve complete gas self-sufficiency. However, these projects will significantly offset the decline from aging fields, support regional integration, and enhance energy security by reducing reliance on imports.

The strategic importance of these projects extends beyond mere capacity increases. They reinforce Europe's bargaining position by diversifying supply sources and reducing dependence on Russian gas. Additionally, linking new production sites to regional infrastructure—such as the BRUA pipeline and the North Sea gas grid—facilitates efficient gas distribution, thereby supporting both local and transnational energy security. In conclusion, while Europe continues to align with long-term decarbonization goals, the

[66] Black Sea Oil & Gas. (n.d.). *Midia Gas Development*. Retrieved May 13, 2025, from https://www.blackseaog.com/ro/midia-gas-development/

expansion of domestic gas production remains a critical pillar for maintaining energy stability. By leveraging existing and new gas fields, particularly in Romania, Denmark, and the UK, Europe is strengthening its supply chain and reducing strategic vulnerabilities within the import mix. There are numerous ongoing projects regarding new natural gas exploration and production. By 2030–2035 these developments could increase domestic gas production across Europe. Although overall demand is declining due to the events of the past years and decarbonization policies, strategic investments in domestic gas production remain vital to improve supply security and reduce reliance on imports from external sources.

Appendices

Appendix 1: Abbreviations and expressions used in the Study

- AGSI – Aggregated Gas Storage Inventory – A transparency platform providing daily, standardized data on gas storage levels across European countries. Operated by Gas Infrastructure Europe (GIE), AGSI tracks the fill levels of underground gas storage facilities, helping policymakers and market actors monitor storage adequacy and seasonal readiness.
- ANRE – Autoritatea Națională de Reglementare în domeniul Energiei: Romania's National Energy Regulatory Authority. ANRE is the independent national authority responsible for regulating electricity and natural gas markets in Romania. It oversees market liberalization, tariff setting, licensing, consumer protection, and the implementation of EU energy legislation at the national level.
- BRUA – A regional gas pipeline connecting Bulgaria, Romania, Hungary, and Austria, designed to improve source diversification and enhance North-South gas transmission across Central and Eastern Europe.
- CEEGEX – Central Eastern European Gas Exchange. The Hungarian natural gas exchange, facilitating spot and futures trading within the Central and Eastern European region.
- CEGH – Central European Gas Hub. Austria's gas trading hub located around the Baumgarten entry point, serving as a key regional distribution and trading center.
- EUGAL – European Gas Pipeline Link. A major gas pipeline in Germany that transports gas from the Nord Stream 2 pipeline into the internal European gas grid, including toward southern Germany and the Czech Republic.
- EUSDR – EU Strategy for the Danube Region. The European Union's macro-regional strategy targeting 14 countries in the Danube basin to promote cooperation in areas such as energy, transport, environment, and economic development.
- FSRU – Floating Storage and Regasification Unit. A floating LNG terminal capable of storing liquefied natural gas and regasifying it for injection into the pipeline network.
- GIE – Gas Infrastructure Europe –The European association representing the interests of gas infrastructure operators, including transmission system operators, LNG terminal operators, and gas storage system operators. GIE promotes transparency and market integration and is responsible for managing data platforms such as AGSI and ALSI to support informed energy policymaking and market functioning.

- IEA – International Energy Agency An autonomous agency within the framework of the Organization for Economic Co-operation and Development (OECD), established to promote energy security, economic growth, and environmental sustainability. The IEA provides policy advice, data, and works on energy technologies, including efforts to combat climate change.
- IGB – Interconnector Greece–Bulgaria. A gas pipeline linking Greece and Bulgaria to facilitate the transport of alternative gas sources (e.g., LNG or Azerbaijani gas), strengthening regional energy security.
- LNG – Liquefied Natural Gas. Natural gas that has been cooled to -162°C to be transported and stored in liquid form, typically by ship, for delivery to global markets.
- NCG – NetConnect Germany. A former German virtual trading point (VTP) that merged with Gaspool in 2021 to form Trading Hub Europe (THE).
- OPCOM – The Romanian electricity and natural gas exchange, serving as the official organized energy market for Romania.
- OTC – Over-the-Counter. A type of trading where contracts are negotiated directly between parties, outside of formal exchanges, typically involving customized terms.
- PSV – Punto di Scambio Virtuale. Italy's virtual gas trading point, where gas is traded within the national gas system without being tied to a physical location.
- SME – Small and Medium-sized Enterprises. Businesses falling within certain employment and turnover thresholds, often considered key stakeholders in energy policy and support schemes.
- TAP – Trans Adriatic Pipeline. A pipeline transporting natural gas from Azerbaijan to Italy via Greece and Albania, forming part of the Southern Gas Corridor.
- THE – Trading Hub Europe. The unified German virtual trading point (VTP), established in 2021 by merging NCG and Gaspool, now serving as the countrywide gas market area.
- TTF – Title Transfer Facility. The Dutch virtual gas trading hub and one of Europe's most liquid benchmark markets for natural gas pricing.
- TurkStream – A gas pipeline transporting Russian natural gas across the Black Sea to Turkey and further into Southeast Europe, bypassing Ukraine.
- VTP – Virtual Trading Point. A generic term for non-physical gas trading hubs within national transmission systems (e.g., TTF, PSV, THE), enabling flexible gas transactions.

Appendix 2: Table of figures

Appendix 3: Table of tables

Disclaimer

The present study was prepared by KPMG Tanácsadó Kft. (’KPMG’) according to the conditions of the assignment contracted between Ministry of Foreign Affairs (’Ministry’) and KPMG on 02.12.2024.

A significant part of the data and information used for the Study was collected from public sources and country representative of EUSDR countries. Our work did not include source checking data and information, and in particular we did not carry out an audit in accordance with accounting rules, nor a company valuation. KPMG Tanácsadó Kft. does not assume any liability for the accuracy and completeness of the data and information used.

In addition to the data and information provided by country representative the report is based on publicly available data and information as described in the report. Our reliance on and use of such data and information should not be construed as an expression of our opinion on them, unless and to the extent we state otherwise in our report. We assume no liability for the impact on our conclusions of any inaccuracies in such data and information.

The Study may contain certain predictive statements, estimates and projections that are regarding the future evolution of the hydrogen markets. These statements, estimates and projections are based on assumptions and thus by nature are affected by uncertainties. Often in business practice, the projections and actual future outcomes can differ, as certain events and circumstances may not happen in accordance with the assumptions of the forecast, leading to significant discrepancies. Only the Ministry is liable for the definition or selection of assumptions present or referenced in the Study, as these have been consulted with, or provided to KPMG by the representatives of Company. The assignment completed by KPMG does in no way (neither explicitly, nor implicitly) represent assurance regarding the accuracy of future projections. The fundamental condition to the eventuation of projections is the continual validity of the underlying assumptions. From time to time, these assumptions need to be reviewed and adjusted to changing

circumstances. Given the uncertainty of the assumptions among future events and circumstances, actual future outcomes may differ from forecasted results.

The Study was finalized on 13.06.2025. In relation to events following said finalisation, which might have had effects on the results of the Study, KPMG accepts no liability or reliability whatsoever, in relation to such events KPMG has completed no analysis.

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