BBVA Research

APRIL, 2026

From gas vulnerability to renewable resilience:
Spain's energy shift in a EU context

Key messages

Spain's renewable-based power model has increased resilience to external energy shocks, especially at the wholesale level, but incomplete grid readiness, limited storage and high non-energy costs constrain how much of that advantage reaches final consumers.

Is Europe becoming more resilient to energy shocks, and does Spain stand out?

Europe is less fossil-intensive than in the past, but it is still exposed because it remains dependent on imported gas. Spain stands out because its higher renewable penetration has reduced its dependence on gas more than in most peer markets.

Do wholesale electricity prices in Spain behave differently from those in other European markets?

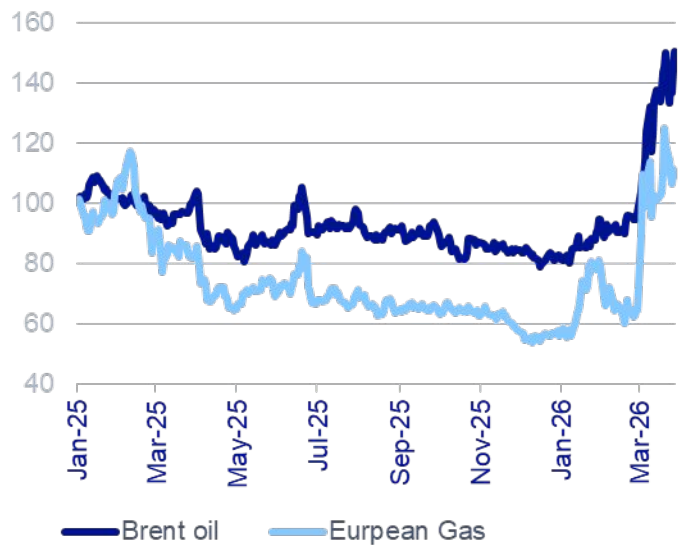
Gas remains the key marginal driver of electricity prices across Europe, but Spain's wholesale prices are less sensitive to gas than those of Italy, Germany or France. The Iberian exception reinforced that divergence during part of the sample, but it does not fully explain it.

Is this resilience also reflected in retail electricity prices for consumers?

Only partially. Even where retail tariffs are more directly linked to wholesale prices, non-energy components such as balancing services, taxes, network tariffs and other regulated costs limit the pass-through to final consumers.

Iran crisis and renewed pressure on energy markets

OIL AND NATURAL GAS PRICES
(01/01/2025 = 100)

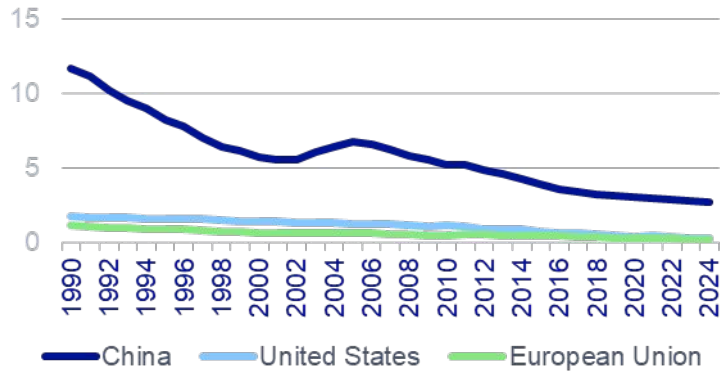


Source: BBVA Research with data from Intercontinental Exchange and Haver Analytics.
Notes: Europe gas refers to the Dutch TTF gas price.

- **Iran crisis is triggering a new global energy shock.**
- **Supply risks in key routes (e.g. Strait of Hormuz) are tightening oil and gas markets. Prices have risen and become more volatile, with a renewed geopolitical risk premium.**
- This raises several **questions:**
  1. ***Is Europe becoming more resilient to energy shocks, and does Spain stand out due to its higher renewable penetration?***
  2. ***Do wholesale electricity prices in Spain behave differently from those in other European markets?***
  3. ***Is this resilience also reflected in retail electricity prices for consumers?***

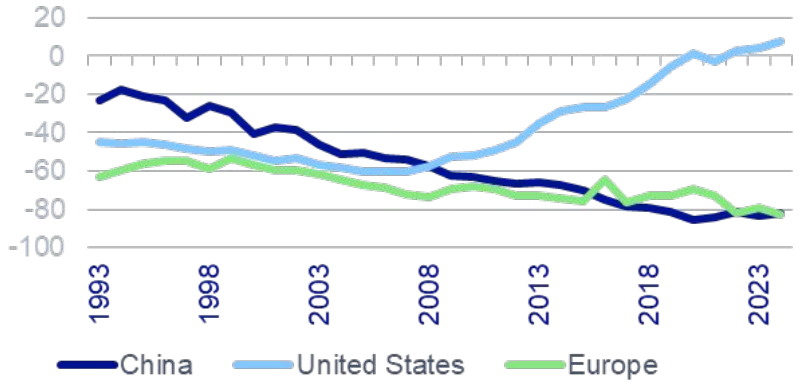
Europe has steadily reduced its fossil energy intensity, showing a sustained structural shift over time

FOSSIL ENERGY INTENSITY OF GDP
(MEGAJOULES PER MILLION OF USD PPP ADJUSTED 2021 INTERNATIONAL USD)



Source: BBVA Research with data from World Bank and EI Stats Review.
Note: Fossil energy is defined as the sum of coal, natural gas and oil.

OIL TRADE BALANCE
(% OF OIL CONSUMPTION)

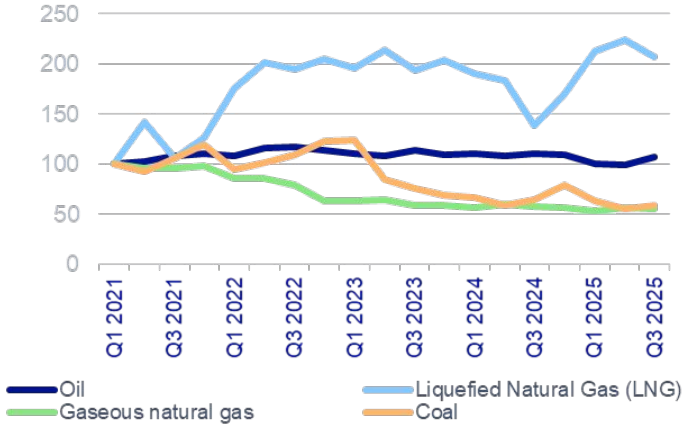


Source: BBVA Research with data from EI Stats Review

Global fossil fuel intensity has declined since the 1990s due to efficiency gains and structural shifts. Europe has led this transition among advanced economies, while China has reduced coal reliance and the US has moved into an oil surplus. In contrast, Europe remains in a persistent oil deficit, highlighting structural differences in energy exposure

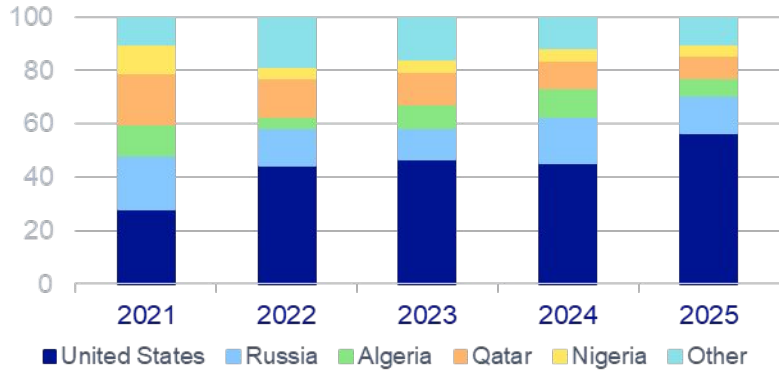
Nevertheless, Europe remains highly dependent on external energy, with the war in Ukraine increasing reliance on LNG, particularly from the US

VOLUME OF EU IMPORTS OF ENERGY PRODUCTS 2021-2025 (Q1 2021 = 100)



Source BBVA Research with data from Eurostat.

EU IMPORTS OF LNG BY PARTNER 2021-2025Q3. (%)

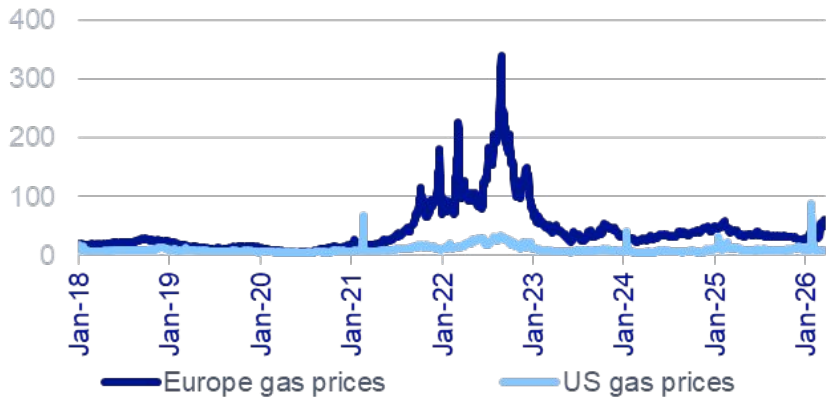


Source: BBVA Research with data from European Commission

EU energy imports remain high, with LNG more than doubling since 2021 and replacing declining Russian pipeline gas. The US now supplies close to 60% of EU LNG, increasing Europe's exposure to global gas market dynamics

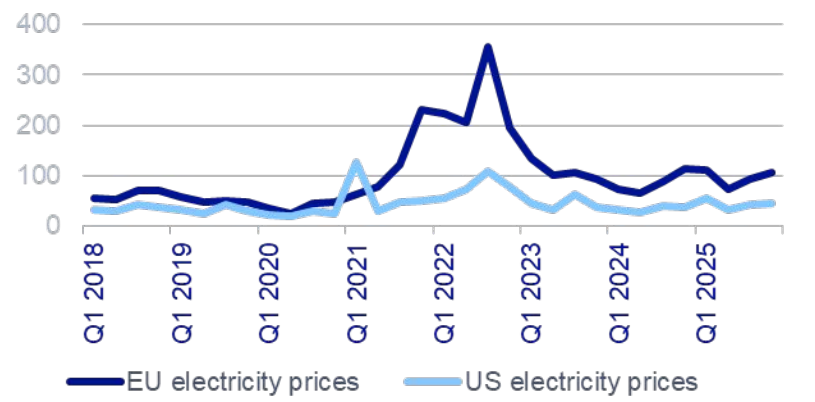
LNG has made gas more costly in Europe, reinforcing its role in wholesale electricity prices

NATURAL GAS PRICES
(EUR/MWh)



Source: BBVA Research with data from Intercontinental Exchange, Energy Information Administration and Haver Analytics. Notes: Europe gas refers to the Dutch TTF gas price, while US gas refers to the Henry hub Natural Gas spot price.

WHOLESALE ELECTRICITY PRICES
(EUR/MWh)

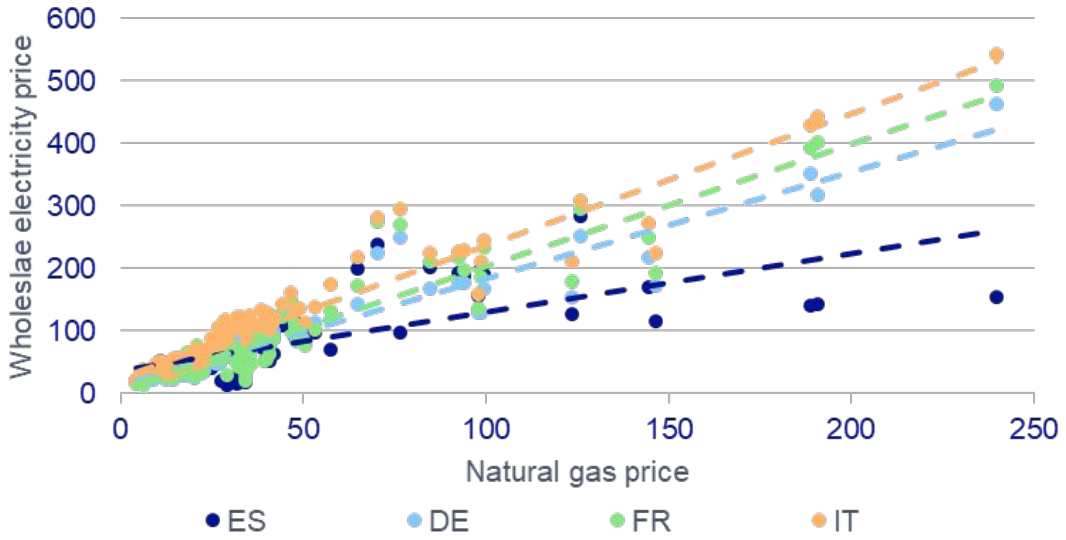


Source: BBVA Research with data from International Energy Agency.

Electricity prices closely track gas, the key marginal driver. In Europe, post-Ukraine gas price increases—driven by a shift to costlier LNG—pushed electricity prices higher, a dynamic now repeating amid the Iran crisis. EU ETS costs also add pressure. This, in turn, reflects a rising geopolitical risk premium, driven by lost Russian pipeline supply, uncertainty around Qatar and stronger Asian demand

However, the strength of this link varies across European countries, with Spain showing lower exposure

WHOLESALE ELECTRICITY PRICES AND GAS PRICES
(EUR/MWH, JAN. 2015 - FEB. 2026)

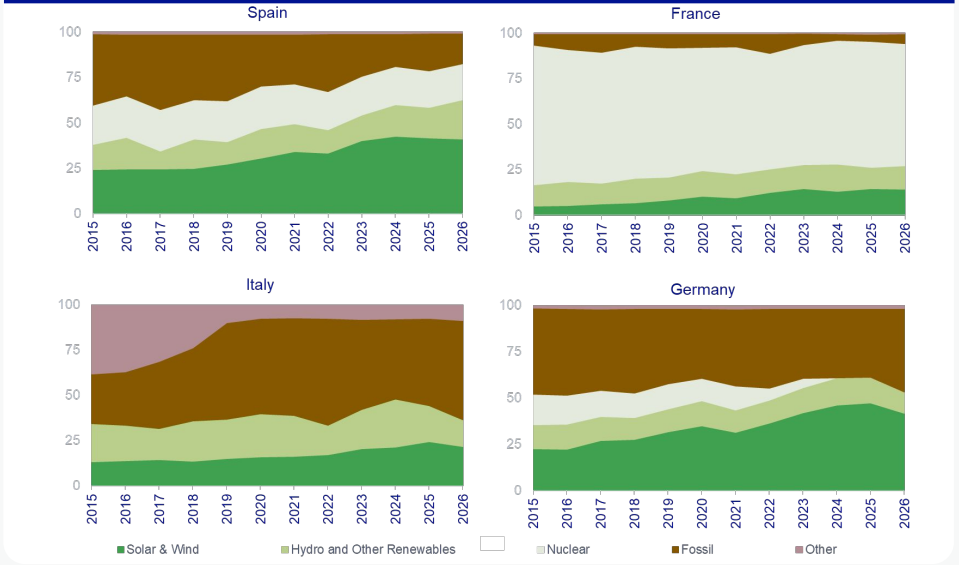


- **Electricity prices closely track gas prices across all markets**, confirming the key role of gas-fires generation as the marginal price setter in European power markets. **The strength of this relationship varies by country**: Italy shows the highest sensitivity, France and Germany are in the middle, while Spain is comparatively less exposed.
- **At higher natural gas prices,** Spain's wholesale electricity prices diverge more from those of its peers, partly due to the Iberian exception. Overall, **excluding that period, Spain's electricity prices are less sensitive to gas** than in other markets.

Source: BBVA Research with data from EMBER, Intercontinental Exchange and Haver Analytics.
Note:Natural gas price refers to the Dutch TTF gas price and wholesale electricity prices correspond to market prices in Spain, Germany, France, and Italy.

Spain's lower exposure reflects its leadership in renewables, exceeding 55% of the electricity mix

ELECTRICITY MIX GENERATION BY COUNTRY
(% OF TOTAL GENERATION)

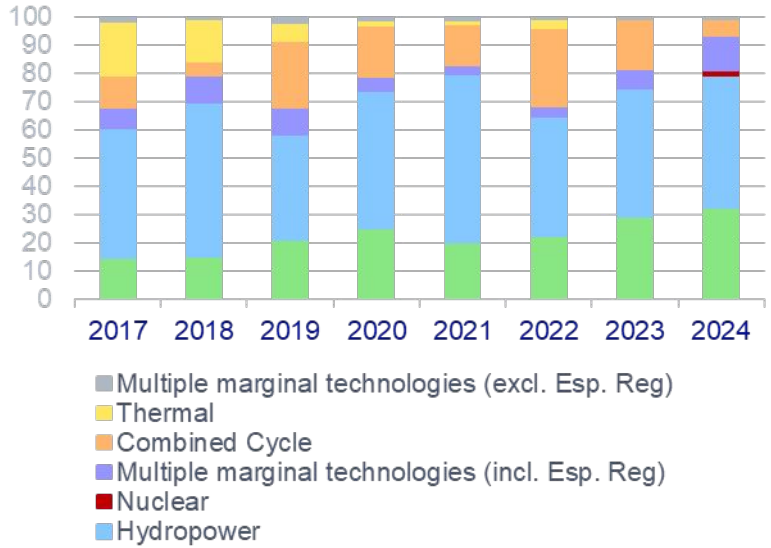


Source: BBVA Research with data from ENTSO-E.
Note: For Italy, TERNA informs the platform users that from 27th June 2017 the category "Other" has been redistributed to the correct Types. TERNA informs the platform users that actual data is reported on a provisional basis. Provisional data can be subject to adjustments and recalculations.

- **Spain's renewable share has risen to 57% in 2025** (vs 42% in Europe), with fossil generation down from around 32% in 2022 to 17% today.
- In comparison, **France** remains largely based on nuclear, while **Germany** and **Italy** continue to rely more heavily on fossil fuels (45–55%).
- As a result, **Spain's lower reliance on gas reduces its exposure to price volatility and improves its resilience to external energy shocks, such as the Iran crisis, compared to 2022**.

Renewables set over 30% of electricity prices in Spain, up from 20% in 2022

SPAIN. DAILY MARKET. HOURS PER YEAR SETTING THE MARGINAL PRICE BY TECHNOLOGY
(%, 2017 - 2024)

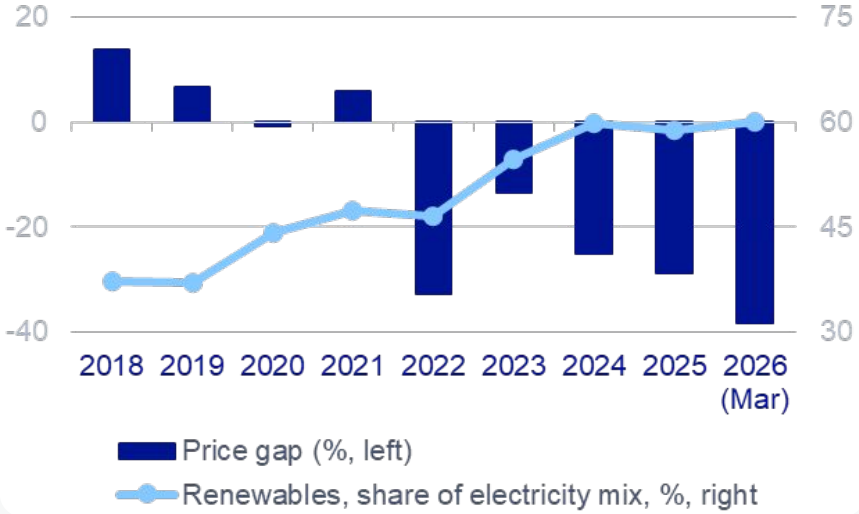


- **Spain** provides a relevant case study of **structural change within a marginal market.**
- **The marginal electricity price is mostly set by Hydro and Pumped Storage technology.** These technologies have high opportunity costs, so they set a price close to the estimated marginal cost for fossil fuel technologies.
- However, **the increase in the number of hours during which the price is set by renewables** is remarkable (from 20% in 2019-2022 to more than 30% in 2024), while gas (combined cycle) has sharply declined from around 25–30% to less than 10% in 2024.
  This reflects a clear **structural shift away from gas towards renewables in price formation.**

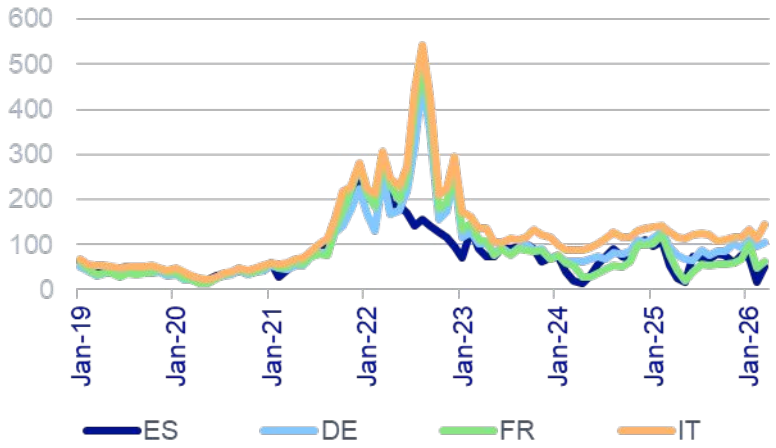
Source: BBVA Research with data from OMIE.

Spain is now more resilient to energy shocks, with wholesale electricity prices below European peers

SPAIN. WHOLESALE ELECTRICITY PRICES GAP AND RENEWABLE SHARE IN ELECTRICITY MIX
(% WITH EUROPEAN MEDIAN, LEFT; % RIGHT)



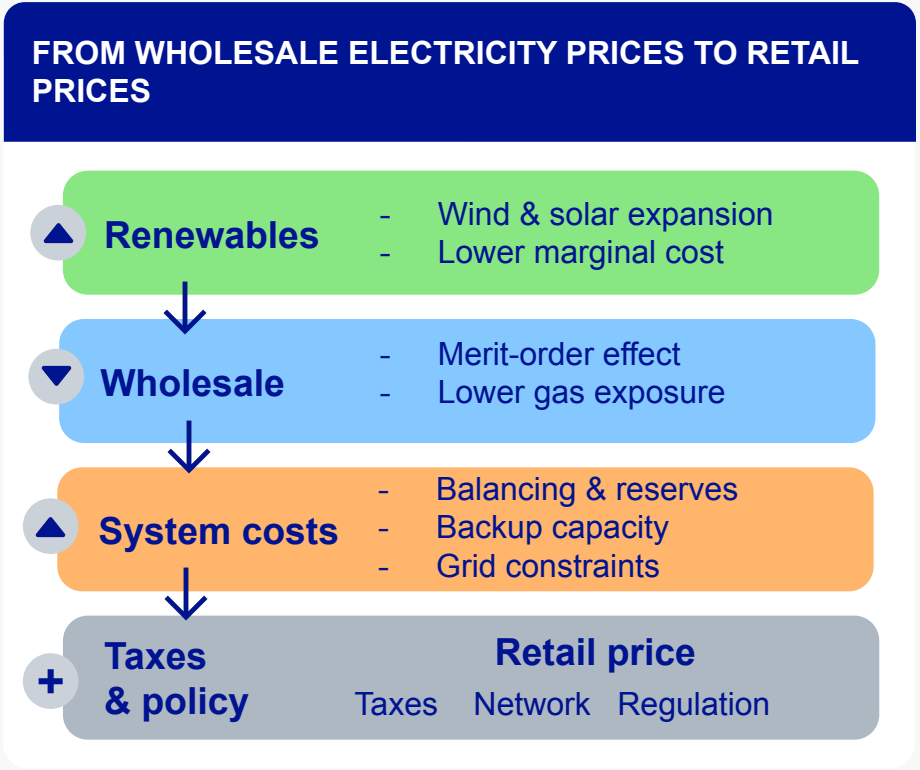
WHOLESALE ELECTRICITY PRICES
(EUR/MWH)



Note: These are the prices paid to electricity generators, and are not necessarily the same as the costs to end users. The share of renewables includes bilateral contracts.
Source: BBVA Research with data from EMBER and OMIE.

Source: BBVA Research with data from EMBER.

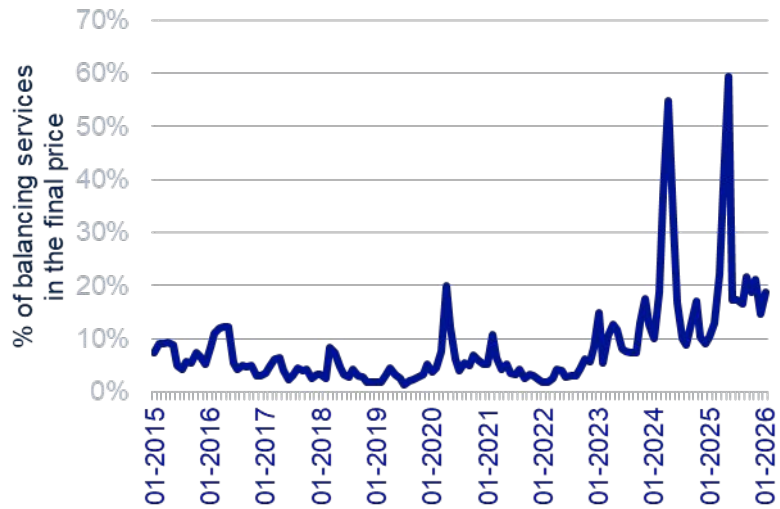
Spain's wholesale resilience is clear but its benefits are only partially reflected in retail prices



- **Higher renewable penetration lowers wholesale electricity prices** through the merit-order effect.
- At the same time, **it increases system costs**, driven by higher balancing, backup, and grid requirements.
- **Retail prices include additional non-energy components**, such as taxes, network tariffs, and regulatory charges.
- As a result, **lower wholesale prices are only partially passed through to consumers.**

Balancing cost services have become increasingly relevant in the electricity system in Spain

SPAIN. BALANCING COST SERVICES AS A SHARE OF FINAL ELECTRICITY PRICES (%)



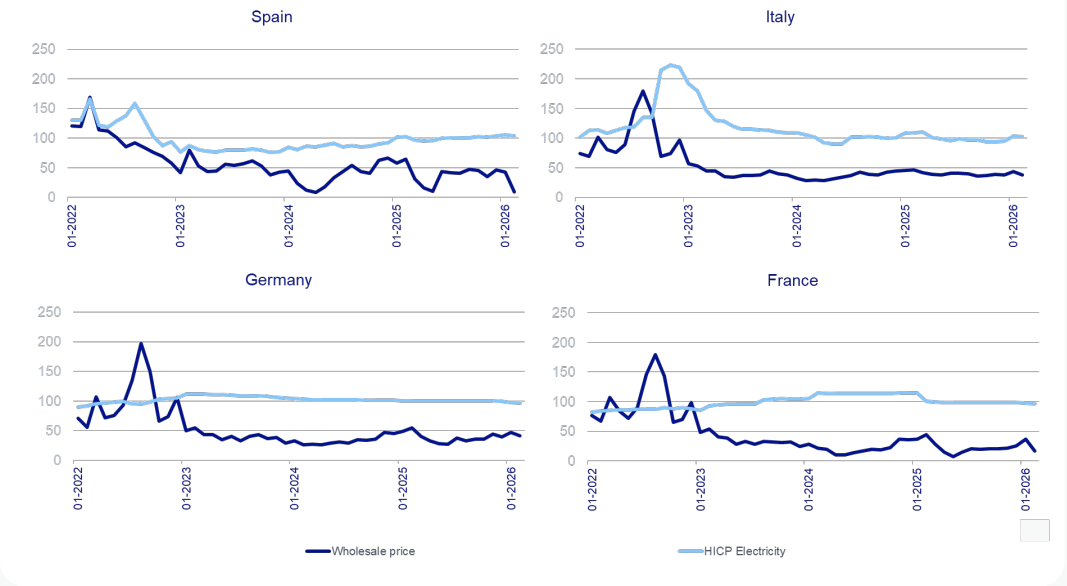
- **Additional costs** arise from balancing and ancillary services, redispatch and technical constraints, and capacity mechanisms.
- **These costs increase with renewable penetration** and spike during stressed system conditions.
- **In fact, balancing services** have become increasingly relevant in Spain, rising from less than 10% historically to peaks of 50–60% in 2024–2025. This rise is not only the result of a structural shift in system operation; it also reflects underprepared grids, limited storage and delayed anticipatory investment.(*)

Source: BBVA Research with data from REE

(*) for reference: Global | Grid, Baby, Grid | BBVA Research

Despite faster pass-through in Spain, higher non-energy components widen the wholesale–retail gap

WHOLESALE PRICES AND HICP ELECTRICITY
(2022 = 100)



- Whilst wholesale prices have fallen below 2022 levels, HICP Electricity exhibits profound downward rigidity, remaining stubbornly elevated across all four countries.

- **The wholesale–retail spread is wider in Spain and France** than in Germany and Italy, reflecting differences in price structures. Despite **faster pass-through in Spain due to indexed tariff , higher non-energy components (such as taxes, charges and balancing costs) widen the gap between wholesale and retail prices.**

Source: BBVA Research with data from EMBER, Eurostat and Haver Analytics

Key messages

Spain's renewable-based power model has increased resilience to external energy shocks, especially at the wholesale level, but incomplete grid readiness, limited storage and high non-energy costs constrain how much of that advantage reaches final consumers.

Is Europe becoming more resilient to energy shocks, and does Spain stand out?

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Is this resilience also reflected in retail electricity prices for consumers?

Only partially. Even where retail tariffs are more directly linked to wholesale prices, non-energy components such as balancing services, taxes, network tariffs and other regulated costs limit the pass-through to final consumers.

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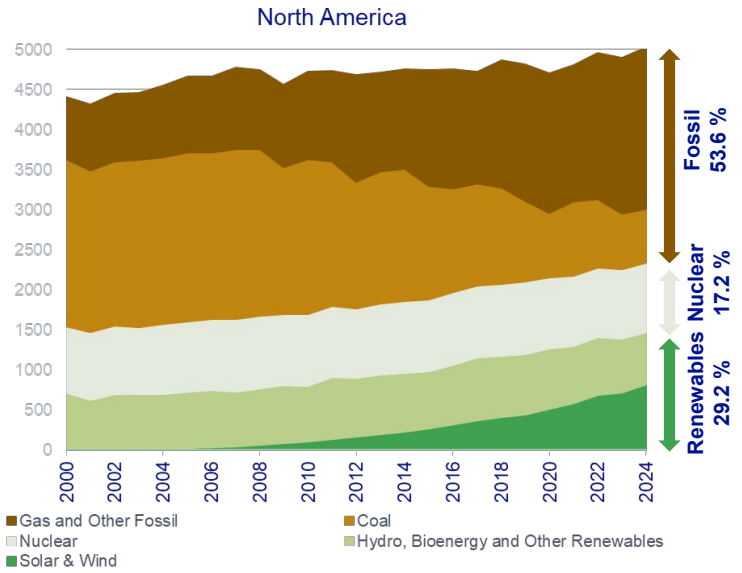
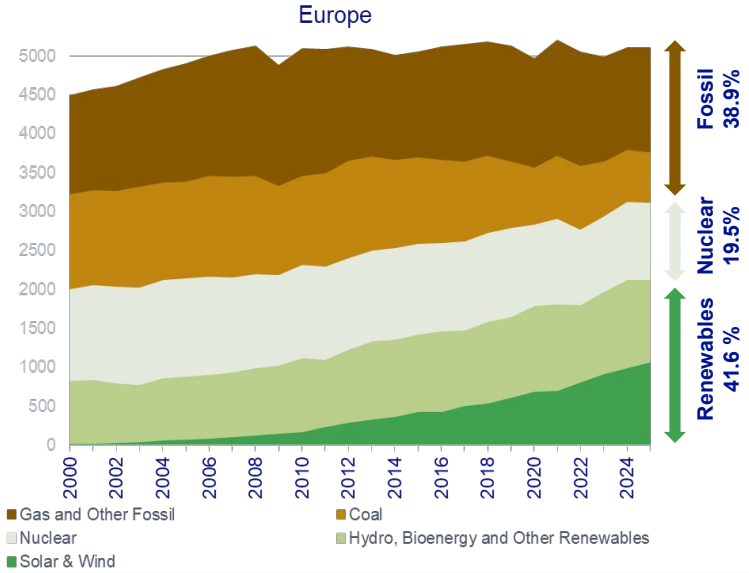
Annex

Europe is a global leader in renewables, ahead of the US

US. ELECTRICITY GENERATION MIX
(TWh)



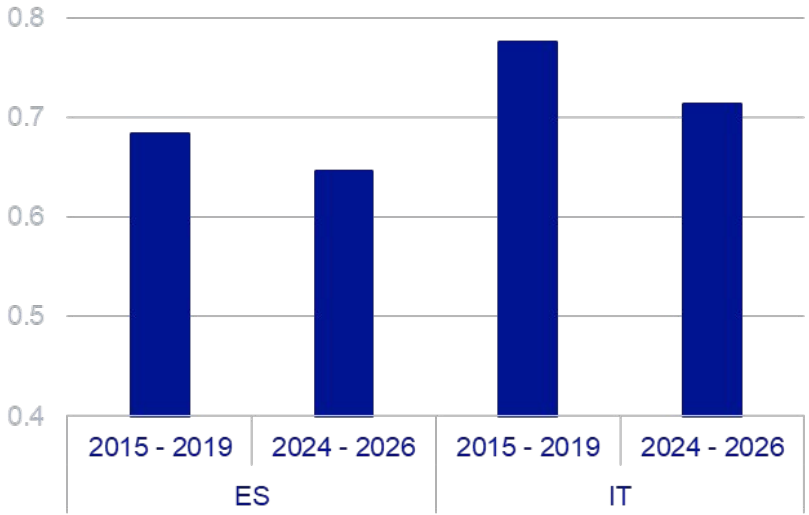
EUROPE. ELECTRICITY GENERATION MIX
(TWh)



Fuente :BBVA Research with data from EMBER
Note: The last observation for North America is 2024 and for Europe is 2025.

Nowadays, Spain's wholesale price is less related to gas price

SPAIN VS ITALY. GAS AND ELECTRICITY PRICE CORRELATION (%)

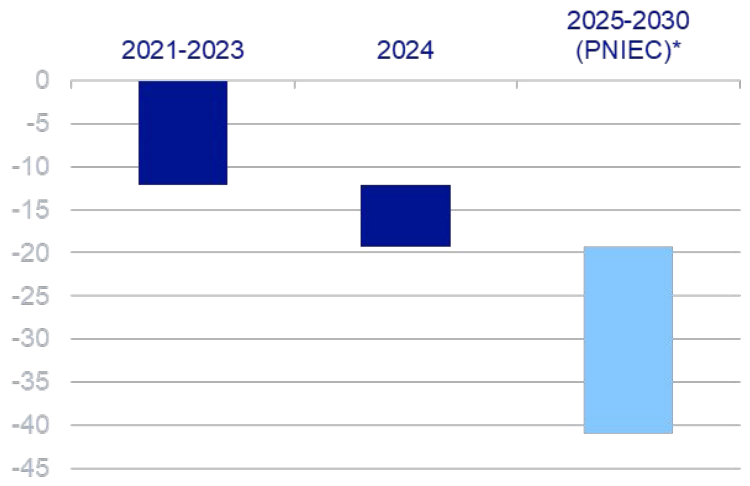


- **Spain has reduced its dependence on natural gas price dynamics**, as electricity prices are now less closely correlated to gas than in the past.
- This suggests that the g**rowing share of renewable energy** in Spain is changing how electricity prices are formed, weakening the influence of fossil fuels.
- In contrast, **Italy shows a stronger link in recent years than Spain**, highlighting that gas continues to play a central role in price formation.

Source: BBVA Research with data from EMBER, Intercontinental Exchange and Haver Analytics.

Quantifying the renewable effect. Empirical impact on wholesale prices in Spain

IMPACT OF RENEWABLES IN WHOLESALE ELECTRICITY PRICES IN SPAIN (%)



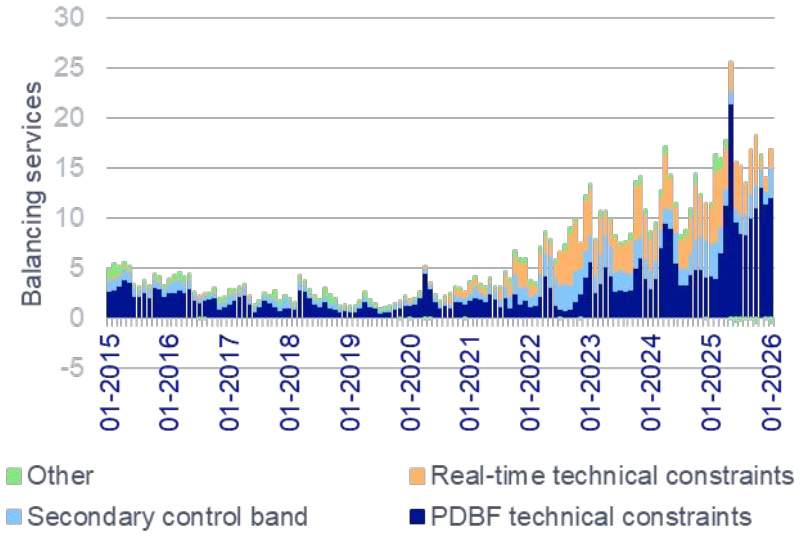
Source: BBVA Research with data from OMIE, MIBGAS, SENDECO data and PNIEC. *The estimation of 2024 is based on the available data up to June 2024.

- **The evidence is clear(*)**: an increase of around 20 pp in renewable penetration (from ~45% to ~65%) has reduced wholesale electricity prices by approximately 20% between 2021 and 2024.
- This effect is:
  - negative (lower prices)
  - non-linear (stronger at higher penetration levels)
  - state-dependent (larger when gas prices are high)

(*) Spain | Reaping the Benefits of Renewable Energy in the Spanish Economy | BBVA Research. April, 2025

Balancing services account for up to 20% of final wholesale prices

BALANCING SERVICES AND COMPONENTS
(EUR/MWh)



- The rise in balancing services is mainly driven by **technical constraints** (PDBF), which represent the largest and most persistent share of adjustment costs.
- **Real-time technical constraints** have also gained importance, contributing to the spikes and higher volatility observed in recent periods.
- **Secondary regulation** (balancing reserves) plays a steady but smaller role, supporting system stability. **Other components** remain marginal throughout the period.
  Overall, the chart shows rising adjustment needs, reflecting a more complex, renewables-driven system.

Source: BBVA Research with data from REE

Dominant retail electricity tariff structure by country

Country	Most relevant tariff type	Description	Implication for pass-through	Key reference
Spain	**Indexed tariff** (PVPC) + fixed contracts	Regulated tariff linked to wholesale prices (OMIE), widely used by households	**Fast and direct** pass-through	CNMC (Retail Electricity Market Report); MITECO (PVPC regulation)
Germany	**Fixed-price** contracts	Multi-year retail contracts, prices adjusted periodically	**Slow and smoothed** pass-through	Bundesnetzagentur (Monitoring Report 2025); BDEW (Annual Report 2025: Energy supply in Germany)
France	**Regulated** tariffs (TRV)	Government-regulated prices, influenced by nuclear (ARENH mechanism)	**Very limited and delayed** pass-through	CRE (Tarifs Réglementés de Vente); IEA (France Report)
Italy	Market-based contracts (fixed + variable)	Mix of fixed and variable contracts under a liberalized market	**Moderate** pass-through	ARERA (Annual Report 2025); IEA (Italy Review)

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