eurelectric
powering people

Ensuring a resilient and secure energy system

Eurelectric Position Paper

September 2025

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

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Electrification & Sustainability Committee
Generation & Environment Committee
Markets & Investments Committee
Distribution & Market Facilitation Committee
Customers & Retail Services Committee

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EXECUTIVE SUMMARY

Despite the investigation is still ongoing on the Iberian blackout, Eurelectric proposes to take this incident as a starting point for a broader reflection on the security of supply challenges in an energy system increasingly based on renewable energy sources (RES). Our paper is structured around five key pillars: **(i) governance and transparency, (ii) planning, (iii) flexibility (including system services), (iv) adequacy and (v) grid investments.**

Regardless of the possible causes of the blackout, on which Eurelectric will refrain from commenting until all relevant investigations are concluded, and in particular, that of ENTSO-E, the severity of the event underscores the growing pressure on Europe's electricity system. With millions of citizens left without power, the need to address the requirements of a modern energy system to ensure the security of electricity supply is evident. This need becomes even more pressing in light of mounting risks such as climate change, hybrid threats and supply chain vulnerabilities, combined with the fact that economy-wide electrification is a key driver of the EU's competitiveness.

The recommendations of this paper are mostly covered in the February 2025 flagship study, *Redefining energy security in age of electricity* and other existing positions in Eurelectric position papers.

KEY MESSAGES

i. **Governance** arises as a key area which needs to be urgently reviewed. The most pressing lesson is the urgent need to separate operational responsibility from investigative authority. Moreover, **transparency** is vital before, during and after disruptions. clear roles, timely information sharing, a clear line of communication and decision making and structured coordination across sectors are essential to ensure that all actors can respond effectively in emergencies and make informed decisions in a coordinated way that reinforce system resilience.

ii. **Planning** must evolve from reactive assessments to a forward-looking, holistic framework that continuously integrates flexibility, cross-sectoral interdependencies and structural risks, and enables Europe to anticipate possible disruptions and guide strategic investments in line with both fostering competitiveness and achieving long-term climate targets.

iii. **Flexibility** is critical for stability and resilience in a system increasingly reliant on variable renewables. This must be supported through clear investment signals. First, an appropriate remuneration for **system services** such as inertia, reactive power, voltage control and black start is necessary, ensuring resilience in an increasingly RES-based system. Second, integrations of flexibility in capacity remuneration mechanism, flexibility support schemes

where needed and/or storage strategies could complete the flexibility framework where current markets fail to give sufficient visibility and incentives (e.g. as regards risk management and securing revenue in the long-term).

iv. **Adequacy** assessments must be grounded in operational realities, including real interconnection availability, and must anticipate (and not block) necessary national interventions initiatives where security of supply could be at risk, e.g., particularly when and where national adequacy assessments point to urgent capacity needs.

v. **Grid investments** must be forward looking and accelerated via coordinated planning and fair remuneration to meet growing electrification and decentralisation needs. At the same time, we must serve customers in a resilient, cost-efficient manner, while ensuring interconnection gaps such as those in Iberia are urgently addressed through coordinated infrastructure planning.

Ensuring a resilient and secure energy system

Energy security has become an increasingly urgent priority for Europe's electricity system. **A decarbonised system built around electrification offers a pathway to lower CO_2 emissions while enhancing affordability and resilience**. Reducing our dependence on imported fossil fuels is a no-regret solution that limits exposure to volatile prices and brings significant economic advantages. A system largely powered by variable renewables introduces both new opportunities and challenges. **This notwithstanding, it is equally capable of delivering reliability (see Eurelectric study *Redefining energy security in age of electricity*); provided that the system is managed and operated in a sound way.**

Recent events on the Iberian Peninsula call for reflection on vulnerabilities that can arise when system planning, infrastructure development, coordination and operational processes are misaligned. Even if this appears today to be an isolated incident, it is essential to identify early improvements to strengthen system resilience in the future and ensure the continuity of electricity supply.

Solutions are within reach. Security of supply in a decarbonised electricity system can be further enhanced if strategic actions are taken across all levels. This requires a coherent framework grounded in five complementary pillars:

I. **Governance & transparency**
II. **Planning**
III. **Flexibility, including system service procurement**
IV. **Adequacy**
V. **Grid investments**

The following sections examine each of these pillars in greater detail, assessing the challenges ahead and the policy and regulatory responses needed to strengthen Europe's electricity system.

I. Governance & transparency

Effective responses to major system disruptions require getting both real-time management and post-event analysis right. This is why governance and transparency are critical.

Governance ensures that roles and responsibilities are clearly and fairly allocated after an incident. In the case of the Iberian blackout, *Red Eléctrica de España* (REE), the Spanish TSO, has access to comprehensive data from all European TSOs. Such an access should only be used to foster accountability (e.g. of the actions taken by the national system operator).

Transparency is equally vital before, during and after disruption. Timely and open communication is essential to limit the impact and coordinate responses. The Iberian blackout exposed serious weaknesses in how information was shared, both within the electricity system and with external stakeholders (industries, population, etc.). Delays in disclosing data and the lack of transparency months after the event highlight that openness is still not a default approach.

Assessment

The Iberian blackout revealed a fundamental weakness in how system operation and incident investigation are governed in Europe. **The most urgent lesson is the need to separate operational responsibilities from investigative authority.**

It is not appropriate for a stakeholder to take part in investigations of incidents in which it may directly or indirectly be involved, as it happened in the Iberian case, since this raises clear concerns about impartiality and possible conflicts of interest. The appropriate safeguards should therefore be put transparently in place to avoid any protection of vested interests.

Furthermore, the electricity system involves many actors such as system operators, market participants, regulators, security services and requires clearly defined roles, communication protocols, data transparency, and coordinated response. **Inadequate information sharing can compromise stability, especially during crises that require swift decisions.**

Transparency must also extend to other sectors. This requires predefined protocols, regular crisis simulations and cross-sectoral access to relevant (sometimes classified) information.

Recommendation

- ✓ To protect the integrity of future investigations, the following actions are essential:
  - Establish independent panels for incident analysis, where the parties concerned do not conduct the investigation but participate and provide all necessary data without delays.
  - Ensure clear separation between operational, regulatory and analytical bodies.
  - Guarantee appropriate data transparency and access to key findings, enabling accountability and peer review.
- ✓ More broadly, **a coherent and revised governance framework is essential to enable effective cross-sectoral information sharing and protect sensitive data**, especially given existing structural challenges within governments. This review must critically assess current oversight mechanisms and avoid giving entities that could have contributed to the problem a central role in the governance to ensure an efficient and secure energy system.

II. Planning

The best way to anticipate unforeseen events is a sound preparedness. The goal must be to anticipate such potential risks, limit damage and ensure system resilience, not to rush for solutions once crises unfold. **Yet, sometimes, our planning frameworks remain reactive rather than proactive**. Therefore, we believe that the planning phase should move beyond a narrow focus on adequacy (based on NECPs rather than trends and projected scenarios) and infrastructure needs, to also cover flexibility requirements, long-term planning to anticipate risks and needs, and enhanced cross-border and cross-sectoral coordination. This also implies ensuring a proper application of processes and performance monitoring.

Assessment

While Europe has developed valuable tools, the current system needs assessments at both EU and national levels remain too narrow. The focus is predominantly on system adequacy and network development tailored to the immediate network needs, often neglecting flexibility needs, cross-sector interactions and long-term structural risks. The assessment tends to rely on short time horizons, which are not aligned with Europe's 2040 and 2050 climate and energy targets and lack harmonised methodologies to support coherent investment decisions. In addition, these structural risks - including supply chain, cybersecurity and climate risks - are not always allowed nor incentivised to be properly integrated into investment plans by Member States or NRAs. If system

operators do not proactively strengthen resilience in line with increased existing risks or development of new risks, the resulting recovery costs will ultimately be higher.

Although EU long-term studies framework has been in development for years (such as the European Resource Adequacy Assessment [ERAA] and Ten-Year Network Development Plan [TYNDP]), **they are still insufficient to effectively and efficiently guide policymakers and investors and coordinate investments required for Green Deal, REPowerEU and Clean Industrial Deal goals.**

Today's patchy and fragmented approach is incompatible with the integrated internal energy market we aim to build. Without better cross-border coordination on a transmission level, we risk distorted investment signals and inefficient capacity deployment. Optimising system needs across countries and energy vectors under a long-term perspective consistent with the 2050 carbon neutrality goal is essential to direct investments where they are truly needed and avoid wasteful duplication or gaps.

Some progress has been made. For example, **the new flexibility needs assessment introduced by the electricity market design (EMD) regulation is a positive step, but planning still lacks a full and consistent EU-wide integration of flexibility**. Current metrics still focus on firm capacity, largely ignoring the growing role of flexible assets.

Recommendation

- ✓ **A truly holistic assessment must move beyond adequacy alone. It must incorporate different energy vectors and a more electrified system, sustainable access to raw materials, supply chain resilience, disruptive events like climate shocks and cyberattacks and the increasing systemic nature of these risks.** These are no longer extreme, once-in-a-generation events. They are becoming the new normal, given their increased frequency. Planning frameworks must fully integrate automatic adaptation, resilience and sectoral coordination, ensuring that Europe's energy system remains robust, efficient and ready for what lies ahead.

III. Flexibility

Flexibility is an essential pillar of security of supply in a power system increasingly based on variable renewables generation. There are undoubtedly new challenges that arise from relying on energy sources and that can be met efficiently with improved flexibility on the supply and demand sides. **We know very well by now that the need for daily, weekly and seasonal flexibility will grow sharply between today and 2030/2050** due to the expansion of wind and solar generation and the electrification of end-use sectors. Flexibility solutions will enable the system to manage periods of both high- and low-RES production while optimising surplus generation and ensuring system resilience. **In the recent revision of the market design and the prevailing regulatory environment, the additional tools to ensure appropriate investment incentives to enable these technologies to scale were introduced. It is necessary to now swiftly implement such tools, thus ensuring the much-needed investment stability.**

Assessment

In the current energy system, a growing flexibility gap is emerging in many Member States, flexible resources either do not earn sufficient revenues from energy, balancing or ancillary services markets, or face barriers to accessing these markets, making it difficult to justify investment at the

pace and scale needed for their optimal development. **To address this, it is essential to clarify the long-term role of flexibility in the system, strengthen market price signals (also by reflecting scarcity) and provide visibility for investments where and when market signals alone are not sufficient (e.g., full integration of flexibility in capacity remuneration mechanisms or flexibility supporting schemes, when such schemes are deemed necessary).**

The recent EMD reform provides new tools for Member States to act. Under the reformed framework, governments do not need to wait for the full development and approval of EU-wide methodologies before acting. **Member States can already define indicative flexibility targets and develop national support schemes to accelerate deployment. This includes the possibility to fully integrate flexibility into capacity remuneration mechanisms, establish dedicated flexibility support schemes and/or storage strategies with clear action lines**. National strategies should actively incentivise investment and project execution, address permitting barriers and ensure proper governance with clear responsibilities, timelines and delivery targets. Without credible and stable investment frameworks, Europe will face a flexibility gap that could undermine the reliability and cost-effectiveness of its decarbonised power system.

Furthermore, the proper remuneration of system services is fundamental to maintain a secure and stable system. **Services such as inertia, reactive power, voltage control and black start capabilities** are disappearing from decarbonised systems (due to the phase-out of conventional fossil-based synchronous power plants and its replacement with variable RES) but remain indispensable for safe operation. Indeed, procurement mechanisms do not exist in most of Member States (e.g. remuneration of inertia), are not designed with a market-wide approach or often fail to reflect the strategic importance of these services.

Recommendation

- ✓ **Member States should assess and define their flexibility needs (at least hourly, daily, seasonal) and develop national support schemes with clear action lines if deemed necessary.** The objective should be to incentivise investment in flexibility, address potential regulatory barriers, deliver flexible capacities (demand and supply sides) that allow to fill the identified flexibility needs, and ensure clear governance and responsibilities.
- ✓ **Strengthen price signals.** Where these are not sufficient, integrate flexibility in capacity remuneration mechanisms or implement flexibility supports schemes.
- ✓ **Ensure adequate remuneration for system services (e.g. inertia, voltage control, black start) across all Member States.**

IV. Adequacy

Adequacy must be addressed with a more realistic and context-sensitive approach if Europe is to ensure true security of supply in a decarbonised, electrified and interconnected energy system. As electricity becomes central to our energy mix, adequacy assessments must move beyond theoretical models and reflect the real-world constraints faced by national systems. The ERAA, while being one of the main outputs at European level, too often concludes that adequacy is not at risk, only for countries to later face serious challenges. While we greatly value this European tool, any disconnection between a “theoretical” assessment on paper and the “on-the-ground” perception and operational realities undermines trust in this exercise. This highlights the urgent need to improve it by revisiting the assumptions used and the risk factors considered, particularly

regarding interconnection availability, real-world risk-averse investor behaviour, demand patterns and weather-dependent generation.

Assessment

The recent case of Portugal during the Iberian blackout is emblematic. The country was unable to access support through interconnections: the only interconnection (with Spain) was unavailable at the time and, Portugal had to rely exclusively on national resources. As there were no alternative interconnections, it left the system effectively isolated despite being physically part of the continental network. In this context, adequacy in Portugal became a real and immediate concern, even if this specific case is not captured in ERAA modelling.

More broadly, the current adequacy approach remains patchy, especially when viewed against the ambition of an integrated internal energy market. National energy and climate plans (NECPs) frequently do not reflect actual system constraints or the speed of change on the ground, leading to planning and investment gaps that could have been anticipated.

We must collectively improve how this essential component is delivered, by ensuring greater consistency across national and European assessments, by making better use of real-time system knowledge, and by optimising investment signals across borders. Adequacy cannot remain a tick-the-box exercise. It must become a robust, operationally grounded tool that enables proactive, coordinated and credible energy system planning at a regional and European level.

Recommendation

- ✓ **The European tool's assumptions should improve to reflect reality, particularly to effectively identify security of supply concerns and incentivise Member States to propose measures such as capacity remuneration mechanisms, when such mechanisms are deemed necessary to reach adequacy targets.** The framework must allow for a fast and flexible response, rather than becoming a barrier to timely action.

V. Grid investment

The energy transition cannot succeed without accelerating and optimising grid investments. As electricity becomes the lifeblood of Europe's decarbonised economy, the role of electricity grids is no longer secondary. In particular, the distribution grids will be a critical enabler to connecting decentralised renewable generation and delivering the flexibility needed for a more secure system based on greater shares of RES. At the same time, electrification of transport, heating and industry, combined with massive deployment of RES and other distributed energy resources (DERs), is rapidly increasing both the volume and complexity of electricity flows.

Yet, today's grid investment practices remain largely incremental and reactive, based on outdated assumptions that do not reflect the speed and scale of change. Without urgent action, this will result, even more than today, in growing grid congestion, connection delays and systemic risks that will slow down both decarbonisation and economic growth and hinder security of supply.

Assessment

Grid investments (in particular at distribution level) for modernisation, reinforcement and expansion are not optional - they are an absolute necessity. Therefore, grids investments must be underpinned by an appropriate financing framework. This includes fit-for-purpose network tariffs,

dedicated funding from national and EU budgets (e.g. to deal with anticipatory investments) or favourable financing terms (e.g. low-interest loans, extended maturities).

Modernisation means building smarter grids, capable of quickly detecting and responding to faults through automation and digital grid meshing. These technologies improve resilience by enabling real-time reconfiguration in the face of disruptions. At the same time, modernisation must be supported by appropriate remuneration of Transmission System Operators (TSOs) and Distribution System Operators (DSOs). In some countries, specific charges create a divergence between the actual remuneration of DSOs and the nominal rate considered fair by regulators. This gap undermines the incentives and financial capacity needed for DSOs to carry out their evolving responsibilities, as well as retain capital market investors to finance grids, which should be addressed as a matter of urgency.

Investment in interconnection is also essential. A truly integrated internal electricity market cannot function if large parts of Europe remain effectively isolated. The case of Iberia is particularly striking. Despite being physically located on the European mainland, it remains more isolated than actual islands like the United Kingdom or Ireland, which have better interconnection with the continental Europe, though a new interconnection "Bay of Biscay" between France and Spain is under construction at the moment. This situation limits cross-border flexibility, weakens system resilience and should be addressed through coordinated policy and strategic infrastructure investment, even if in specific events such as the Iberian blackout their immediate impact might have been limited.

Europe cannot afford to let its electricity grid become the bottleneck of its energy transition. Grid investments, both locally and across borders (i.e. distribution and transmission levels), must be prioritised, modernised and properly rewarded to ensure a resilient, decarbonised and truly connected energy system.

Recommendation

- ✓ **To meet the objectives of the European Green Deal, REPowerEU and the Clean Industrial Deal, annual investment in distribution grids must more than double for the next fifteen years and remain elevated through 2050, averaging around €67 billion per year.** Around 43% of this investment is driven by demand growth. Anticipatory investment, where DSOs plan assets to meet future needs, is the most cost-effective strategy and must be enabled and incentivised. However, it requires long-term forecasting capabilities and coordination, as well as regulatory frameworks that provide investment certainty, adequate returns and de-risking.

Conclusion

The transition to a decarbonised energy system brings with it new opportunities, but also significant risks and responsibilities.

A decarbonised system, primarily based on electrification, is not only the most effective path for reducing CO_2 emissions, but also the most reliable and affordable solution. By decreasing reliance on volatile fossil fuel imports, Europe stands to benefit from substantial cost reductions. According to data from the European Commission and Eurelectric, the EU's fossil fuel import bill could decline

by up to 63 percent by 2040, saving between €200 and €300 billion annually, with even greater savings expected by 2050. Rather than depending on expensive fossil fuels from third countries, Europe will rely increasingly on clean, homegrown energy sources. While some dependence on critical raw materials will remain, it is largely manageable by diversifying supply chains, investing in domestic production and fostering strategic trade agreements.

As regards the risks and responsibilities, these cannot be effectively addressed with reactive measures or fragmented approaches. While the cause of the Iberian blackout is still to be clearly determined and the response to it was extraordinarily commendable, actions should be taken now to reduce the risks of more serious consequences in the future. This **requires a forward-looking, integrated strategy that ensures the system is equipped to deliver reliability, resilience and cost-effectiveness under increasingly complex conditions.**

The five pillars outlined in this paper provide a comprehensive foundation for such a strategy. **Governance improvements and transparency** (especially the separation of the operational responsibility from the investigative authority), strengthening **planning** frameworks, securing the availability of **flexibility and system services**, delivering realistic **adequacy** assessments, modernising and expanding **grid infrastructure on all voltage levels**. They are essential components of a functioning, future-proof electricity system.

The recent system stress in Iberia should be seen not only as a warning, but as a clear signal that action is required. Europe has the tools and the regulatory levers to act. The challenge now lies in deploying them with urgency, consistency and strategic foresight.

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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