

# Europe's energy crisis: a sight in the rearview mirror?



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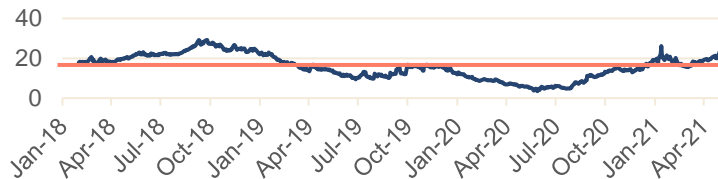
# Natural gas in Europe: From 3 Eur/MWh in 2020 to 339 Eur/MWh in 2022

Natural gas is at the epicenter of the European energy crisis

2019 - 2020

## WHERE DID DEMAND GO?

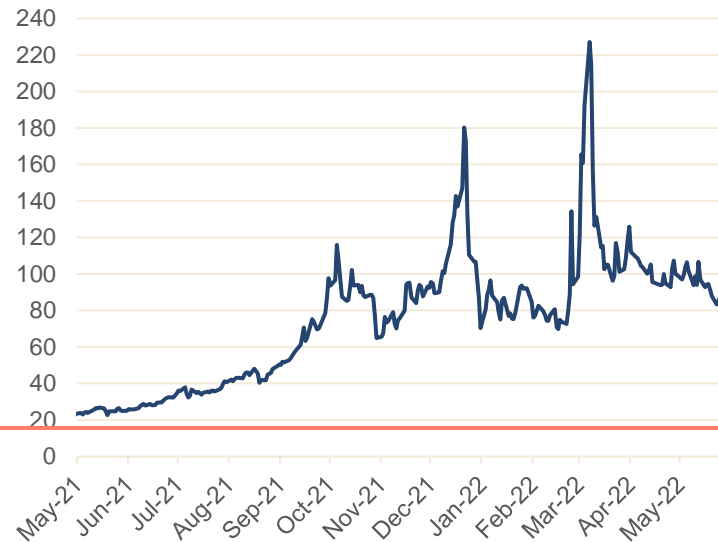
- Struggling with oversupply since 2019, European gas market was hit by demand destruction during COVID pandemic, resulting in some of the lowest gas prices on record during 2020.
- By early 2021, European gas market shook off the oversupply of the pandemic year and rebalanced at 20 Eur/MWh, the TTF front-month average of the previous decade.



FROM MID-2021

## SUPPLY CONCERNS CREEP IN

- While post-COVID demand was on a strong recovery path, supply was facing interregional competition (LNG) and unexpected limitations (Norway, Russia).
- The outbreak of the war in Ukraine cemented negative outlook for the Russian pipeline gas imports.



FROM MID-2022

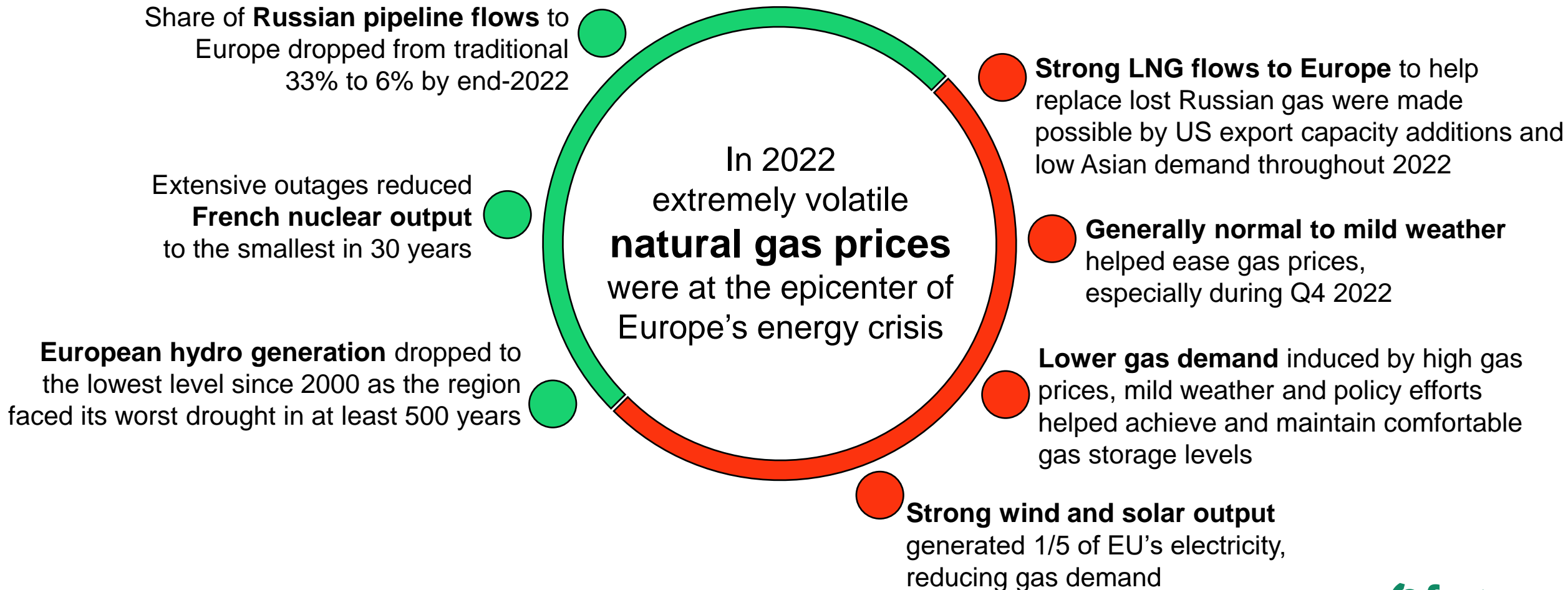
## LIVING ON THE EDGE

- Short-term security of supply is guaranteed less than ever.
- Europe is at the mercy of LNG inflows and the weather.



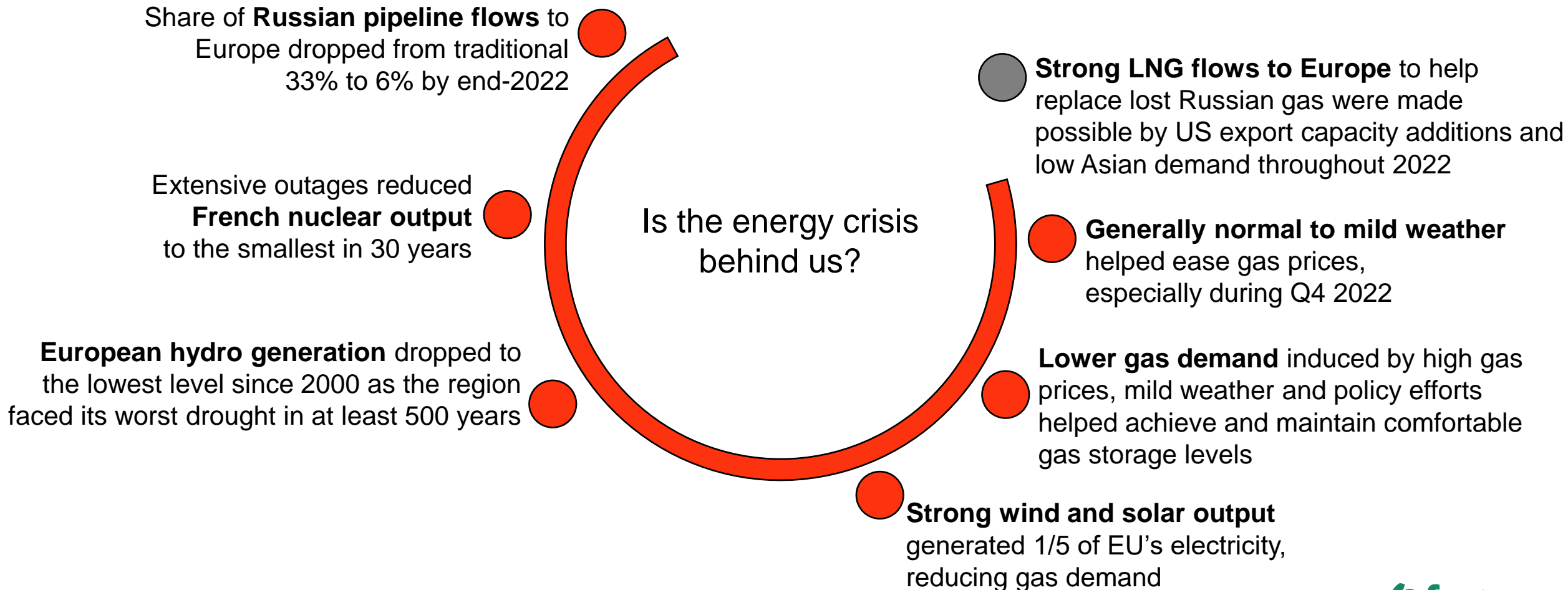
# Europe's 2022 energy crisis centered around natural gas

Key European gas benchmark TTF\* averaged +180% YoY in 2022. However, closing prices of the last trading days of December 2021 and December 2022 were almost identical, at ~80 Eur/MWh.



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Share of **Russian pipeline flows** to Europe dropped from traditional 33% to 6% by end-2022

Extensive outages reduced **French nuclear output** to the smallest in 30 years

**European hydro generation** dropped to the lowest level since 2000 as the region faced its worst drought in at least 500 years

Is the energy crisis behind us?

**Strong LNG flows to Europe** to help replace lost Russian gas were made possible by US export capacity additions and low Asian demand throughout 2022

**Generally normal to mild weather** helped ease gas prices, especially during Q4 2022

**Lower gas demand** induced by high gas prices, mild weather and policy efforts helped achieve and maintain comfortable gas storage levels

**Strong wind and solar output** generated 1/5 of EU's electricity, reducing gas demand

# European gas balance no longer enjoys the luxury of certainty

Fragility and vulnerability of the new European gas balance stems from amplified uncertainties

- **Gas market(s) specific:**

- The list of uncertainties expanded
  - Weather
  - Security of gas supply
  - Storage behavior
  - Demand behavior

- **Outside gas market(s):**

- Increased impact from the broader European energy system via performance of other energy supply sources

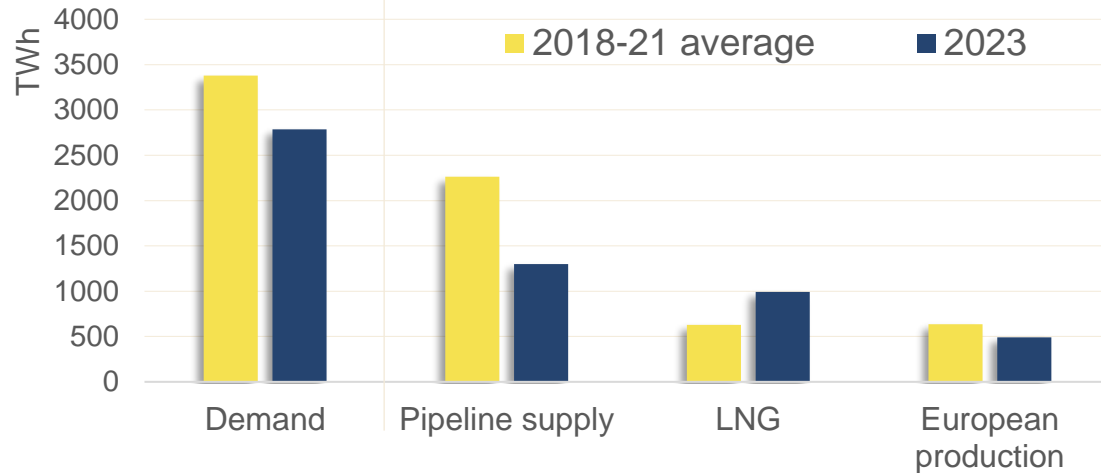
- **Outside energy markets:**

- Politicization and resulting volatility, which is difficult to predict (and sometimes explain) because it cannot be directly attributed to the market fundamentals

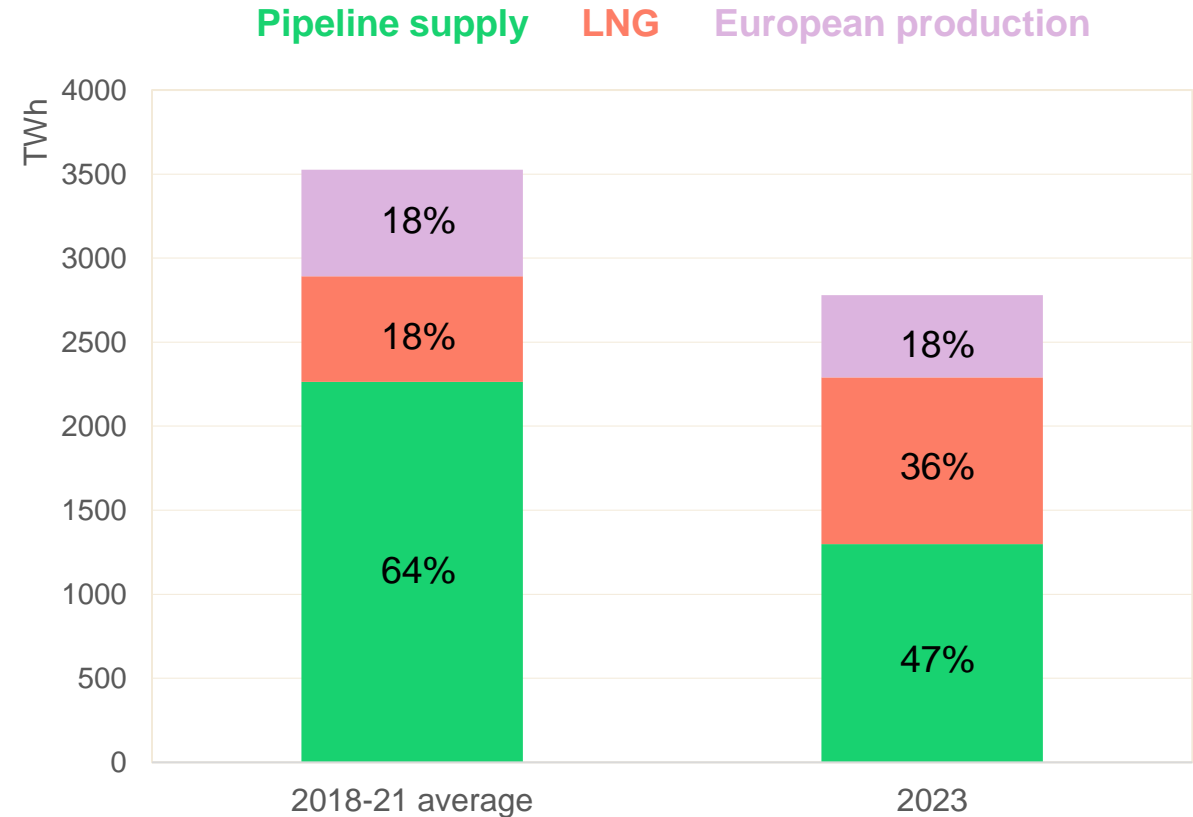
# European gas supply structure is supporting prices (1)

Despite very soft demand so far this year, European gas balance remains very tight

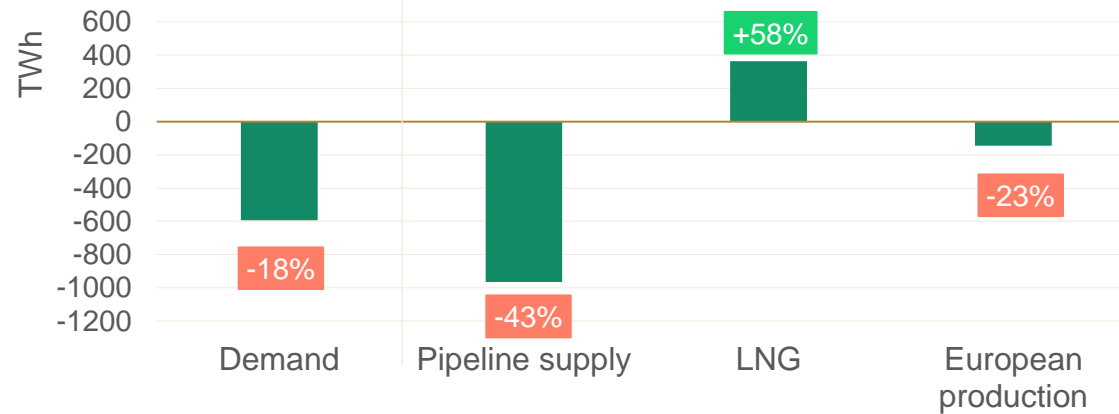
## European gas balance: then vs now



## Supply composition



## Changes in absolute volumes and percentage terms



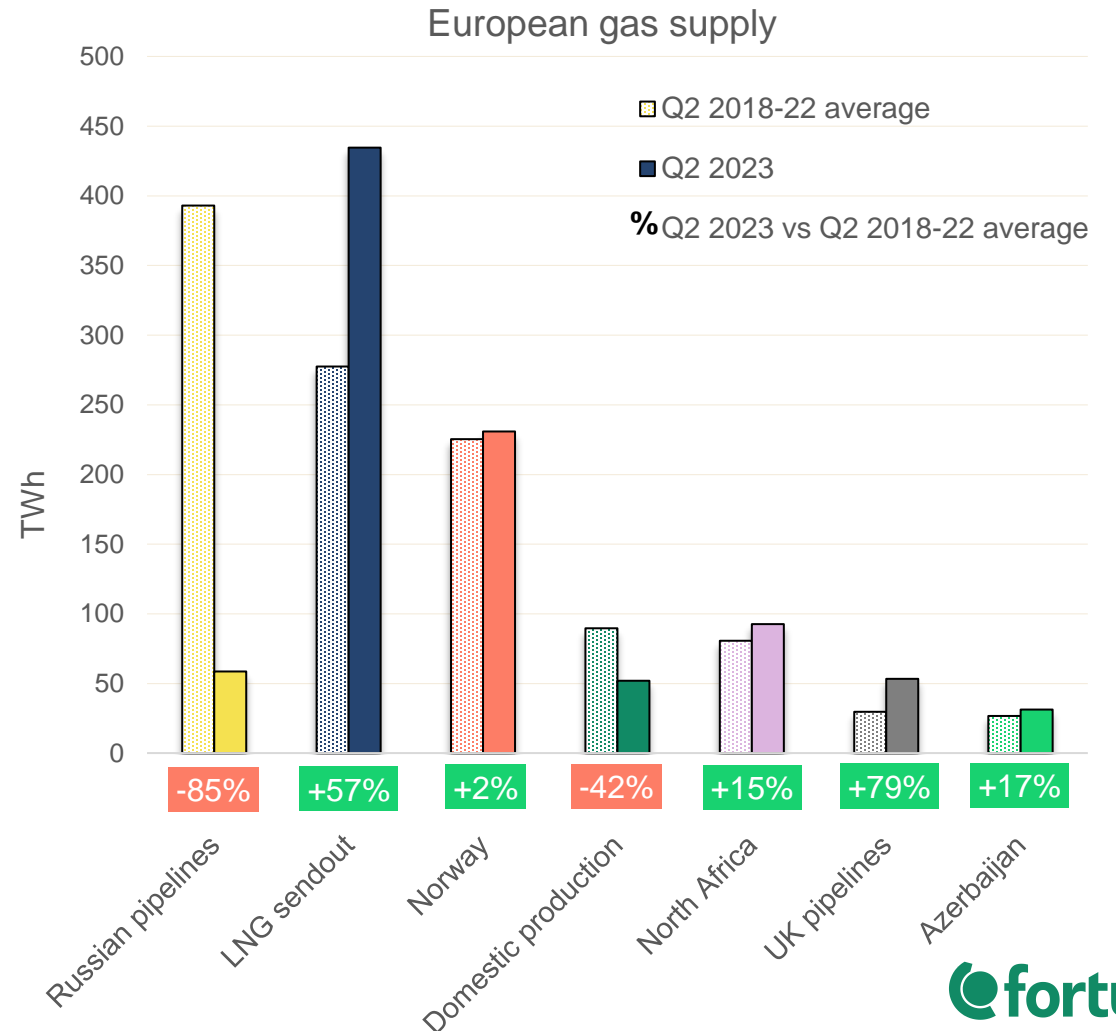
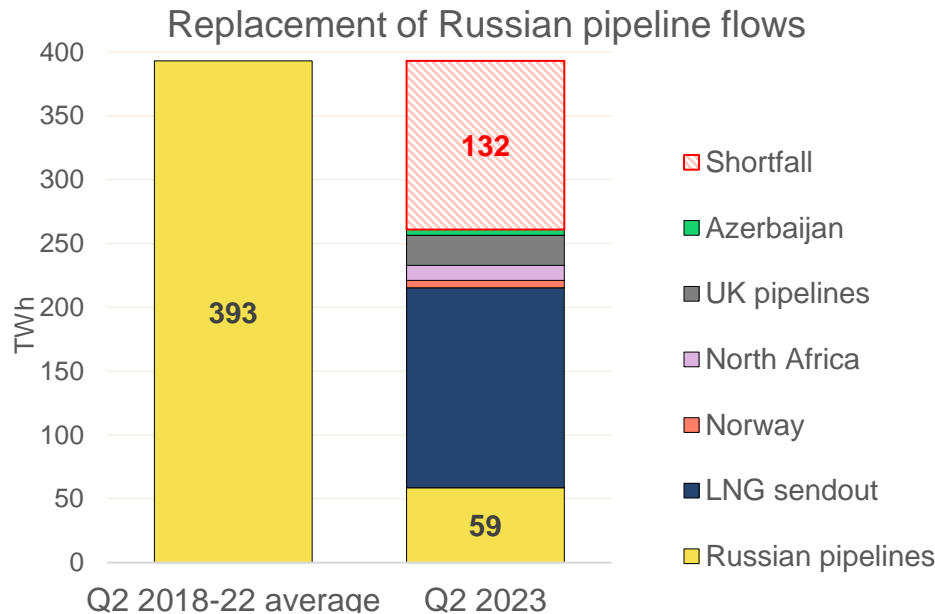
Notes: 2023 data is until September 16.

Comparisons are made for the period of January 1 – September 16 of respective years.

# European gas supply structure is supporting prices (2)

## Supply gap is real and fuels volatility

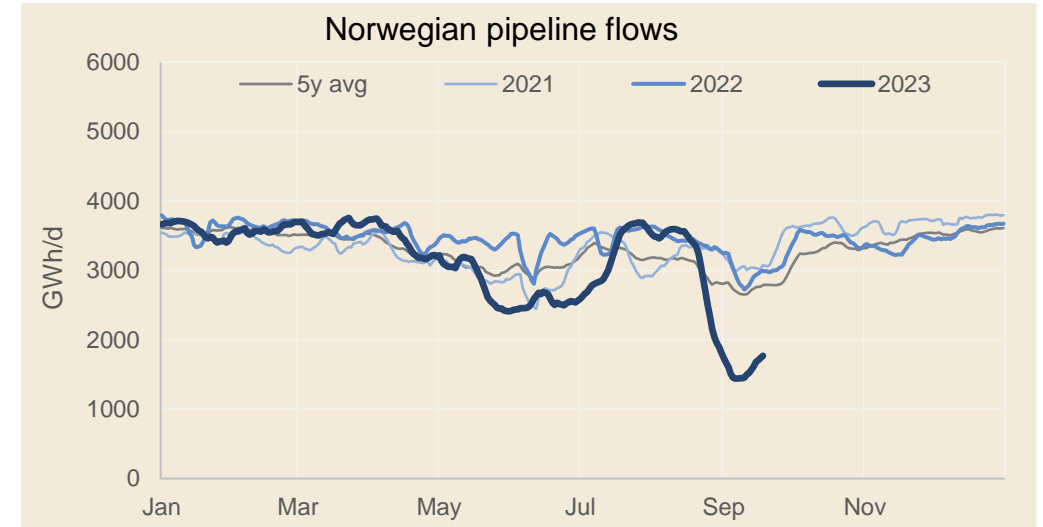
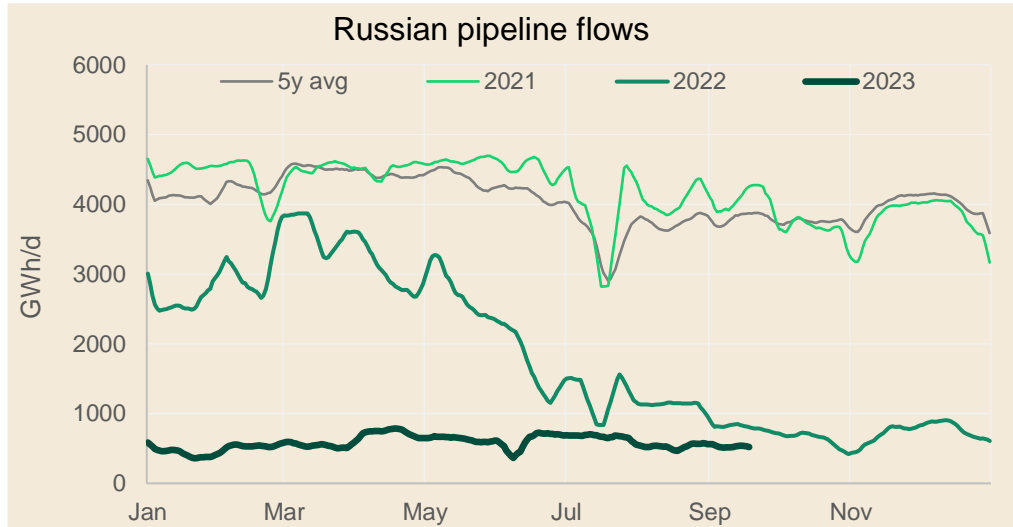
- Despite stable performance of the European gas supply mix in Q2, only additional LNG imports were able to compensate for a significant share of lost Russian pipeline gas filling a 157TWh supply gap (40% of missing Russian flows).
- All other supply components made incremental additions (3% on average), leaving 34% of traditional Russian volumes unfulfilled, a 132TWh shortfall in supply.





# European gas supply (1): Expected became the unexpected

Russian pipeline flows widely seen as one of the riskiest components of the European gas supply surprised with their stability, while generally reliable Norwegian pipeline flows dropped to unexpectedly low levels



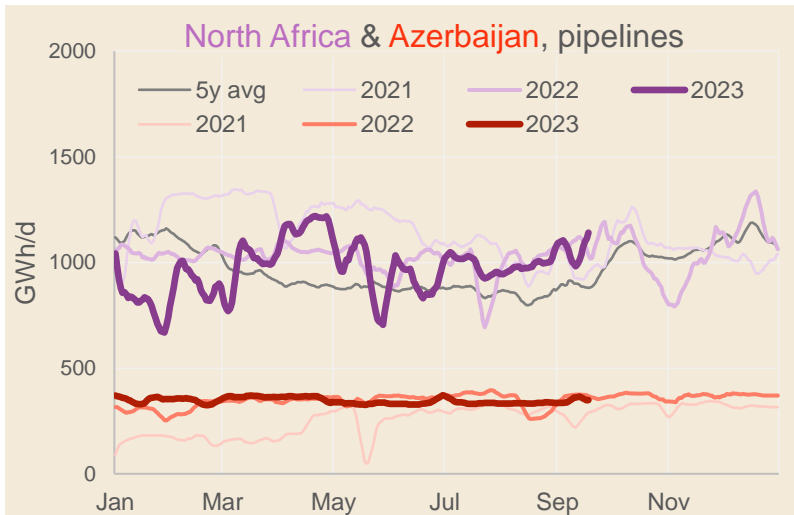
- Following the dramatic decrease in the Russian pipeline gas exports to Europe as a result of the war in Ukraine, the flows via remaining operational routes (Ukraine and Turkey) have been consistent since September 2022.
- In Q2 2023, pipeline flows from Russia to Europe stood at 59TWh (-74% YoY, but +3% QoQ) and constituted 7% of the region's gas imports, as opposed to the historical share of ~38%.

- In contrast, Norwegian pipeline flows to continental Europe surprised to the downside during Q2 2023 as planned maintenance turned out to be heavier and longer than originally expected.
- Interestingly, while Norwegian supply experienced a -6% YoY drop, flows were +2.5% higher compared to the 2018-2022 five-year average. It was a combination of the element of surprise, overall tight supply situation and currently strong focus on security of gas supply that made reduced YoY flows from Norway extremely noticeable and garnered a price reaction with TTF contracts rebounding in June 2023.

# European gas supply (2): Different shades of 'stable'

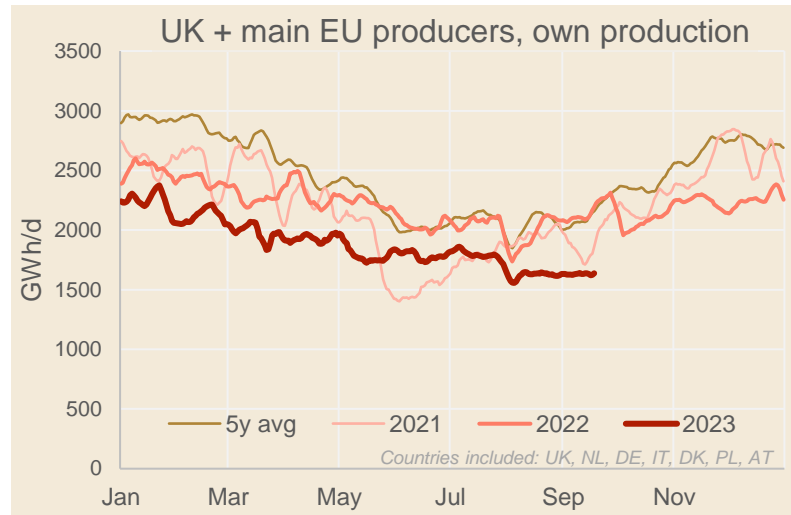
Other components of supply remain stable, but are not without risks

## Stable increase



- The importance of North African and Azerbaijani pipeline gas imports has been on the rise, and together they now constitute 13% of total supply.
- In Q2, the volume of gas supplied from these origins increased +16% from the 2018-2022 average.

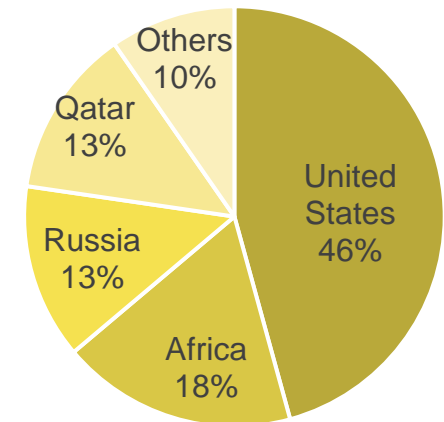
## Stable decline



- EU gas production decreased drastically in Q2 2023, -43% compared to the average of the previous five years.
- The share of the EU production in the total European gas supply decreased from 8% to 5.5%. Stronger UK output is offsetting some of the decline.

## Seasonally stable

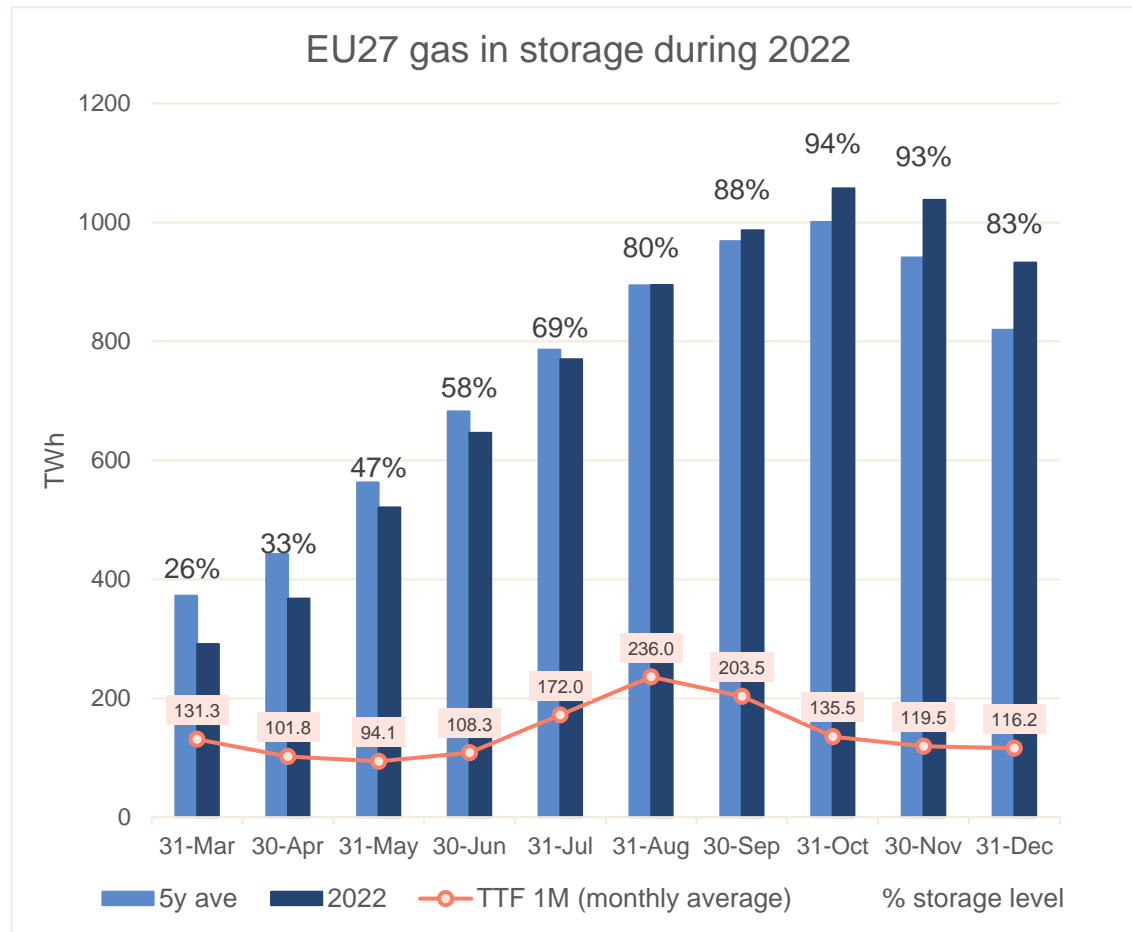
European LNG imports by origin



- LNG has become the single most important source of the European gas supply, providing 46% of the total in Q2 2023 vs 25% during the same quarter in the previous five years.
- LNG flows declined QoQ, but the decrease was in line with the expectations and seasonal variations.
- Hence, seasonally lower, yet stable LNG flows had minimal impact on the price volatility, especially since they were +10% YoY.

# European gas storages got special attention as security of supply crumbled

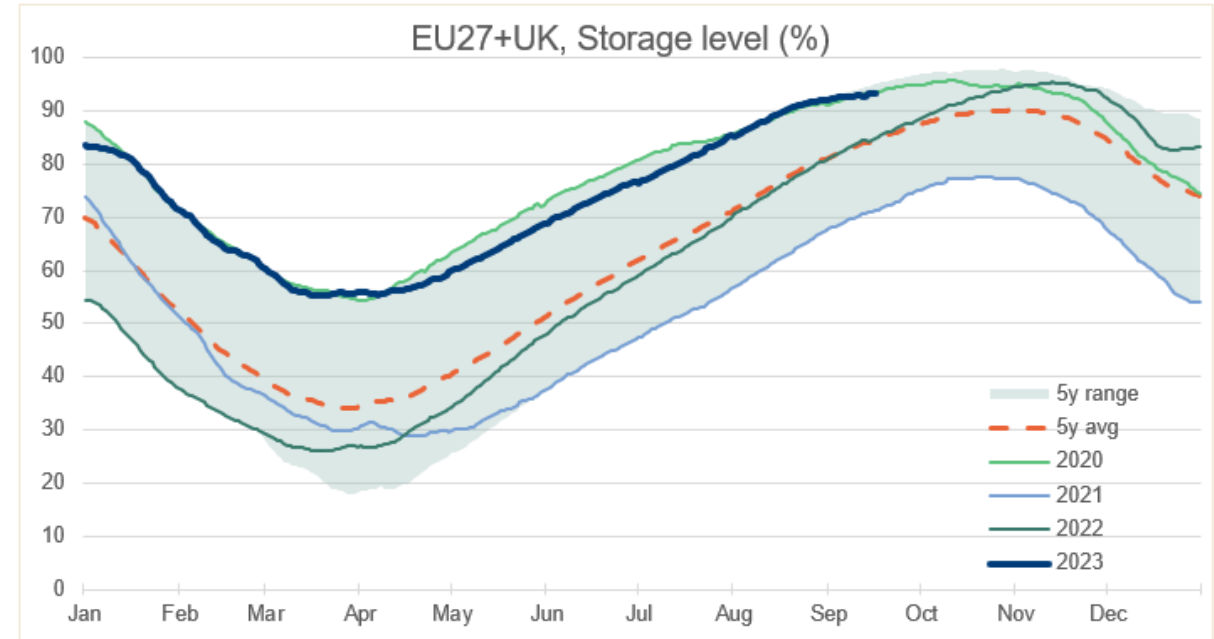
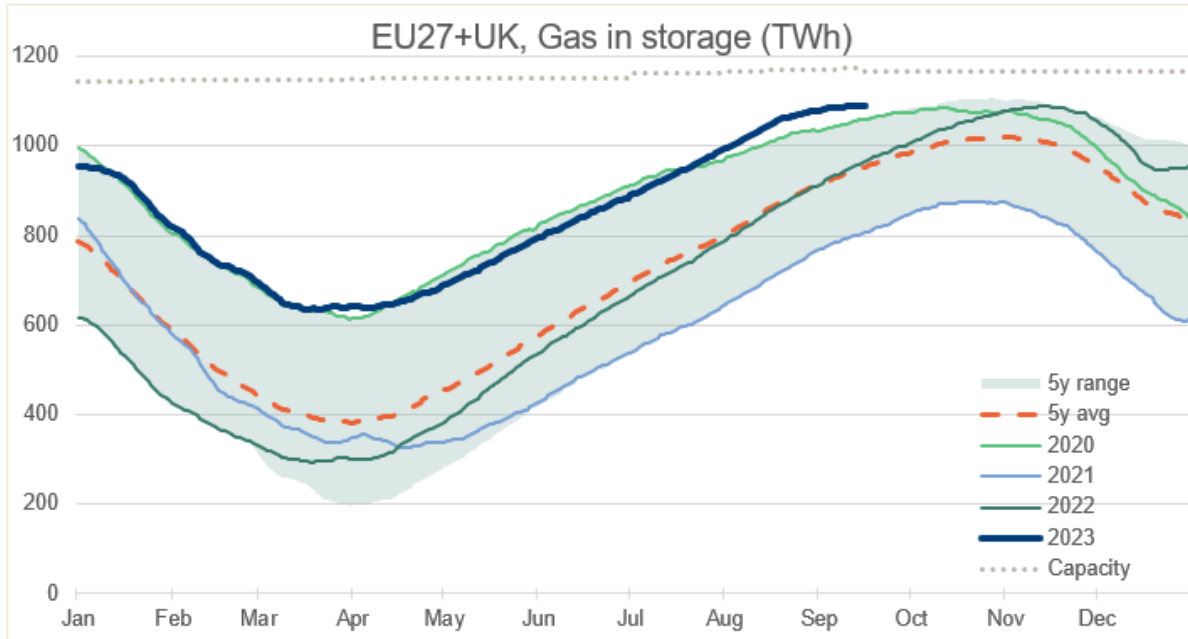
Mandatory EU storage targets were implemented because the gas supply crisis threatened Europe's ability to make it through 2022-23 winter. Storages filled to ~90% helped take the edge off gas prices by late 2022.



- **Supply fears drove implementation of mandatory EU gas storage targets:** With gas storages at levels below the five-year average in the spring 2022 and winter 2022-23 increasingly uncertain, by late June the EU agreed on a mandatory gas storage target: 80% by November 1, 2022 and 90% by November 1 in subsequent years.
- **Gas storage target met two months ahead of deadline:** The rush to secure supply ahead of extremely uncertain winter resulted in 80% full storages by August 31.
- **Rush to fill gas storages likely to have contributed to record high gas prices in August 2022:** Mandated storage targets and market participants in crisis mode rushed to fill gas storages at any price, contributing to the price spike.
- **Comfortable storage levels kept gas prices in check during Q4:** Demand destruction caused by extremely high prices during the summer and mild weather during autumn and early winter allowed to minimize withdrawals and preserve high volumes of gas in storage.

# European gas storages above 90% full

Similar to 2022, gas storages met the regulation mandated filling target of 90% at the end of August, two months ahead of the official target



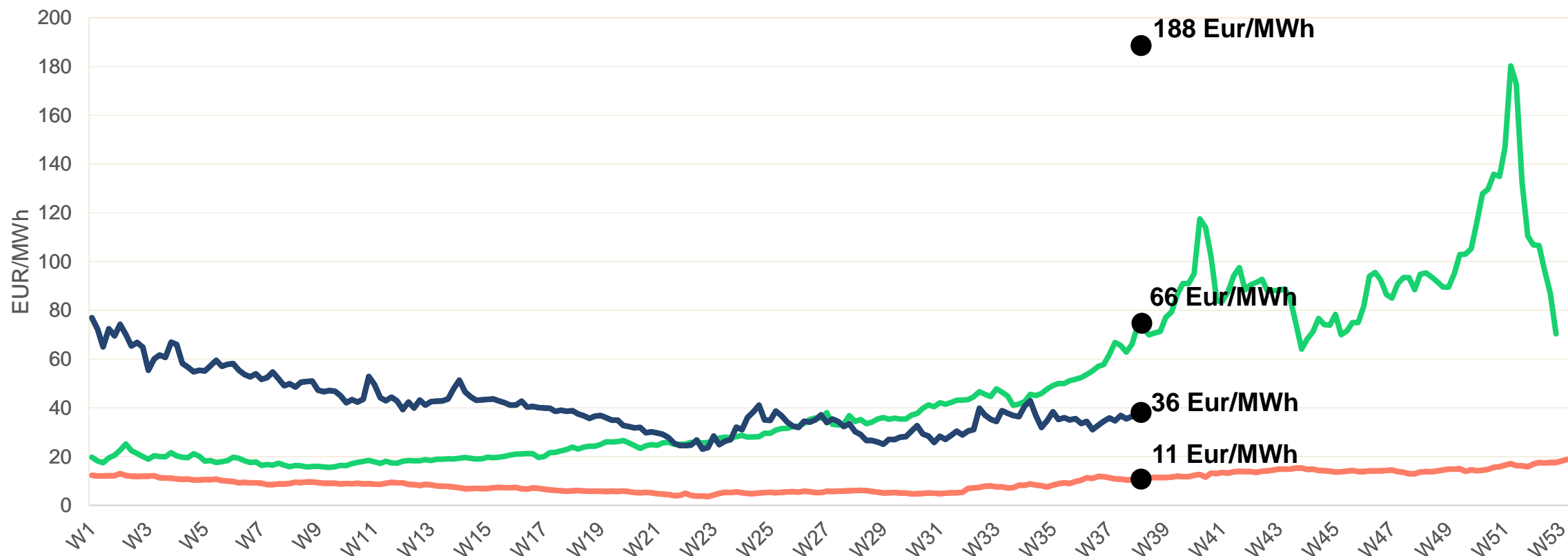
		16.9.2023	YoY	vs 5y avg
<b>EU27+UK</b>	Gas in storage (TWh)	<b>1089.8</b>	+124.0	+135.7
	Fullness (% , %p)	<b>93.3</b>	+8.5	+8.7
<b>NWE</b>	Gas in storage (TWh)	<b>504.7</b>	+32.7	+57.5
	Fullness (% , %p)	<b>93.2</b>	+3.4	+7.7

# Storages are full and demand is low, so why are gas prices higher again?

In August, TTF front-month contract gained +19% MoM, despite Europe meeting the 90% gas storage filling deadline two months ahead of schedule and demand staying stubbornly low (-11% YoY in Jan-Aug 2023)

TTF front-month contract, daily prices

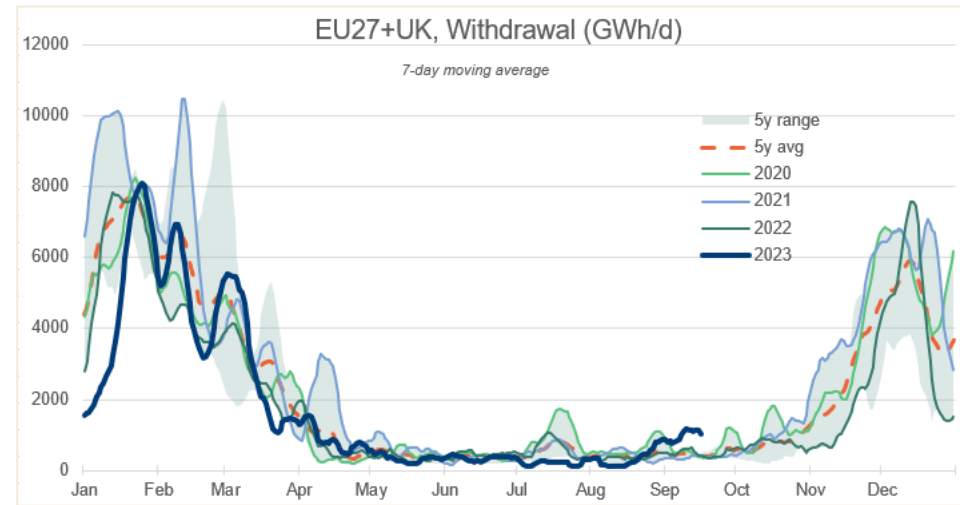
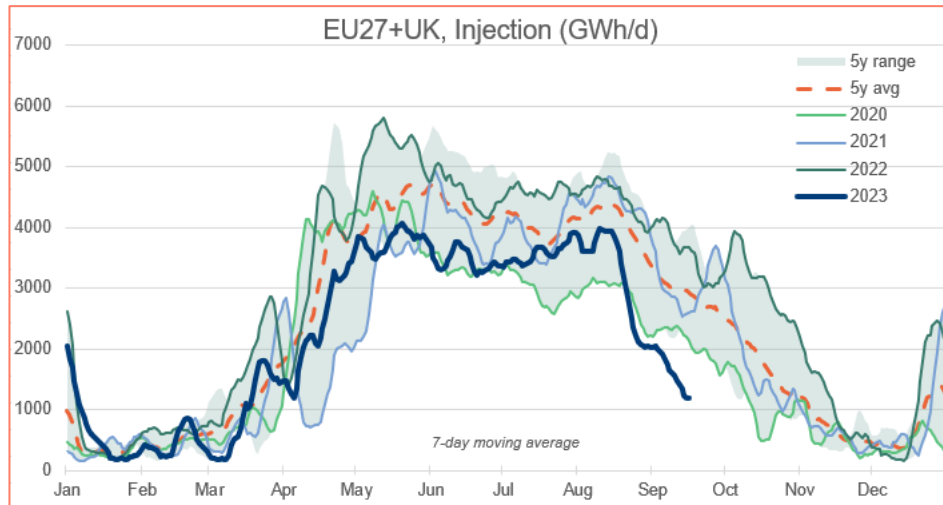
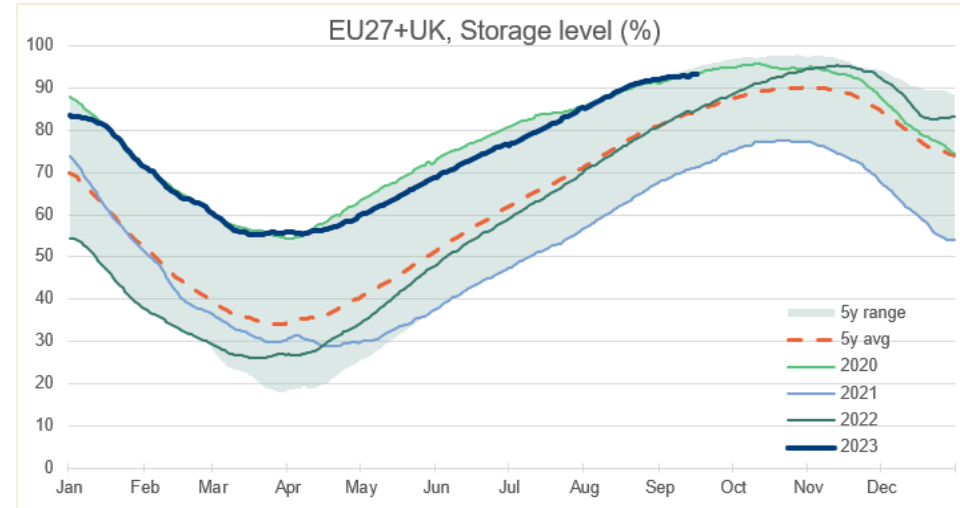
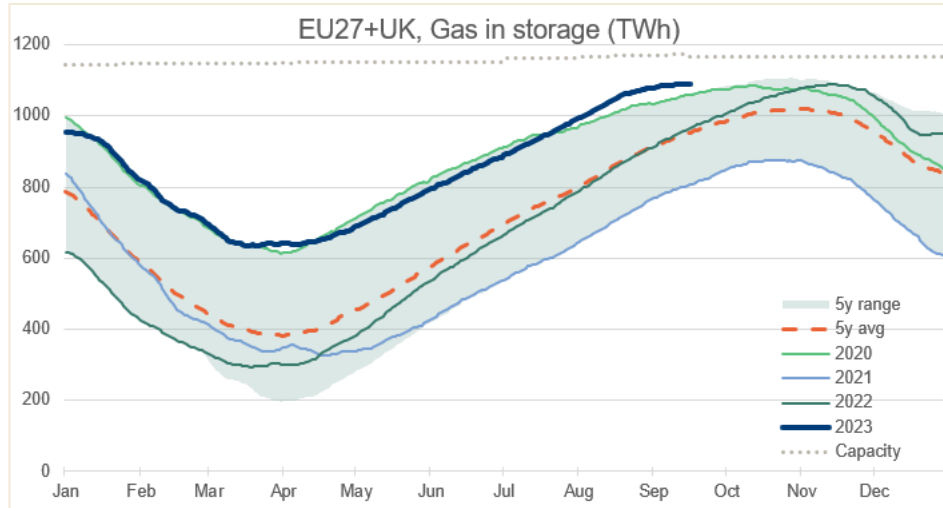
2023 2022 2021



# European gas storages above 90% full

Gas storages have continued to fill at a fast rate as a result of relatively stable supply and persistently weak demand, even despite slower than average injections

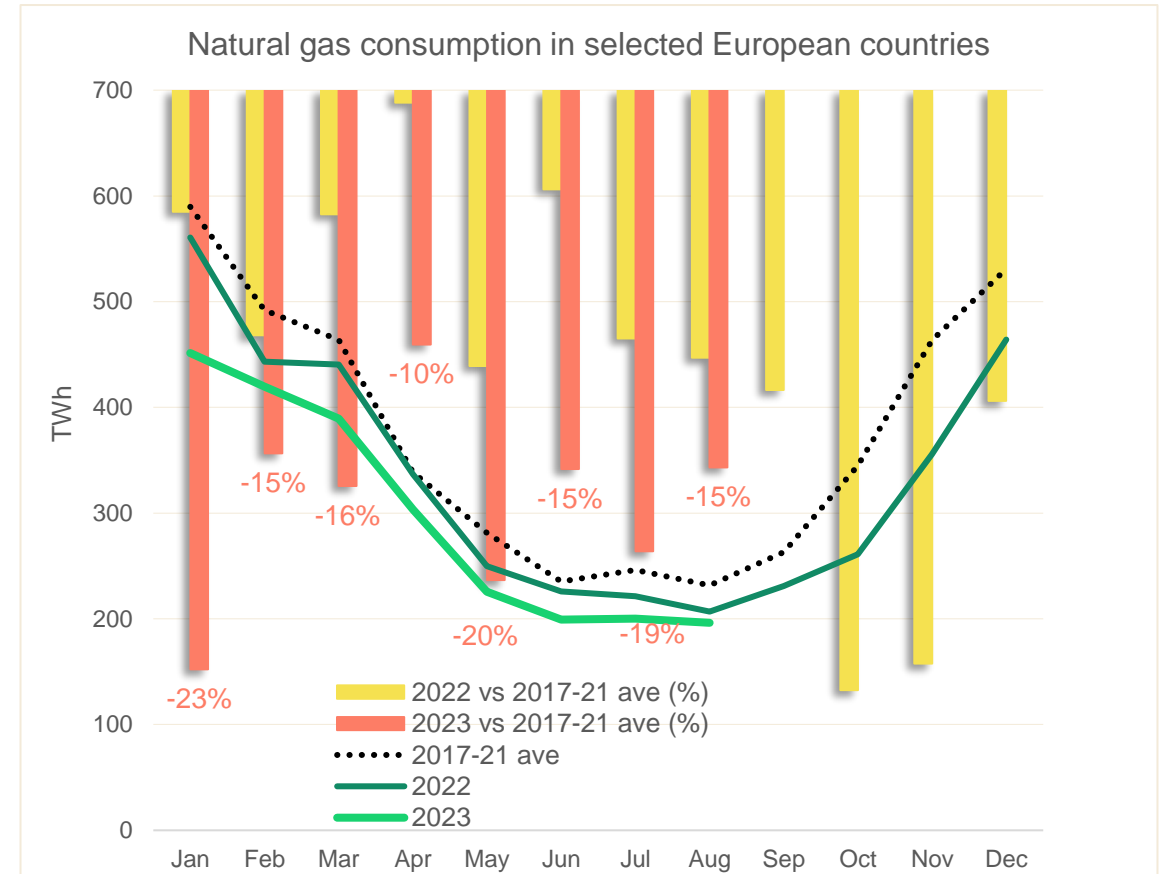
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# Low European gas demand plays its part in preserving the market balance

In conditions of tighter supply and higher prices, significant gas demand cuts contribute to a more stable market environment with strong savings achieved so far this year.

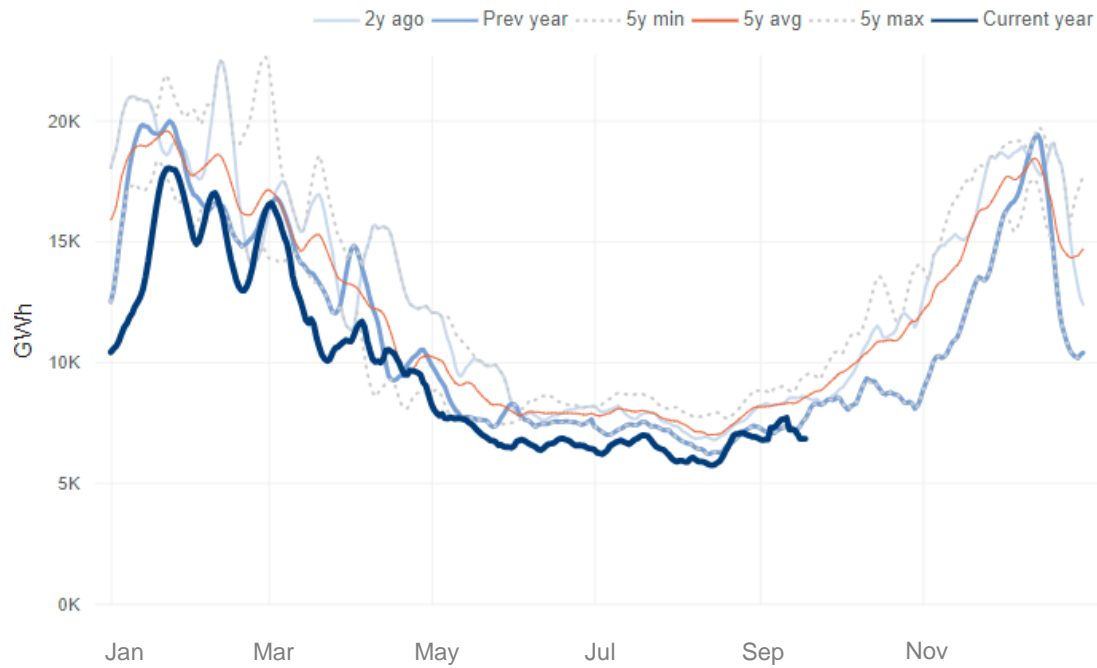
- In 1H 2023, European gas demand is -12% YoY and -17% below the 2017-21 average.
- In comparison with 2022 – the year of the energy crisis, gas savings are higher by 268TWh in 1H 2023.
- On average, every quarter this year Europe cut an additional 10% of demand from last year compared to the longer-term consumption represented by the 2017-21 average.
- There are various reasons for the achieved gas savings:
  - Most of demand reduction comes from the residential & commercial gas use, in part due to a warmer 2022-23 winter as well as policy campaigns to encourage gas savings.
  - Since last year, industries resort to other fuels and/or cut production.
  - Power sector's savings result from coal switching and increased use of renewable energy.



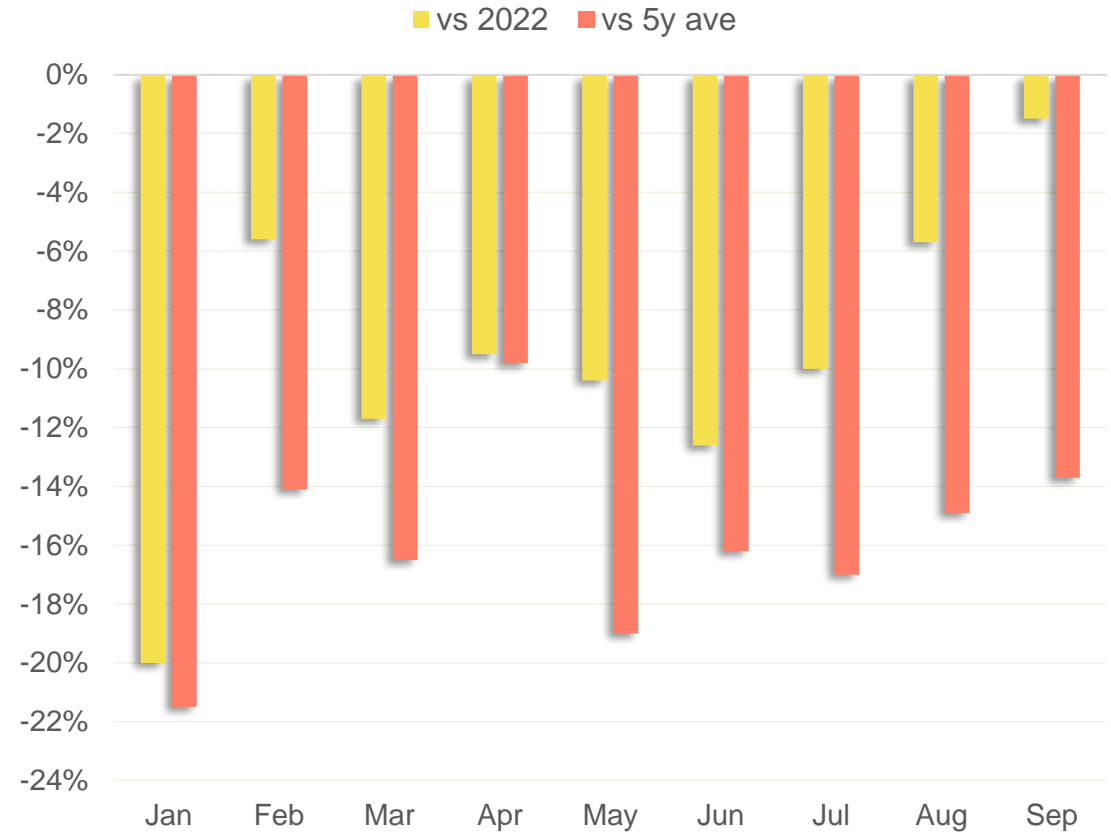
Note: Gas consumption is for 19 countries, including AT, BE, CH, CZ, DE, EE, ES, FR, GB, HR, IT, LU, LV, MC, NL, PL, PT, SI and SM. The country selection is representative of major European demand trends.

# European gas demand: Signs of recovery?

In August, gas demand was -5% YoY and -14% vs the five-year average. So far in September, it is -1.5% YoY and -14% compared to the longer-term average.



European gas demand in 2023



Notes: Gas consumption is for 19 countries, including AT, BE, CH, CZ, DE, EE, ES, FR, GB, HR, IT, LU, LV, MC, NL, PL, PT, SI and SM. The country selection is representative of major European demand trends. The five-year average is for 2018 – 2022. September 2023 data is until 18.09.2023.

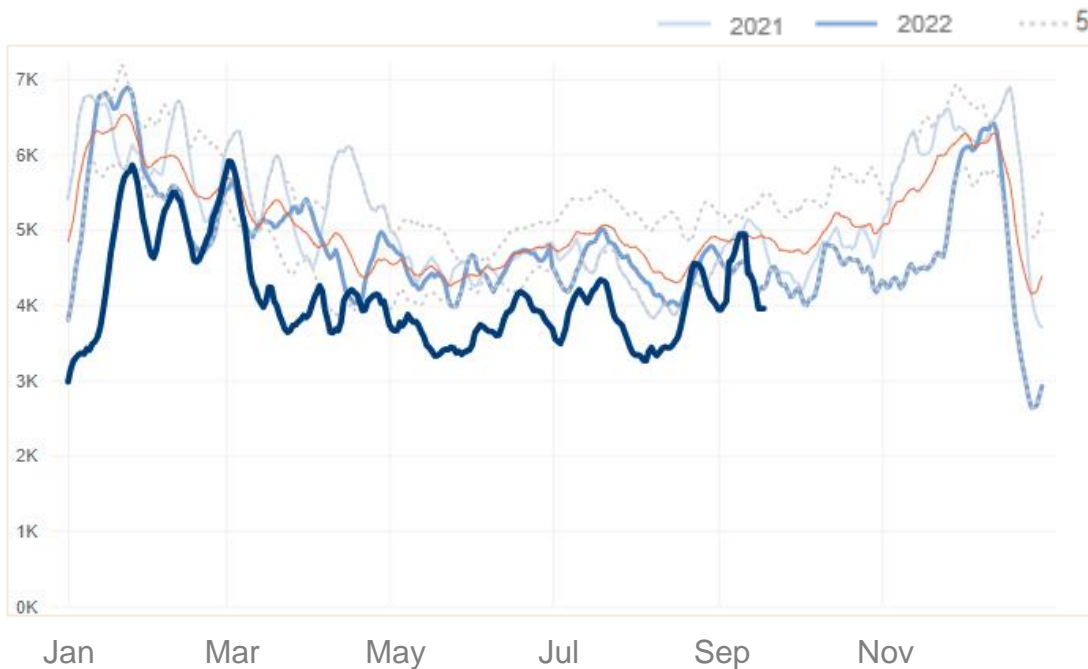


# European gas demand: what sectors show signs of recovery?

The slight recovery in demand during August is due to higher YoY demand from the residential and other small-scale demand segment. In early September, there has also been an uptick in industrial & power demand. Overall, demand is still considerably below the five-year average.

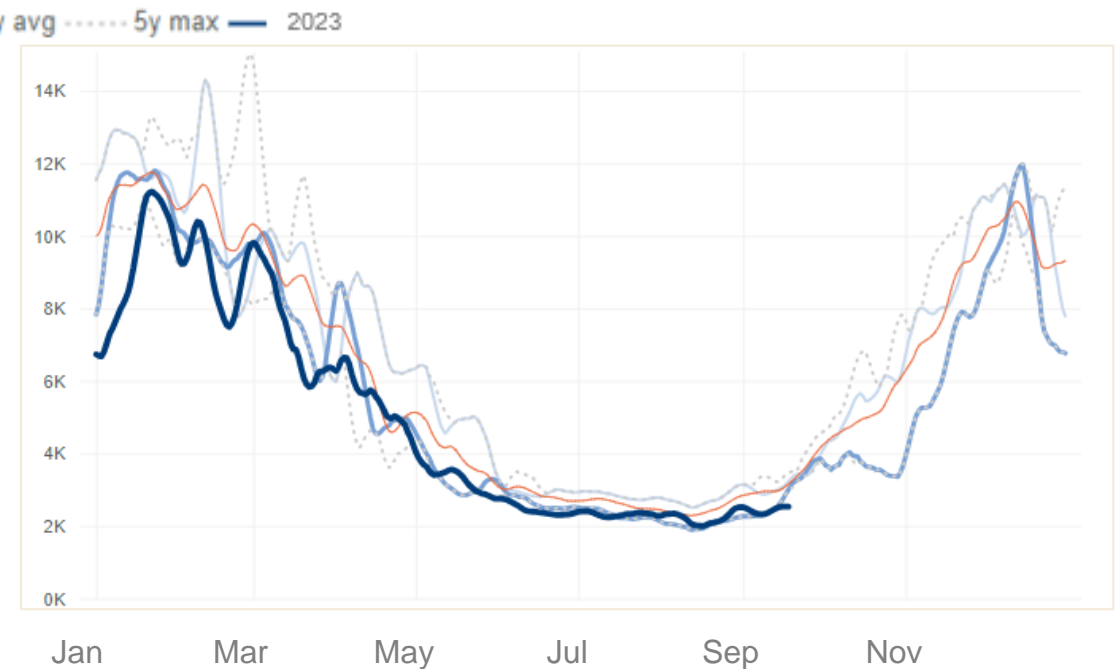
## Industrial & Power demand

YoY: **-12%** in August (**-1.7%** in early September)  
vs 5y average: **-17%** in August (**-10.6%** in early September)



## LDZ (residential & other small-scale) demand

YoY: **-12%** in August (**-0.4%** in early September)  
vs 5y average: **-17%** in August (**-17.6%** in early September)



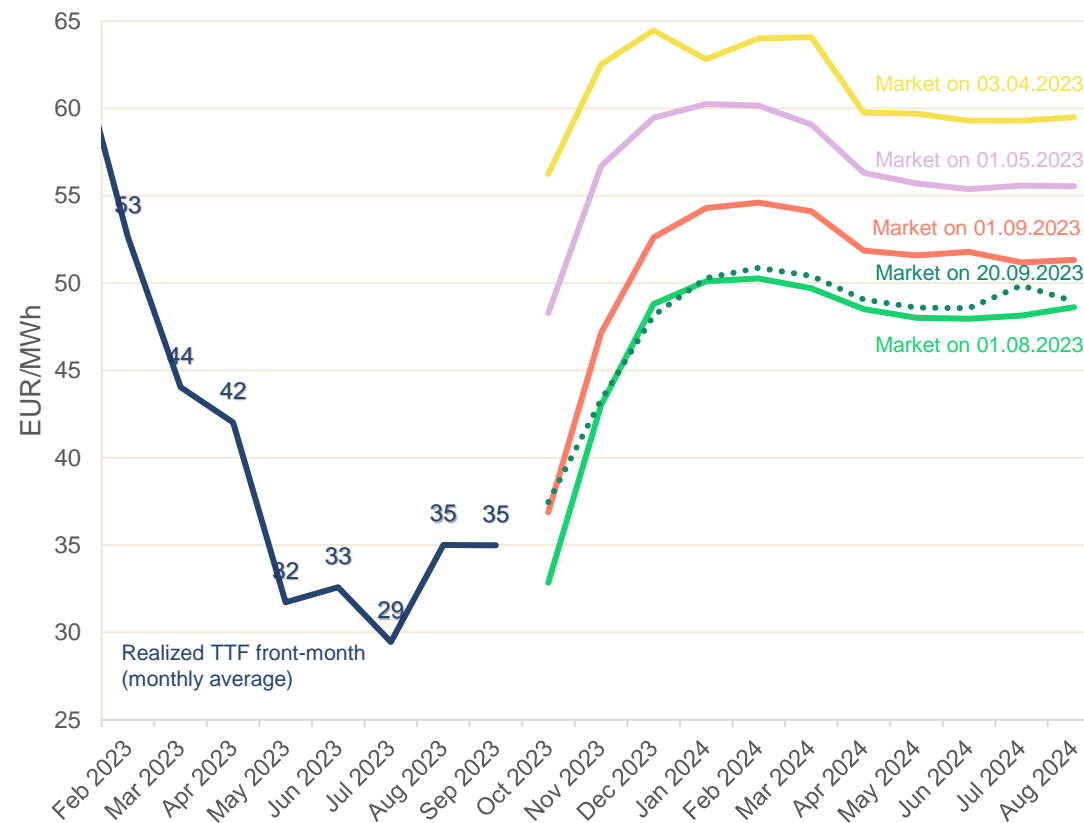
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# The price of peace of mind

As long gas supply is perceived as threatened and energy security is high on the agenda, European gas market will be willing to pay a premium on any probable risk because an actual supply disruption could potentially cost even more.

- Asia's gas supply problem is Europe's too:** Even though zero volumes of LNG produced at the Australian facilities where strikes began in early September make their way to Europe, European gas price has been more reactive to this risk than Asian LNG prices. If Australian LNG supply is curtailed, Asian customers will look for supply elsewhere, potentially pulling cargoes away from the Atlantic basin. As Europe is highly dependent on LNG imports (~40% of total supply) and spot LNG purchases in particular, this scenario could end up quite costly.
- Winter is coming... not only to Europe:** The change of seasons brings additional risks associated with the weather – this time on the demand side of the fragile balance too.
  - Is full gas storage helpful?** So far this year, very weak gas demand allowed Europe to fill its storages despite supply limitations and below average storage injections. However, EU-wide gas storage regulation mandates to have storages filled to 90% by November 1.
  - A chance of higher European demand:** Colder weather could lift residential demand. Also, reduced renewables generation could lift gas-for-power demand. Industrial gas demand is most certain to remain low for the rest of this year as economic recovery is challenging.
  - Small fundamental change – big price impact:** Importantly, a demand increase does not need to last long to rattle gas prices.
  - Winter outside Europe:** Unfavorable weather conditions might arrive across northern hemisphere, having a similar impact on Asian demand.
- In case of emergency call 'LNG':** In autumn – winter, unexpected limitations in any of the pipeline components of European gas supply would mean an additional call on LNG. Potential upside risks on the demand side would also translate into higher LNG buying. Hence, while European gas market might look almost oversupplied today, the fear of supply insecurity keeps gas prices elevated along the curve.

TTF price development



Notes: September price is based on the average of daily closing prices until 20.09.2023