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Key developments in EU electricity and gas markets

2026 Monitoring Report

16 March 2026

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Key 2025 gas and electricity market trends

EU wholesales energy prices declined after the crisis, but global price competitiveness remains a challenge.

Renewables provide 50% of electricity generation, with solar driving the energy transition (+41 TWh in 2025 compared to 2024).

Daily price swings got larger (~5× vs 2020), highlighting higher need for flexibility.

Gas power plants provide most of today's flexibility.

EU reduces reliance on Russian gas (-162 TWh in 2025), met by LNG.

Large growth in global LNG capacity (+70 TWh/month, further LNG growth expected).

Disclaimer: The analysis focuses on developments up until the end of 2025 and therefore does not reflect more recent geopolitical impacts.

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Industrial electricity prices: EU-US gap widened

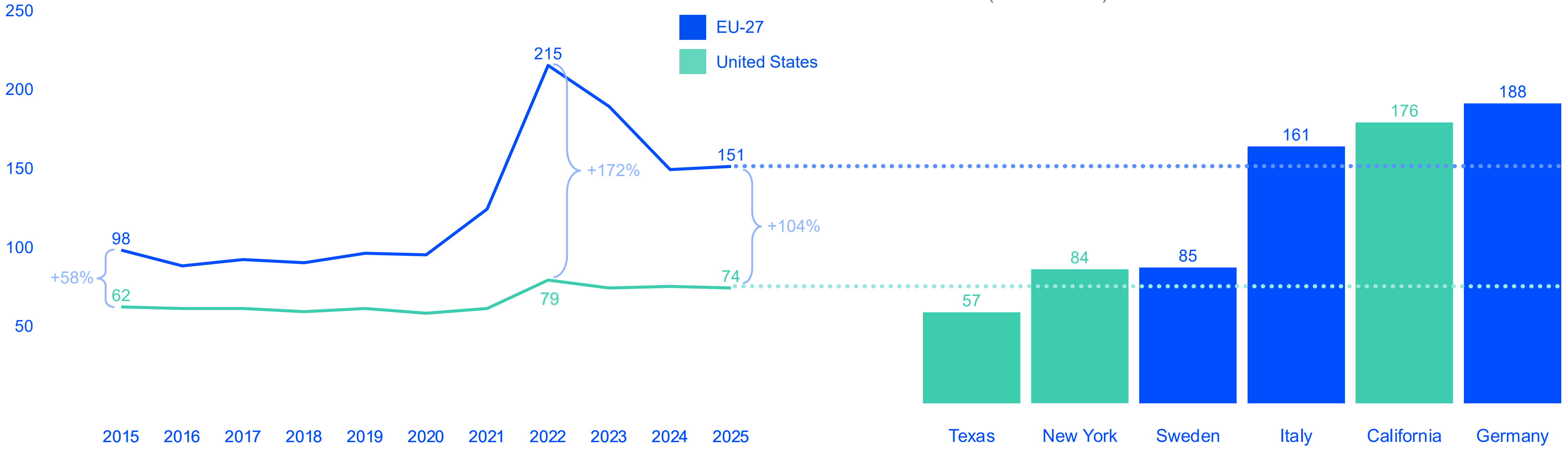
The EU-US industrial electricity price gap widened between 2015 and 2025 with improvement after the crisis

EU-US end-user electricity **price gap for industries widened** between 2015 and 2025 with strong **regional price differences** across both the EU and the US in 2025.

For EU industry's competitiveness, it is essential to have **efficiency in wholesale electricity pricing, network charges and taxes**, that collectively make up the end-user electricity bill.

Average nominal electricity end-user price evolution for the industrial sector, EU-27 and United States, 2015-2025 (EUR/MWh)

Nominal electricity end-user prices for the industrial sector in selected regions, and average US and EU price, first half of 2025 (EUR/MWh)



Source: ACER calculations based on Eurostat data for the EU (nrg_pc_205), U.S. Energy Information Administration (EIA) data for the US. Average yearly exchange rate taken from the European Central Bank (ECB). Note 1: For the EU-27 average and for Germany, Italy and Sweden, Eurostat's 70,000-149,999 MWh consumption band is used, which represents large industrial consumers. Note 2: The price evolution chart only depicts average yearly data for the years 2015-2024 and average data for the first semester of 2025.

The EU market is exposed to global dynamics

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EU wholesale electricity prices remain structurally higher than in the US, affecting EU's price competitiveness

The electricity **price gap** is mainly reflected in differences in the generation mix and fuel cost.

Europe's **higher exposure** to gas price dynamics continues to affect competitiveness, despite the growing share of renewables.

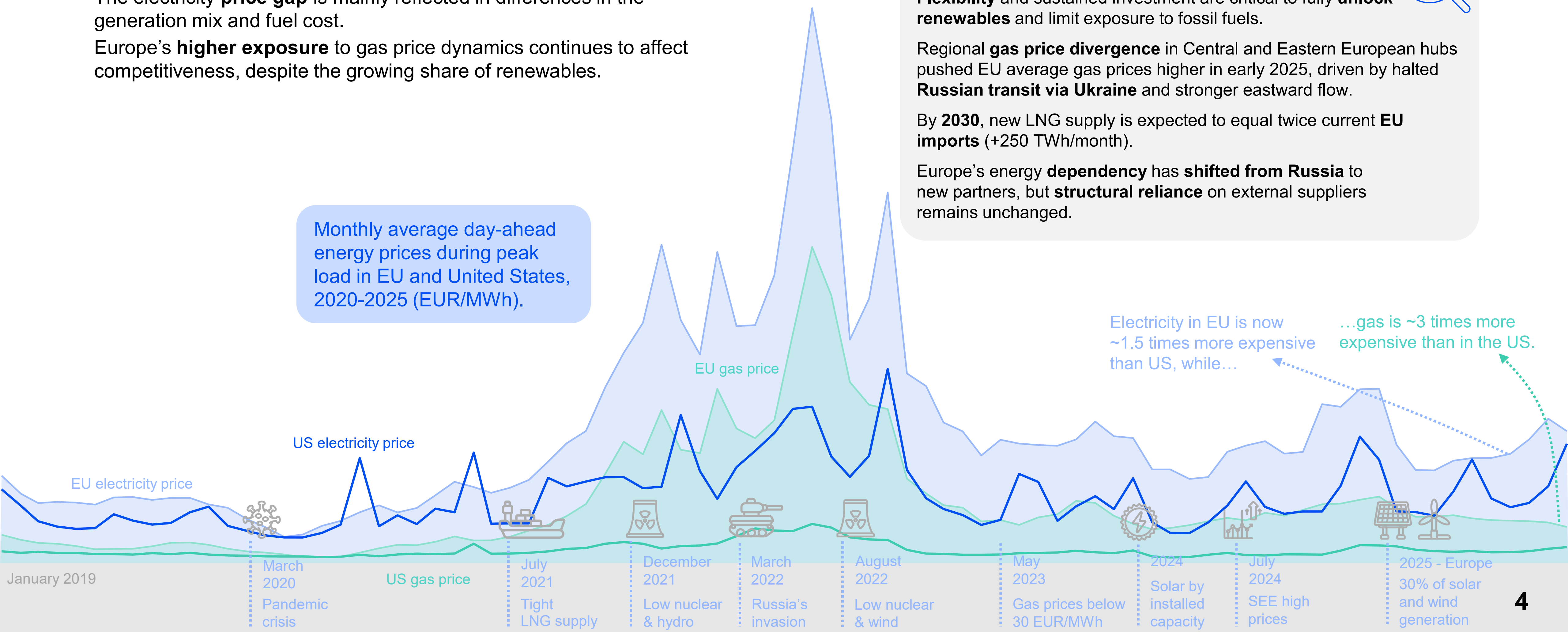
The EU's **power system** is increasingly **driven** by **renewables**, reflecting a clear long-term decarbonisation path.

Flexibility and sustained investment are critical to fully **unlock renewables** and limit exposure to fossil fuels.

Regional **gas price divergence** in Central and Eastern European hubs pushed EU average gas prices higher in early 2025, driven by halted **Russian transit via Ukraine** and stronger eastward flow.

By **2030**, new LNG supply is expected to equal twice current **EU imports** (+250 TWh/month).

Europe's energy **dependency** has **shifted from Russia** to new partners, but **structural reliance** on external suppliers remains unchanged.



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Solar reshapes wholesale prices

Solar is transforming Europe's price patterns, bringing cheaper midday power and sharper wholesales price contrasts

Renewable generation continued to expand strongly with a share of around **50%**.

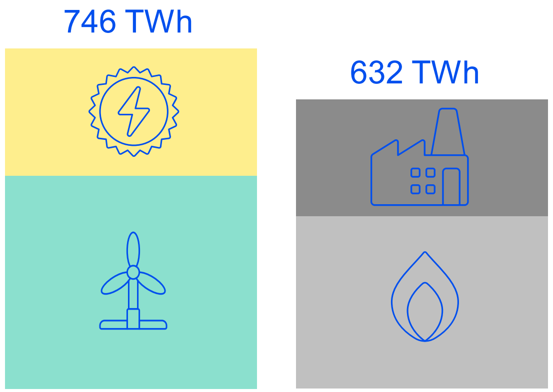
The growing share of renewables has increased the **system's sensitivity** to weather conditions. Extreme events can simultaneously affect both supply and demand.

The higher incidence of **high-price hours** reflects increased sensitivity to the evening **decline in solar** output and constraints in available system **flexibility**.

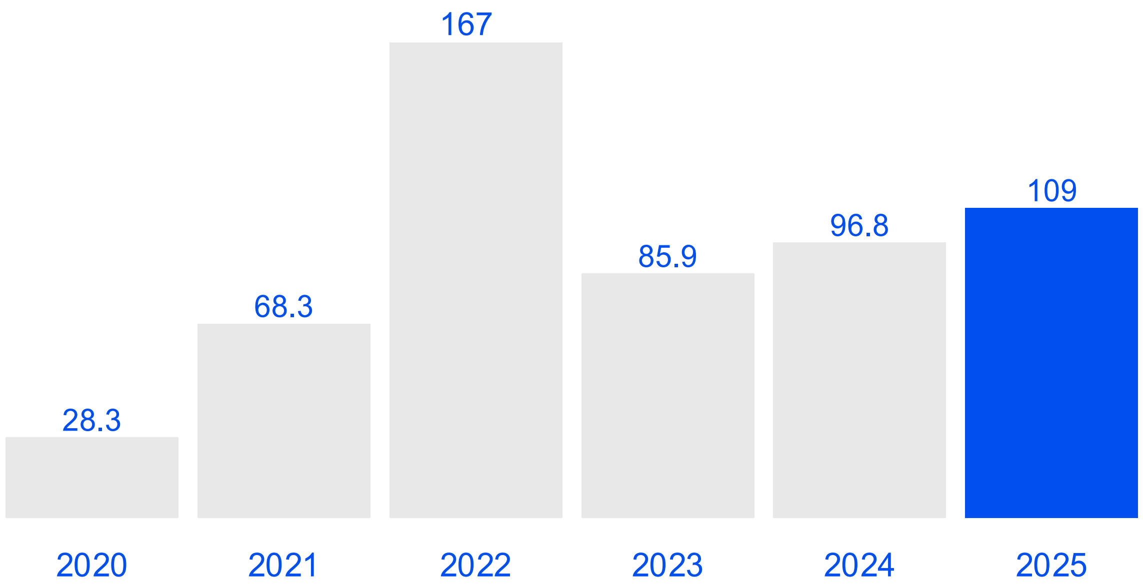
The average electricity **price difference** has grown **five times** compared to the **2020** value.

Gas remains a crucial **anchor** for the system, during **evening peaks** and periods of limited renewable output.

Total generation per type in the EU-27/EEA (Norway), 2025



Yearly average difference of minimum and maximum day-ahead prices across bidding zones, EU-27/EEA (Norway), 2020-2025 (EUR/MWh)



Source: ACER calculations based on ENTSO-E Transparency Platform data.
Note: 2022 is excluded due to extreme price levels, which would distort the scale and prevent a clear visual comparison of price dynamics and current market levels.

Gas price volatility reduced – LNG on the rise

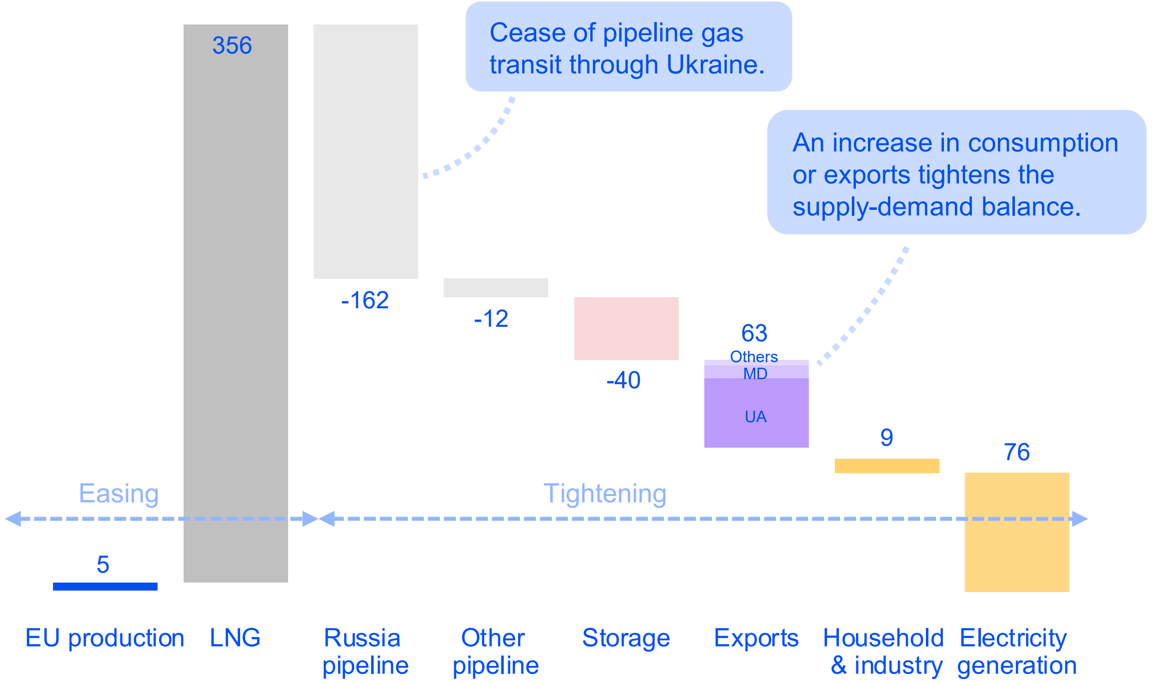
The second half of 2025 showed a break with the trend of volatile gas prices that characterised the energy crisis in the EU

In 2025, the EU gas market was driven by opposing forces. Tightening pressure came from a **decrease in Russian pipeline** flows combined with rising overall demand. Conversely, increased availability of LNG sent easing signals.

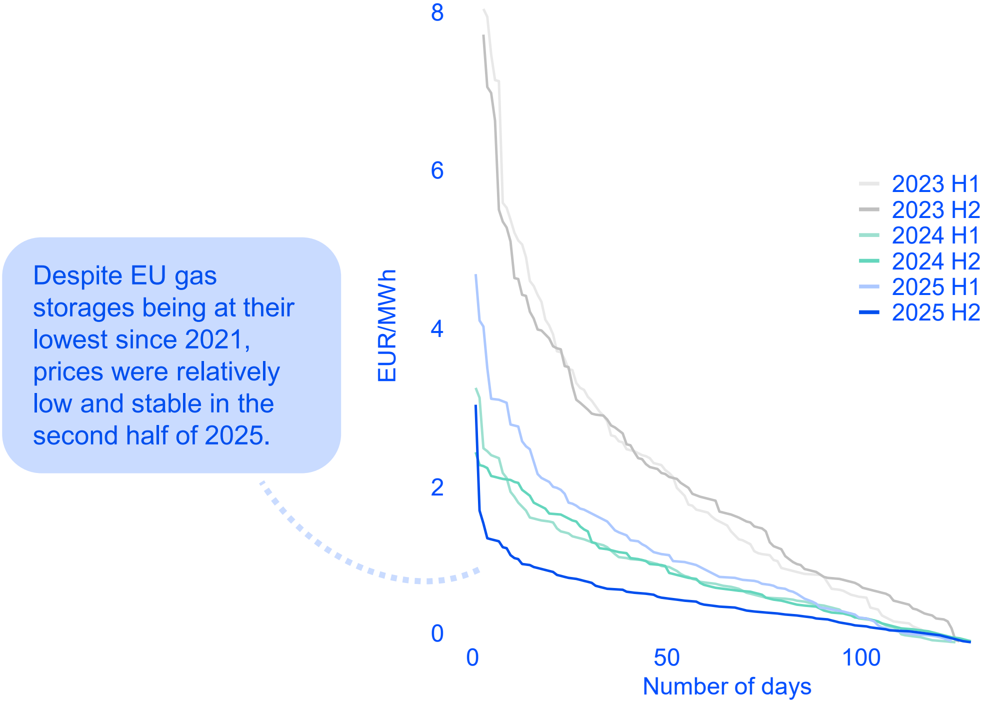
Reduced **Russian pipeline** flows have been largely **offset** by higher LNG imports.

Gas markets presented more **stable prices** across major gas hubs. However, **changes** of **direction** in the magnitude of the **spread** are noteworthy[1].

Changes in EU gas supply and demand, main sources, 2025 relative to 2024 (TWh)



Day-on-day price change, day-ahead product, NL-TTF, 2023-2025 (EUR/MWh)



Source: ACER calculations based on ENTSOG, ENTSOE, GIE, ENaGaD and EUROSTAT data (nrg_cb_gasm) (left). ACER calculations based on ICIS data (right).
Note 1: Geopolitical shocks in Q1 2026 are already challenging the stability seen in the second half of 2025.

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Recommendations

Efficiency and market integration are key to affordability, competitiveness and clean energy

- Ensure efficiency across all electricity **price components** to improve household affordability and industrial competitiveness.
- Expand market integration to support **decarbonisation** objectives and reinforce Europe's **global competitiveness**.

Strengthen system flexibility and interconnection to integrate higher shares of renewables

- Accelerate the rollout of **demand response**, **storage** and other flexibility solutions to address widening price swings during the day.
- Ensure market signals allow **flexible** resources to respond effectively to evening price peaks and periods of low renewable output.
- Strengthen **cross-border interconnections** to reduce regional price divergences.

Further diversify gas supply sources and promote low-carbon domestic alternatives

- Reduce **conventional gas consumption** while accelerating the uptake of renewable gases.
- Carefully plan **infrastructure** development and tariff design to contain network cost increases without compromising security of supply.

Introduction

Overview

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Report overview: EU Gas and electricity in 2025

Europe leads in renewable deployment, which strengthens energy independence and moderates prices. However:

- As a net gas importer, the EU faces higher and more volatile costs than countries with domestic reserves.
- High generation costs for gas-fired electricity drive prices up.
- Global LNG replaces Russian pipeline gas, but the EU remains reliant on imports.

Renewable expansion in Europe remains a strong structural trend, but gas system decarbonisation is still at an early stage.

- Record solar capacity in 2025 increased price volatility.
- Lower wind and hydro output exposed to weather risks.
- Gas-fired power remains critical for flexibility.

Growing spreads between peak and low wholesale electricity prices show structural flexibility gaps. Addressing them requires accelerated deployment of system solutions:

- Scaling up storage, interconnections and demand response.
- Develop additional seasonal flexibility beyond gas storage and conventional plants.

Global context

- The EU leads in power sector decarbonisation with one of the world's cleanest electricity mixes
- EU reliance on imported fossil fuels has decreased but remains significant
- Energy prices in the EU remain substantially higher than in the US

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Europe’s energy landscape: strengths and vulnerabilities

Europe leads the transition with a much cleaner power mix

- Europe stands out for its cleaner electricity mix. Wind and solar have expanded steadily, creating an electricity system, on average, far greener than those of the United States and China.
- While Europe accelerates its transition, it remains highly dependent on imported gas, increasing its exposure to gas market dynamics and contributing to differences in price outcomes relative to the US. By contrast, the US continues to rely predominantly on fossil fuels, particularly gas.

A greener system still relies on imported fuels

- Despite rapid renewable electricity deployment, and absent homegrown flexibility solutions, a larger share of EU energy demand is still met by imported fossil fuels than by electricity. Domestic low-carbon gas solutions remain at an early stage.
- Europe’s dependence on gas imports and its exposure to intensified global competition for LNG leave the EU vulnerable to global market fluctuations. This contrasts with the US, where abundant domestic gas resources help keep prices low, and underscores the importance of developing local flexibility solutions to manage the EU’s reliance on renewables.

End-user prices reveal persistent structural gaps

- Higher-cost imports translate directly into energy bills and affect Europe’s price competitiveness in the global market. Even after prices decreased following the crisis, end-user prices for industrial users in the EU remain substantially higher compared to those in the United States.
- Addressing this gap requires more than short-term price adjustments in the case of LNG, Europe could for example benefit from long-term gas contracts with destination flexibility[1]. It also points to the need for technological upgrading and new solutions, including in the energy sector.

[1]See Analysis of the European LNG market developments.

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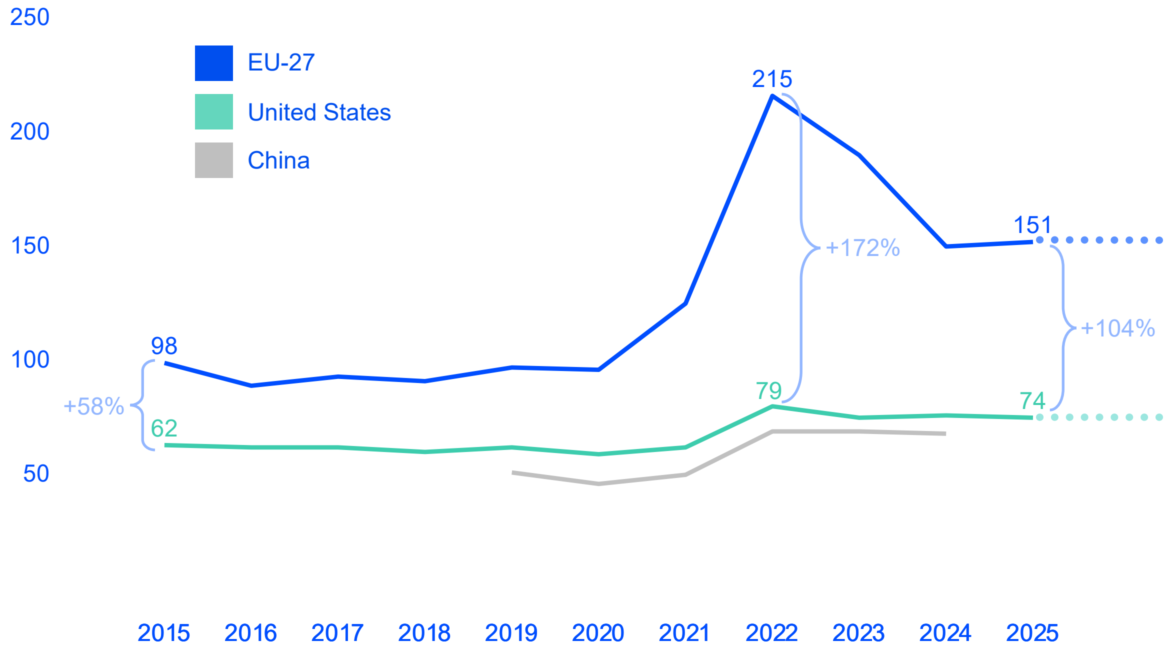
End-user electricity price gap twice as high as pre-crisis

The EU-US industrial electricity price gap widened between 2015 and 2025

After the energy crisis, EU industrial electricity prices declined but did not revert to pre-crisis levels. In contrast, US prices stayed stable due to abundant domestic resources. Efficiency in wholesale electricity pricing, network charges, and taxes is vital for EU industry competitiveness.

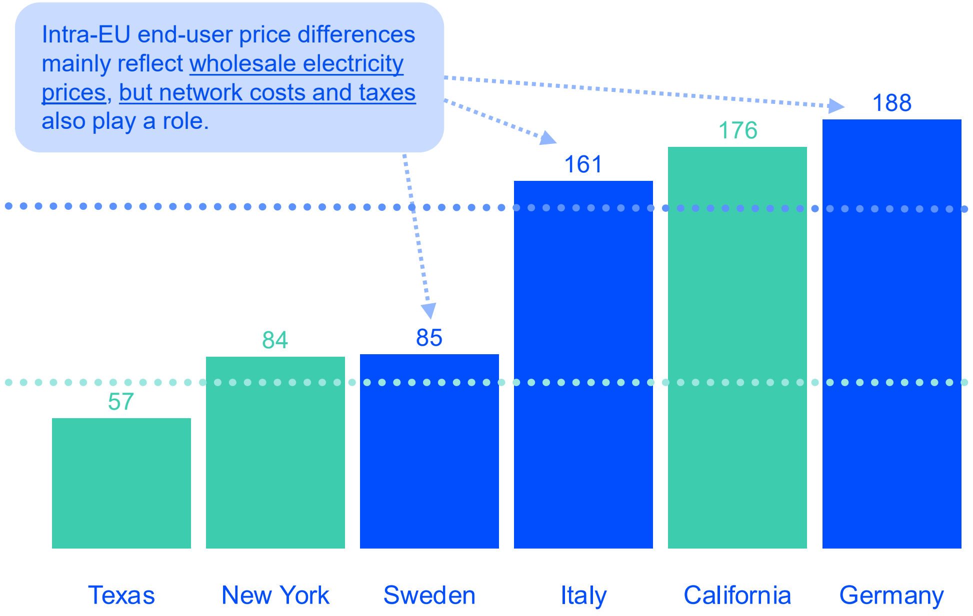
Average nominal electricity end-user price evolution for industrial sector, EU-27, United States and China, 2015-2025 (EUR/MWh)



Strong regional differences in both EU and US

End-user prices vary widely across EU Member States. Similar patterns appear among US states. In 2025, the gap between the highest and lowest-price regions reached over a 3-fold difference in the US and a 2-fold difference within the EU.

Nominal electricity end-user prices for the industrial sector in selected regions, and average US and EU price, first half of 2025 (EUR/MWh)



Source: ACER calculations based on Eurostat data for the EU (nrg_pc_205), U.S. Energy Information Administration (EIA) data for the US, IEA data for China. Average yearly exchange rate taken from the European Central Bank. Note 1: For the EU-27 average and for Germany, Italy and Sweden, Eurostat's 70,000–149,999 MWh consumption band is used, which represents large industrial consumers. Note 2: The price evolution chart only depicts average yearly data for 2015-2024 and average data for the first semester of 2025. Note 3: The end-user electricity price for large industries in China is based on data for Inner Mongolia.

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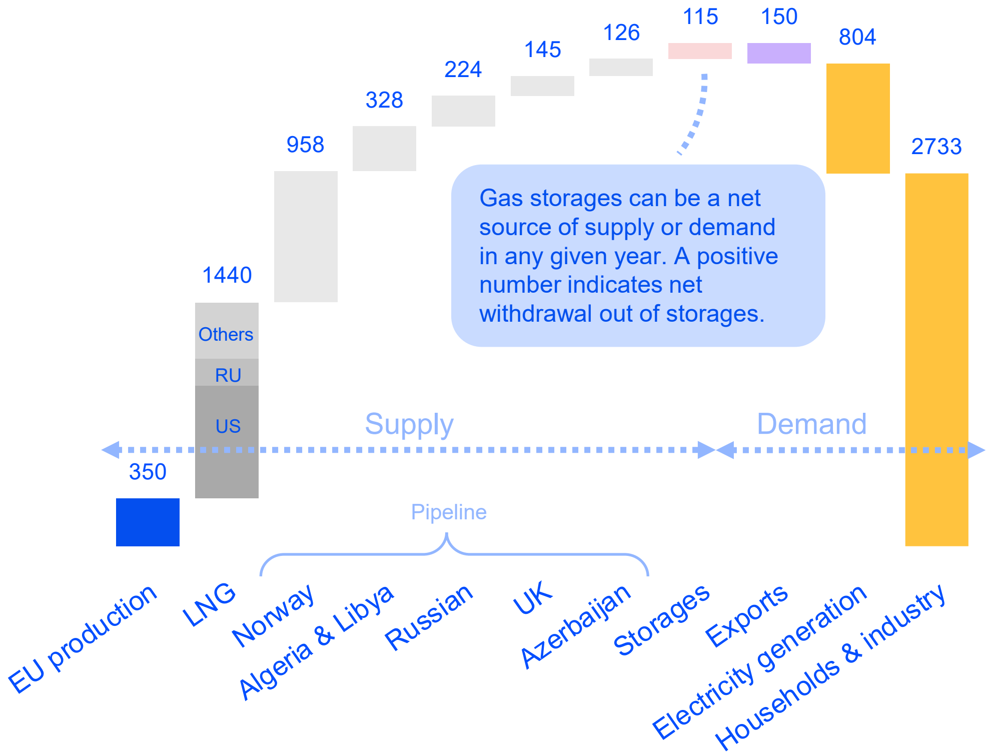
Import dependence shapes Europe's price competitiveness

Europe depends on imported gas, which exposes it to global market developments

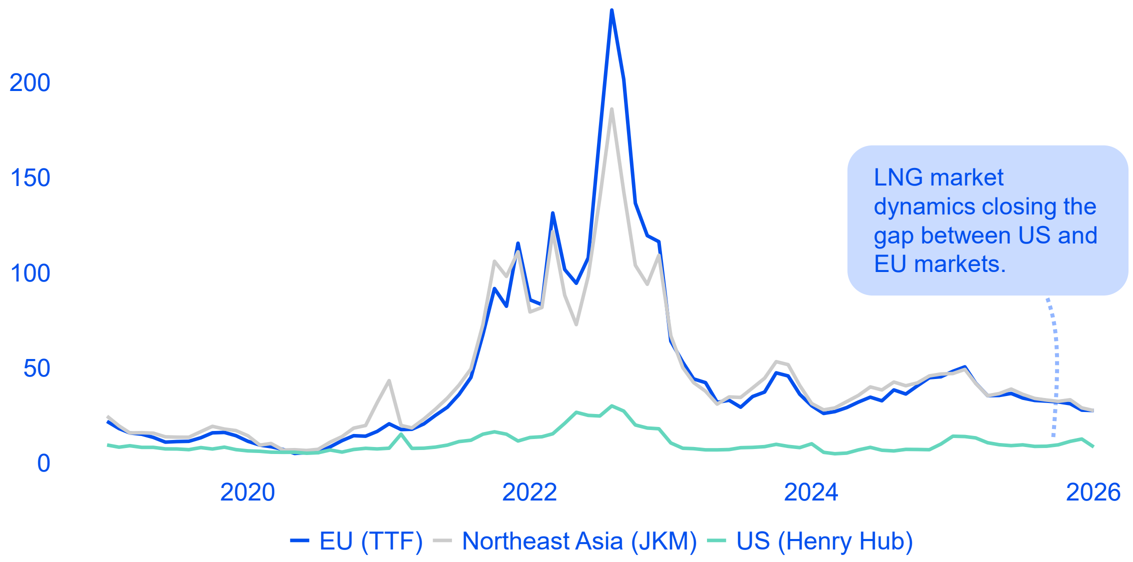
In 2025, the **EU gas mix** remained strongly import-dependent: 50% pipeline gas, 40% LNG (primarily from the US), and 10% domestic production and storage.

Gas supply and demand, main sources, 2025 (TWh)



- Europe's structural dependence on imports directly influences its gas prices, like the Northeast Asian market. Gas prices remain exposed to episodes of global supply tensions, even if more stable in 2025. The price spread between the US and the EU reduced, especially in the last quarter.
- These dynamics contribute to differences in competitiveness: while the US benefits from more stable and cheaper domestic gas, European prices must respond quickly to international shocks and fluctuations.

Average wholesale prices of key international gas benchmarks in Europe, United States and Northeast Asia, 2020-2025 (EUR/MWh)

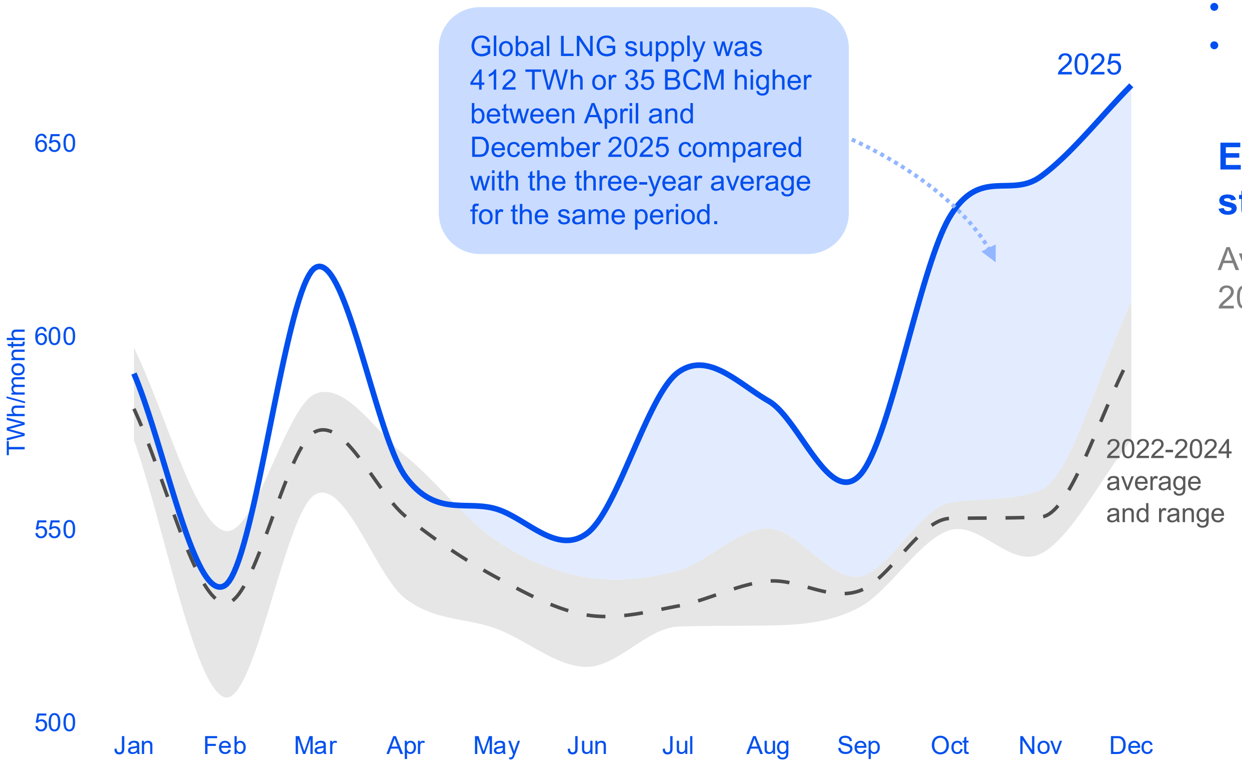


Source: ACER calculations based on ENTSOG, ENTSOE, GIE, ENaGaD and EUROSTAT data (nrg_cb_gasm) (left). Henry Hub - EIA and TTF/JKM - S&P Global (right).
Note: LNG breakdown should be seen as indicative as total supply figures rely on LNG send-out, whereas the distribution by source is allocated according to landing volumes. 'Storages' refer to the year-on-year change in storage stock.

New supply eases global LNG market tightness

After years of minimal growth, the global LNG market saw a surge in supply capacity in the second half of 2025

Estimated global supply of LNG, 2022-2025 (TWh/month)

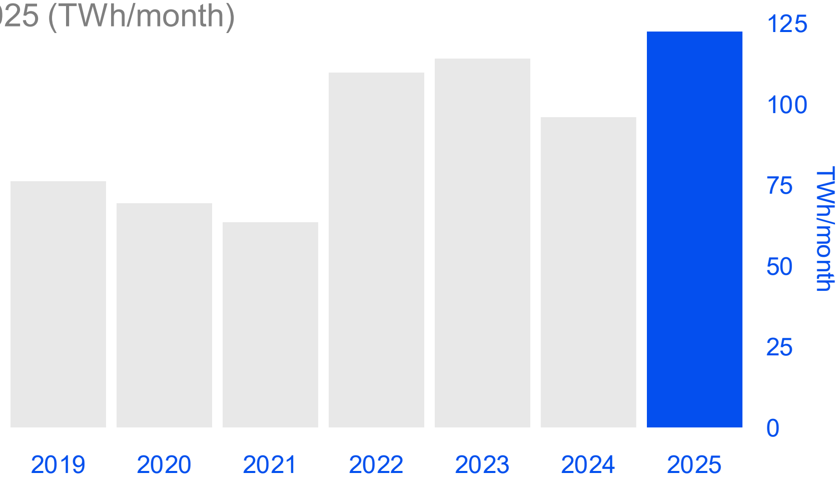


The narrowing price gap between the US and the EU is largely driven by the recent expansion of global LNG supply, marking a clear shift from the 2022-2024 period of stagnant availability.

- Additional **LNG volumes** since **mid-2025** have led to a sharp decline in benchmark prices.
- **Further LNG** capacity is expected to enter the market **from 2026** onward.
- **By 2030**, projected new supply (+250 TWh/month) could reach the equivalent of twice current EU imports.

EU imports record LNG volumes amid increased supply, steady Asian demand, and declining spot prices

Average monthly imports of LNG to EU gas networks, 2019-2025 (TWh/month)



Source: ACER calculations based on Gas Infrastructure Europe, S&P Global.

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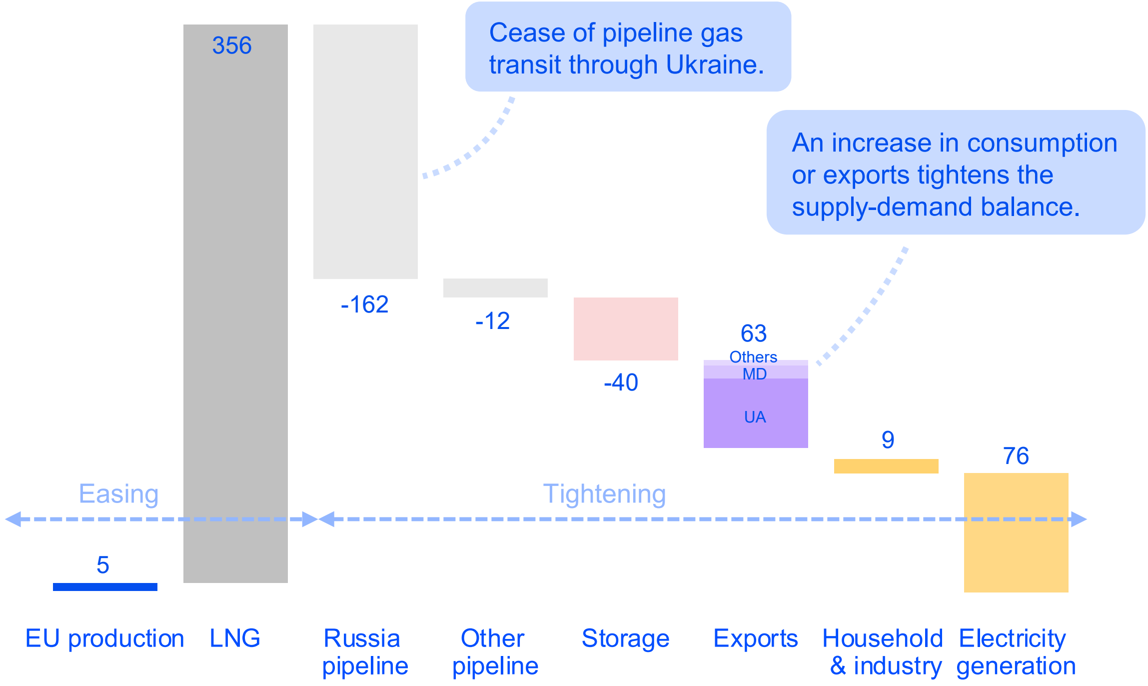
The LNG build-up also eases pressure on gas storage

Expanded LNG availability is mitigating security of supply concerns even with tightened supply from other sources and with heavy winter withdrawals, leaving year-end 2025 storage at recent historical lows

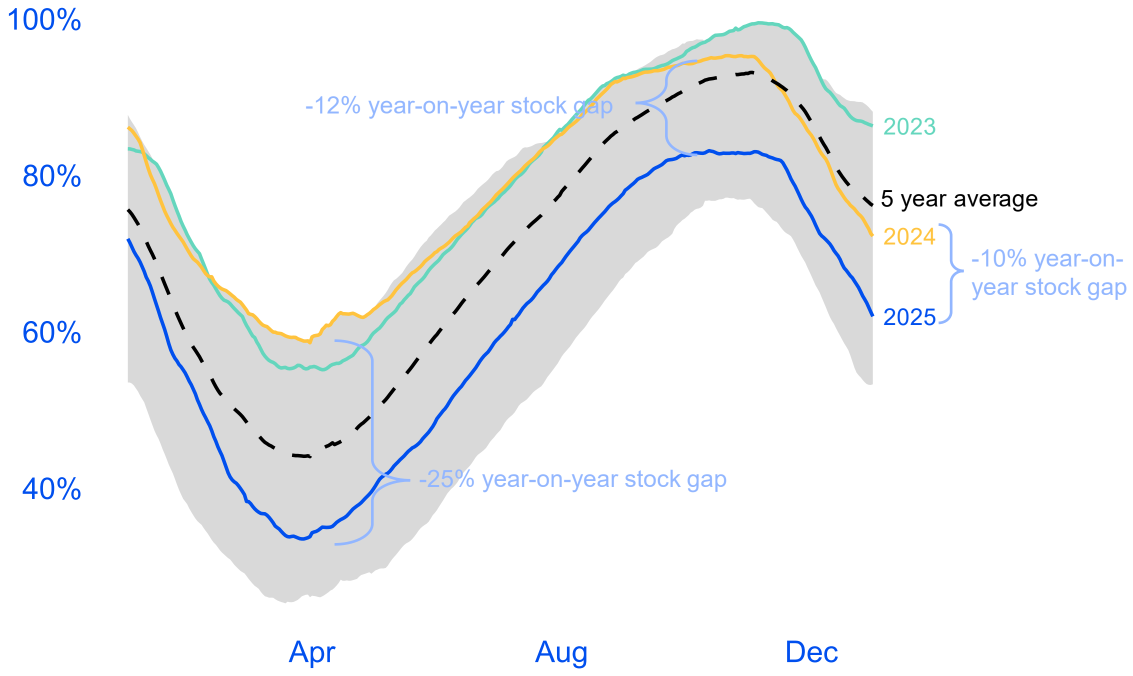
In 2025, the EU gas market was driven by opposing forces:
- Tightening pressure came from a decrease in Russian pipeline flows combined with rising overall demand.
- Conversely, increased availability of LNG sent easing signals.

Changes in EU gas supply and demand, main sources, 2025 relative to 2024 (TWh)



Storage levels were only at 82% on 1 November and ended up at 62% by year-end, a 10%-point decrease compared to the previous year.

EU Gas storage levels, 2019-2025 (% of EU working gas volume)



Source: ACER calculations based on ENTSOG, ENTSOE, GIE, ENaGaD and EUROSTAT data (nrg_cb_gasm).
Note: 'Storages' refer to the rate of change in storage stocks in the chart on the left.

Gas price-setting in electricity markets varies across regions

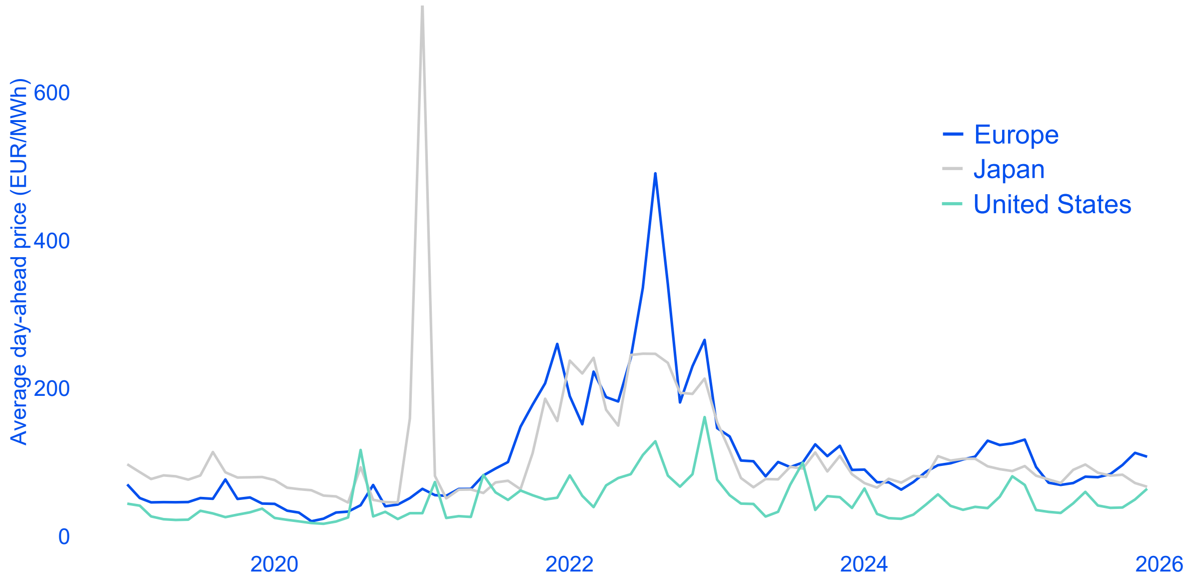
For gas importers, electricity competitiveness varies with exposure to gas power plants

Wholesale electricity price outcomes reflect how gas price dynamics are transmitted across power markets. In Europe, gas-fired generation frequently sets the marginal price, particularly during peak demand periods.

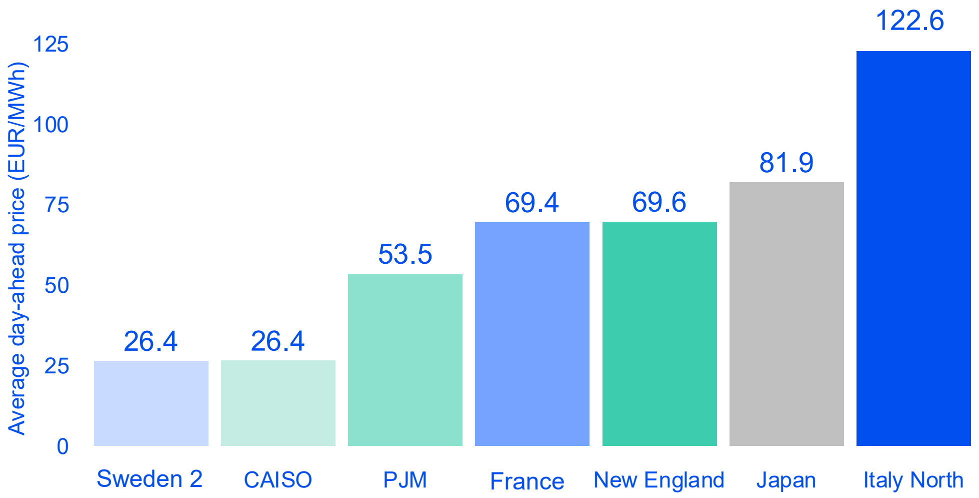
This drives regional competitiveness differences:

- Higher shares of **renewables** and **nuclear decrease** wholesale price levels.
- Greater **gas reliance** leads to **higher** and more **volatile prices**.

Monthly average wholesale day-ahead electricity prices during peak load in Europe, United States and Japan, 2020-2025 (EUR/MWh)



Average wholesale day-ahead electricity prices during peak load for selected areas in Europe, United States and Asia, 2025 (EUR/MWh)



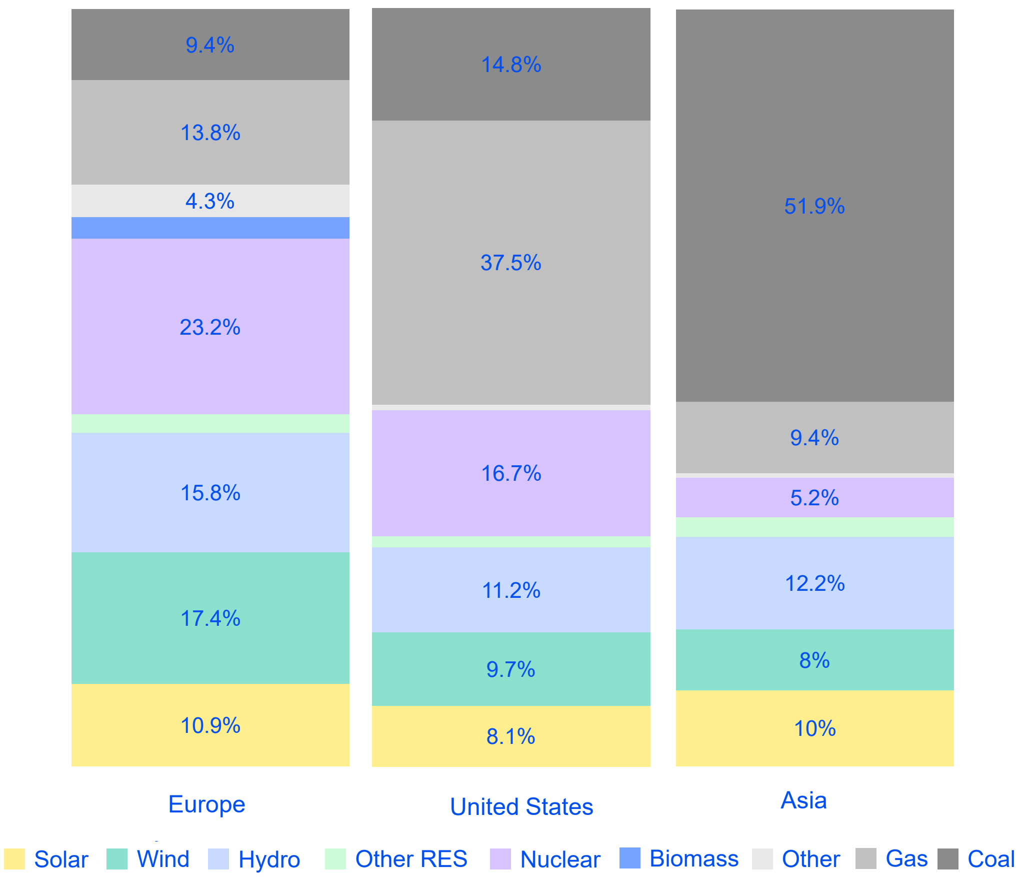
Source: ACER calculations based on ENTSO-E Transparency Platform, EIA and Japan Electric Power Exchange. Note: Average prices are calculated based on peak load using values 8 AM-11 PM on weekdays only, excluding holidays to align with US prices as defined by the ICE Product Guide. Note: Regional price areas refer to CAISO (California Independent System Operator, Western US), PJM (PJM Interconnection, Eastern US), ISO-NE/New England (Independent System Operator New England, Northeastern US). European zones correspond to national bidding zones, Asian data refer to selected national wholesale markets.

Europe leads the global shift toward cleaner electricity

A strong renewable backbone sets Europe apart from the US and Asia

- Differences in wholesale electricity prices across regions are closely linked to the composition of generation mixes and underlying policy objectives. Europe stands out for its high and steadily increasing share of renewable electricity, reflecting a long-term decarbonisation strategy.
- The United States and Asia continue to rely heavily on fossil-based generation, even if China has rapidly expanded renewable capacity, particularly solar. Europe, by contrast, has already built a power system increasingly driven by wind and solar, a structural shift that has been reinforced year after year.
- This widening divergence reflects both policies and physical constraints: in the US, abundant and cheap fossil resources continue to dominate generation, whereas Europe has accelerated the deployment of renewables. Adequate system flexibility and sustained investment are therefore essential to unlock the full potential of renewables and reduce exposure to fossil fuels.

Electricity generation per type in Europe, United States and Asia, 2025 (%)



Source: ACER calculations based on ENTSO-E Transparency Platform for Europe and EMBER for United States and Asia data.
Note: For consistency, all references to “Europe” in the following analysis refer to the EU-27/EEA (Norway), unless otherwise indicated.

Global trade and geopolitics shape the EU energy landscape

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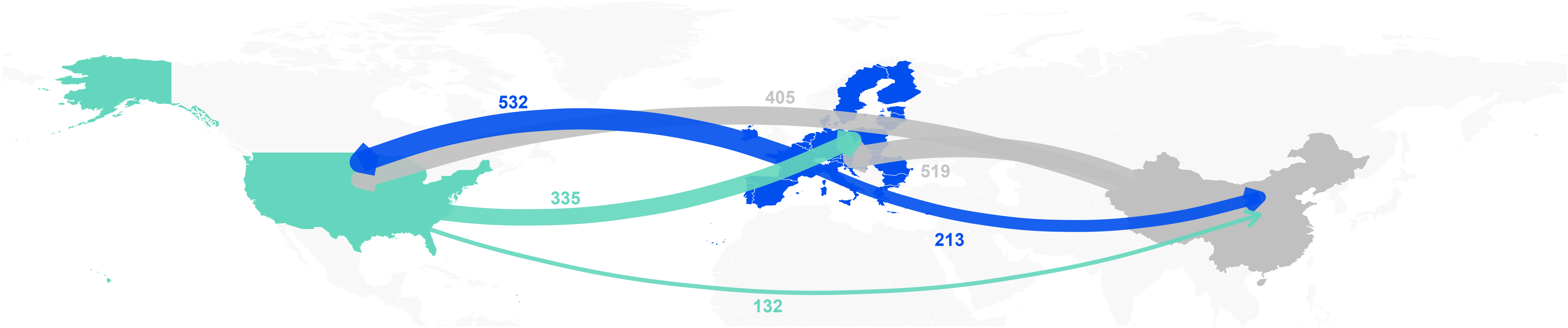
Global economies are deeply interconnected through trade, with energy-related flows at the core*

Total goods trade exchanges among the US, China and EU (billion EUR), 2024



Europe remains structurally dependent on external energy partners. While the shift away from Russian gas changed the profile of this dependency, it did not eliminate the underlying reliance:

- The **United States** is now a critical supplier for energy, providing over 50% of EU LNG and 27% of total gas (worth ~EUR 15 billion in 2024 and increasing in 2025 to an estimate of ~€23billion)[1]. Rising US gas exports and long-term contracts consolidate this relationship; however, in the current geopolitical context, this exposes the EU to price volatility and tariff risks, potentially driving up costs for European industry and consumers.
- **China** dominates the supply chains for green technologies like batteries, EVs, and solar. For instance, China supplied 98% of the EUR 11 billion worth of solar panels imported in 2024, double the value of green energy related products[2] exported by the EU to the rest of the world. This deep integration supports renewable deployment but creates significant strategic risks regarding trade imbalances and access to both finished goods and critical raw materials.

Source: Figure created based on EU-US trade: facts and figures, EU-China trade: facts and figures and Census.gov - Trade in Goods with China. Sources for energy related imports and exports: EU imports of energy products - latest developments, International trade in products related to green energy and Eurostat data (ds-045409). Note 1: 2024 values according to Eurostat data while 2025 values are an estimate based on ACER calculations. Note 2: Green energy related products considered are wind turbines, solar panels and biofuels.
*Geopolitical shocks in Q1 2026 are expected to impact global trading and energy flows.

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Europe

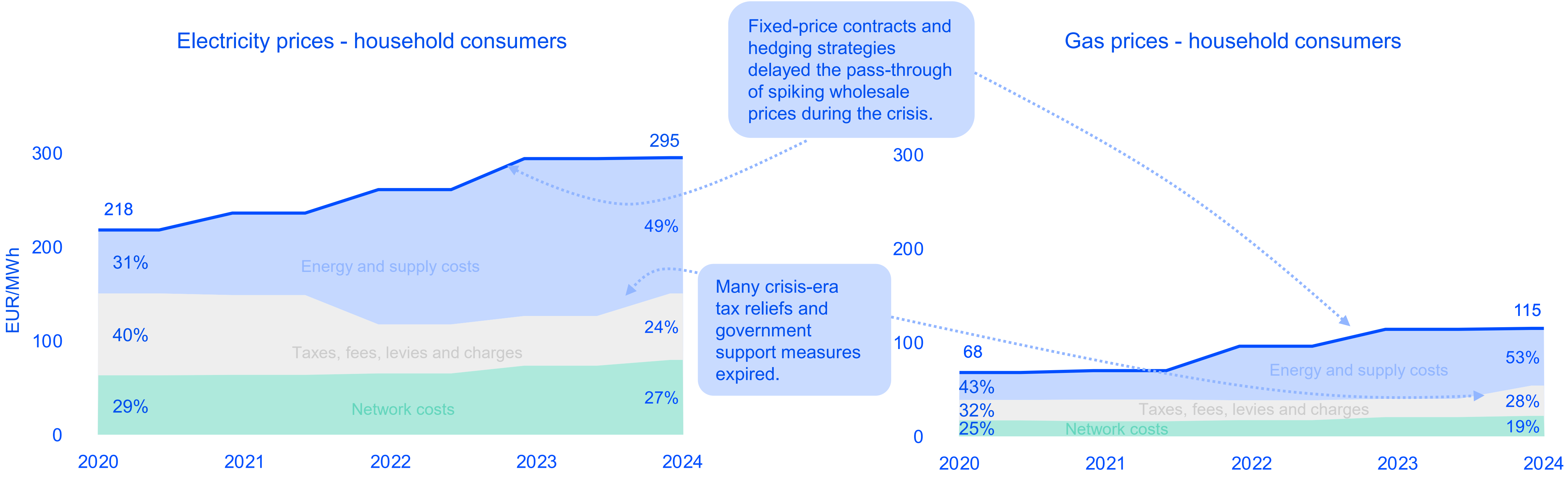
- From retail to wholesale market: Solar investments reshaping price dynamics
- Increasing peak-to-valley price spreads highlight the urgent need for flexibility to unlock the full benefits of renewables
- How gas-fired power plants influence electricity prices

Household end-user prices stay high…

Household prices remain elevated despite falling wholesale prices

Household gas and electricity prices have stabilised at elevated post-crisis levels. Fixed-price contracts and hedging strategies have slowed the pass-through of lower wholesale energy costs. In addition, several crisis-era tax reliefs and government support measures have expired. In 2024, energy and supply costs account for around half of final household prices, reflecting a change from pre-crisis pricing structures.

Average nominal end-user electricity (left) and gas (right) prices for household consumers and their price components in EU-27, 2020-2024, in EUR/MWh

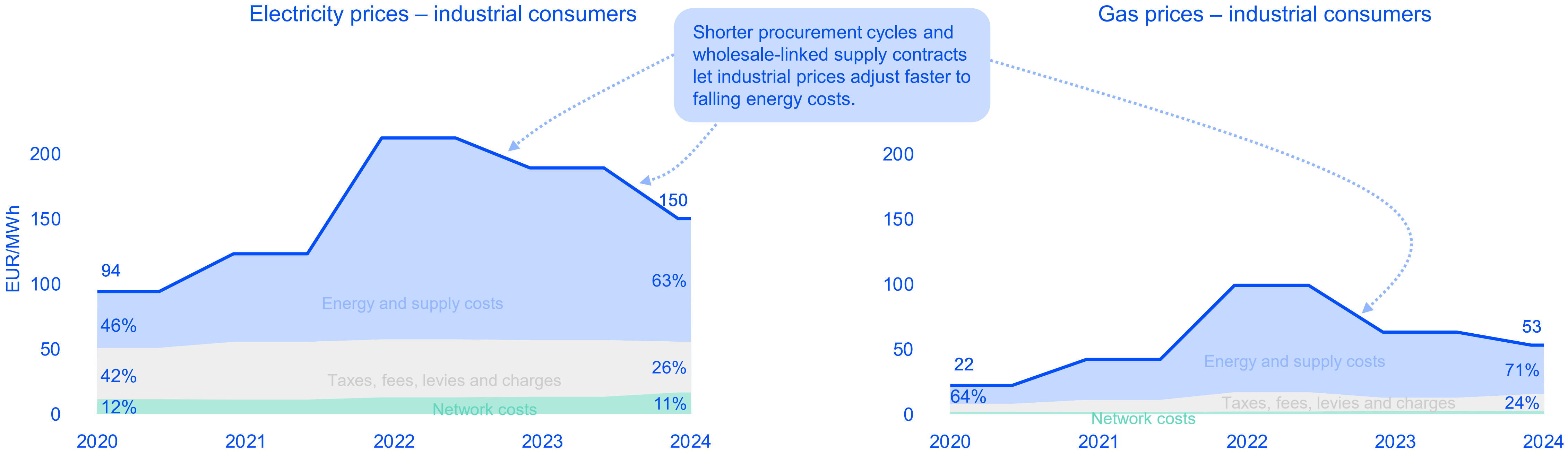


… while industry prices have eased after the energy crisis

Industry end-user prices have eased after the 2022 spike but remain above pre-crisis levels

By contrast, industrial energy prices responded more quickly to wholesale market developments. After peaking in 2022, gas and electricity prices for industry have eased significantly, driven by lower wholesale prices. Nevertheless, prices remain above pre-crisis levels, continuing to weigh on production costs and EU's global price competitiveness.

Average nominal end-user electricity (left) and gas (right) prices for industrial consumers and their price components in EU-27, 2020–2024, in EUR/MWh



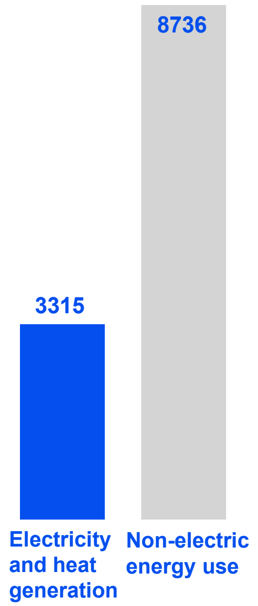
Source: ACER calculations based on Eurostat data (nrg_pc_204_c, nrg_pc_205_c, nrg_pc_202_c, nrg_pc_203_c)
Note 1: Eurostat's 70,000–149,999 MWh consumption band is used for electricity industrial consumers. For gas, Eurostat's 1,000,000–3,999,999 GJ consumption band is applied, representing large industrial consumers. Note 2: See ACER report on EU electricity infrastructure (2024) for more information on network costs and the need for efficient investment and tariff design.

Renewable growth and fossil fuel reliance in Europe

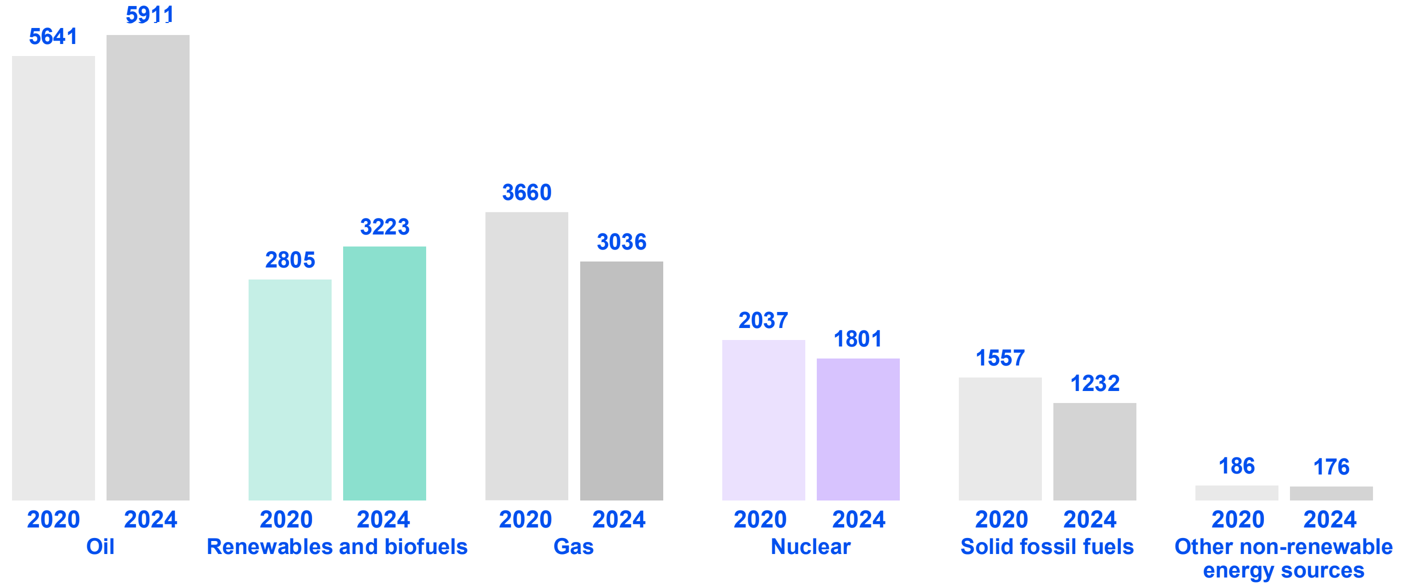
Electrification supports EU energy policies for competitiveness, security and decarbonisation; still much non-fossil in the end energy use

Final energy consumption reflects Europe's progress toward energy security, efficiency and sustainability.

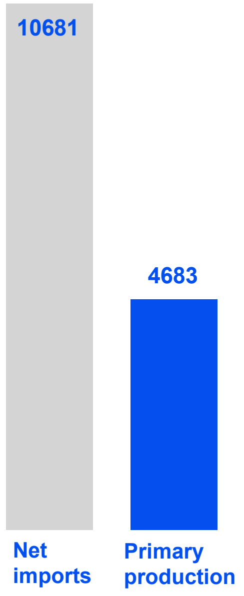
Electrification of final energy use, EU-27, 2024 (TWh)



Primary energy supply by source, EU-27, 2024 (TWh)



Energy supply balance, EU-27, 2024 (TWh)



Additional efforts are needed to meet the 2030 target to cut EU greenhouse gas emissions by at least 55% compared to 1990, and to become climate neutral by 2050. Europe remains significantly reliant on imported fossil fuels (oil and gas).

Source: ACER calculations based on Eurostat data (nrg_bal_c).

The rise of solar and wholesale electricity price volatility

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Structural trend: solar surpasses coal

- In 2025, renewable deployment across Europe strengthened as a structural trend and marked further progress in Europe's decarbonisation pathway.
- Solar generation posted new records in 2025, reinforcing its position as the fastest-growing electricity source across Europe and a central pillar of the energy transition. It surpassed coal generation. Solar's expansion reshaped residual demand patterns and reduced fossil baseload requirements during daylight hours.
- Despite continued growth in renewables, wind and hydro generation declined in 2025 due to unfavourable weather conditions. These meteorological and seasonal fluctuations underscore both the inherent exposure of renewables to climate conditions and the increasing importance of flexibility resources to facilitate their integration.

Duck curve deepens: negative prices and widening price spreads during the day

- Rising solar penetration intensified the "duck curve": more low and negative-price hours during midday and sharper evening price peaks. The higher incidence of high-price hours reflects increased sensitivity to the evening decline in solar output and constraints in available system flexibility.
- Following the early-2024 price decline, day-ahead prices in 2025 remained broadly consistent with the levels seen in 2023. Average prices stabilised, but volatility increased: daily peak-valley spreads rose above 2023 levels, reflecting a system increasingly driven by variable resources and by insufficient flexibility during tight hours.
- Stronger peak-valley spread and more pronounced evening ramping signals reinforced investment incentives for short term flexibility.

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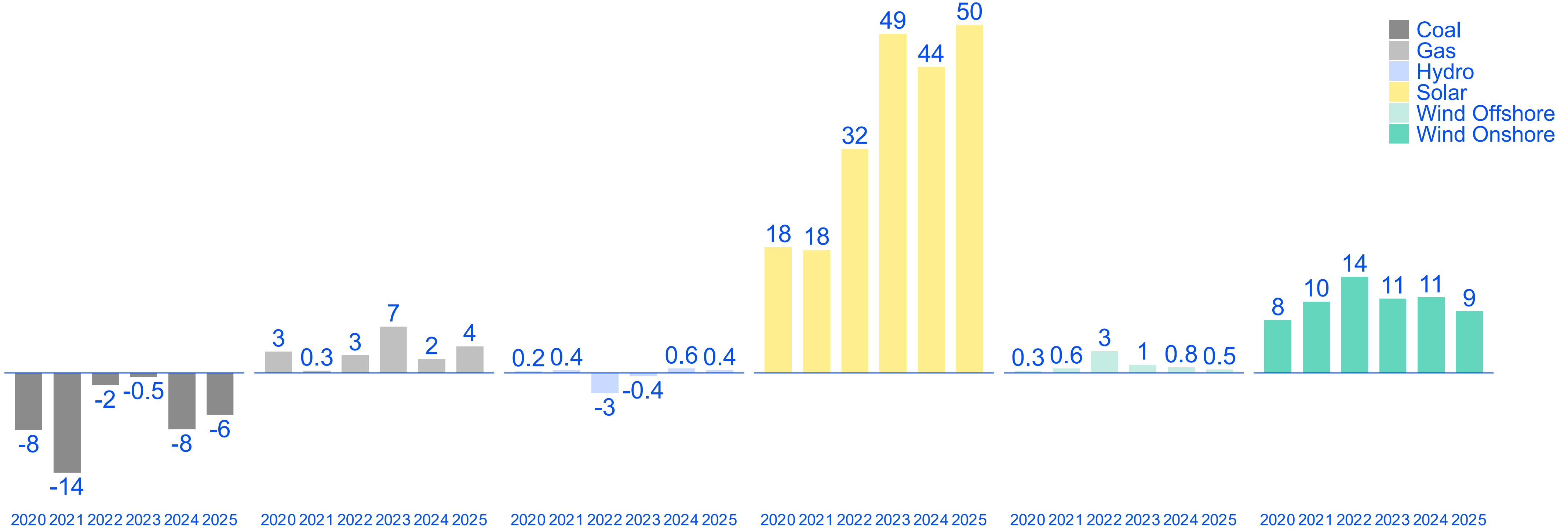
Solar dominates Europe's power deployment

Investments accelerate in solar while wind expansion shows signs of slowing

Installed capacity trends confirm Europe's structural shift toward renewables:

- **Solar** is the EU's largest source of installed capacity, with sustained investment accelerating the transformation of the power mix.
- **Wind capacity growth** is flattening, despite its central role in the energy transition.
- **Offshore wind** deployment remains limited, reflecting weaker investment momentum.

Year on year change of installed capacity per type in the EU-27/ EEA(Norway), 2020-2025 (GW)



Source: ACER calculations based on ENTSO-E Transparency Platform.

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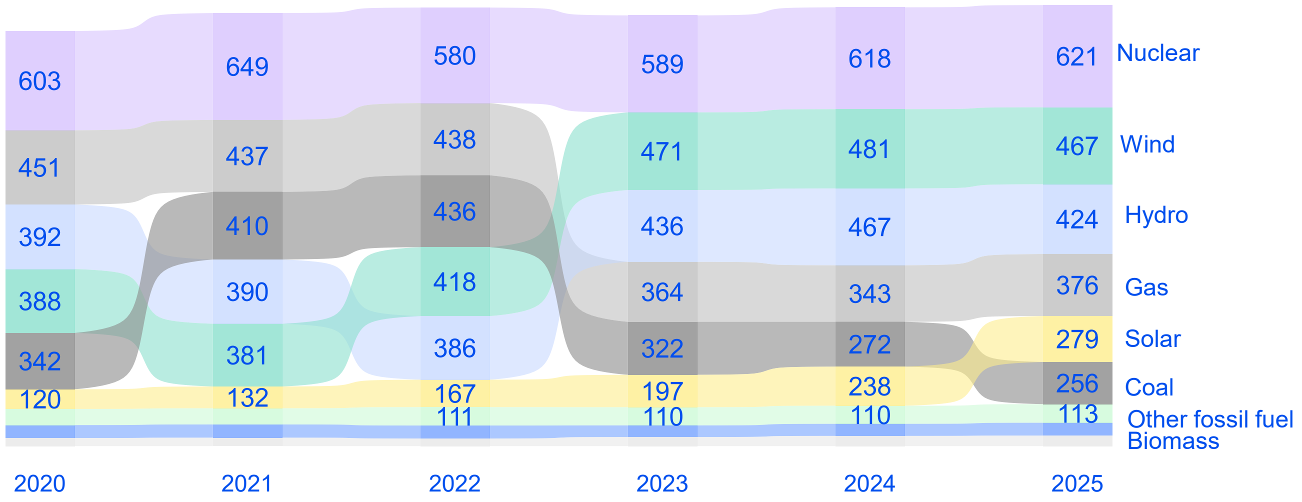
Renewables advance along the decarbonisation path

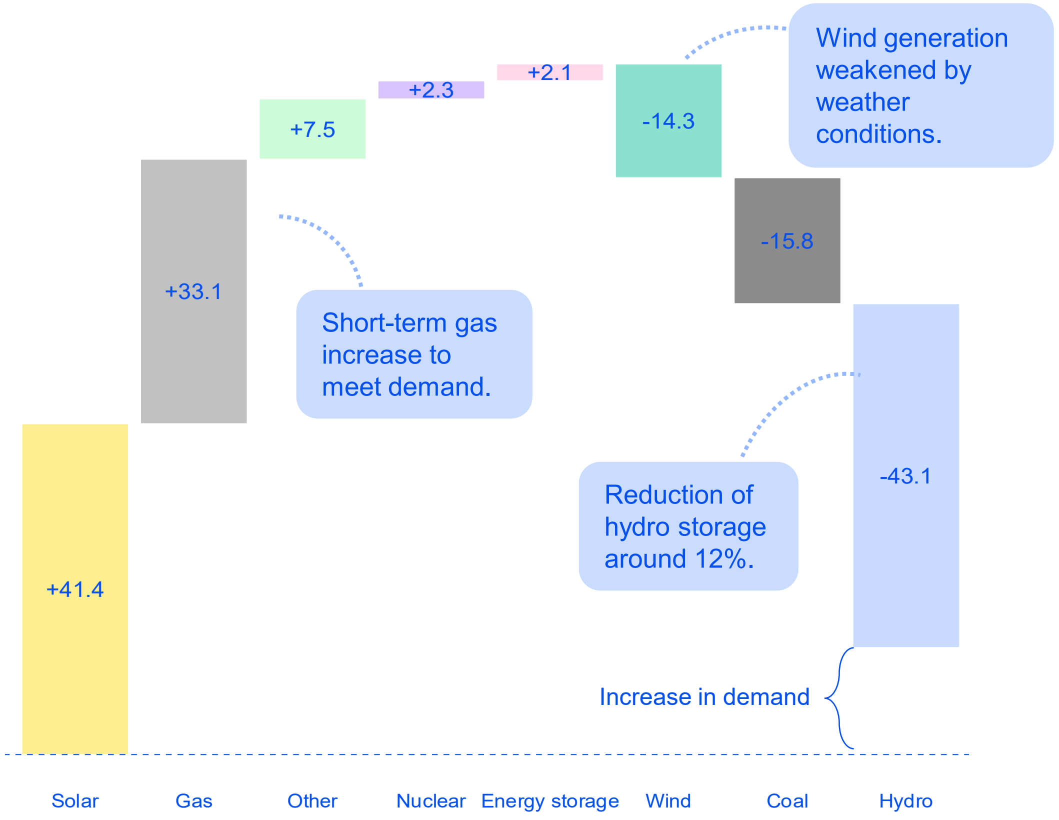
Solar kept growing, although output remains sensitive to weather conditions

- Solar generation continued to increase across Europe in 2025, translating sustained investment in new capacity into higher electricity output and reinforcing a structural shift in the power mix. This growth confirms the central role of solar in driving the expansion of renewable generation.
- Despite ongoing expansion, wind and hydro production declined in 2025 due to weather-driven resource variability. These temporary fluctuations did not change the broader direction: renewables are steadily gaining ground in Europe's power system.

Evolution of generation per type in the EU-27/ EEA(Norway), 2020-2025 (TWh)



Year-on-year changes for the main generation technologies, EU-27/EEA(Norway), 2025 compared with 2024 (TWh)



Source: ACER calculations based on ENTSO-E Transparency Platform.
Note: The annual variation represents the total change in generation from the main technologies. It was computed as the overall difference between 2024 and 2025. Note: More data is available on the ACER website in the form of dashboards. The dashboard focuses on renewable generation and key system indicators, providing insights into day-ahead prices, generation, load, temperature, and wind conditions.

Weather variability can shape electricity market outcomes

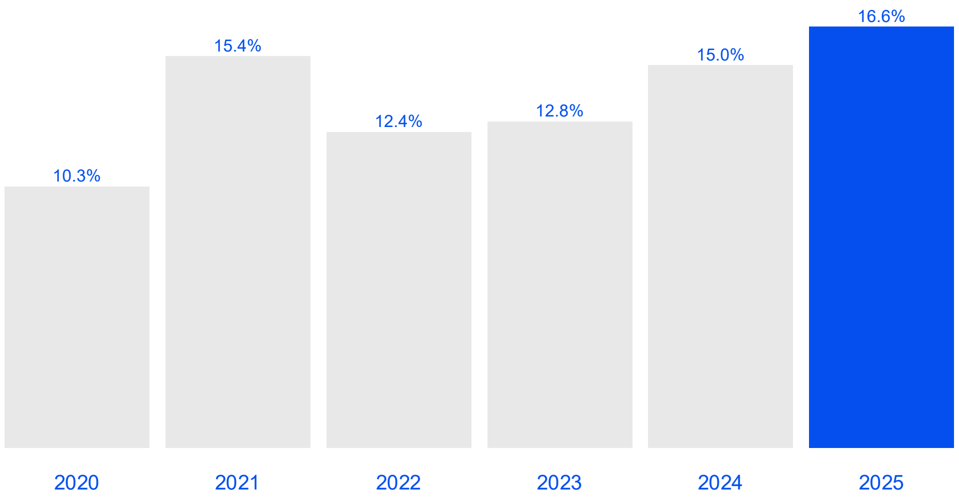
Supply-side impacts: renewable availability

- 2025 saw an increase in periods of prolonged low wind output, such as Dunkelflaute-type events. These episodes were associated with tighter system conditions, particularly during winter months.
- During such periods of reduced renewable availability (and high demand), power prices typically increase sharply.

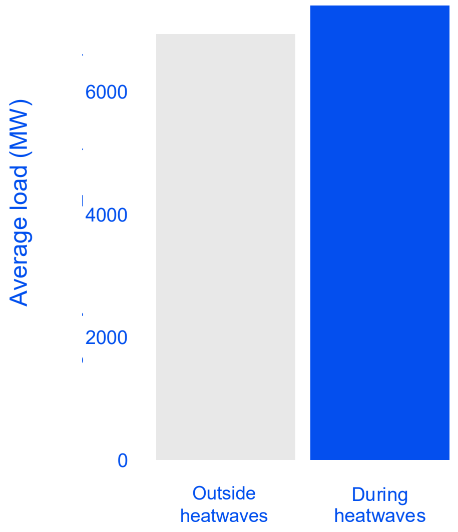
Demand-side impacts: extreme temperatures and price responses

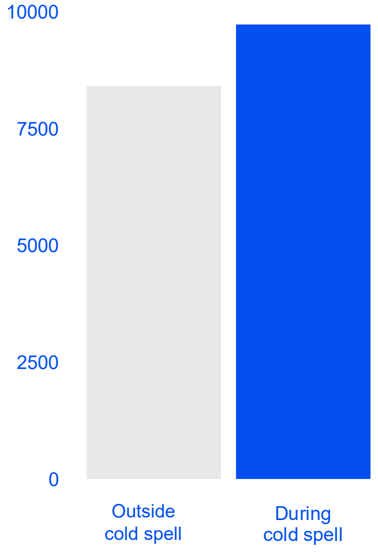
- Episodes of extreme temperatures affected electricity demand patterns. Cold spells increase heating demand and heatwaves drive up electricity consumption for cooling.
- Temperature-driven demand contributes increasingly to price variability. It shows the interaction between weather conditions and system tightness (driven by more extreme fundamentals) with an impact on wholesale electricity prices.

Percentage of time of wind capacity factor below 10 percent during the winter season, EU-27/EEA (Norway), 2020-2025



Average load during and outside the heatwaves and cold spells (MW), EU-27/EEA (Norway), 2025 winter and summer season





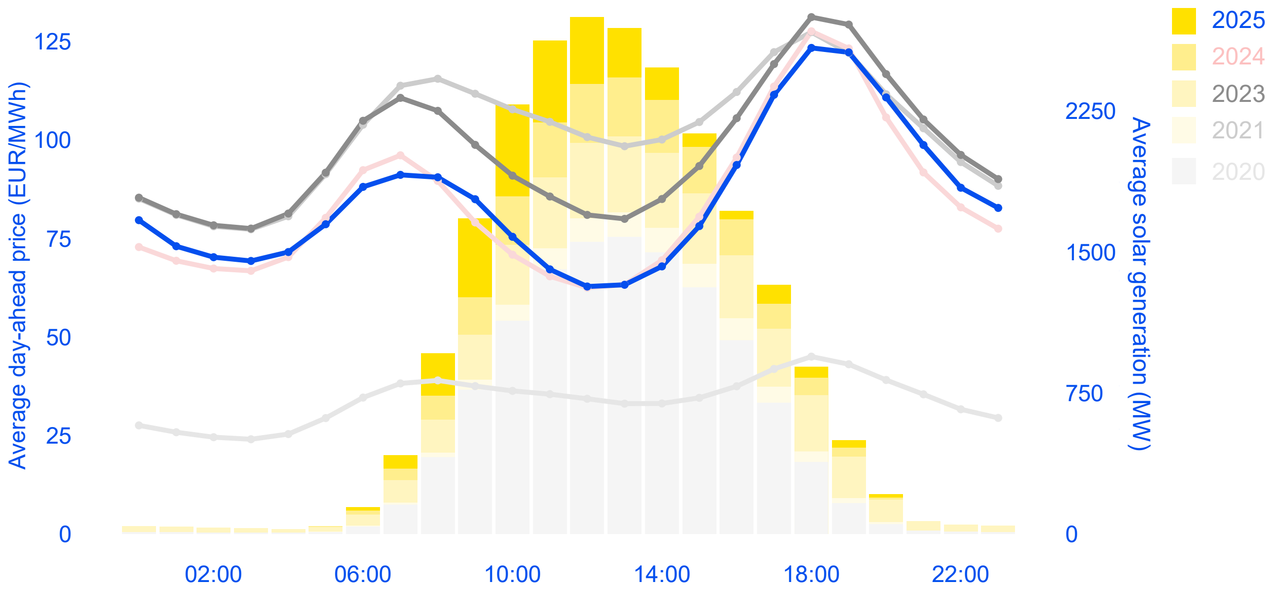
Source: ACER calculations based on Copernicus, ERA5 data and ENTSO-E transparency platform. Note 1: Capacity factor is the ratio between actual electricity generation and installed capacity of a given technology over a consistent period. Note 2: For this analysis, winter covers October-February, summer covers June-August. Note 3: Heatwaves and cold spells are identified using the temperature distribution of each bidding zone. The 95th and 5th percentiles of temperature are used to capture extreme conditions reflecting local climatic characteristics. A day is classified as a heatwave or a cold spell if at least one temperature observation exceeds the relevant percentile threshold.

Solar reshapes daily wholesale price dynamics

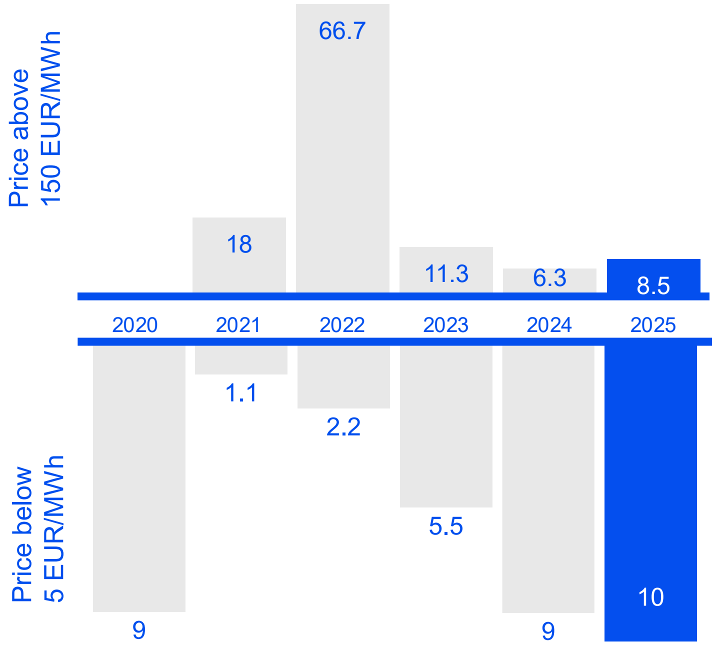
Solar is transforming Europe's price patterns, bringing cheaper midday power and sharper price contrasts

The continued rise of solar generation is deepening the "duck curve", widening the gap between low midday and higher prices during morning and evening hours. The price evolutions underline the growing importance of demand response and storage in accommodating rising shares of renewables, leading to more pronounced price differentials within the same day. In 2025, the number of high-price hours increased, reflecting the growing sensitivity of price formation to declining solar output and the limited availability of flexible resources to meet residual demand or influence its behaviours.

Average hourly day-ahead price and solar generation, EU-27/EEA, 2020*-2025, (EUR/MWh & MW)



% of hours where wholesale prices are above 150 and below 5 EUR/MWh, EU-27/EEA(Norway), 2020-2025



Source: ACER calculations based on ENTSO-E Transparency Platform.
* 2022 is excluded due to extreme price levels, which would distort the scale and prevent a clear visual comparison of price dynamics and current market levels.

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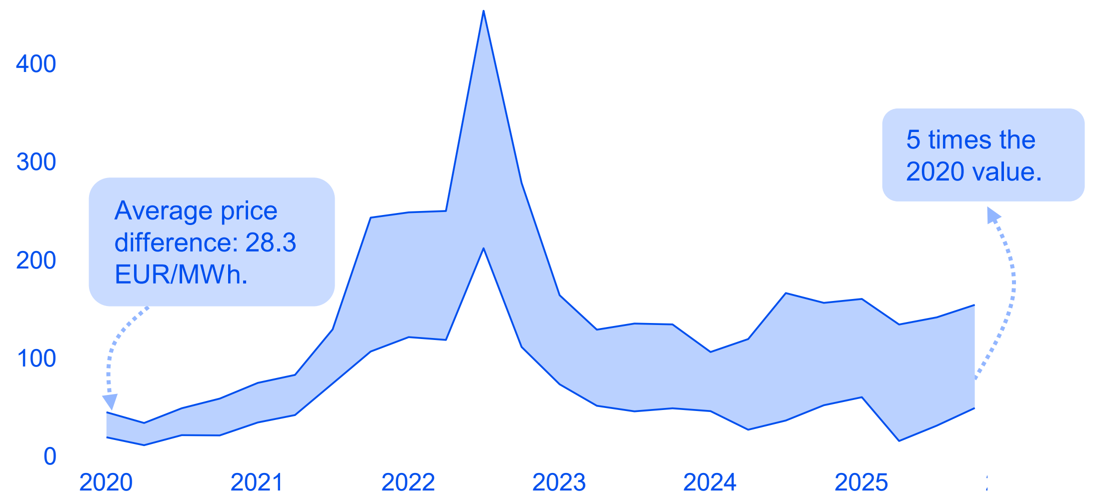
Wholesale electricity prices reveal a persistent volatility

Flexibility constraints drive price variability

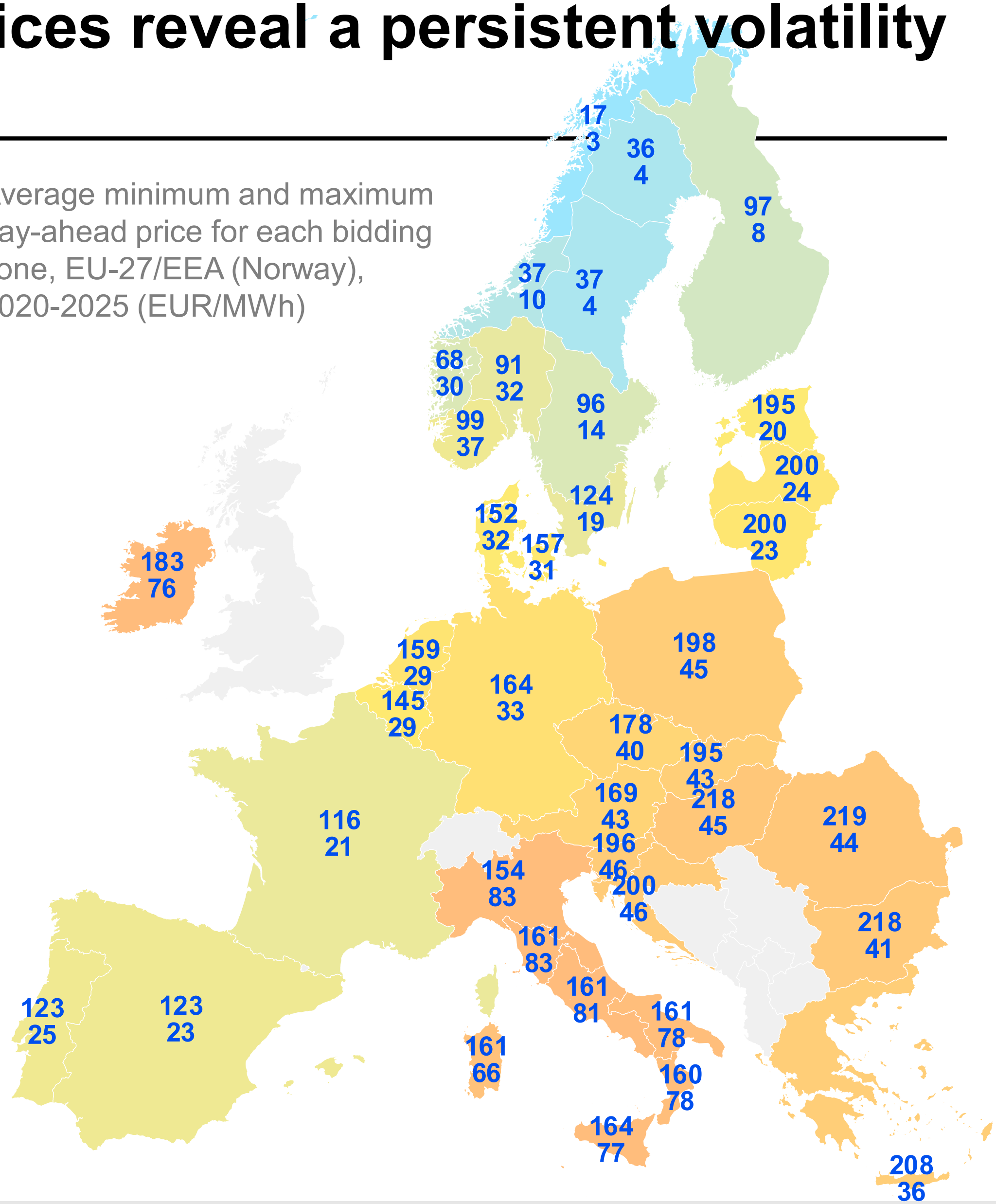
In 2025, electricity markets operated under high renewable output and increasing weather dependence, broadly aligning with 2023 conditions. While average day-ahead prices converged toward post-crisis levels, price dynamics during the day became more pronounced.

- The spread between daily minimum and maximum day-ahead prices increased.
- Limited system flexibility continues to translate into elevated price variability.

Average of daily minimum and maximum day-ahead prices across bidding zones, EU-27/EEA (Norway), 2020-2025 (EUR/MWh)



Average minimum and maximum day-ahead price for each bidding zone, EU-27/EEA (Norway), 2020-2025 (EUR/MWh)



Source: ACER calculations based on ENTSO-E Transparency Platform.
Note: The percentage of hours was computed by counting, for each year, how many hourly observations fell within the specified price range across all bidding zones. This count was then divided by the total number of hours in that year.

The evolving role of gas: From baseload to peak-price setter

A narrowing role, but still decisive at the margin

- Renewables continue to reshape power price formation across Europe, compressing mid-day prices and reducing average fossil dispatch. Yet gas remains a crucial anchor for the system, particularly during evening peaks and periods of subdued renewable output.
- As solar scales further, demand for gas-fired generation shrinks across daylight hours, progressively limiting the time window in which gas contributes to the price setting. The European power system is transitioning from gas-driven pricing throughout the day toward a model dominated by renewables with gas acting as flexible back-up.

Correlation remains persistent; structural flexibility still constrained

- The correlation between gas and electricity prices shows a moderate positive linear relationship, although on a downward trend. This reflects a system in transition: while renewables increasingly shape daily pricing patterns, system tightness during low-renewables hours still links power prices to gas fundamentals. This is especially true in markets where storage, demand response and interconnections are limited.

Gas-marginality hours are still system-critical

- In 2025 in comparison to 2024, the share of “gas-in-the-money” hours has increased, signalling that gas continues to play a central role in setting power prices during tight hours. Gas remains needed when renewable output weakens and non-fossil flexible resources are insufficient to cover the gap.
- Recent market developments help explain the renewed increase in gas as a price-setter. It can be linked to periods of lower renewable availability and slightly lower gas prices year-on-year.

Source: ACER report on EU security of supply, 2025.
Note: Gas-in-the-money refers to periods when gas-fired generation is economically profitable, i.e. when electricity prices are high enough to cover variable generation costs. For example, if gas is in-the-money 41% of the time, this means that in 41% of hours electricity prices were equal to or above the cost of producing electricity from gas-fired power plants, making gas generation economically viable in those hours.

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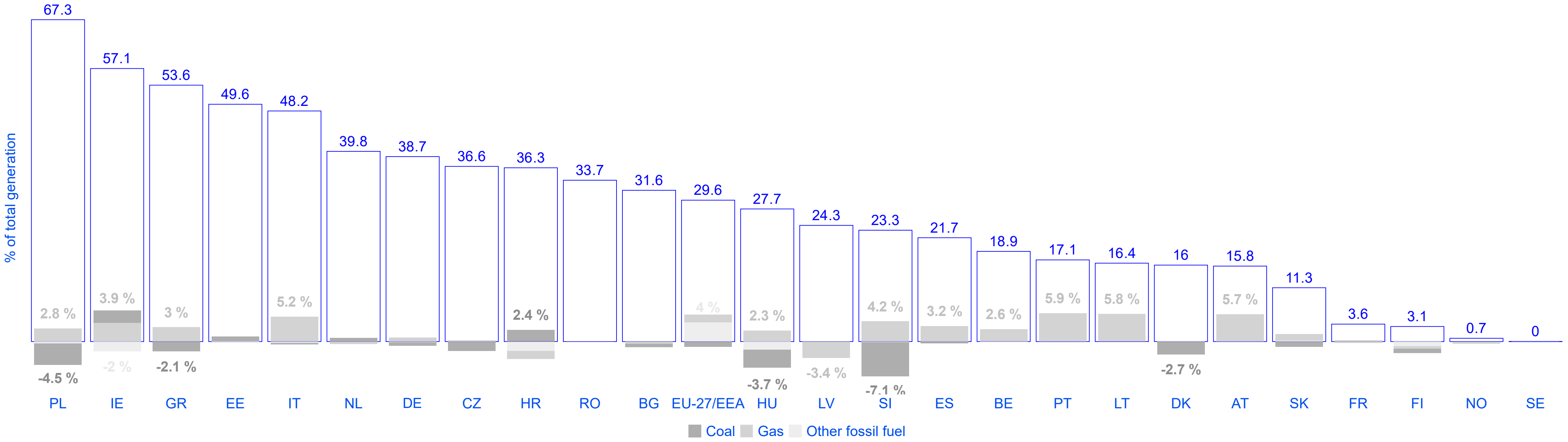
Gas stays a key price-setter, with gradually shifting role

The sun takes over: gas sets the price after sunset

- Renewables are reshaping wholesale price dynamics, and gas still plays a central role in many markets, especially when the system tightens in the evening. As solar expands and variability increases, the number of hours in which gas becomes the price-setting technology has risen again, especially during evening ramps and periods of low wind.
- Europe is moving from a system where gas drives the price across the day to one where gas increasingly matters only during periods when electricity demand reaches its highest levels.

Share of electricity generated from fossil fuels, EU-27/EEA (Norway), 2025 (%) and variation from 2024



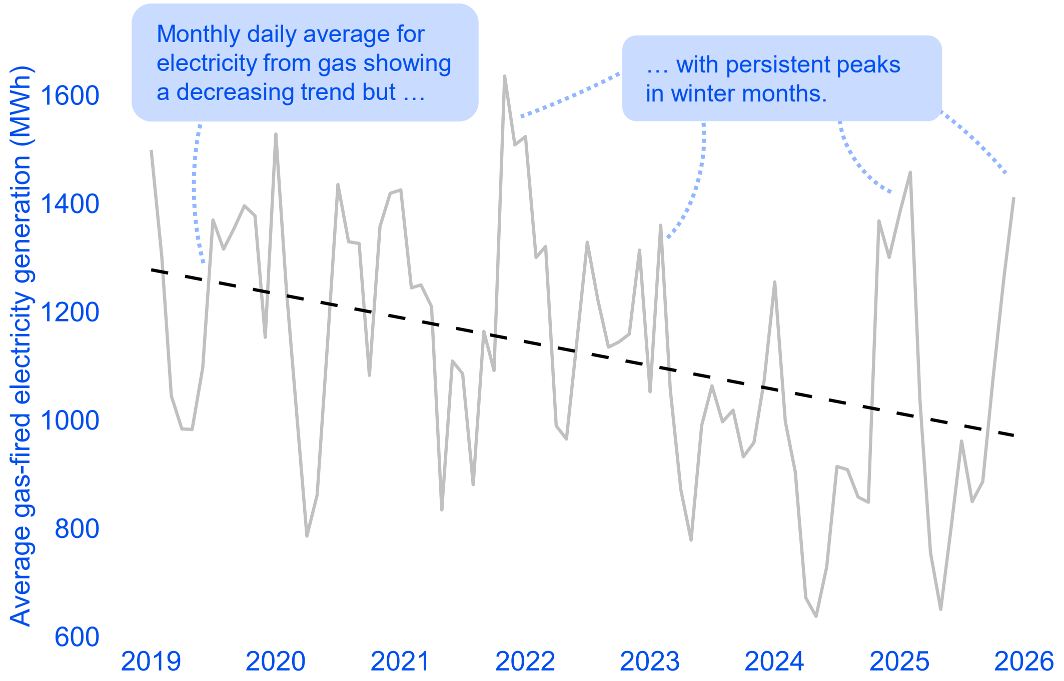
Volatility of gas consumption for power generation increases

As gas shifts to an increasing flexibility provider role, volatility increases with potential impacts on both gas and electricity markets

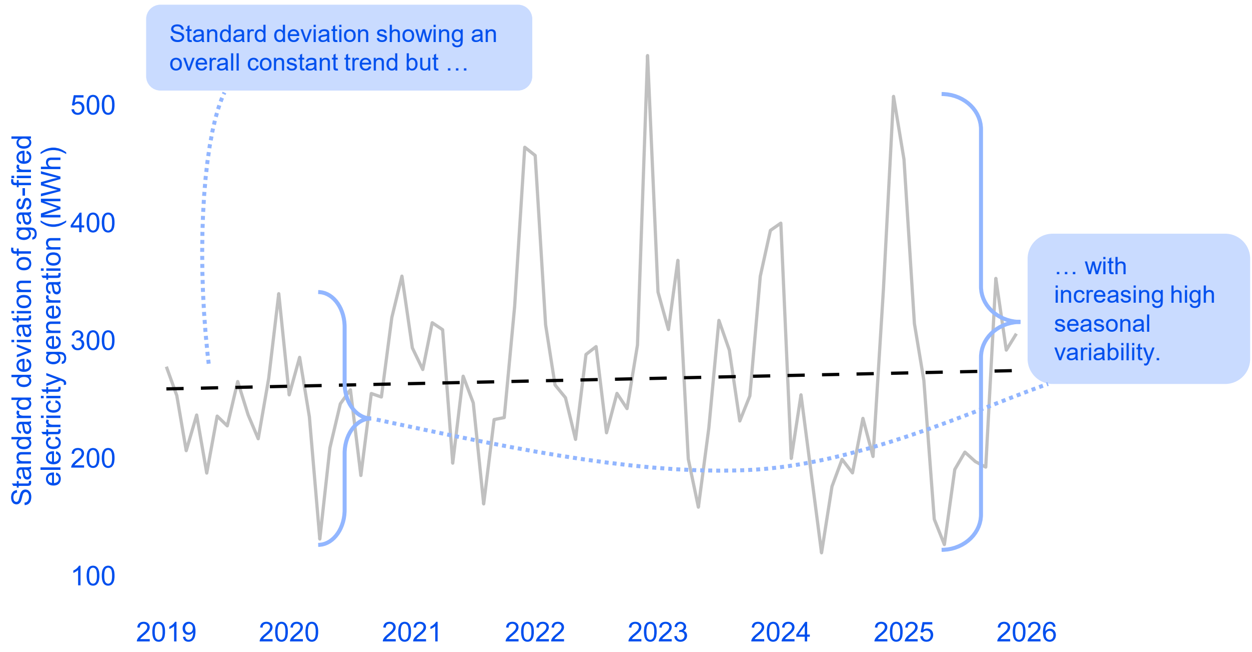
As gas increasingly sets wholesale prices during peak hours, its role shifts from baseload generation to more short-term flexibility.

- Gas demand for electricity becomes more volatile, with lower averages but larger daily variations.
- Gas-fired plants adapts to play a more flexible role.

Average gas-fired electricity generation, EU-27/EEA (Norway), 2019-2025 (MWh)



Standard deviation of daily gas-fired electricity generation for each month, EU-27/EEA (Norway), 2019-2025 (MWh)



Source: ACER calculations based on ENTSO-E transparency platform.

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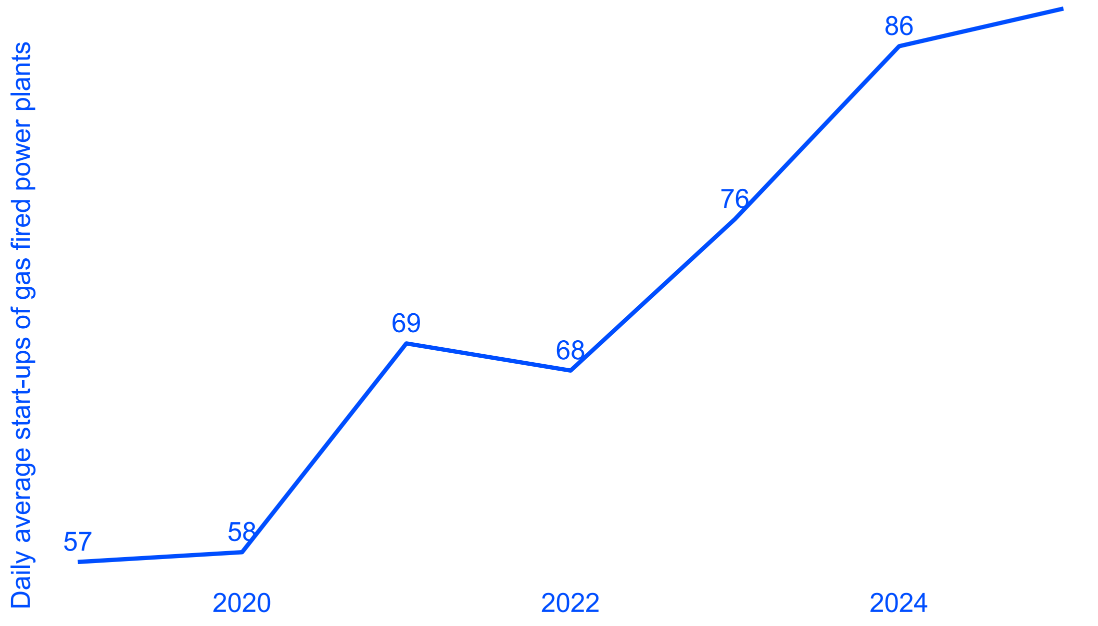
Flexibility creates a new dynamic for gas-fired power plants

Gas power plants generation units' start-ups are increasing while running hours per start have significantly decreased as result of electricity system requiring more flexibility

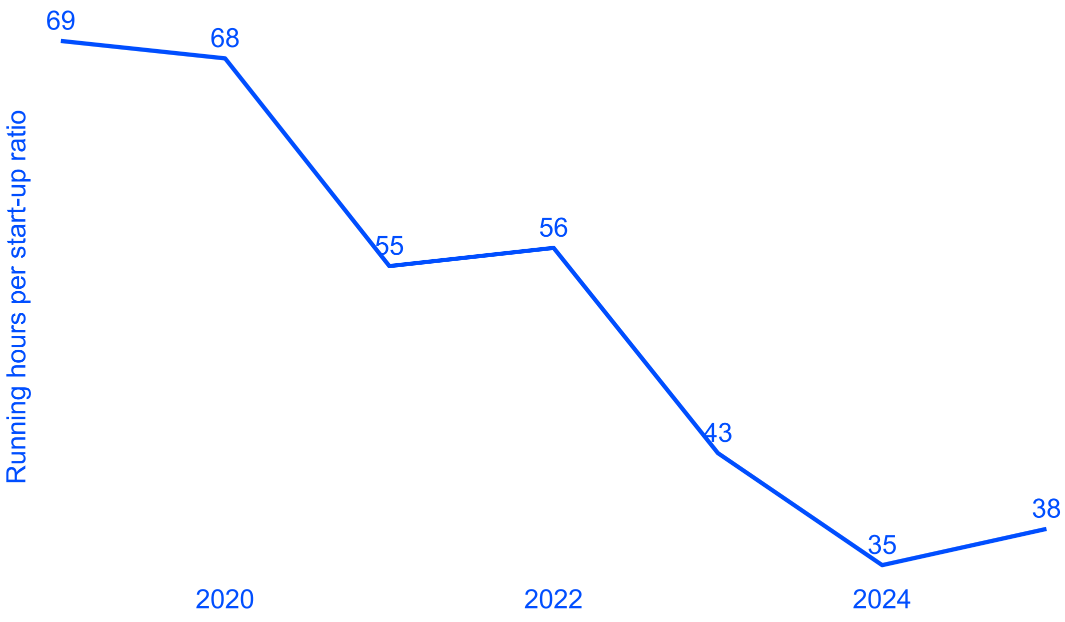
The growing flexibility role of gas-fired plants is reflected in more frequent cycling, with average daily start-ups rising from around 60 in 2019 to nearly 90 in 2025, while running hours per start-up declined significantly. This means:

- Higher cycling intensity with shorter operating periods.
- Increased generation costs due to start-up fixed costs.
- Lower thermal efficiency and potential emissions impacts.
- Implications for wholesale price formation and system efficiency.

Annual daily average of gas-fired power plants generation units' start-ups, EU-27*, 2019-2025



Ratio of number of running hours of gas-fired power plants generation units per start-up, EU-27*, 2019-2025



Source: ACER calculations based on ENTSO-E Transparency Platform performed for MSs where generation unit level data is available for gas-fired power plants. *Analyses excludes BG, CY, EE, HR, IE, MT and SK due to missing data at generation unit level. Note: Due to data structuring and quality, a start-up is modelled when hourly generation is reported as more than 5 MW for a given generation unit where previous hourly generation is lower than 5 MW. It is possible that some misfired and idling behaviours are accounted for in the data. Nevertheless, it is expected that the error remains below 5%. See Annex 1.

High carbon intensity means high electricity prices

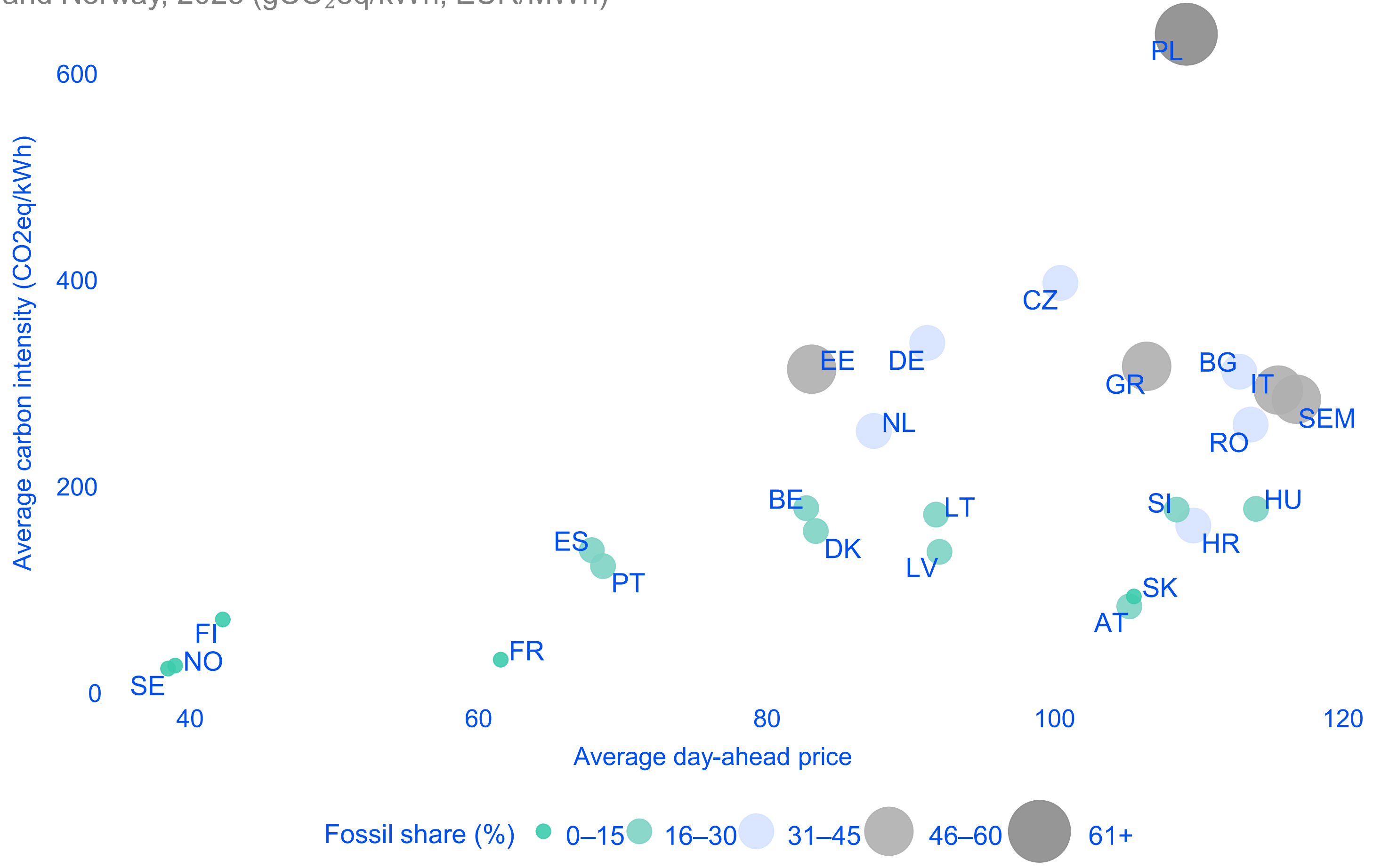
Carbon intensity and wholesale electricity prices remain tightly linked across EU power markets

Differences in price levels across Member States increasingly reflect the share of fossil fuels in their generation mix.

Countries where fossil-based generation still accounts for around half of electricity production tend to exhibit higher average day-ahead prices and higher carbon intensity, indicating more limited progress in decarbonisation. By contrast, Member States with a lower fossil share generally record lower price levels.

The observed pattern underscores the dual role of decarbonisation: reducing emissions while also mitigating exposure to higher wholesale electricity prices linked to fossil fuel dependence.

Average carbon intensity and day-ahead prices with fossil fuel share in the generation mix, EU-27 and Norway, 2025 (gCO_2eq/kWh; EUR/MWh)



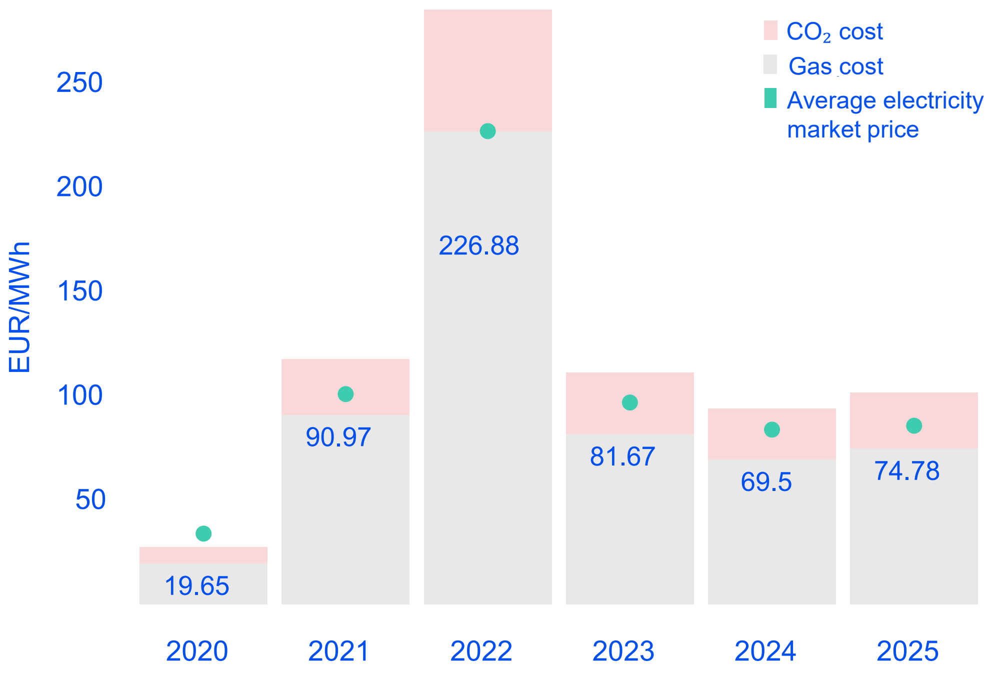
Source: ACER calculations based on ENTSO-E Transparency Platform and EMBER.
Note: Differences between Member States depend on more than only the fossil share. The entire generation mix, especially the availability of flexible resources, plays a role.

Flexibility gap: without alternatives, gas keeps its power

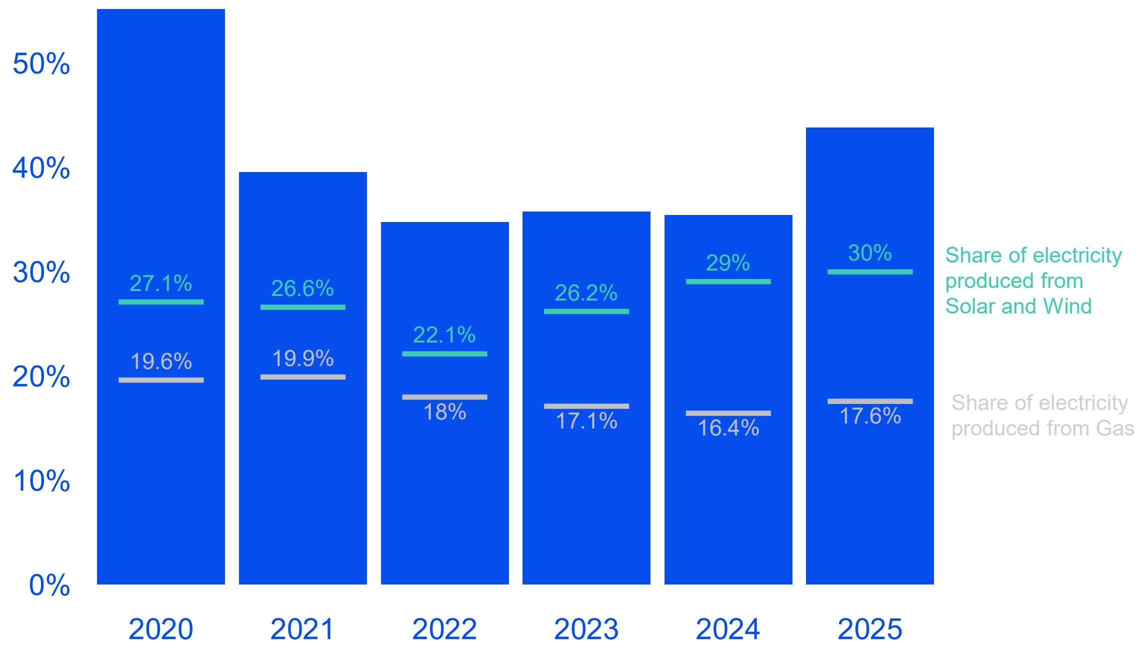
Flexibility gap: without alternatives, gas keeps its power

The share of "gas-in-the-money" hours (when gas-fired generation was profitable) has increased compared to the crisis years and remains around 43% for 2025. These hours largely coincide with periods of low solar and wind availability, when gas-fired plants are called upon to meet residual demand.

Average annual cost of gas for producing electricity and average day-ahead electricity price, EU-27/EEA (Norway), 2020-2025 (EUR/MWh)



Percentage of hours when electricity day-ahead prices were equal or above the baseline costs of producing electricity from gas, EU-27/EEA (Norway), 2020-2025 (%)

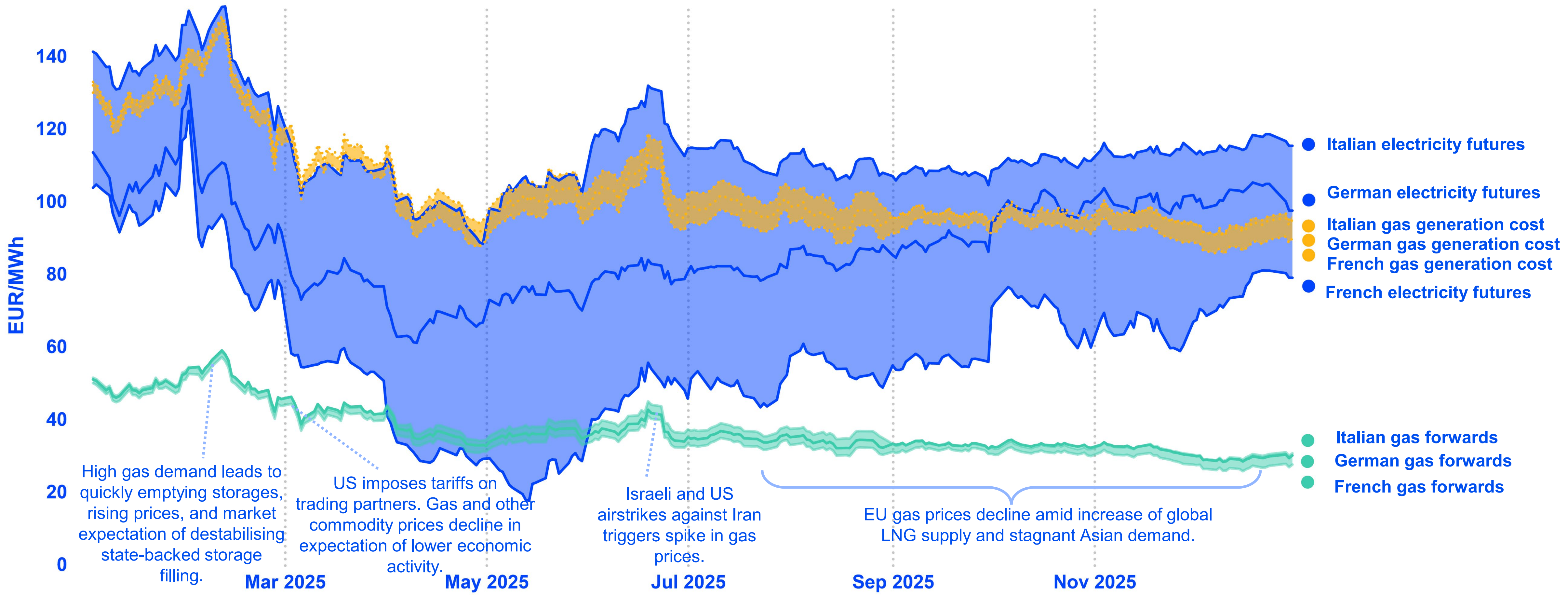


Source: ACER calculations based on ENTSO-E Transparency Platform and ICIS. Note 1: The percentage of hours when electricity day-ahead prices were equal to or higher than the cost of generating electricity from gas was calculated. The calculation considered whether at least one bidding zone recorded a day-ahead price equal to or above the gas-based generation cost. Note 2: Gas prices were taken from the most liquid national markets (AT, BE, CZ, DE, ES, FR, HU, IT, NL, PL) where available. For other EU Member States without sufficiently liquid gas hubs, the TTF price was used as a reference benchmark.

Stabilising gas markets and volatile electricity markets

Electricity and gas prices for forward delivery in the EU reacted to a mix of local and global market signals

Evolution of month-ahead electricity and natural gas prices and implied gas generation costs, France, Germany and Italy, 2025 (EUR/MWh)



Source: ACER based on ICIS, EEX and ICE data.
Note: The cost of gas fired electricity generation is calculated assuming a power-plant efficiency of 50% and associated gas and EU emissions allowance prices as input.

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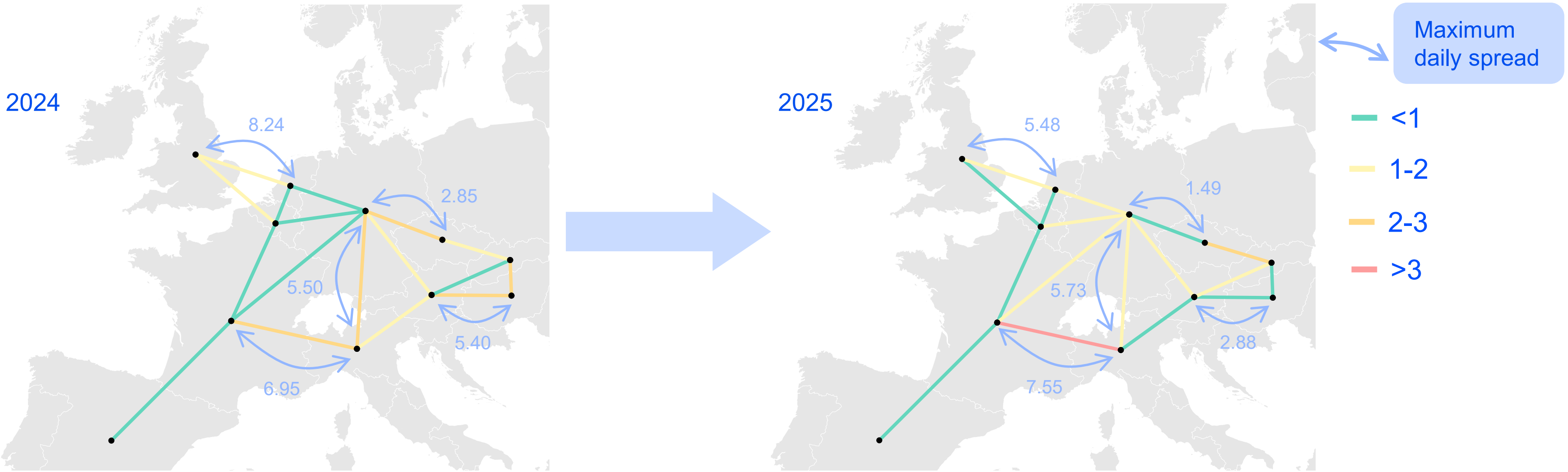
Gas price spreads remain structurally low

In contrast to power markets, gas markets show more uniform and stable prices across major gas hubs. Some changes of direction in the magnitude of the spread are worth noting nonetheless

Gas price spreads across major European hubs generally remained below 2 EUR/MWh, supported by common import price references, increasingly EU-based, and sufficient interconnection capacity. Residual differences reflect national supply structures, competitive conditions and transmission costs.

- Southwestern and Western hubs recorded relatively lower prices, partly due to larger access to LNG.
- Eastern European prices converged toward German ones following the removal of Germany's gas export levy in January 2025.
- The end of Russian gas transit via Ukraine tightened supply in some Eastern markets, increasing reliance on Western hubs and raising transport-related costs.
- Shifting gas flows and transmission costs continue to shape regional price differentials despite broad market alignment.

Annual average of the daily price spread per Member State in major gas hubs, 2024 & 2025 (EUR/MWh)



Source: ACER calculations based on ICIS data.
Note 1: Calculations are performed for major gas hubs with available data and significant liquidity. See ACER key developments in European gas wholesale markets - Q3 2025 and capacity use and booking trends in European natural gas market (2025) for more information on price, demand, flows and booking capacity developments across European gas markets.

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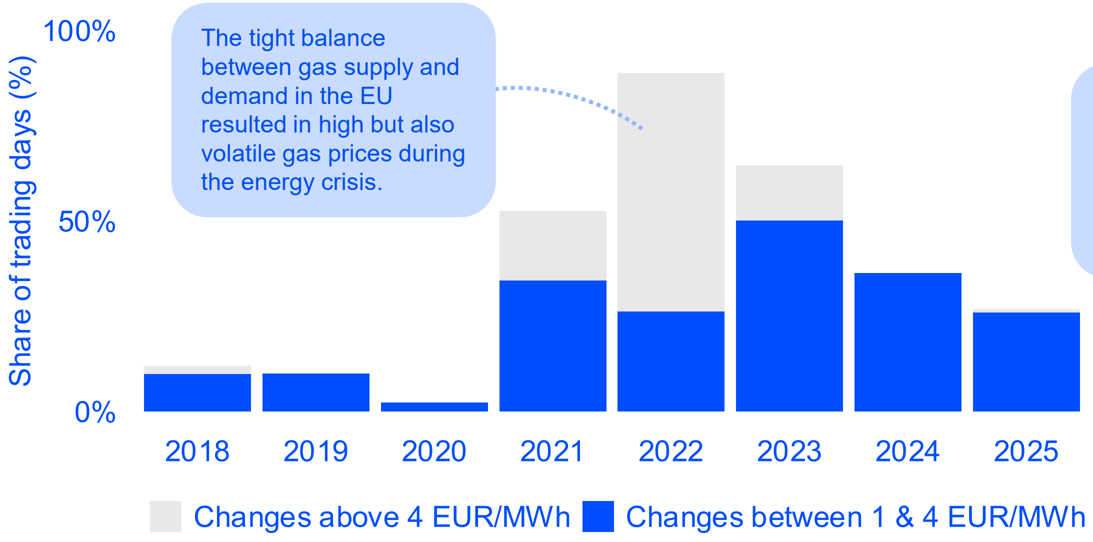
Gas prices stabilised notably in the second half of 2025

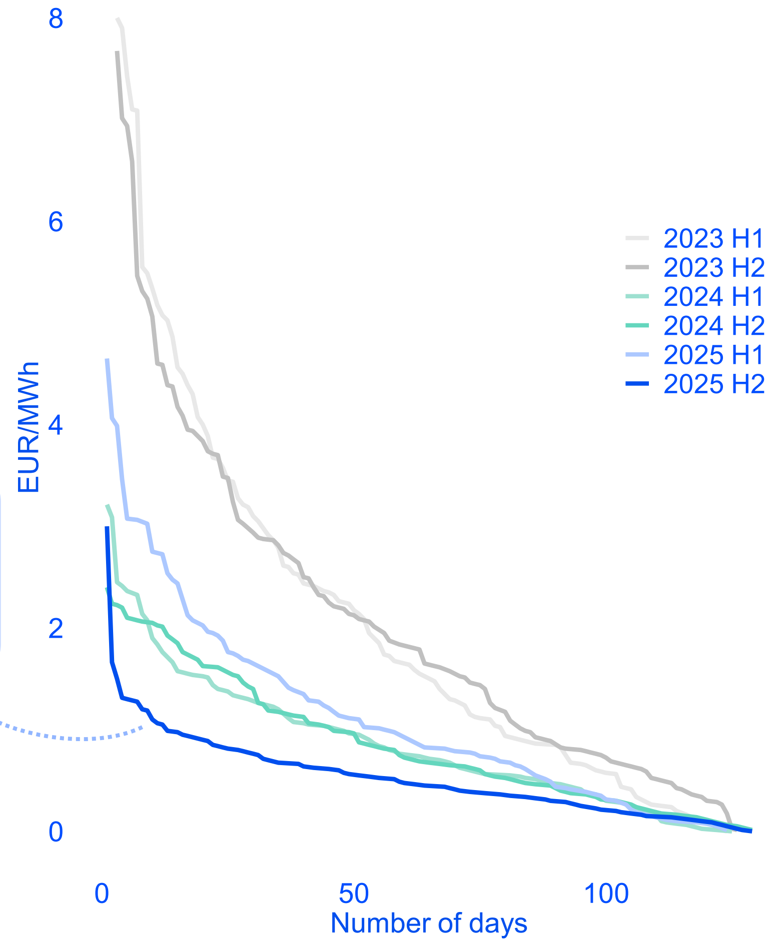
The second half of 2025 showed a break with the trend of volatile gas prices that characterised the energy crisis in the EU

While gas markets remain relatively well integrated across Europe, price convergence has not prevented elevated volatility in recent years. Following the post-2021 shock, European gas prices remained well above pre-crisis levels and were characterised by large and sudden price swings. In the first half of 2025 these trends persisted. In the second half of 2025 price volatility of European gas markets declined to the lowest level since 2020. Yet changes to fundamentals compared to those that existed pre-crisis (e.g. LNG dependence, limited coal-gas switching capacity, etc.) may mean the gas price stability of the latter period could remain elusive[1].

Share of trading days with ‘large’ day-ahead price changes, NL-TTF, 2018-2025 (%)



Day-on-day price change, day-ahead product, NL-TTF, 2023-2025 (EUR/MWh)



Source: ACER calculations based on ICIS data.
Note: Price changes measured as absolute price change day over day.
Note 1: Geopolitical shocks in 2026 Q1 are already challenging the stability seen in the second half of 2025.

Case study
Impact of 15-minute granularity in the day-ahead market

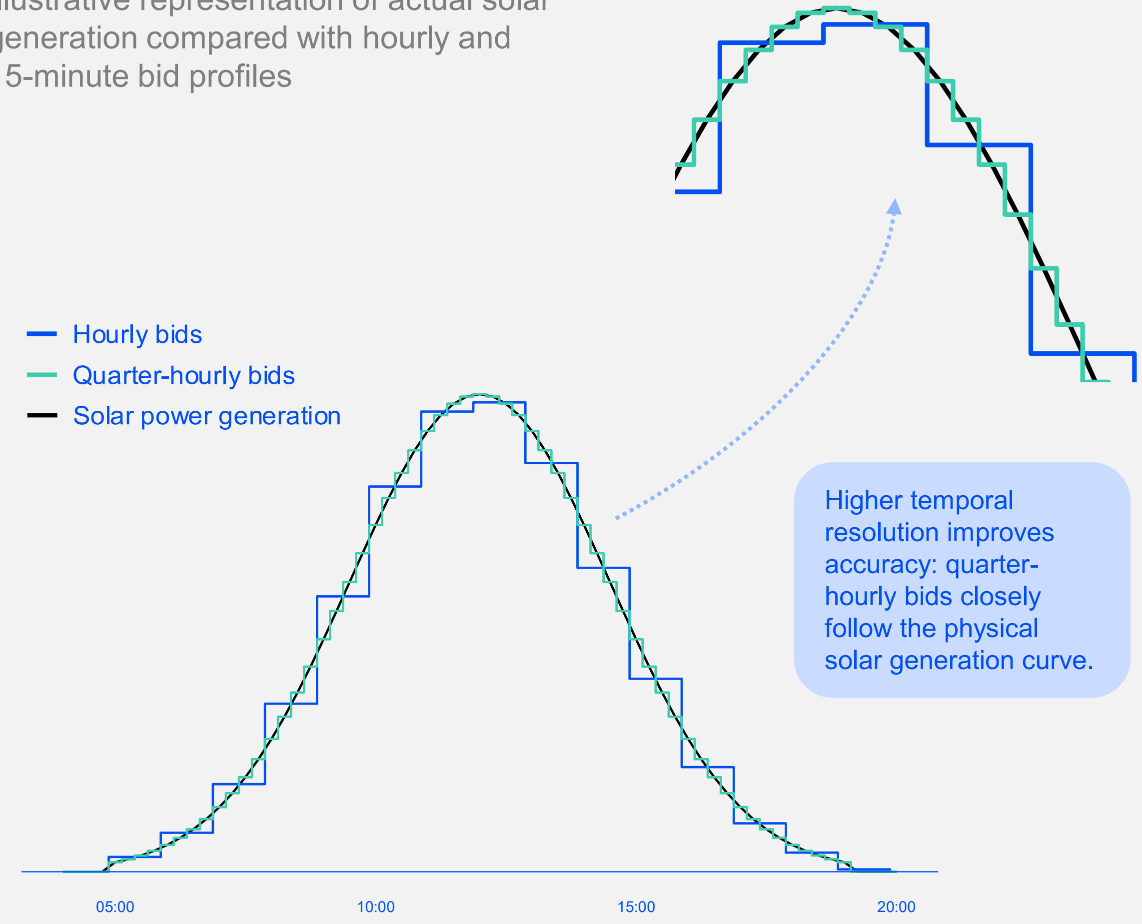
Finer granularity to better reflect renewables and reward flexibility

On 1st October 2025, the European day-ahead electricity market transitioned from hourly to 15-minute trading intervals. Schedules now follow the intra-hour variability of generation and demand much more closely, so short solar ramps and other rapid changes that were previously unable to be covered by hourly blocks are captured in market outcomes. The result is a more granular price signal and a market that naturally values speed and flexibility.

Key benefits:

- **Improved integration of renewables:** aligning with imbalance-settlement; better reflecting the fast fluctuations of variable RES; reducing the “smoothing” effect that used to hide rapid ramps within hourly blocks.
- **Better reflection of renewable variability**: capture rapid changes in wind and solar output that hourly blocks smoothen out, improving market signals for then and where generation is available.
- **Enhanced value for fast flexibility:** batteries and other fast-responding technologies can target 15-minute price spreads and provide intra-hour services, improving the economics of fast-response assets.

Illustrative representation of actual solar generation compared with hourly and 15-minute bid profiles



Note: Further analysis will be provided in the upcoming market integration report.

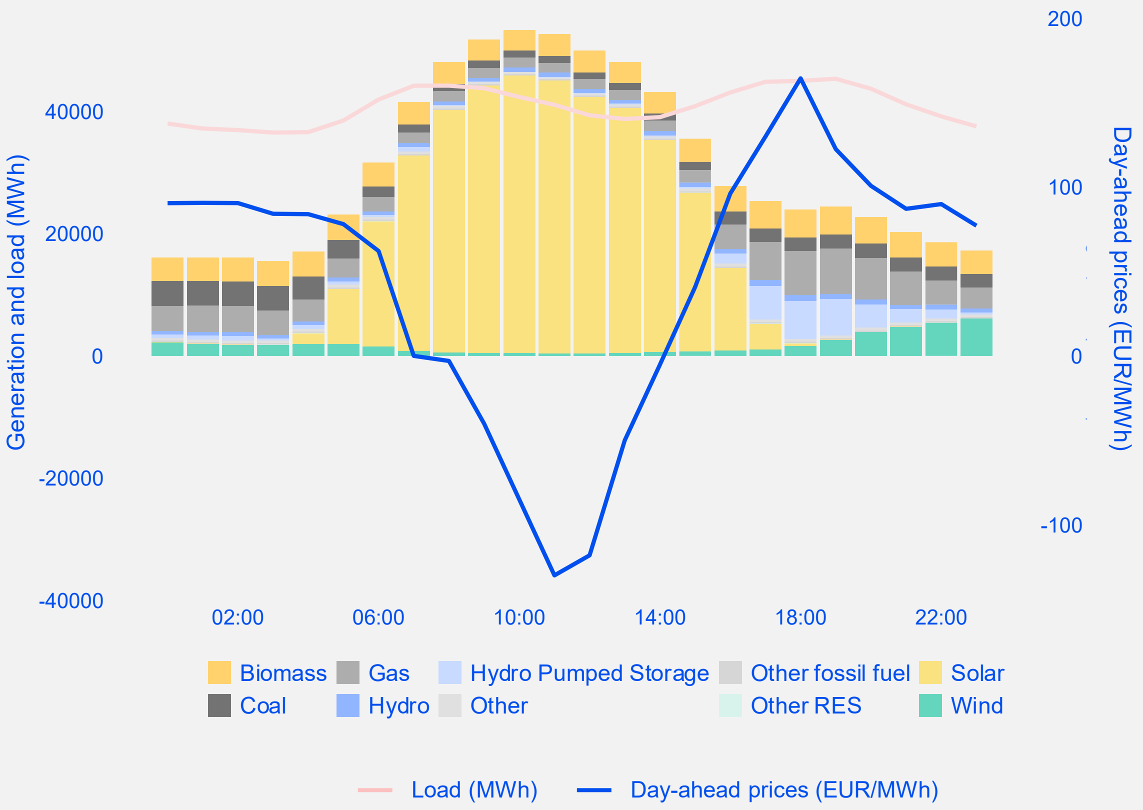
Electricity price swing in Germany, 1 May 2025

“Hitzeflaute”: extreme solar-wind imbalance and its system impacts

- On 1 May, day-ahead prices fell to around -130 EUR/MWh at midday, when solar output peaked, before surging to roughly 164 EUR/MWh in the evening. This represents an exceptional swing of about 294 EUR/MWh during the day. Solar generation comfortably met consumption during the central hours of the day, while conventional plants had to ramp up quickly in the evening, amplifying price volatility.

- These events underline the importance of stronger EU-wide interconnections and additional flexibility sources, including thermal backup, storage and demand-response. Smart grids and improved forecasting are also essential to support real-time coordination and anticipate renewable variability, enhancing the system’s ability to respond effectively.

Generation mix per production type, load and day-ahead price in Germany, 1 May 2025 (MWh, EUR/MWh)



Source: ACER calculation based on ENTSO-E transparency platform data.
Note: “Hitzeflaute” describes periods with exceptionally high solar generation paired with very low wind output.

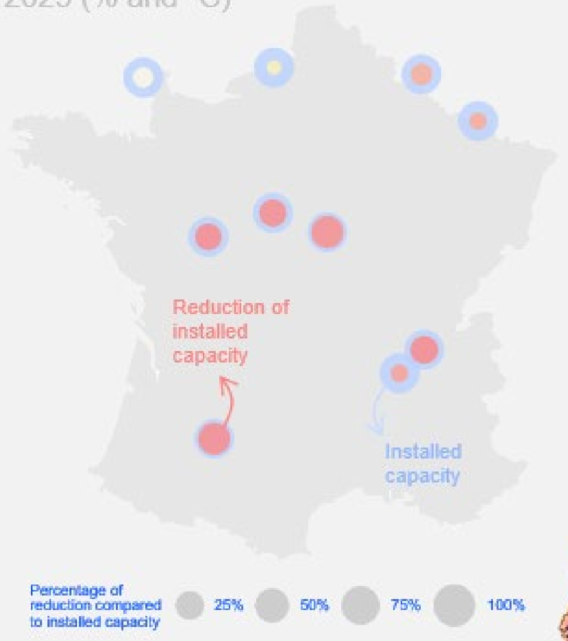
Case study
When heat hits, electricity prices spike

Heatwaves simultaneously stress demand, supply and prices

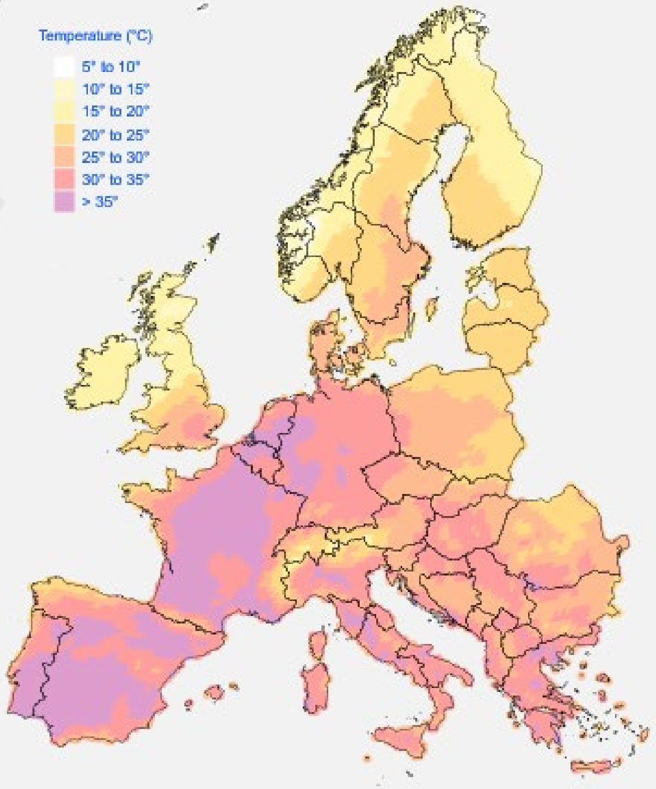
- On 1 July, electricity demand rose sharply, increasing by around 6% across Europe compared to the week before. In France, each degree above 20 °C added approximately 600 MW of additional load, driven primarily by cooling needs.
- Elevated river temperatures limited cooling efficiency for thermal and nuclear power plants, tightening supply precisely during peak demand periods. These effects converged in the evening hours, when demand remained elevated as solar generation declined and system flexibility became increasingly scarce. Under these conditions, electricity prices spiked sharply, exceeding 400 EUR/MWh in Germany and reaching up to 470 EUR/MWh in Poland.
- Heat peaks typically occur in the late afternoon, coinciding with the downward ramp of solar output. In the absence of sufficient flexibility - including interconnectors, storage and demand-side response - such demand-supply mismatches can rapidly translate into extreme prices.

Heat, rivers, reactors: 1 July exposed how rising temperatures can shrink supply while demand keeps climbing

Reduction of offered capacity and average temperature for selected Nuclear power plants in France – 1 July 2025 (% and °C)



Maximum temperature of 1 July 2025 in Europe – (°C)



Source: ACER calculation based on ENTSO-E transparency platform data and Copernicus data – ERA5.
Note: The location of each nuclear power plant is taken from the Global Nuclear Power Tracker - Global Energy Monitor.

Challenges ahead

- Electricity prices reveal a need for flexibility and cross-zonal capacity
- Short-term flexibility solutions exist; uptake must grow
- Seasonal flexibility still relies on gas, making decarbonisation the central long-term challenge

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Flexible systems key to efficient energy transition

Peak and baseload price gap

- Since 2020, the average daily gap between the lowest and highest day-ahead electricity prices has increased fivefold. While gas and coal remain key sources of short-term and seasonal flexibility, they have relatively high marginal costs and emissions intensities. Moreover, the EU depends on imports for much of its fossil fuels. This highlights the importance of exploring pathways to maintain flexibility while progressively decarbonising the electricity market.
- Solar, wind, hydro, and nuclear energy are key to lowering electricity prices but require flexibility solutions.

Emerging flexibility solutions

- Interconnectivity, storage, and demand response are becoming essential for stabilizing markets and preventing low capture prices[1] for wind and solar, in addition to facilitating grid operation. Expanding and diversifying fossil-free flexibility resources will reduce reliance on fossil fuels.

Renewables and regional integration

- Looking at the variability of wind and solar from a wider geographical perspective, at the EU level, offers benefit. EU-wide coordination helps smooth variability by combining complementary renewable patterns and flexibility resources across regions.

The role of gas storage

- While decarbonisation progresses, alternatives to gas storage for seasonal flexibility remain underdeveloped. Gas storages play a critical role in ensuring security of supply and market stability. The energy crisis underscored the need for coordinated, efficient storage policies to avoid costly missteps, and backup capacity (such as thermal generation, storage or demand-response) ensuring security of supply during extreme conditions. For this reason, gas system decarbonisation without jeopardising industry competitiveness remains critical in the coming decades.

Cross-sector infrastructure adequacy

- To enable the further decarbonisation of the EU energy sector, electrification is a key element. This requires significant electricity grid reinforcement, which needs to be well coordinated to ensure cost-efficiency. At the same time, overall gas network usage is expected to reduce, but the network adequacy needs to be retained for peak demand periods.

Note: the capture price is the weighted average price that a power generation technology receives for its electricity in the market.

Flexibility becomes critical as renewables rise

Increasing negative-price hours highlight a system where renewable growth is outpacing flexibility

- Europe cannot rely on intermittent renewables alone. Without sufficient flexibility, weather variability directly translates into price volatility.
- The rapid growth of solar and wind - particularly solar, given the scale of recent investments - has brought a sharp rise in negative-price hours. These episodes occur when renewable generation exceeds demand and the system lacks the flexibility needed to absorb or shift surplus energy.

Weekly % of hours where day-ahead prices are below 0 EUR/MWh and colour as function of the average share of solar and wind generation, EU-27/EEA (Norway), 2021-2023-2025

2021

Jan	0%	0.2%	0%	0%	0%
Feb	0.8%	0.3%	0.2%	0%	
Mar	0.6%	0.2%	0.3%	0.6%	
Apr	2.1%	0%	0%	0.2%	
May	0.3%	1.3%	0.5%	0.6%	0.4%
Jun	0.3%	0.7%	0%	0%	
Jul	0%	0%	0.2%	0.5%	
Aug	0.1%	1.1%	0%	0%	0%
Sep	0%	0%	0%	0.2%	
Oct	0.9%	0%	0.1%	0%	0%
Nov	0%	0%	0%	0%	
Dec	0%	0%	0%	0.3%	

2023

Jan	1.2%	0.1%	0.1%	0%	0%
Feb	0%	0%	0%	0%	
Mar	0%	0.1%	0.6%	0%	
Apr	0%	0.5%	0.1%	0%	0.4%
May	0.2%	1.7%	5.9%	6.4%	
Jun	0.9%	2.1%	0%	0.4%	
Jul	4.8%	1.2%	3.9%	0.6%	0.9%
Aug	8.1%	0.1%	0%	0%	
Sep	2.6%	1.5%	7.2%	7.4%	
Oct	7.1%	8.4%	3.9%	0%	0.5%
Nov	0.1%	0%	0.1%	0%	
Dec	0%	0.1%	1.1%	4.1%	0.7%

2025

Jan	0%	0.4%	0%	0%	
Feb	0%	0%	0%	0%	
Mar	2.4%	1.1%	3.5%	2%	9.4%
Apr	5.5%	3.4%	4%	11.8%	
May	4.3%	8.3%	4.7%	8.1%	
Jun	6.8%	7%	7.8%	6.8%	6%
Jul	0.1%	0.7%	0.4%	0.2%	
Aug	9.7%	4.2%	0.6%	1.8%	2.4%
Sep	2.9%	2.7%	2.5%	1.9%	
Oct	3%	0.5%	0.2%	0.3%	
Nov	1.1%	0.7%	0.1%	0.6%	0.1%
Dec	0%	0.8%	0.6%	0.5%	

Average share of solar and wind generation: 10 20 30 40

Source: ACER calculations based on ENTSO-E Transparency Platform data.

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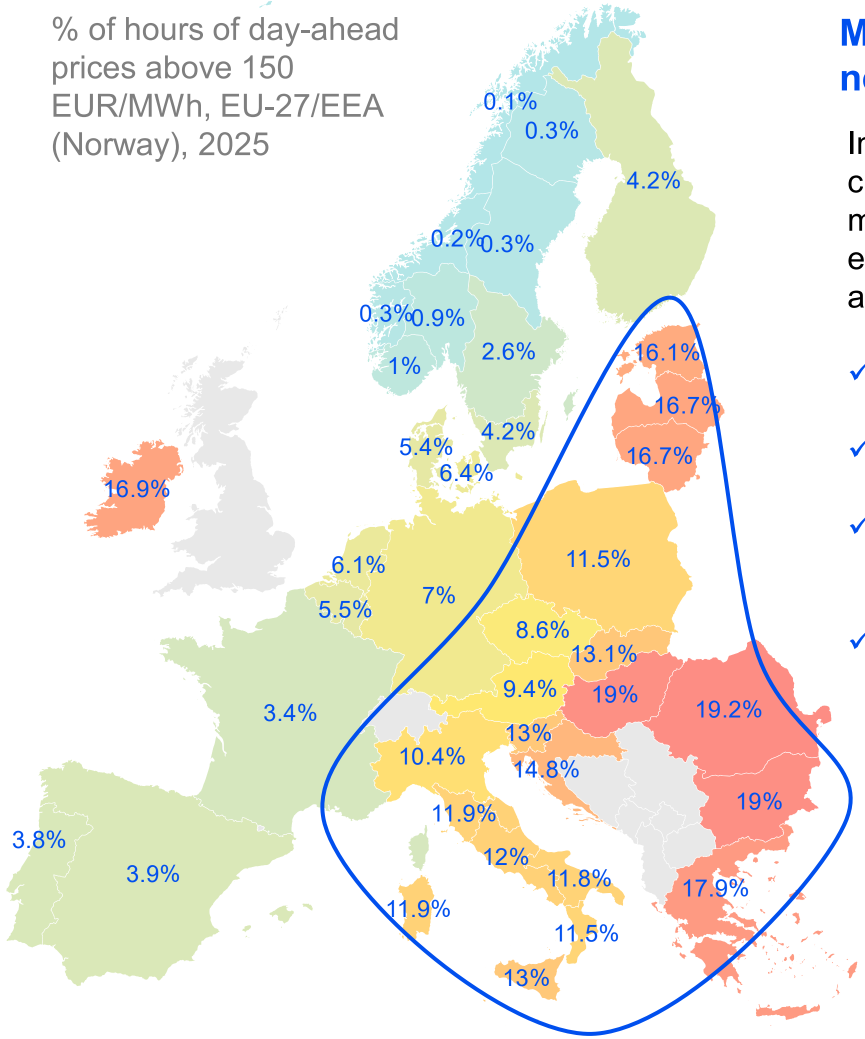
Electricity prices reveal a need for more interconnection

% of hours of day-ahead prices above 150 EUR/MWh, EU-27/EEA (Norway), 2025

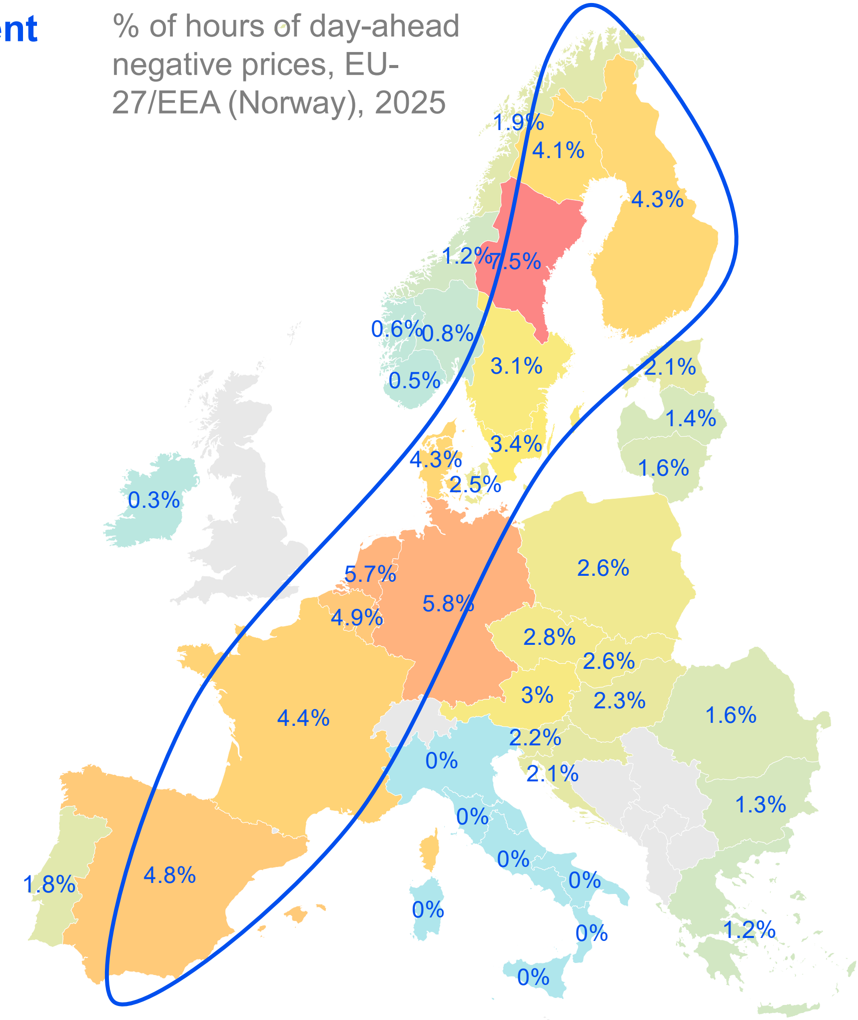


Market volatility highlights the urgent need for more interconnection

In 2025, electricity price patterns showed a clear geographical divide: countries with more negative-price hours generally experienced fewer extreme price spikes above 150 EUR/MWh.

- ✓ Price extremes vary significantly across regions.
- ✓ Stronger interconnections enable surplus clean generation to flow across borders.
- ✓ Maximising cross-zonal capacity helps reduce system stress and smooth price volatility.
- ✓ Future security of supply benefits from strong interconnections.

% of hours of day-ahead negative prices, EU-27/EEA (Norway), 2025



Source: ACER calculations based on ENTSO-E Transparency Platform data.

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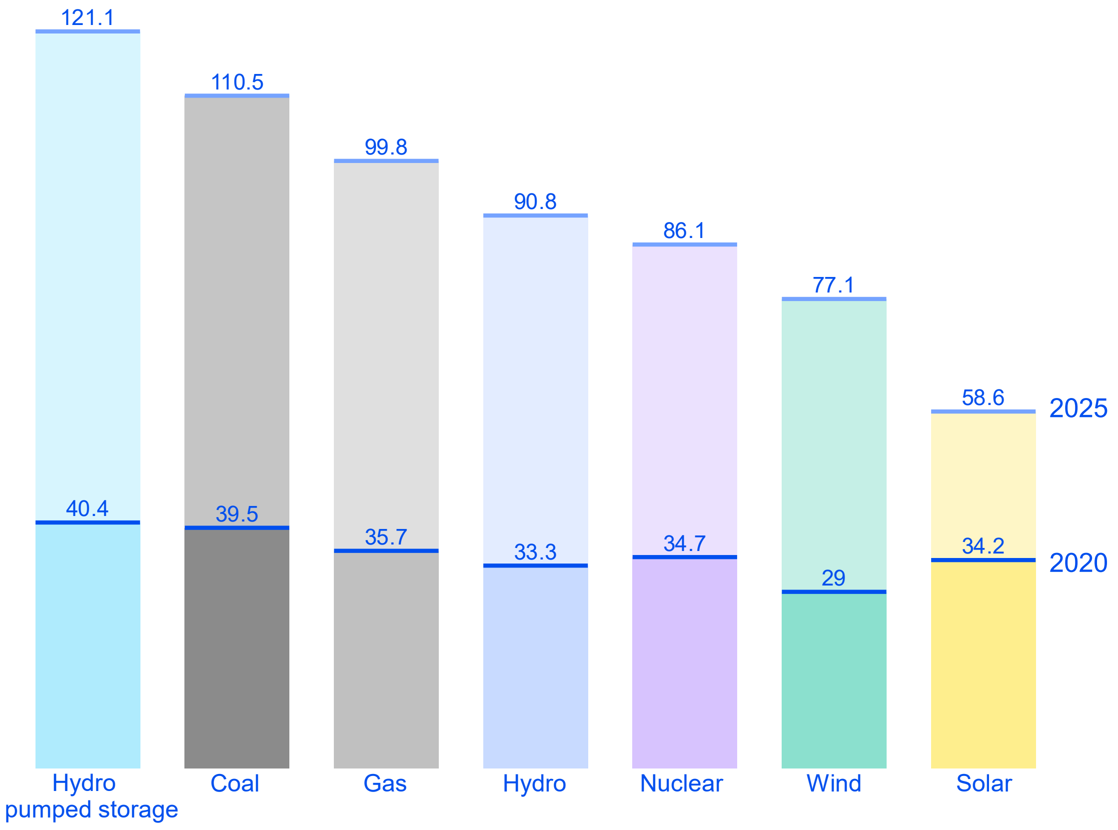
Rising gas reliance reflects flexibility gap

Baseline and peak-time contribution of gas fired power plants stabilises at 2024 levels; coal generation further declines in both baseload and peak

- All generation technologies were rewarded with higher market values since 2020, reflecting increased revenue potential across the system.
- However, the differentiation between technologies has emerged primarily over the last five years, driven by the rapid growth of renewables and changing system needs.
- This evolution highlights the growing importance to reward flexibility to fully capture the benefits of renewables.
- Flexible resources play a critical role in enabling renewable integration. The uptake of non-fossil flexibility resources such as demand response is needed to reduce the reliance on costly gas-fired generation.
- Renewables as home-grown cheaper and clean sources can reduce import dependencies and prices, but flexibility is essential to make the system work.

Average value of electricity by production type in the EU-27/EEA (Norway), 2020 vs 2025 (EUR/MWh)



Source: ACER calculations based on ENTSO-E transparency platform.
Note1: The average value of electricity production by type, for each technology, is calculated as the sum of the hourly generation multiplied by the hourly day-ahead prices, divided by the total annual generation.
Note2: Changes compared to last year's published results reflect updates to the underlying data in the ENTSO-E Transparency Platform.

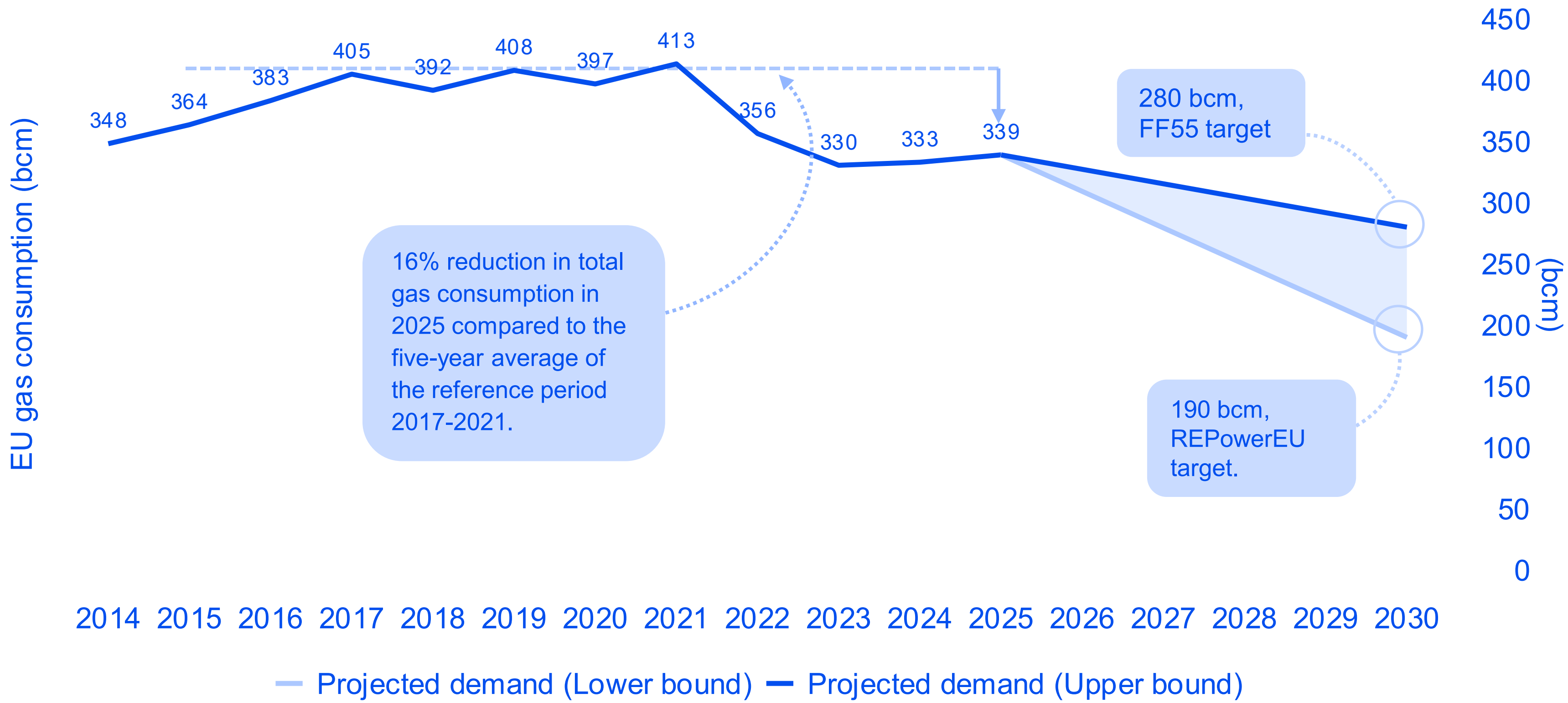
Gas consumption reduction has stalled

Slight increase of approximately 2% in gas consumption in the EU in 2025 year-on-year

The EU has set legally binding climate targets for 2030 and climate neutrality by 2050, with commitments under Fit-for-55 to reduce gas demand by 30% (over 120 bcm) by 2030 compared to 2019, and an even more ambitious - though non-binding - REPowerEU objective.

- Gas demand has declined over the past four years, driven by electrification, efficiency gains and post-2022 industrial contraction.
- This trend signals a transition in progress from gas as a backbone fuel to a flexibility resource.
- Achieving 2030 targets requires an additional demand reduction of 17–44% from 2025 levels within the next five years.

Historical gas consumption in the EU, 2014-2025 (bcm) and projected gas consumption under Fit-for-55 and REPowerEU decarbonisation scenarios, 2026-2030 (bcm)



Source: ACER calculations based on Eurostat and European Commission's documents. For further information, the reader is referred to ACER report on LNG market developments, 2025. Note: We assume two decarbonisation scenarios outlined in the European Commission's Fit-for-55 package and REPowerEU plan to project gas consumption by 2030. The former scenario projects a drop of 32% in natural gas consumption in 2030 relative to 2019 figures; the REPowerEU target (without considering the gas savings related to renewable hydrogen targets) estimates gas demand 32% lower than the projected FF55 demand.

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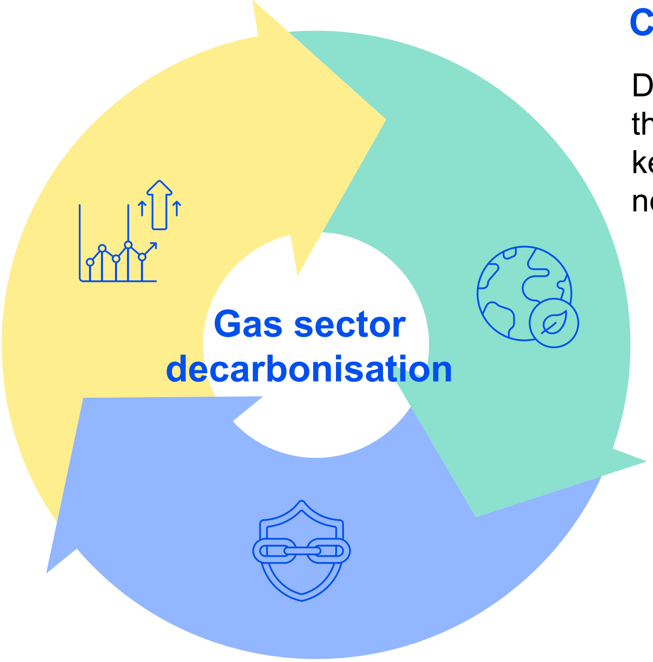
Gas system decarbonisation brings challenges and impacts

Transforming the EU gas system: decarbonisation, security and competitiveness

Competitiveness

EU industrial competitiveness has been weakened by higher relative energy costs. This raises concerns about Europe's ability to meet gas decarbonisation ambitions.



Climate objectives

Decarbonisation of the gas system is key to meet climate neutrality by 2050.

Energy security

Gas decarbonisation options should strengthen supply independence. However, scaling them up remains challenging and brings infrastructure, regulatory and contractual challenges.

- To meet decarbonisation objectives, the EU gas system must substantially transform over the coming decades. System-wide actions are required to reduce emissions across the entire value chain, from production and processing to transport and end use, while overall gas demand is expected to decline.
- Since 2022, the EU has progressively offset Russian gas pipeline supply with rising LNG imports, while reducing gas final consumption by 18%. However, EU gas system decarbonisation progress has been modest so far, with biomethane currently accounting for around 2% of total EU gas supply. This is despite an ambitious outlook, including a prominent role of hydrogen.

Coming soon: ACER decarbonised gas Monitoring Report (June 2026) will analyse the gas system decarbonisation outlook and impacts.

Sources: ENTSOG Transparency Platform, ALSI GIE, The Draghi report on EU competitiveness and EC's impact assessment for the 2040 climate target.

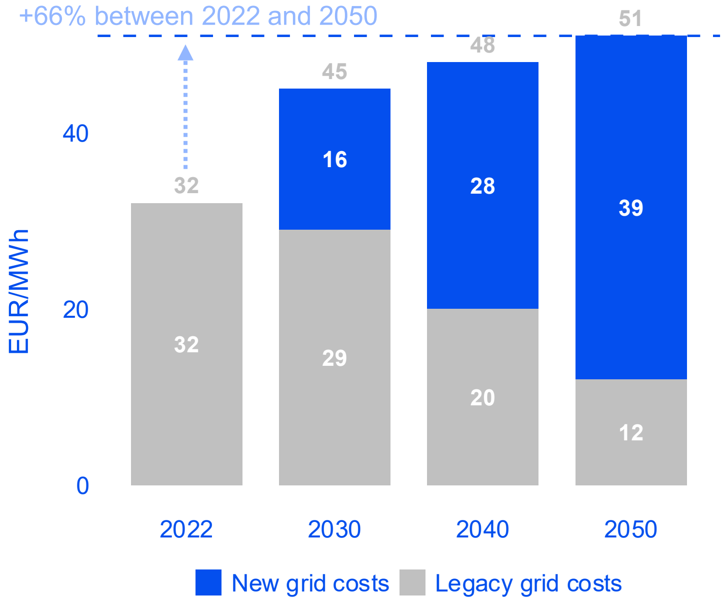
Additional grid and network cost can be considerable

The Electricity grid needs considerable investments to enable the electrification shift. The annual investment needs are projected to be as high as EUR 100 billion between 2025 and 2050. By 2030 the EU could benefit from an additional 85 GW of interconnector capacity, on top of today's 50 GW. Cost-effective and cross-sector coordinated investments shall be prioritised as well as the optimisation of existing capacity.

In contrast, the average **use of gas networks** is expected to decline further as final consumption decreases, in line with decarbonisation efforts, and despite the gradual increase of low-carbon gases. The extent to which gas infrastructure is used, including its repurposed parts to support the emerging hydrogen market, will influence the long-term evolution of tariffs. At the same time, challenges remain in ensuring gas network adequacy for a shrinking gas sector that may still be required to meet power peak demand periods.

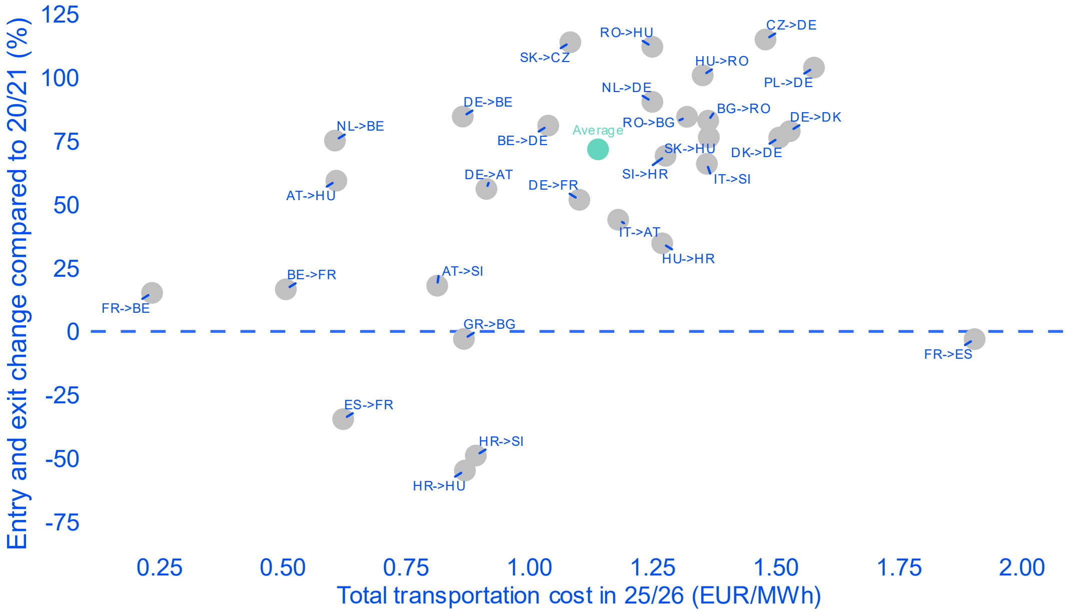
Grid costs rises needed to back EU energy system electrification

Projection of grid cost for household consumers, 2022-2050



Gas tariff rises can impact hub convergence and decrease gas use

Relative change in cross-border capacity reserve prices for yearly products in selected borders, 2025/2026 vs 2020/2021 (EUR/MWh)



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How will ACER contribute in 2026?

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Stay tuned for more …

2026

April
- Best practices report: DSO revenues
- Quarterly gas reports

May
- Analysis of European LNG market developments

June
- Gas decarbonisation report

July
- Report on Russian gas imports phase-out
- Quarterly gas reports

September
- Aggregation models and baselining
- Retail monitoring

October
- Quarterly gas reports
- Security of EU electricity supply

November
- Infrastructure monitoring report
- European hydrogen market
- Market integration & cross-zonal report

Alongside its monitoring activities, ACER will continue its work on network codes and methodological updates.

Timelines are indicative, please consult ACER website for the latest updates on its monitoring activities.

Annex

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Annex 1 - Gas-fired power plants start-ups

To be able to analyse the start-up behaviour of gas-fired power plants, hourly ENTSO-E data at generation unit level is used. Some care was needed in handling the data.

- First, the dataset does not breakdown the different types of gas-fired power plants so we cannot easily distinguish between simple gas turbines and gas-fired power plants. Nevertheless, is worth noting that the dataset already trims the data for units with an installed capacity that is bigger than 50 MW.
- Second, data quality is sometimes questionable. Analysing some generation units in detail is possible to identify some unexpected behaviours. For example, in some units output never drops to 0, staying at values closed to 0 for long periods of time – excluding therefore idling behaviour. In another example there are some hours for some units where generation will keep changing in small MW numbers (hour 1 - 0.4, hour 2 - 3.64, hour 3 – 1.23, hour 4 – 2.3, hour 5 - 0), this could potently be considered as misfires but some of this behaviour is to erratic for that case.

Start-up accounting

- To overcome some of these challenges related to data, and in order to be able to quantify start-ups a simple methodology was developed. A threshold generation was defined from where to assume that a unit had start-up. This threshold was set at 5 MW. So, if a generation unit, in a given hour, reports a generation higher than 5 MW where the previous generation was lower than 5 MW a start up flag is created. Its this start up flags that allow us to count the overall number of start-ups. The 5 MW allows to discard the erratic behaviour exemplified before while accounting for smooth start-ups where generation ramps up slowly.
- It is nevertheless possible that idling behaviour, some misfires and even other data quality issues contribute to the error of this analysis. To better understand how large of an error this analysis can potentially have, cumulative distribution functions for the probability of the generation on the hour after start-up and two hours after start-up are calculated. The graphs are shown below. It is possible to ascertain that with this threshold the generation in the hour after and two hours after start-up is at least 10 MW 95% of the time which allows to stay that the threshold is relatively well placed as most units ramp up after the initial threshold.