

How energy security is reshaping infrastructure investment in Europe



Chris Twomey and **Federica Gallina**, Partners at Sosteneo, part of Generali Investments, discuss two inescapable energy challenges that Europe has to face: security of supply and system resilience.

Europe's energy transition has entered a new and more complex phase. What began as a decarbonisation agenda is now defined by energy security – not only in terms of supply, but in the economic viability of the system itself. In this evolving context, infrastructure investment strategies are being fundamentally reshaped.

Why energy storage matters

Despite repeated crises, Europe's reliance on imported fuels has persisted, with energy imports still accounting for around 60% of EU energy consumption.¹ Recent geopolitical shocks have simply redirected this dependence, replacing one source of imported energy with another. The strategic question is now not just how to generate low-carbon energy, but how to build a system capable of delivering it reliably, efficiently and competitively.

The answer lies in accelerating domestic clean energy deployment while transforming the infrastructure that supports it. However, this is not just a question of building more generation capacity. The rapid expansion of wind and solar has shown that the energy transition now needs to make this healthy renewable supply work effectively within the system.

Renewables-led power systems are inherently more complex. Their intermittent nature introduces volatility into electricity markets, including increasing periods of very low or even negative pricing. In Spain, for example, power prices have been negative for approximately 10% of total hours in recent periods. This creates operational challenges for energy systems and in this environment, flexibility becomes the defining requirement.

Battery energy storage systems (BESS) have emerged as a key solution. Over the past decade, installed costs have fallen dramatically from over \$1,700/kWh in 2014 to around \$190/kWh in 2024.² At the same time, European grid-scale storage capacity has grown roughly tenfold, increasing from 5.6 GWh in 2020 to 61 GWh in 2024.³ This previously niche technology is now a commercially viable, scalable solution capable of balancing intermittency, stabilising prices and enabling higher penetration of renewables.

Grid divergence

Yet storage alone is not sufficient. The real bottleneck lies in the grid. Europe's electricity networks were designed for a different era, characterised by centralised, dispatchable generation. Today's system, by contrast, requires the efficient transport of decentralised, variable power across regions and borders. This mismatch is already visible in the growing divergence between where electricity is produced, and where it is consumed.

In Italy, for example, renewable generation is largely concentrated in the south, while demand is centred in the north. In the UK and Germany it's the reverse, with strong generation in northern regions and demand further south. These imbalances are compounded by insufficient grid capacity, long connection queues, and increasing levels

of curtailment. Across key European markets, hundreds of gigawatts of renewable capacity are waiting for grid access.

Increased investment is needed to address this critical infrastructure gap. Annual grid spending in Europe is expected to increase from around €69 billion today to approximately €103 billion per year through to 2050.⁴ In parallel, Europe will need to build approximately 29,000 km of transmission lines and 300,000 km of distribution lines annually to keep the pace with demand.⁵

This represents an infrastructure programme of historic scale. Public balance sheets and regulated utilities are unlikely to meet these large, immediate investment needs alone, since operators face structural constraints on leverage and capital deployment. This is a significant funding gap that cannot be bridged without private capital.

The new investment landscape

Capital requirements for grid assets and system flexibility are not only large but also highly visible and durable. For investors, this means long-term deployment opportunities aligned with structural demand.

Meanwhile, the nature of infrastructure investing is evolving. In an increasingly complex and volatile market, predictable assets with contracted or regulated revenues are attractive, providing visibility on cash flows and resilience across market cycles. Entry points are moving earlier in the asset lifecycle, particularly at construction-ready stages where risks are better understood but value creation potential remains.

Equally important is the ability to manage execution risk. This involves rigorous procurement processes, detailed counterparty assessment, and careful structuring of contracts across the value chain – from equipment supply to operations and maintenance. That's why among asset managers, industrial expertise and operational capability are becoming key differentiators.

In short, Europe's energy transition is moving towards a system optimisation phase. The challenge is no longer simply to decarbonise, but to ensure that decarbonisation is economically sustainable and operationally robust – forming the backbone of Europe's security, competitiveness, and growth. Against this generational shift, we see compelling renewable infrastructure opportunities that are no longer confined to generation assets, but extend across storage, networks and system services.



¹Source: Eurostat, 2026: <https://ec.europa.eu/eurostat/web/interactive-publications/energy-2026>

²Source: IRENA, 2024.

³Source: X-Change: Batteries – The Battery Domino Effect, 2023.

⁴Source: The State of European Power Grids: A Meta-Analysis (Aurora, 2025).
⁵Estimated based on planned investments in transmission lines until 2030 as reported in the 2024 TYNDP by ENTSO-E, extrapolated linearly to 2050.