

November 2024



European Gas Market Supply & Demand: Winter Outlook 2024/25

1. Introduction: skating on thin ice

News that Russian gas supply to Austria's OMV has been suspended following an arbitration ruling against Gazprom Export is hardly a surprise – bringing to an early close another tranche of Ukraine transit volumes to central Europe. Prompt TTF's rally to a new year high on the headlines is a timely reminder that Europe's gas market remains fundamentally vulnerable to the aftershocks of the Ukraine crisis, even years after the initial supply crunch. As the bulk of the winter months stretch out ahead, our analysis shows declining European indigenous supply combined with limited upside flexibility for imported pipeline gas means that storage withdrawals and spot LNG will be the key balancing items.

After two years of mild European winters, the 2024/25 season is set to be chillier as La Niña takes hold, bringing with it colder, wetter and stormier conditions across Europe's key gas demand zones. Despite a third year of overall contraction in gas demand in the EU-27 plus UK, we expect gas demand over the winter months to rise 10 Bcm year-on-year, as colder temperatures drive space heating and power demand, with short-term gas demand volatility exacerbated by ever-rising volumes required to cover renewables intermittency. This forecast assumes a normal winter – a cold winter could more than double that increment.

The demand bump comes as Europe's domestic gas production continues to slide, pulled back by falling UK output. Meanwhile, pipeline imports from Norway, North Africa and Azerbaijan are nearly topped out and remaining Russian transit gas via Ukraine is expected to halt at the end of December, leaving a shortfall to be filled by higher LNG flows. Given that global LNG balances are tight, Europe will have to pay a premium to draw additional cargoes, a fresh driver for higher prices over the winter months. New US-based LNG projects are starting up but the ramp-up of both Plaquemines and the Corpus Christi expansion is unlikely to materially loosen balances this winter. The LNG market context outside Europe is not helping either: China, OECD Asia and Emerging Asian buyers have all increased their LNG imports in 2024, balanced by softer European demand. The winter demand surge changes that picture sharply, with price alone set to decide which is the real premium market.

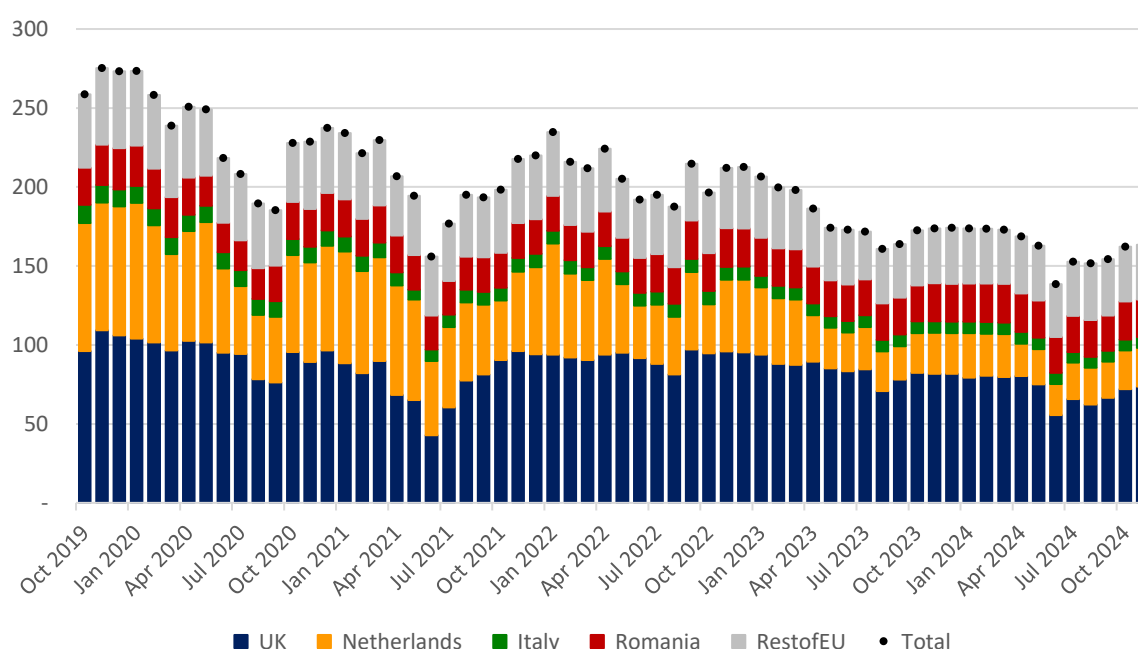
European storage is perhaps the silver lining – representing the most responsive source of short-term supply over the winter. European regulators have kept storage fill mandates in place since the 2022 crisis and while shippers may not have been quite as zealous at injecting storage this past summer, European storage was still nearly full at the start of the winter. Historical data suggests that storage is easily sufficient to meet realistic market scenarios for the winter, even if temperatures are colder than normal. But whatever is withdrawn will need to be replenished in summer 2025 – the main reason why price curves through next year's summer are robust and only soften when the new wave of LNG starts to show up late in the year.

2. No upside flexibility for European gas production amid UK decline

Europe's gas production continues its gentle downwards slope, curbed last year by the halt in production at Groningen in the Netherlands and this year by UK declines. This means there is little scope for a short-term supply response if balances tighten further during winter 2024/25. Since May 2023, European gas production charted a range of 150-174 MMcm/d, with a winter plateau of 170-174 MMcm/d from October 2023 to March 2024.

With EU-27 monthly gas production virtually flat at around 86-92 MMcm/d since May 2023, the UK accounts for most of the month-on-month fluctuation in production. In our scenario for winter 2024/25, EU-27 production remains flat year-on-year (90-92 MMcm/d) while UK production is 10 MMcm/d lower year-on-year, in a continuation of the trend seen over the past 12 months. This scenario offers UK production of 70-72 MMcm/d during winter 2024/25 and total European production of 160-164 MMcm/d.

Figure 1: European monthly gas production (MMcm per day)



Source: Data from National gas Transmission (UK) and Eurostat (EU-27). Graph by the author. Gas production in Netherlands and Rest of EU in October-November 2024 are estimates based on preliminary data.

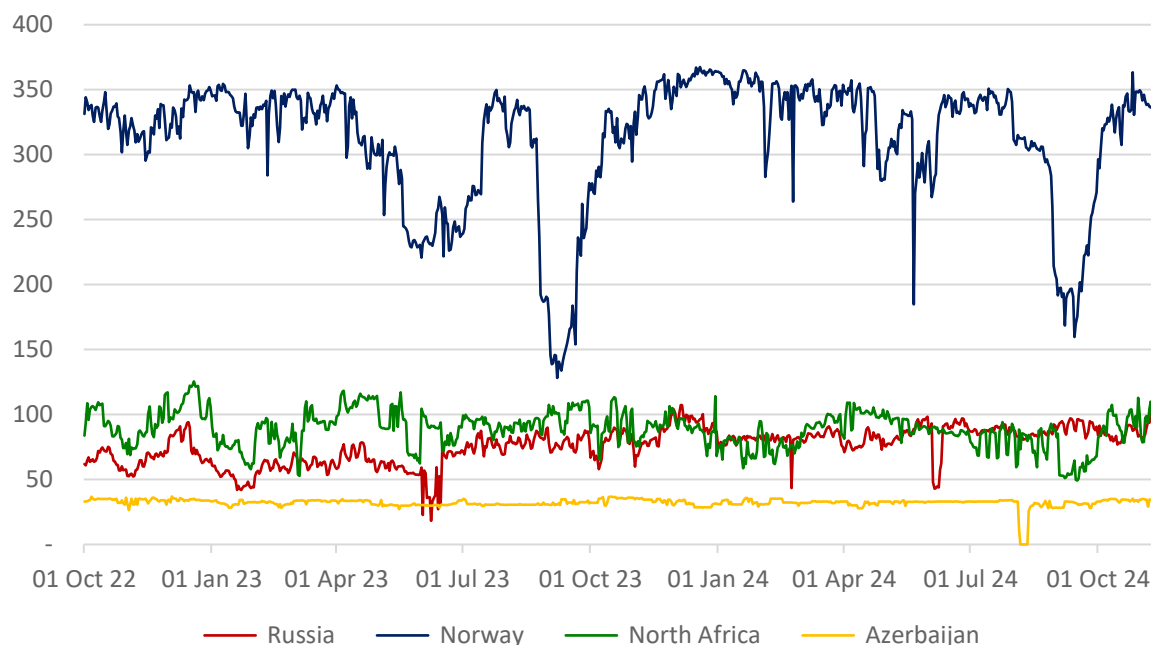
3. Pipeline gas imports set to decline as Ukrainian transit ends

Non-Russian pipeline supply

In terms of pipeline imports, supply from Norway returned to its normal winter range of 335-355 MMcm/d at the start of winter 2024/25. In four of the past five winters, Norway has sustained monthly average pipeline volumes in that range for between four and six of the winter months between October and March. Winter 2023/24 was an exception, with the peak monthly volumes reaching 360 MMcm/d in December 2023 and 356 MMcm/d in January 2024. The latest planned maintenance data from Gassco¹ suggests Norway's full production capacity of 360 MMcm/d will be reached in mid-November. A mid-range scenario could see an average of 350 MMcm/d in December-January, and 345 MMcm/d in November, February and March. If Europe experiences a surge in demand, Norwegian supply could nudge the top of its capacity envelope at 355-360 MMcm/d as it did in 2023/24, absent unplanned outages.

¹ Gassco, 2024. *Urgent Market Messages (UMM)*. <https://umm.gassco.no/> [updated 7 November 2024]

Figure 2: European daily pipeline imports by source since 1 October 2022 (MMcm per day)



Source: Data from ENTSOG Transparency Platform, 1 October 2022 to 16 November 2024.² Graph by the author.

North Africa's gas supply is less predictable, particularly Algerian supply to Italy via the Transmed pipeline, with flow fluctuations seen on a daily and monthly basis. Setting aside the heavy impact of maintenance in September 2024, monthly flows via Transmed between October 2023 and October 2024 were in the range of 43-68 MMcm/d at an average of 56 MMcm/d. The key factor in daily flows is the relatively wide range of flexibility in offtake nominations under the contracts between Sonatrach and Italian buyers. Edison (1 Bcma), Enel (3 Bcma) and Eni (9 Bcma) all have contracts with Sonatrach that expire in 2027/28, plus the ability to purchase additional spot volumes from Sonatrach over and above their long-term contract offtake commitments.^{3 4} Italian imports via the Transmed pipeline totalled just over 20 Bcm in 2021 and over 22 Bcm in 2022 and 2023, which suggests Italian buyers have been exercising their right to purchase additional spot volumes from Sonatrach. A tight market this winter suggests that pattern will continue.⁵

In the same period, other North African gas flows to Europe remained within a narrower and more predictable envelope over the past year. Monthly Algerian flows to Spain via the Medgaz pipeline averaged 27 MMcm/d in a range of 21-31 MMcm/d, while Libyan flows to Italy via the Green Stream pipeline averaged 5 MMcm/d in the past year, stable at 2-3 MMcm/d since June 2024. Overall, total supply from North Africa, which averaged 94 MMcm/d in October and 1-12 November, could continue in the range of 90-95 MMcm/d, with potential to rise to 95-100 MMcm/d, especially if Algerian flows to Italy are boosted by higher nominations and spot purchases.

² ENTSOG, 2023. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

³ S&P Global, 2019. Algeria's Sonatrach renews long-term gas sales contract with Italy's Edison. *Commodity Insights*, 12 November. <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/111219-algerias-sonatrach-renews-long-term-gas-sales-contract-with-italys-edison>

⁴ S&P Global, 2021. Sonatrach Italian partners buying spot Algerian gas on top of long-term volumes: sources. *Commodity Insights*, 16 April. <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/041621-sonatrach-italian-partners-buying-spot-algerian-gas-on-top-of-long-term-volumes-sources>

⁵ Data from ENTSOG Transparency Platform. <https://transparency.entsog.eu/#/map>

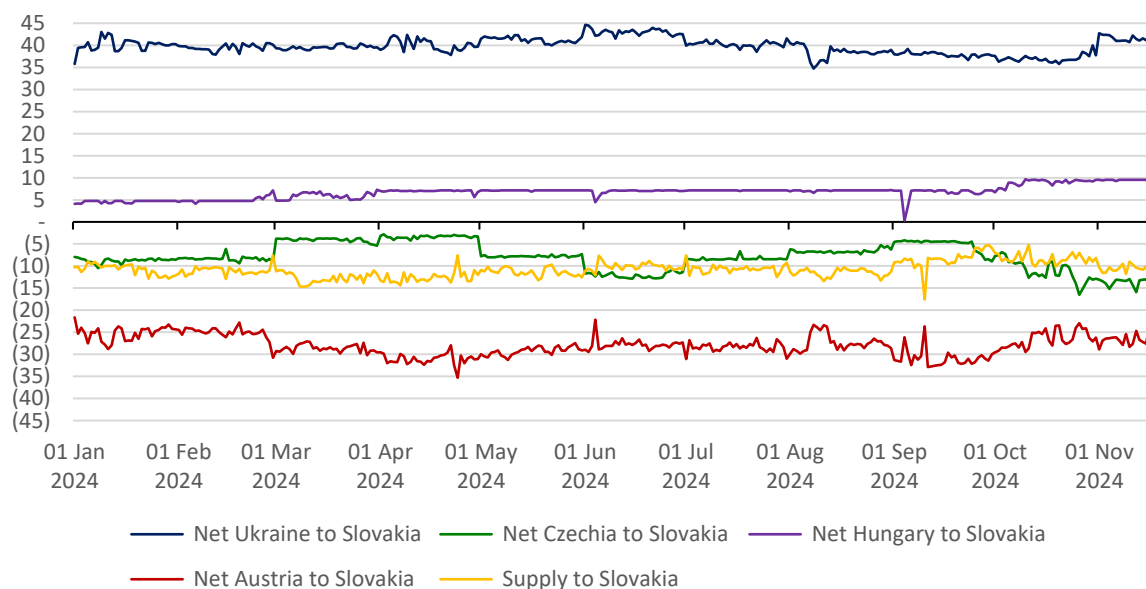
Monthly European imports from Azerbaijan via the Trans-Adriatic Pipeline (TAP) – as measured on the border between Turkey and Greece – have been consistent in the 31-35 MMcm/d range over the past year, so we are assuming a flat rate of 34 MMcm/d throughout the winter.

Russian pipeline supply

The most significant shift in pipeline supplies this winter will be driven by Russian supply. Europe’s pipeline imports from Russia are sourced via two routes: the Turkish Stream pipeline and subsequent transit via Turkey supplies South-Eastern Europe, while transit via Ukraine supplies Central Europe. Since November 2023, monthly gas transit via Ukraine (as measured on the Ukraine-Slovakia border) has been in the range of 37-42 MMcm/d. The contract for Russian gas transit expires on 31 December 2024 and we expect flows will cease at that point. Over the past 12 months, monthly Russian pipeline gas supply to South-Eastern Europe via Turkish Stream has been in the range of 39-46 MMcm/d, averaging 43 MMcm/d.⁶

In Central Europe, the Russian gas transited via Ukraine exits Ukraine exclusively into Slovakia at a rate of 35-45 MMcm/d. That supply into Slovakia is augmented by 5-10 MMcm/d of net Slovak imports from Hungary. Of that volume, 5-15 MMcm/d is supplied to the Slovak market, 25-30 MMcm/d is delivered onwards to Austria, and the remainder (5-15 MMcm/d) is re-exported from Slovakia to the Czech Republic, as illustrated in the graph below.

Figure 3: European daily pipeline imports by source since 1 October 2022 (MMcm per day)



Source: Data from ENTSOG Transparency Platform.⁷ Graph by the author. Positive values indicate supply to Slovakia, and negative values indicate exports from Slovakia or supply to the domestic Slovak market.

Therefore, the cessation of Russian gas transit via Ukraine will primarily impact Slovakia and Austria, where SPP and OMV (respectively) still hold long-term contracts with Gazprom. A knock-on impact will be felt in the Czech Republic and Italy, where some volumes continued to be traded across the border, albeit with the Czech and Italian buyers not purchasing gas from Gazprom directly. When the Ukrainian transit stops, we would expect to see: 1) an uptick in storage withdrawals; 2) a rise in Slovakia and Austria hub prices above those in the Czech Republic, Germany, Italy and Hungary; 3) gas traders taking advantage of that premium to sell volumes across those borders; and finally, 4) hub prices in the Czech Republic, Germany, Italy and Hungary consequently facing some upward pressure.

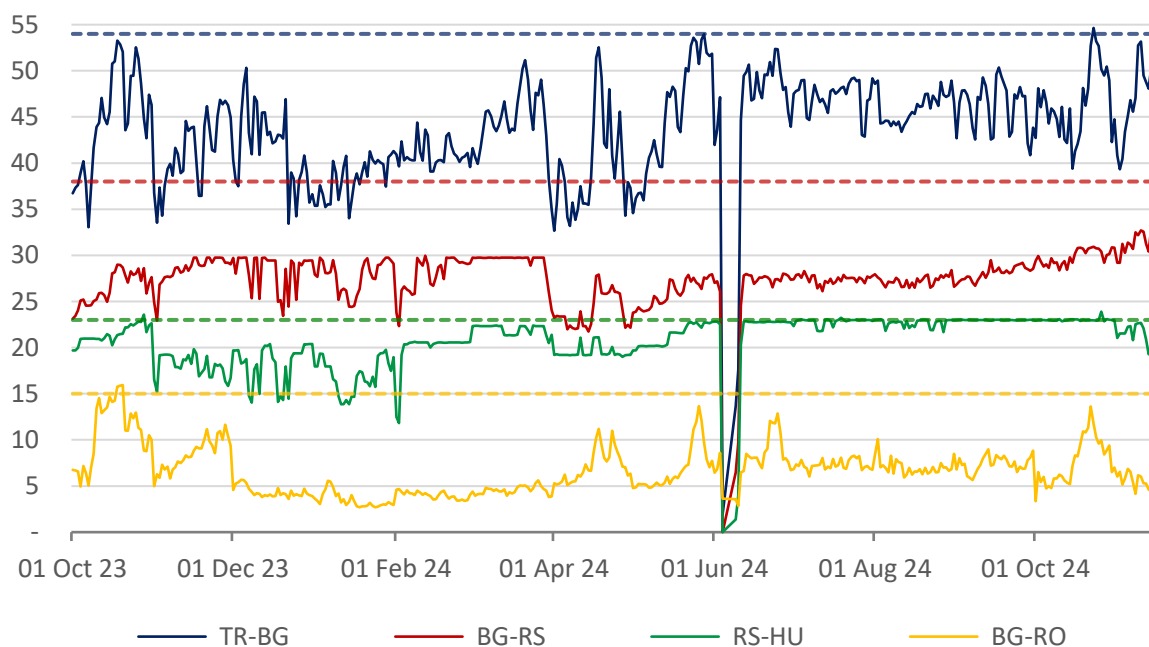
⁶ This excludes June 2024, which saw the Turkish Stream pipeline taken offline for five days of maintenance.

⁷ ENTSOG, 2023. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

OMV announced on 13 November that its German trading subsidiary, OMV Gas Marketing & Trading GmbH (OGMT) had succeeded in its arbitration case against Gazprom Export and had been awarded EUR 230 million in damages. OMV announced that it would take steps to enforce the award 'with immediate effect' by offsetting this sum against invoices for supply under its contract with Gazprom Export. In doing so, OMV acknowledged that "it is expected that there may be a deterioration of the contractual relationship under the Austrian supply contract of OGMT with Gazprom Export, including a potential halt of gas supply".⁸ Two days later, the Central European Gas Hub (CEGH) reported that Gazprom Export had informed OMV that it would reduce its supplies OMV under its contract to supply gas to Austria from 16 November. The volume affected (7,400 MWh per hour, or 178 GWh/d) equates to 16.4 MMcm/d (6 Bcma).¹⁰

The first three days of the suspension of Gazprom supplies to OMV (16-18 November) saw flows from Ukraine to Slovakia and Slovakia to Austria continue at broadly similar levels. It remains to be seen whether this is the result of SPP raising its daily nominations under its own contract with Gazprom, and then re-selling the volumes to Austrian buyers, or if it is the result of Gazprom selling spot volumes to non-OMV buyers delivering to Austria. In any case, the situation is likely to change again in six weeks' time, when the contract for transit via Ukraine expires.

Figure 4: Daily pipeline flows in South-Eastern Europe since 1 October 2023 (MMcm per day)



Note: TF-BG (Turkey to Bulgaria); BG-RS (Bulgaria to Serbia); RS-HU (Serbia to Hungary); BG-RO (Bulgaria to Romania). Daily flows are represented by solid lines and daily capacities by dotted lines.

Source: Data from ENTSOG Transparency Platform, 1 October 2023 to 16 November 2024.¹¹ Graph by the author.

⁸ OMV, 2024. OMV successfully receives arbitral award in relation to its German gas supplies from Gazprom Export. *Press Release*, 13 November. <https://www.omv.com/en/news/241113-omv-successfully-receives-arbitral-award-in-relation-to-its-german-gas-supplies-from-gazprom-export>

⁹ The arbitration concerned a shortfall in in Gazprom supplies to OGMT in Germany in 2022

¹⁰ CEGH, 2024. Information on gas supplies under Gazprom Export contract for Austrian Market Area East. *CEGH REMIT platform for publication of inside information*, 15 November. <https://www.gashub.at/remit/details.xhtml?id=52028-2-2024>

¹¹ ENTSOG, 2023. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

As illustrated in the graph above, the ability of Gazprom to send additional gas into South-Eastern Europe to offset the loss of transit via Ukraine is limited. On the Turkey-Bulgaria border, the daily capacity is 53.5 MMcm/d (585 GWh/d), which suggests only 10 MMcm/d of spare capacity relative to flows over the past year, and just 7-8 MMcm/d of spare capacity relative to flows in the period July-October 2024. The ability to bring these additional volumes north into Central Europe, from Bulgaria to Hungary via Serbia, is also constrained by the capacity to move gas across the border from Serbia to Hungary (23 MMcm/d), which has been more or less fully utilised since March 2024. The ability to flow more Russian gas to Hungary via Romania is also capped by cross-border capacity at Csanadpalota (79 GWh/d, or 7.2 MMcm/d), which was fully utilised from late May until the end of October, before a decline in utilisation in early November.

Overall, pipeline imports into Europe are therefore expected to be in a range of 340-350 MMcm/d from Norway, 85-95 MMcm/d from North Africa, 33 MMcm/d from Azerbaijan, giving a non-Russian total of 458-478 MMcm/d. Russian supply via Turkish Stream is expected in a range of 40-50 MMcm/d, while transit via Ukraine of 37-42 MMcm/d is expected to cease on 31 December 2024. Therefore, total European pipeline imports are expected to be in a range of 535-570 MMcm/d in November-December, falling to 498-528 MMcm/d in January-March 2025.

Given the expected end of Russian gas transit via Ukraine, it is also worth noting that Ukraine's gas imports since November 2023 have been limited and sourced almost exclusively from Hungary. Since October 2023, the 'commercial' and 'physical' exit flows across the border to Slovakia reported by the Ukrainian TSO (TSOUA) have been identical, which suggests that Ukraine has not been utilising backhaul ('virtual reverse flow') to import gas from Slovakia over the past year. However, it is notable that on 1 November 2024, Ukraine's gas storage stocks (87.0 TWh) were notably lower than on the same date in 2023 (125.9 TWh) and 2022 (105.3 TWh).¹² These lower stocks increase the possibility that Ukraine will need imports during the winter, but an absence of transit means that backhaul will not be an option, while the tighter Central European market means that physical imports will be more expensive.

4. European LNG imports

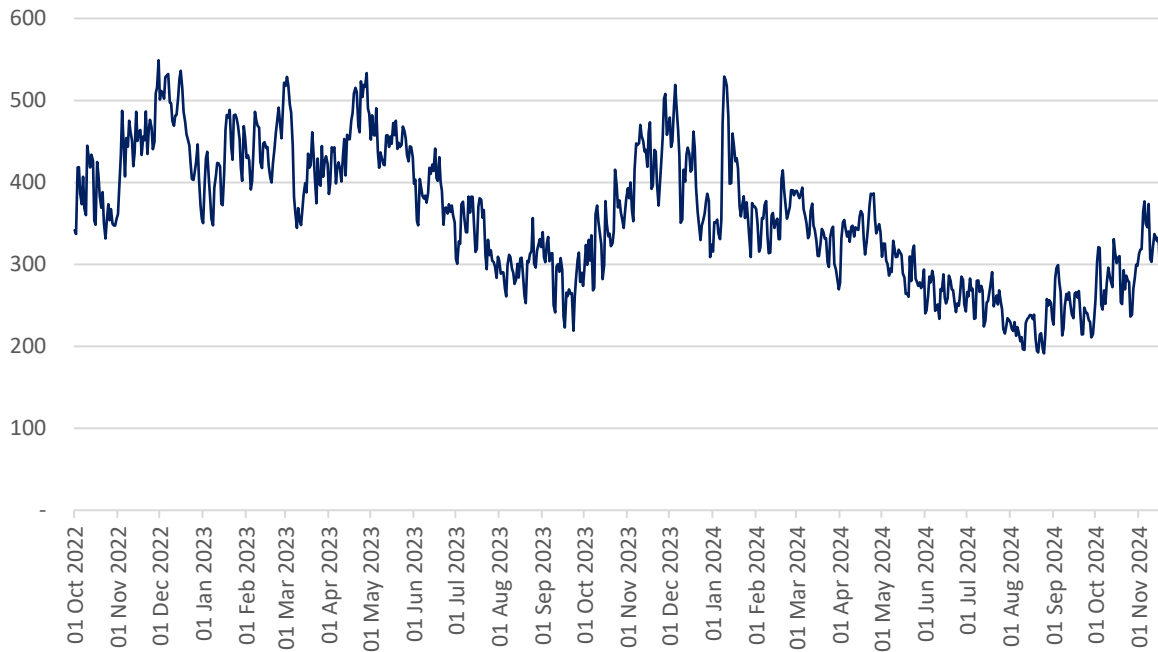
Given the lack of upside flexibility from European production and limited upside flexibility from pipeline imports, LNG imports will be the main non-storage source of supply-side flexibility this winter. That flexibility exists both in the ability to increase monthly supply – in line with seasonal demand – by attracting additional cargoes and the ability to increase daily supply by flexing sendout.

In summer 2022 and winter 2023/24, Europe's LNG import growth and demand reduction equally offset the decline in pipeline supply from Russia. But as European demand continued to decline year-on-year, LNG imports stabilised in summer 2023 before falling in winter 2023/24 and summer 2024. Monthly LNG sendout ranged from 420 to 470 MMcm/d in winter 2022/23 (November to March) and 339-430 MMcm/d in winter 2023/24.

¹² Gas Infrastructure Europe, 2024. *Aggregated Gas Storage Inventory (AGSI) - Ukraine*. <https://agsi.gie.eu/data-overview/VGS--UGS-UKRAINE/UA/21X000000013279>

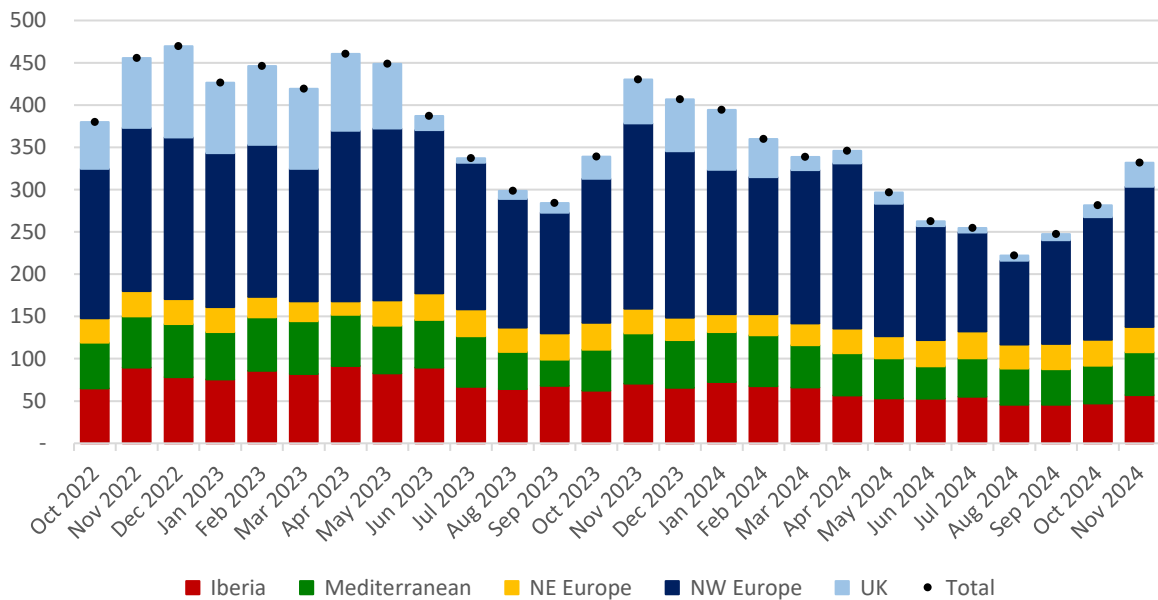


Figure 5: EU-27 plus UK daily LNG sendout (MMcm per day)



Source: Data for 1 October 2022 to 16 November 2024 from GIE ALSI¹³ and National Gas Transmission (UK).¹⁴

Figure 6: European LNG sendout by region (MMcm per day)



Source: Data from GIE ALSI¹⁵ and National Gas Transmission (UK).¹⁶ Graph by the author.¹⁷

¹³ GIE, 2023. *Aggregated LNG Storage Inventory (ALSI)*. <https://alsi.gie.eu/#/historical/1>

¹⁴ National Gas Transmission, 2023. *Gas Transmission Data*. <https://data.nationalgas.com/find-gas-data>

¹⁵ GIE, 2023. *Aggregated LNG Storage Inventory (ALSI)*. <https://alsi.gie.eu/#/historical/1>

¹⁶ National Gas Transmission, 2023. *Gas Transmission Data*. <https://data.nationalgas.com/find-gas-data>

¹⁷ The regions are Iberia (Spain, Portugal), Mediterranean (Italy, Croatia, Greece), NW Europe (France, Belgium, Netherlands, Germany), NE Europe (Poland, Lithuania, Finland), and UK. Sendout data for Sweden, Malta, and Gibraltar is not available.



In terms of Europe's regasification capacity, new Floating Storage and Regasification Units (FSRUs) were added at Eemshaven (Netherlands), Wilhelmshaven, Lubmin, Brunsbüttel (Germany), Le Havre (France), Piombino (Italy) and Inkoo (Finland) in 2022-23.

Ahead of winter 2024/25, the Lubmin FSRU was relocated 40km north to Mukran and its capacity more than doubled with the addition of a second FSRU. The first post-expansion cargo was received on 28 August. No cargoes then arrived in the following six weeks, before two in quick succession on 17 and 28 October. Sendout at Mukran exceeded 100 GWh/d for the first time on 4 November.¹⁸ Those German FSRUs are seemingly foreclosed to Russian LNG supplies. On 14 November, the German Economy Ministry instructed the operator of the Brunsbüttel FSRU, Deutsche Energy Terminal, not to accept a Russian cargo that had reportedly been destined for the facility.¹⁹ In Greece, the Alexandroupoli FSRU began commercial operations on 1 October.²⁰

Germany is awaiting two additional FSRUs, namely a second for Wilhelmshaven and one for Stade. As we noted in our most recent Quarterly Gas Market Review, the *FSRU Excelsior* (destined for Wilhelmshaven) remains at the Spanish port of Ferrol but is expected to begin operations at Wilhelmshaven before the end of 2024. The *FSRU Energos Force* arrived at Stade on 15 March but is not yet ready for commercial operations and no timescale for start-up has been confirmed.

In the year to date, growth in global LNG supply has been limited while growth in non-European LNG demand has been robust, with lower European LNG imports helping to balance the market. Looking ahead to winter 2024/25, this tight market could see a temperature-driven surge in northern hemisphere demand. Therefore, the key issues to watch will be any delays in the ramp up at Plaquemines or Corpus Christi, any curtailments at other liquefaction plants (such as the Freeport shut-in that lasted from mid-January to early May 2024) and any seasonal surge in LNG demand in North-East Asia.

For this reason, our Winter Outlook scenario assumes sendout from European LNG regasification terminals in winter 2024/25 will be: 350 MMcm/d in November (up from the average of 332 MMcm/d in 1-16 November), rising to 422 MMcm/d in December (the mid-point between the monthly averages for December 2022 and December 2023). Thereafter, we estimate sendout in Q1 2025 at 450 MMcm/d in January, 440 MMcm/d in February and 430 MMcm/d in March – slightly higher than levels seen in Q1 2023 and an average of 75 MMcm/d higher than the levels seen in Q1 2024, as Europe seeks to offset the loss of Russian supply via Ukraine.

Assuming stable year-on-year LNG supply from existing projects and the two US projects starting on schedule (albeit with limited contribution to global supply in Q1 2025), the extent to which any surge in European LNG demand will drive higher prices depends on the strength of LNG demand outside Europe.

¹⁸ Gas Infrastructure Europe, 2024. *Aggregated LNG System Inventory (ALSI) – Mukran LNG Terminal*. <https://alsi.gie.eu/data-overview/37W000000000114D/DE/37X000000000265F>

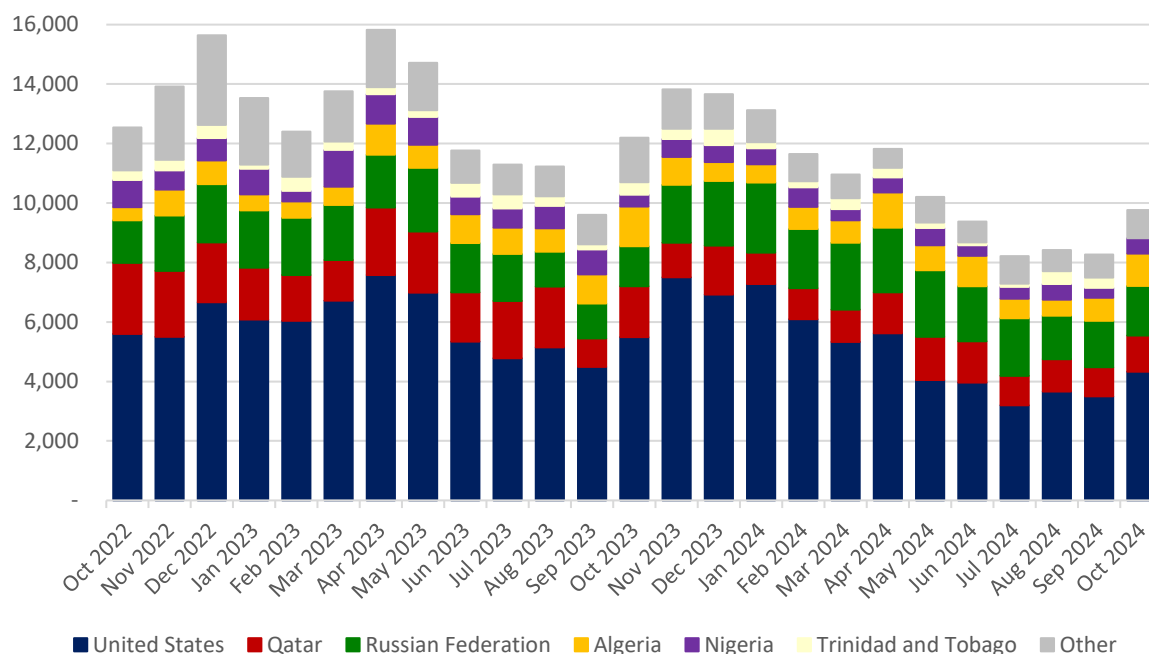
¹⁹ Rashad, M., and Wacket, M., 2024. Germany rejects arrival of Russian LNG shipment at Brunsbuttel terminal, sources say. *Reuters*, 14 November. <https://www.reuters.com/business/energy/germany-tells-ports-reject-russian-gas-cargoes-ft-reports-2024-11-14/>

²⁰ Gastrade, 2024. Commercial Operations of Gastrade's Alexandroupolis LNG Terminal begins. *Press Release*, 1 October. <https://www.gastrade.gr/en/2024/10/01/commercial-operations-of-gastrades-alexandroupolis-lng-terminal-begins/>

5. Global LNG market tightness

On the supply side, the majority of Europe’s LNG imports in winter 2024/25 will be sourced from the United States, Qatar, Russia and Algeria.

Figure 7: EU-27 plus UK LNG imports by source (MMcm per month)



Source: Data from Kpler LNG Platform.²¹ Graph by the author.²²

The only notable new supply from those sources in winter 2024/25 will be the 20 mtpa Plaquemines project led by Venture Global and Cheniere’s 10 mtpa expansion of its Corpus Christi liquefaction plant.

On 6 November, Reuters reported that US Federal Regulators have given Venture Global permission to introduce gas into the plant as part of the commissioning process.²³ Data from Kpler shows two LNG carriers controlled by Venture Global – the *Venture Gator* and *Venture Bayou* – anchored close to the mouth of the Mississippi River, ready to receive the first cargoes.²⁴ The plant consists of thirty-six ‘mid-scale’ trains of 0.626 mtpa, arranged in eighteen blocks (two trains per block). Each 10 mtpa of capacity will consist of nine blocks. The project is expected to begin commercial operations by the end of the year, with capacity growing as blocks are brought online.

At Corpus Christi, Cheniere operates three trains with a total capacity of 15 mtpa. The 10 mtpa expansion project consists of seven ‘mid-scale’ trains of 1.429 mtpa each, which will be launched sequentially. In its Q3 2024 results, Cheniere said it expects first production from the expansion project by the end of 2024, but that substantial completion of the seven trains will take place between H1 2025 and H2 2026.²⁵

²¹ Kpler, 2023. *LNG Platform*. <https://lng.kpler.com/>

²² Note that these are gross LNG imports, and therefore do not account for re-exports.

²³ Reuters, 2024. Federal regulators give Venture Global permission to introduce natural gas into LNG plant. *Reuters*, 6 November. <https://www.reuters.com/business/energy/federal-regulators-give-venture-global-permission-introduce-natural-gas-into-lng-2024-11-06/>

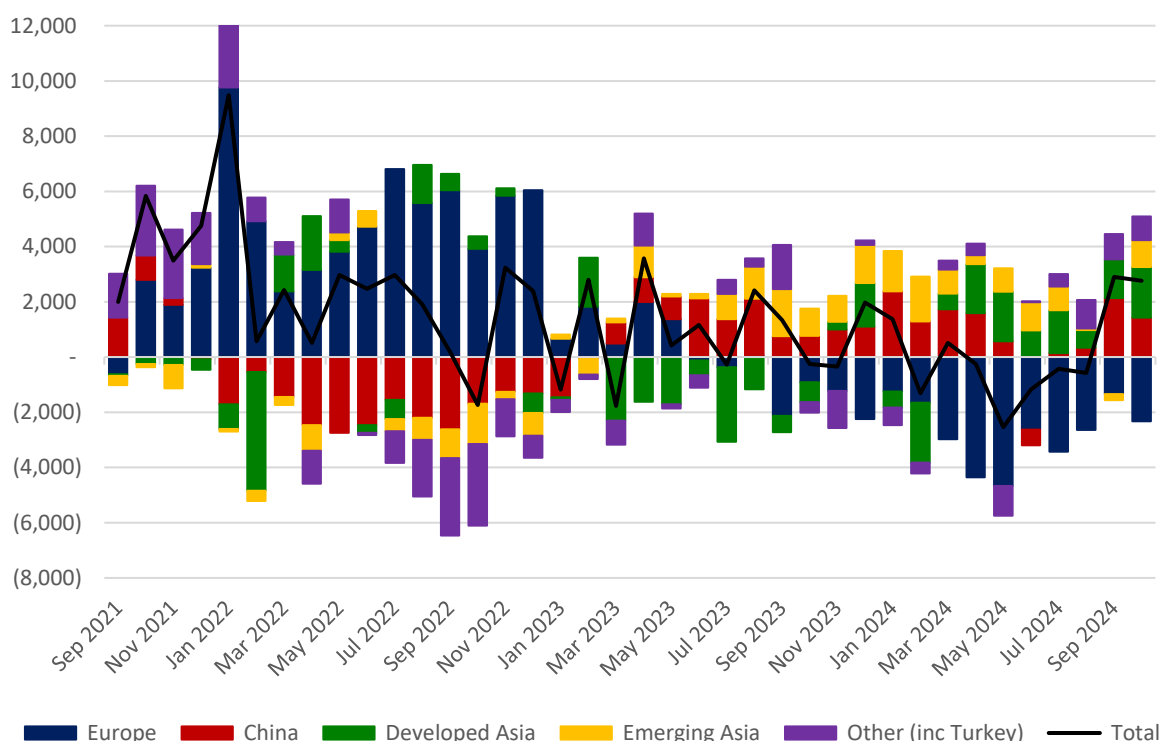
²⁴ Kpler LNG Platform [subscription required]

²⁵ Cheniere, 2024. Cheniere Reports Third Quarter 2024 Results and Raises Full Year 2024 Financial Guidance. *Press Release*, 31 October. <https://lngir.cheniere.com/news-events/press-releases/detail/308/cheniere-reports-third-quarter-2024-results-and-raises-full>

In the case of both Plaquemines and Corpus Christi, even if both launch commercial operations before the end of 2024, the ramp-up of capacity through the sequential launching of the midscale trains means that new supply available to Europe in Q1 2025 will be limited.

In this context of limited new supply, year-on-year declines in European LNG demand since September 2023 have offset growth in LNG demand in China, Emerging Asia (mostly India, plus Thailand in late 2023), Developed Asia (Japan, South Korea, Taiwan, and Singapore), and Other (mostly Egypt, and to a lesser extent, Central and South America). This growth in non-European LNG demand over the past year means that the 'base level' of non-European LNG demand going into winter 2024/25 is higher than it would have been without the past year's growth.

Figure 8: Year-on-year change in global LNG imports by destination (MMcm per month)



Source: Data from Kpler LNG Platform.²⁶ Graph by the author.²⁷

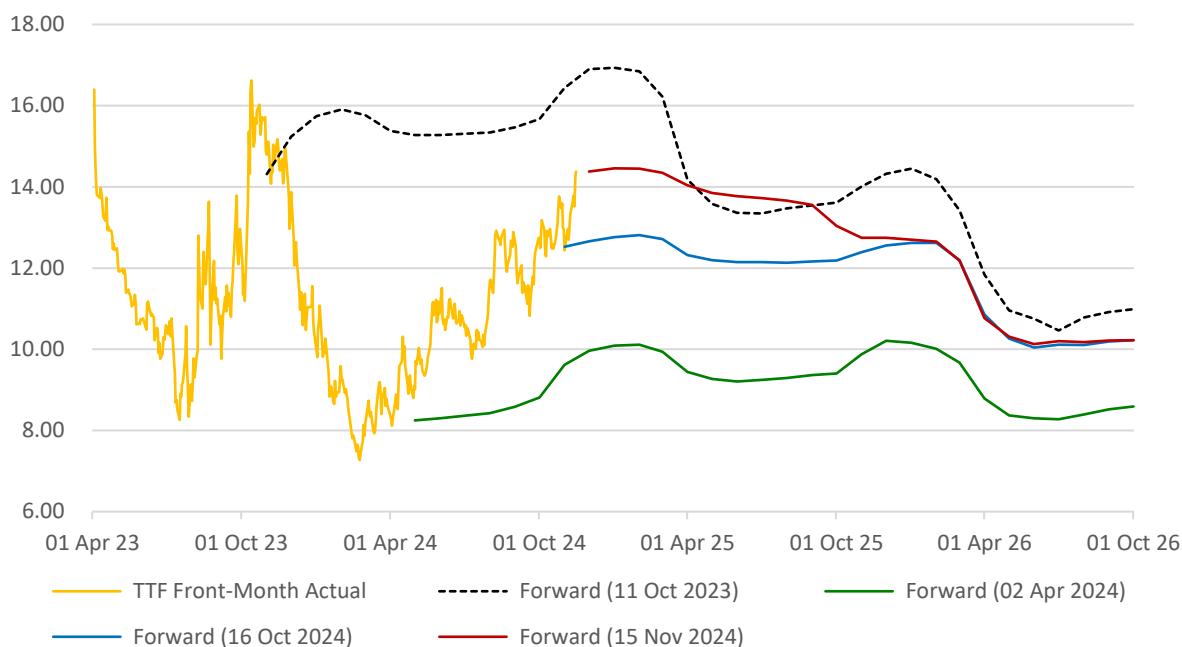
In terms of winter peaks, it is worth noting that China and the developed economies of North-East Asia have the strongest seasonality of demand (along with Turkey). Conversely, there are no such December-February peaks in LNG demand in the emerging economies of South-East Asia, the Middle East or South & Central America. Therefore, a key factor in the volume of LNG available to Europe during winter 2024/25 – and the price that European buyers will have to pay to secure those cargoes – will be the extent of winter peak demand in China and the rest of North-East Asia.

The expectation that market tightness will continue through the coming winter and into 2025 is illustrated by forward prices for TTF as illustrated below. The lack of storage injections in October, an early start to storage drawdown, the probable cessation of Russian gas transit via Ukraine and anticipation of substantial gas demand for storage replenishment amid a tight global LNG market in summer 2025 have contributed to expectation for firm prices throughout winter and into summer.

²⁶ Kpler, 2023. *LNG Platform*. <https://lng.kpler.com/>

²⁷ Note that these are gross LNG imports, and therefore do not account for re-exports.

Figure 9: Historic front-month and forward prices for TTF (USD per MMBtu)



Source: Data from EIKON Refinitiv (S&P Global). Graph by the author.

6. Higher and more volatile European gas demand this winter

After two mild winters, La Niña phenomenon is expected to bring colder temperatures in Europe in the coming months. This will increase gas use for heating, but nothing out of the ordinary for the region. While the overall level of demand remains low by historical standards, short-term spikes in gas demand are to be expected, especially when cold snaps combine with low availability of renewables in the power sector. These episodes will require flexible and rapidly available gas supply, notably from storage.

Early winter gas demand remains muted despite timid industrial sector rebound

Gas demand in Europe remains well below pre-crisis levels.²⁸ Observed gas demand in EU-27 plus UK dropped to an annualized 385 Bcm at the end of October, roughly 103 Bcm lower than pre-crisis gas demand in 2021. In the first ten months of 2024, it was down by 2 per cent year-on-year despite lower year-on-year gas prices (at least until May and for most of October).

Signs of a rebound have been clearly visible in the industrial sector since mid-2023 driven by the petroleum and fertilizer sectors, while gas demand for other gas-intensive sectors remained weak. In 2024, gas use in the industrial sector rose by over 5 per cent year-on-year over the period that runs from January to the end of October but remains nonetheless well below historical levels. Low manufacturing output, a Manufacturing PMI²⁹ below 50 (the twenty-eighth consecutive months of

²⁸ Gas demand is driven by a combination of factors and the biggest difficulty to analyse the impact of these drivers comes from the lack of timely, detailed and consistent data that would allow for an accurate analysis of drivers and trends. When detailed data is available, there are also differences in methodologies and definitions, which complicates comparison between national markets and between sectors. The charts in this section are based on various sources of publicly available statistics and this author's calculations to complete and make the data uniform. The conclusions and outlook presented here are based on the author's analysis of this data.

²⁹ PMI = Purchasing Managers Index is a measure of the prevailing direction of economic trends in manufacturing. The HCOB Eurozone Manufacturing PMI is compiled by S&P Global from responses to monthly questionnaires sent to survey panels of manufacturers in Germany, France, Italy, Spain, the Netherlands, Austria, Ireland and Greece, totalling around 3,000 private sector companies. The headline figure is the Purchasing Managers' Index (PMI), which is a weighted average of the

contraction) and the still rather gloomy economic outlook will continue to place a cap on the recovery of industrial gas demand. Price-responsive demand reductions in industrial sectors, which compete globally, may emerge if gas prices keep on rising, although large industrials are likely to have hedged their price risk earlier this year when prices were lower.

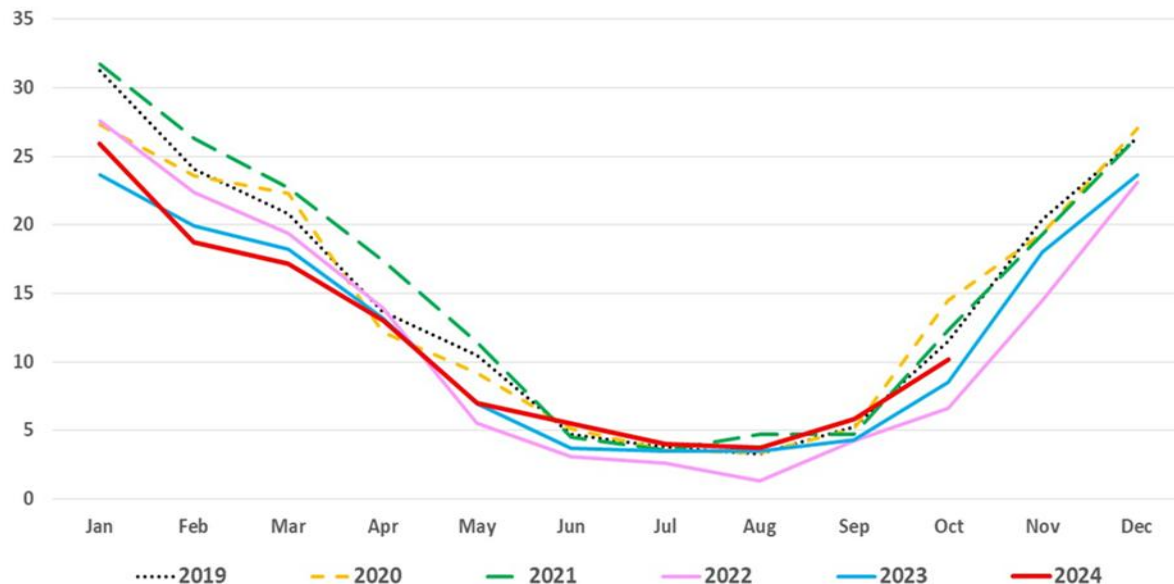
A similar picture seems to emerge for gas use in the commercial sector, although analysis is limited by the quality of short-term data which does not differentiate between residential and commercial gas demand. As a whole, gas use in the residential and commercial sector increased by 5.4 per cent year-on-year in January-October, and the commercial sector was likely the main driver behind the 7 per cent year-on-year demand growth in Q2 and an important share of the 23 per cent year-on-year growth in Q3, especially for July and August. Rising gas prices over the winter will hit the commercial sector harder than large industrials as risk mitigation strategies may not be as widespread.

Aside from the fragile and relatively small rebound in the industrial and commercial sectors, gas demand in Europe this winter is expected to be mainly influenced by temperature and the availability of renewables in the power sector.

Winter temperatures critical to residential heating demand

Weather remains the biggest risk for gas demand in winter in Europe. Temperature impacts gas use across all sectors, but it is particularly true in the residential and commercial sector, which account for almost half of winter demand. Five straight weeks of colder temperatures from early September kicked off gas use for heating earlier this year in several countries, boosting gas demand in the residential and commercial sector by 35 per cent year-on-year in September and by 19 per cent year-on-year in October, driving it to pre-crisis levels, as illustrated in Figure 10.

Figure 10: Gas demand in the residential and commercial sector in EU-27 plus UK, 2019-2024 (Bcm per month)



Source: Data from author's calculations based on various sources, including IEA, Eurostat, ENTSOG, GRTgaz, Terega, THE, SNAM, Enagas and NGT. Graph by the author.

following five indices: New Orders (30%), Output (25%), Employment (20%), Suppliers' Delivery Times (15%) and Stocks of Purchases (10%). For the PMI calculation the Suppliers' Delivery Times Index is inverted so that it moves in a comparable direction to the other indices. The index varies between 0 and 100, with a reading above 50 indicating an overall increase compared to the previous month, and below 50 an overall decrease. <https://tradingeconomics.com/euro-area/manufacturing-pmi>

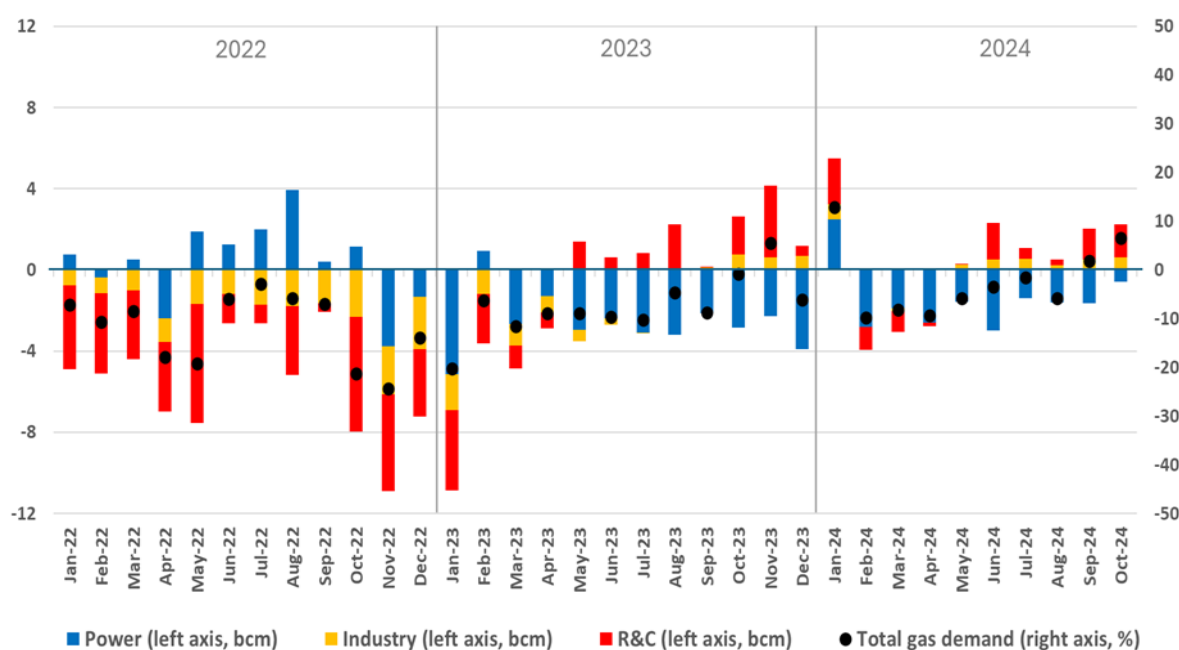
After two consecutive winters with warmer-than-average weather, early indications show a high probability that Western and Central Europe will be hit by colder temperatures due to La Niña phenomenon (although temperatures may still be warmer than the long-term average). The buildout of alternative heating systems (such as heat pump installations) across Europe is slow and the impact on gas demand this winter will still be marginal. A normal winter (as opposed to the two mild winters of 2022/23 and 2023/24) could boost total gas demand by at least 8-10 Bcm and a cold one by at least 20-25 Bcm compared to last year.

The level of demand response will also be a key determinant on how much gas is used in the coming months. While consumers' willingness to reduce their energy for heating is still higher than pre-crisis, it also appears to be eroding. A change in behaviour driven by record-high prices and energy-saving campaigns had clear impacts on gas use in winter 2022/23 (and accounted for a reduction of at least 10 to 15 Bcm year-on-year). Last winter, consumer demand restraint continued to some degree but clearly eroded during episodes of colder temperatures. This winter, judging from the past few weeks of relative cold temperatures in September and October, it may be that consumers have taken another step toward old habits as heating was turned on even during these episodes of not very cold temperatures compared to what can traditionally be seen in January and February. If this trend continues, it will boost gas demand further this winter.

More frequent short term peak demand driven by the power generation sector

Taking into account the timid industrial rebound, colder temperatures this winter (albeit still above historical standards) and continued lower demand in the power sector, we anticipate a rise of just over 10 Bcm year-on-year this winter, which is not unusual for Europe and should not cause any major tightness in the market, although it will increase storage draws for space heating. But the devil might be in the detail.

Figure 11: Year-on-year change in gas demand in the EU-27 plus UK in the three major sectors (Bcm per month and per cent)



Source: Data from author's calculations based on various sources, including IEA, Eurostat, ENTSOG, GRTgaz, Terega, THE, SNAM, Enagas and NGT. Graph by the author.

The power sector has been the main driver of lower gas demand in Europe since late 2022 [Figure 11]. This year, the 14 per cent year-on-year decline in January-October was due to the combination of improved nuclear availability (French nuclear generation is back to historical levels), hydro power back



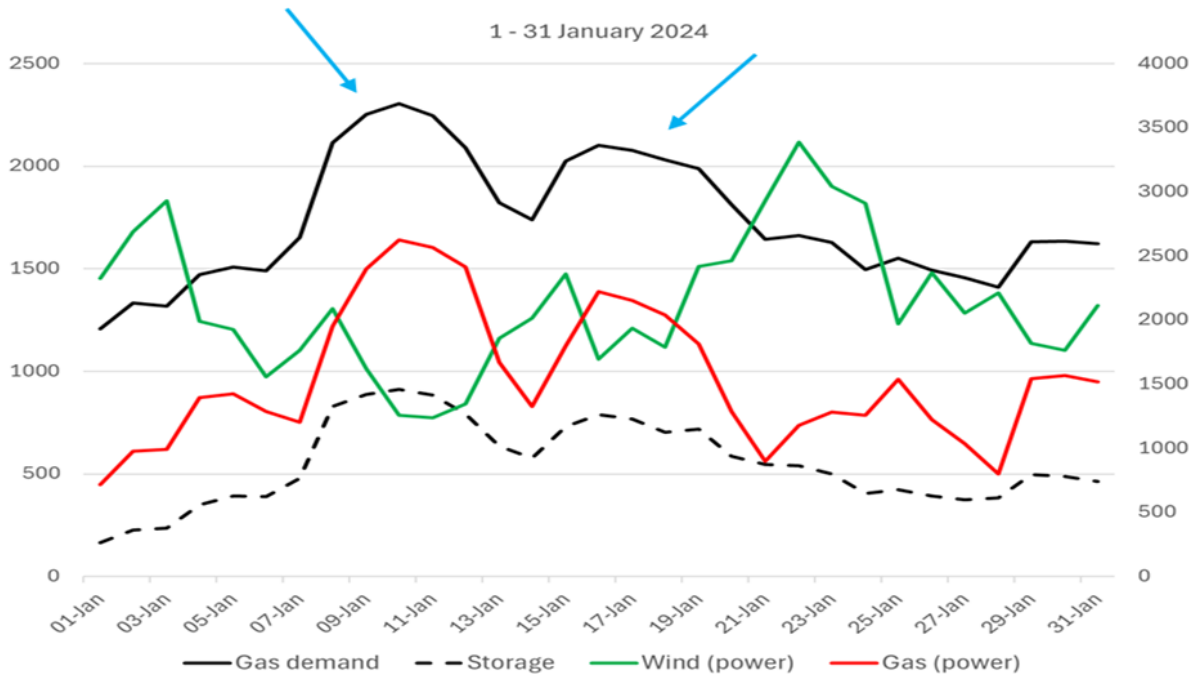
at normal levels, and strong expansion of renewables, which have pushed fossil fuels down the merit order most of the time, including gas-power plants.

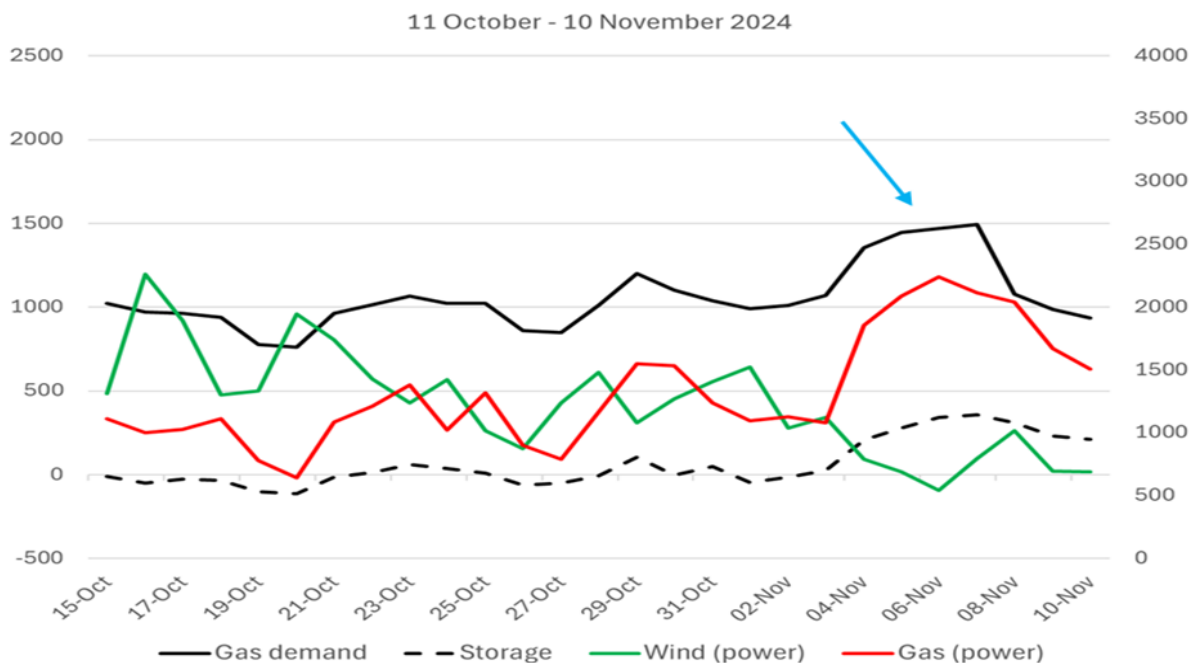
The continued build-out of wind and solar capacity is pushing structural changes, with renewables consistently covering almost 50 per cent of monthly electricity generation in 2024. However, dispatchable generation capacity remains essential to integrate such a large share of intermittent renewables and gas plants in particular still play a major role in balancing power grids. At the regional level (national pictures are more varied), the daily generation mix clearly shows a correlation between renewables (wind in particular) and gas generation: when wind availability is good, the use of gas plants is low, and conversely, when wind is limited, gas plants ramp up to make up for the shortfall [Figure 12].

Variable weather conditions bringing renewable power generation up and down in winter are normal and to be expected, and days of low wind generation will invariably lift the call on gas-fired power plants, which continue to act as the main back-up capacity to wind. This in turn will trigger short-term spikes in gas demand. When this happens during episodes of cold temperatures (which increase both gas and electricity demand for heating), spikes in gas use can be important, as seen for a couple of weeks in January, and again at the beginning of November [Figure 12]. These episodes bolstered the call on gas storage by about 10 Bcm in January (from 6 to 19 January) and 2 Bcm in November (from 3 to 10 November).

Strong seasonality, sudden and short-term spikes in gas demand over the winter and the need to use storage are also nothing new in Europe. But the market has evolved over the past two-three years and the flexibility on the demand side has deteriorated and seems rather limited this winter. First, most of the low hanging fruit of energy savings have probably been harvested after three years of low gas demand. Second, the greatest source of flexibility in winter and the most price-responsive segment of gas consumption came from the ability to switch between coal and gas plants in the power sector, which is now rather limited by the fast decline of coal- and lignite-fired generation capacity across Europe. In other words, gas demand in the power sector has become more volatile, somewhat less predictable and importantly, less price responsive (i.e., when gas plants are used to back-up and/or balance the system).

Figure 12: Daily gas demand and net storage withdrawals (MMcm per day) in EU-27 plus UK in January 2024 and from 11 October to 10 November 2024, compared with power generation from wind and gas (GWh per day)





Note: Left axis: daily gas demand and net storage withdrawals in MMcm per day; right axis: electricity generation from wind and gas in GWh per day

Source: Gas demand data from author's calculations based on various sources, including IEA, Eurostat, ENTSOG, GRTgaz, Terega, THE, SNAM, Enagas and NGT, Electricity generation based on ENTSOE data, Storage data from GIE. Graphs by the author.

7. European storage starts winter lower

Storage remains the most flexible source of incremental European gas supply during the winter months and withdrawals can be ramped up and down at short notice. At the start of winter 2024/25, the EU-27 has made significant use of storage supply through smaller injections and greater withdrawals. Net injection between 1 October and 1 November 2024 (1.0 Bcm) was the second smallest since at least 2017, while the net withdrawal in the period 1-16 November 2024 (4.5 Bcm) was the largest since at least 2017. Therefore, while EU-27 stocks on 1 October 2024 (99.9 Bcm) were just 0.8 Bcm lower year-on-year, stocks on 16 November 2024 were 8.0 Bcm lower year-on-year.

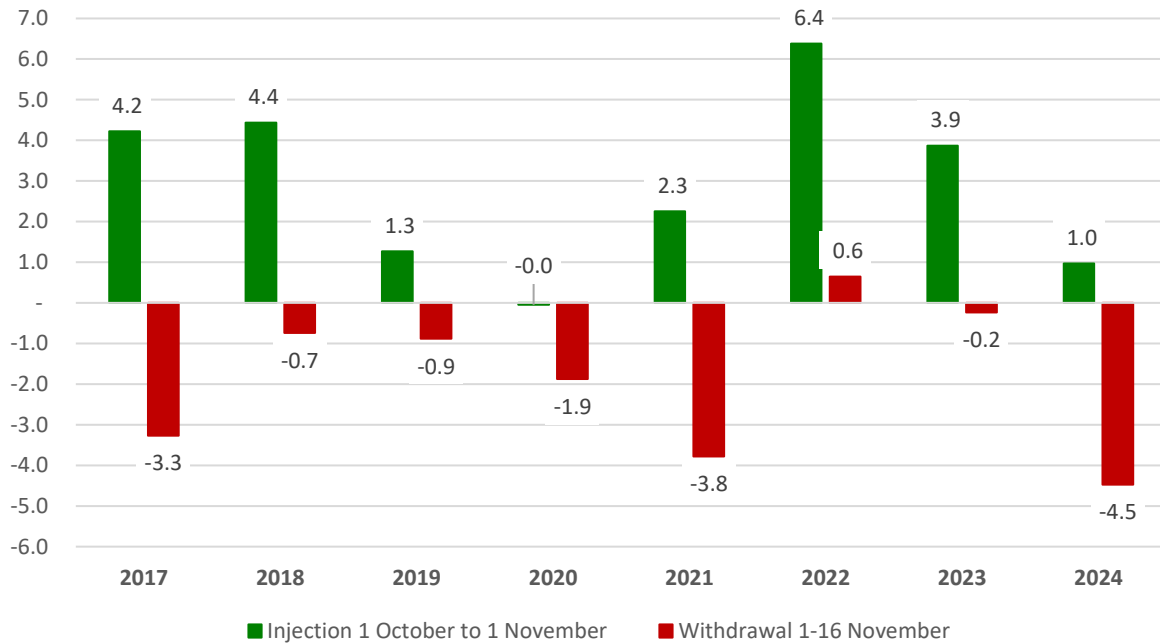
At an EU-27 level, daily sendout capacity is not a constraint. Since 1 January 2017, EU-27 daily storage withdrawal has never exceeded 60 per cent of daily withdrawal capacity and has rarely exceeded 50 per cent of sendout capacity.³⁰ At present, EU-27 daily sendout capacity is roughly 1,840 MMcm/d. In winter 2023/24, monthly net withdrawal peaked at 550 MMcm/d in January, shouldered by net withdrawals of 377-304 MMcm/d in December and February, and lower levels of 127-139 MMcm/d in November and March.

It is also unlikely that stocks will be fully depleted over the course of winter 2024/25, unless a major supply disruption occurs. Since 1 January 2017, the lowest EU-27 stock level has been 17.8 Bcm, which occurred on 31 March 2018. Getting back to that level would imply a net withdrawal of 78.6 Bcm in the 135 days from 17 November 2024 to 31 March 2025, at a flat rate of 582 MMcm/d. Although EU-27 monthly net withdrawals have exceeded that rate on three occasions since January 2017,³¹ withdrawals since January 2017 have never exceeded 550 MMcm/d in consecutive months.

³⁰ On three days in 2017, five days in 2018, and 11 days in January-February 2021

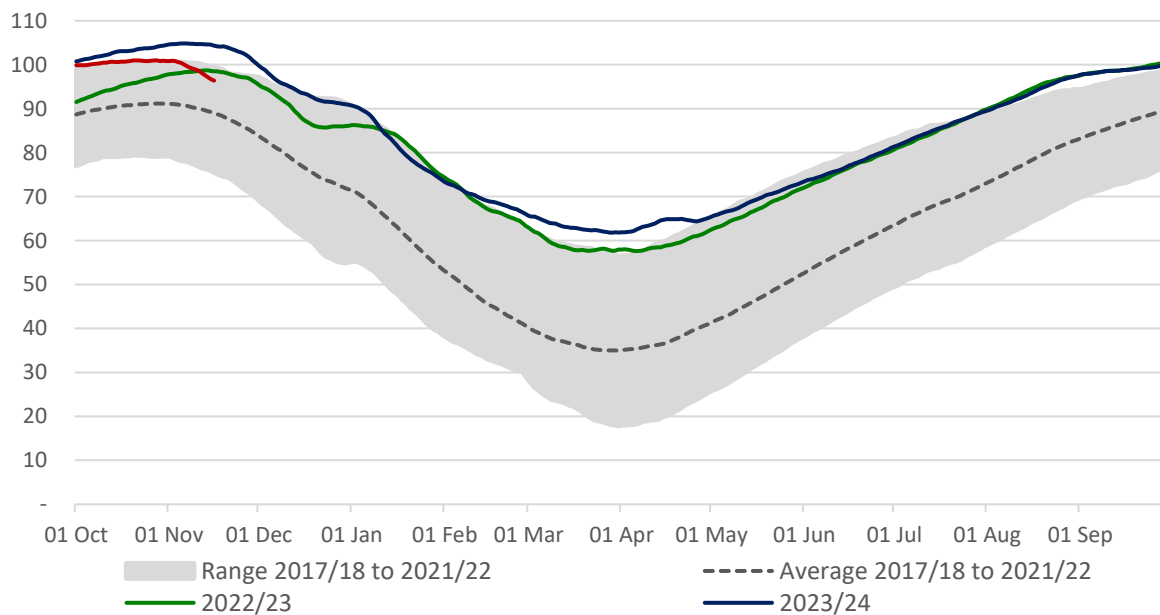
³¹ Reaching 716-757 MMcm/d in January 2017, February 2018, and January 2021

Figure 13: EU-27 storage net injection in October and net withdrawal in 1-16 November (Bcm)



Source: Data from GIE Aggregated Gas Storage Inventory (AGSI).³²

Figure 14: EU-27 daily gas storage stocks (Bcm)



Source: Data from GIE Aggregated Gas Storage Inventory (AGSI).³³

The main issues regarding storage are how much is withdrawn in winter 2024/25 and how much needs to be replenished in summer 2025 ahead of the 2025/26 winter. The key metrics are: 1) start of winter stocks relative to the start of winter 2023/24; 2) the volume of net storage withdrawal in winter 2024/25 relative to 2023/24; and 3) the end of winter stocks on 31 March 2025 compared to 31 March 2024.

³² GIE, 2023. *Aggregated Gas Storage Inventory (AGSI)*. <https://agsi.gie.eu/#/>

³³ GIE, 2023. *Aggregated Gas Storage Inventory (AGSI)*. <https://agsi.gie.eu/#/>

On 1 November 2024, EU-27 stocks were 100.9 Bcm. Yet by 16 November 2024, EU-27 storage stocks were 96.4 Bcm, down from 104.4 Bcm a year earlier (-8.0 Bcm year-on-year). On 31 March 2024, stocks were 61.8 Bcm, implying a net withdrawal of 42.5 Bcm between 16 November 2023 and 31 March 2024. If the net withdrawal between 16 November and 31 March in winter 2024/25 is the same year-on-year, end of winter stocks on 31 March 2025 will be 53.9 Bcm. That, in turn, would imply a summer net injection of over 45 Bcm to get back to stocks of 100 Bcm on 1 November, or a net injection of around 50 Bcm to get back to stocks of 104 Bcm (effectively full capacity).

A major influential factor on storage withdrawals and replenishment over the coming year is the cessation of Russian gas transit via Ukraine, which is currently 1.2 Bcm per month (roughly 40 MMcm/d). If that loss in Q1 2025 is balanced exclusively by additional storage withdrawals, an additional 3.6 Bcm will be taken out of European storage. Moreover, the greater stock replenishment in Q2 and Q3 2025 will take place in conditions of European pipeline gas supply continuing to be 1.2 Bcm per month lower year-on-year, which equates to a loss of supply of 7.2 Bcm over six months in Q2-3.

If the volume of Russian gas not delivered via Ukraine in Q1 2025 is entirely offset by greater storage withdrawals, then end of winter stocks could be 50.3 Bcm, thus requiring summer replenishment of 49.7 Bcm to get back to 100 Bcm by 1 November, or 54.7 Bcm to get back to full capacity (105 Bcm). For comparison, EU-27 net storage injection between 31 March and 1 November 2024 was 39.0 Bcm.

In short, in a winter with storage withdrawal the same as in winter 2023/24 but starting from lower stocks and offsetting the loss of Russian transit via Ukraine, in summer 2025 the EU-27 could need to inject 10-15 Bcm more year-on-year into storage. Given that, after two successive mild winters, a return to a 'normal' winter (not to mention a 'cold' winter) could see higher European gas demand, the storage drawdown and subsequent need for replenishment in summer 2025 could be even greater than the 10-15 Bcm year-on-year increase noted above. Indeed, the year-on-year change has already begun, with Europe failing to match 2023 injections volumes in October 2024, and then starting a notable stock draw in November 2024 that was not seen in November 2023. While the EU-27 is unlikely to experience sustained capacity constraints on daily withdrawals or an insufficiency of stocks overall, the key point is that the greater the storage withdrawal in winter 2024/25, the greater the need for replenishment in summer 2025, under what appear set to remain tight market conditions. Indeed, by starting the winter of 2024/25 with stocks lower year-on-year and anticipating the loss of Russian pipeline supply via Ukraine from 1 January 2025, Europe will require a greater year-on-year stock replenishment in summer 2025. The next four months will determine the size of that year-on-year increase in storage replenishment requirement.

Conclusion: Winter scenario based on current trends in supply and demand

The scenario below combines the assumptions regarding supply and demand discussed above, with storage withdrawals as the balancing item. The figures for October and the first half of November are historic data for actual supply and demand,³⁴ while the figures for the period from mid-November 2024 to March 2025 are the result of our scenario. As noted in the previous section, any surge in demand or curtailment of production or imports will most likely be met primarily by additional storage withdrawals, and secondarily by higher prices attracting additional LNG cargoes, with the consequence being the need for greater volumes of net storage injections in summer 2025. It is our assessment that the risk of deviation from this scenario is in the direction of a tighter market with higher prices.

On the supply side, the risk of a tighter market is driven by the limited amount of potential extra supply available from production and pipeline imports. Compared to our scenario, we could perhaps see an additional 5-10 MMcm/d of Norwegian supply and 5-10 MMcm/d of North African supply over the course of the winter. Conversely, any unexpected substantial curtailment in Norwegian supply could reduce overall European supply by substantially more than that upside.

³⁴ Gas demand data for November are our estimates based on preliminary data, as are the data for EU-27 gas production.

If European demand surges beyond the potential upside from pipeline imports, European price escalation could attract additional LNG cargoes. Here, the key issues are not the global availability of LNG nor is it the availability of European regasification capacity, but how far European buyers need to move up the price curve to secure additional spot cargoes. Europe remains exposed to a global LNG market that is more likely to experience a surge in winter demand and/or unexpected curtailment in supply than a market at risk of a supply surge and/or slump in demand.

On the demand side, Europe is on its way for another small decline in 2024 as a whole (-2 per cent), a third consecutive year of contraction. The outlook for winter 2024/25 is a year-on-year gas demand increase of about 10 Bcm, driven by colder temperatures, but overall, well within normal seasonal fluctuations for the region. Any risks on the demand side are largely weather driven: temperature and wind availability. Cold snaps could test the resilience of the system if they coincide with other market tighteners like the end to Ukraine transit. Another risk, or uncertainty, comes from the growing exposure to wind generation in the power sector, for which gas plants remain the main source of back-up in Europe. This evolution triggers additional fluctuations in gas use, for which size and duration are hard to predict.

The key outcome of our scenario, based on the supply and demand assumptions discussed above and using storage as the balancing item, is that Europe could draw 57.3 Bcm from storage between 1 November and 31 March, thus ending the winter with stocks of 43.7 Bcm. That would imply a 17 Bcm year-on-year increase in net storage injections between 1 April and 1 November 2025 to get stocks back to 100 Bcm, or a 21 Bcm increase to get stocks back to full capacity (105 Bcm). Given the lack of upside from non-LNG supply, that additional volume for storage replenishment will need to come from a global LNG market that is already tight, is likely to see only marginal supply growth over the next six months and could see continued growth in non-European LNG demand.

To conclude, in a context of limited upside flexibility from production and pipeline imports, any year-on-year growth in European gas demand over winter 2024/25 will result in increased European call on LNG supplies and/or year-on-year growth in storage withdrawals. The global LNG market is large enough and flexible enough to accommodate this and Europe started winter 2024/25 with more than 100 Bcm of gas in storage. Therefore, a physical shortage in winter 2024/25 is not a risk. However, the need to call upon additional LNG supply in a currently tight market will place upward pressure on prices, while a greater call on storage will imply greater need for storage replenishment in summer 2025 in what promises to remain a tight market, which will also push prices higher than they would otherwise have been, all other things being equal. In short, Europe is well-placed to cope with the coming winter, but the tightness of the market does mean that any substantial shifts on the supply or demand side are both likely to be in the direction of increased tightness, and likely to result in upward pressure on prices.



Figure 15: EU-27 plus UK gas supply and demand in winter 2024/25: a scenario (MMcm per day)

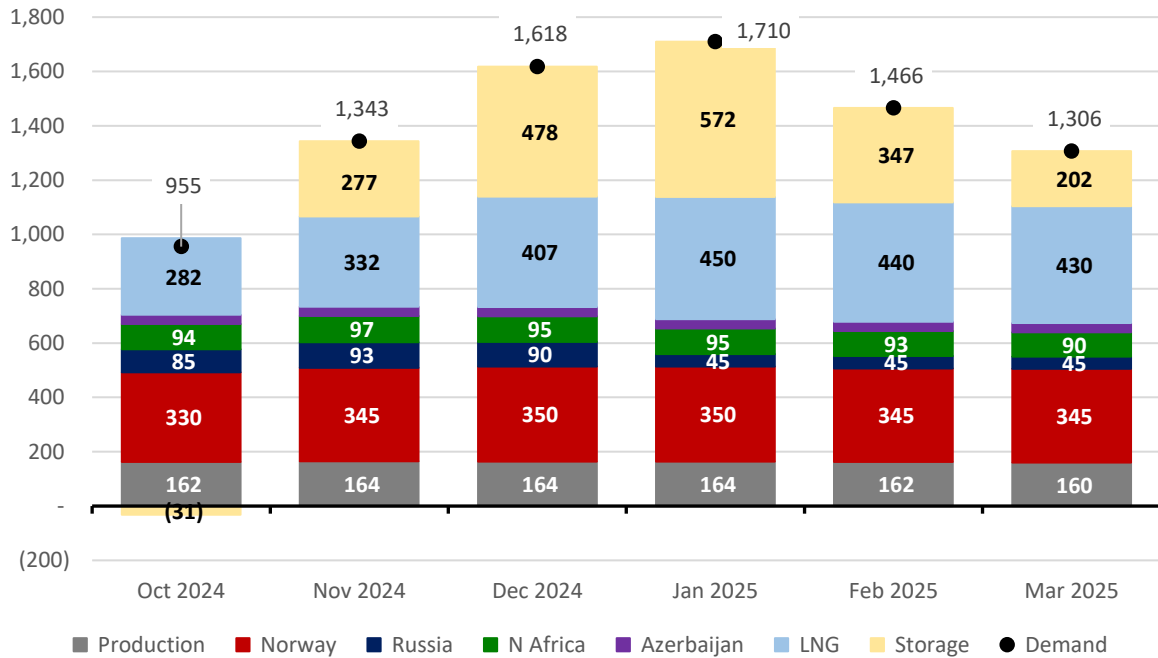
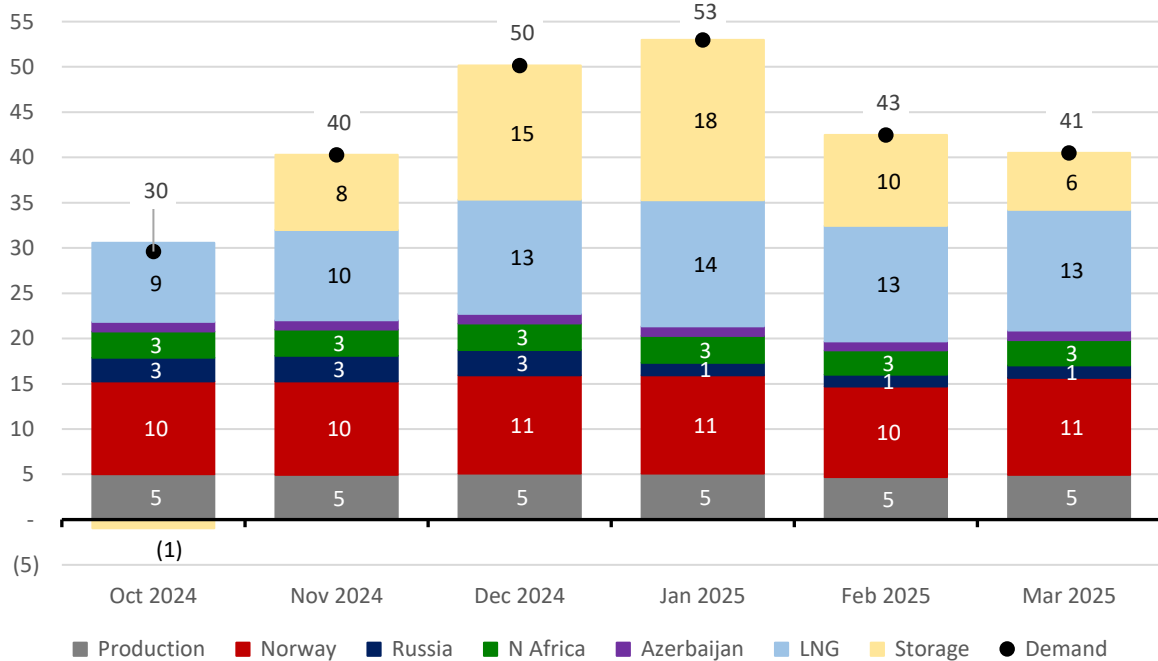


Figure 16: EU-27 plus UK gas supply and demand in winter 2024/25: a scenario (Bcm per month)



Source: Historic data from various sources for 1 October to 16 November 2024.³⁵ Scenario assumptions for mid-November 2024 to March 2025 by the authors. Graphs by the authors.

³⁵ Eurostat, National Gas Transmission (UK), ENTSOG Transparency Platform, Gas Infrastructure Europe (Aggregated Gas Storage Inventory & Aggregated LNG Storage Inventory), and Kpler LNG Platform

Figure 17: EU-27 plus UK actual gas supply and demand in winter 2023/24 (MMcm per day)

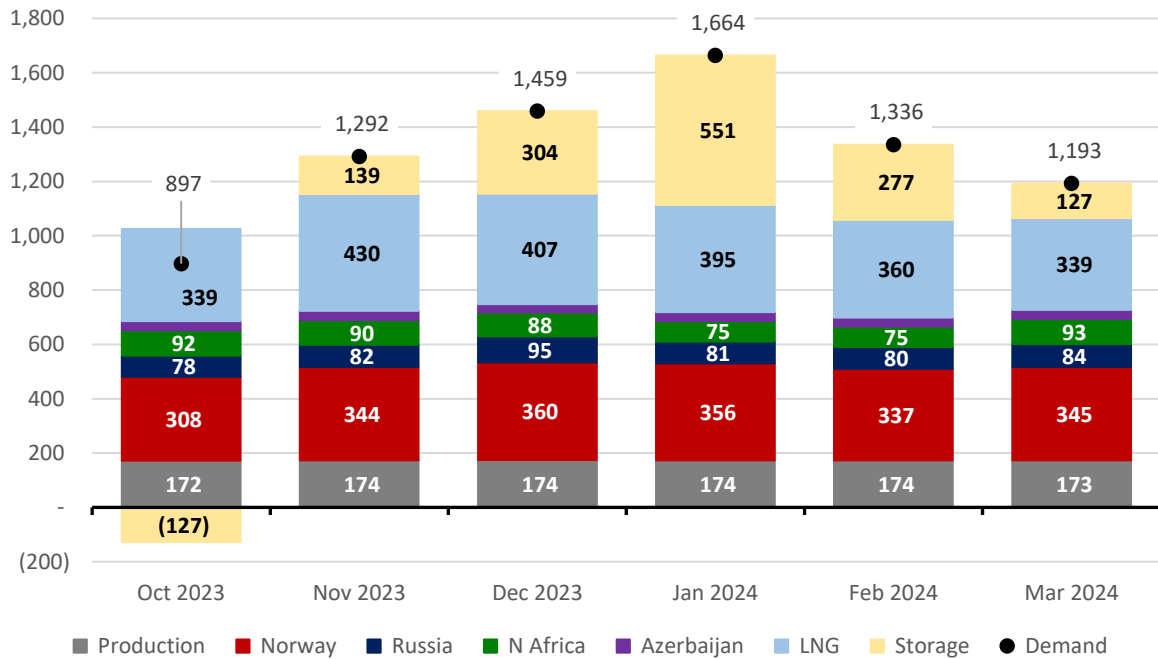
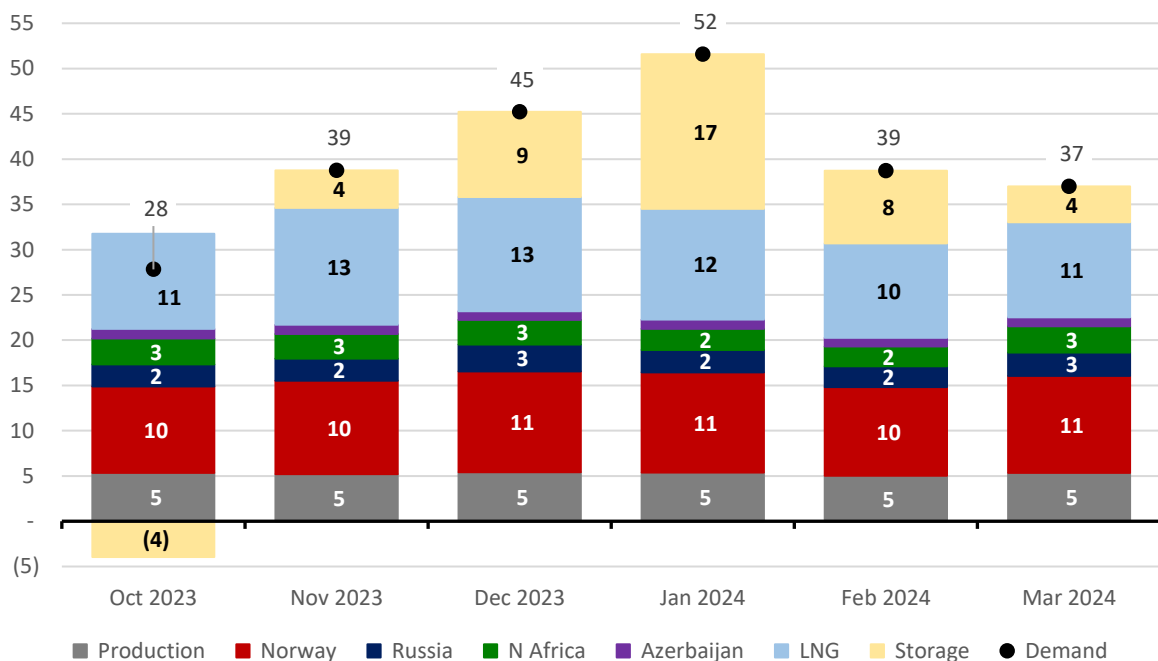


Figure 18: EU-27 plus UK actual gas supply and demand in winter 2023/24 (Bcm per month)



Source: Historic data from various sources for 1 October 2023 to 31 March 2024.³⁶ Graphs by the authors.

³⁶ Eurostat, National Gas Transmission (UK), ENTSOG Transparency Platform, Gas Infrastructure Europe (Aggregated Gas Storage Inventory & Aggregated LNG Storage Inventory), and Kpler LNG Platform