

Net Zero Without Compromising Reliability: GE Vernova Shows How Spain Can Design a Power System That Achieves Both

- Spain has proven renewables can scale, now it must ensure the system can operate reliably as complexity increases
- Net zero is achievable, but not all pathways are equal, system design choices will determine cost, resilience, and long-term performance
- Electricity demand is expected to grow ~60% by 2050, increasing pressure on flexibility, grid infrastructure, and system coordination
- New analysis from GE Vernova outlines the trade-offs and system choices required to deliver a reliable net zero power system

MADRID, SPAIN (15 October 2026) – Spain has emerged as one of Europe’s leading renewable energy markets, with renewables supplying nearly 57% of electricity in 2025 and more than 80% renewable electricity expected by 2030. But as renewable penetration accelerates and electricity demand is projected to grow by around 60% by 2050, the country’s next challenge is no longer scaling renewable energy, it is ensuring the power system can operate reliably under increasing complexity.

As renewable penetration rises and system dynamics shift, challenges around stability, flexibility, and grid coordination are becoming more pronounced. Events such as the April 2025 Iberian blackout have brought renewed attention to system strength, reserve margins, and the need for coordinated grid operation in a high-renewables environment.

New analysis from GE Vernova examines how Spain can meet its net zero goals while maintaining reliability, affordability, and system resilience.

The analysis finds that Spain can achieve a net zero electricity system by 2050 through multiple pathways. However, these pathways differ significantly in terms of system cost, infrastructure requirements, operational resilience, and execution complexity.

"Spain has earned its place as one of Europe's leaders in the energy transition," said Jaime Elguero, Country Manager, Spain, GE Vernova. "The challenge now is not whether the country can achieve its ambitions, but how to build a power system that keeps pace with them, one that is as reliable and resilient as it is sustainable."

With electricity demand projected to rise by around 60% by 2050, driven by electrification and economic growth, the analysis outlines four distinct pathways for Spain's power system: Business-as-Usual, Progressive, Pioneering, and Lower-Carbon Pathway, illustrating how different system choices shape long-term outcomes.

Across these pathways, wind and solar capacity could expand to between 150 GW and 250 GW by 2050. At the same time, the analysis shows that a renewable-dominated system is not a renewable-only system. Even in the most renewable-heavy scenarios, 15-20% of system capacity must remain firm and dispatchable to maintain reliability during periods of low wind and solar output.

This shifts the focus from how much capacity is built to how the system is balanced, operated, and reinforced over time. Technologies such as storage, hydrogen, nuclear extensions, and carbon capture play structural roles in supporting system flexibility and stability.

Transmission and flexibility emerge as critical enablers of the transition. As renewable generation becomes more geographically concentrated, long-distance power flows increase, placing greater pressure on grid infrastructure. Without coordinated investment in transmission, storage, and system services, system inefficiencies such as renewable curtailment are likely to increase.



The analysis also underscores the role of policy and market design in enabling this transition. Streamlined permitting, incentives for geographically optimized renewable deployment, support for storage, and market mechanisms that value flexibility will be essential to align investment with system needs.

“We are proud to partner with Spain's utilities, policymakers and industry leaders as they shape the next chapter of the country's energy future,” added Elguero.

As Spain advances toward its 2030 and 2050 targets, the defining challenge is no longer ambition, but execution. The analysis provides a framework for policymakers, system operators, and investors to navigate trade-offs and build a power system that is not only net zero, but reliable, resilient, and economically sustainable.

The full white paper [is available here](#).

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About GE Vernova

GE Vernova Inc. (NYSE: GEV) is a purpose-built global energy company that includes Power, Electrification and Wind segments and is supported by its accelerator businesses. Building on over 130 years of experience tackling the world's challenges, GE Vernova is uniquely positioned to help lead the energy transition by continuing to electrify the world while simultaneously working to decarbonize it. GE Vernova helps customers power economies and deliver electricity that is vital to health, safety, security, and improved quality of life. GE Vernova is headquartered in Cambridge, Massachusetts, U.S., with approximately 85,000 employees across approximately 100 countries around the world. Supported by the Company's purpose, The Energy to Change the World, GE



Vernova technology helps deliver a more affordable, reliable, sustainable, and secure energy future.

GE Vernova's **Consulting Services** business provides customers with a suite of energy consulting expertise focused on solving the world's toughest technical and economic power system problems, enabling technology integration, and shaping the energy transition to help accelerate a new era of energy. With its cross-business resources, it can deliver power systems analysis, studies, and decarbonization pathways to serve a diverse global client base with a strong local presence.

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This document contains forward-looking statements – that is, statements related to future events that by their nature address matters that are, to different degrees, uncertain. These forward-looking statements often address GE Vernova's expected future business and financial performance and financial condition, and the expected performance of its products, the impact of its services and the results they may generate or produce, and often contain words such as "expect," "anticipate," "intend," "plan," "believe," "seek," "see," "will," "would," "estimate," "forecast," "target," "preliminary," or "range." Forward-looking statements by their nature address matters that are, to different degrees, uncertain, such as statements about planned and potential transactions, investments or projects and their expected results and the impacts of macroeconomic and market conditions and volatility on the Company's business operations, financial results and financial position and on the global supply chain and world economy.

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