Position Paper

SECURING EUROPE'S ELECTRIFIED FUTURE THROUGH RD&I IN ELECTRIC POWER SYSTEM COMPONENTS

Why Europe must accelerate innovation in grid and power system technologies to deliver decarbonisation, competitiveness and strategic autonomy

Europe's electrification challenge

The EU is at a defining moment, balancing three major priorities: tackling climate change, strengthening energy security and sustaining competitiveness.

The EU has long aimed to position itself as a global leader in climate neutrality. It is currently on track to reduce emissions by 55% by 2030 [1], while the agreement on a 90% emissions reduction target for 2040 further reinforces this trajectory [2]. The Clean Industrial Deal also highlights the increasingly strategic link between decarbonisation and competitiveness, underlining that **Europe's industrial transformation will depend on access to affordable, secure and low-carbon electricity.**

At the same time, **the geopolitical context has changed significantly over the last few years.** Russia's full-scale invasion of Ukraine in 2022 and renewed instability in the Middle East in 2026 have reinforced the need for Europe to strengthen its security, resilience and preparedness. Meanwhile, Europe faces **growing competitive pressure and supply chain vulnerabilities vis-à-vis China and the United States** across a range of strategic technologies, compounded by evolving tariff and export policies [3].

At the core of achieving decarbonisation, competitiveness, security and resilience lies large-scale electrification based on affordable zero-emission energy sources. In increasingly electricity-dependent societies, **energy independence and power system reliability are essential to both prosperity and security.**

Why electric power system components matter

While there is no single solution to these interconnected challenges, they all depend on one critical enabler: **electric power system components as the backbone of electrification.** This includes both next-generation grid components and enabling technologies — including grid-enhancing technologies supporting flexibility, digitalisation and system optimisation — underpinning the modernisation, resilience and efficiency of Europe's electricity systems.

European power systems have demonstrated an exceptionally high level of reliability over recent decades, with outages affecting consumers remaining comparatively rare. However, as mature systems, they have not benefited from sustained large-scale RD&I investment. **Maintaining this level of reliability will become more challenging** in the face of growing cybersecurity threats and sabotage risks, climate change impacts and increasing complexity

The acceleration of electrification will require a massive expansion and modernisation of both transmission and distribution grids, alongside **wider innovations in monitoring, digitalisation, edge intelligence and control systems.**

The EU has acknowledged the strategic importance of grids through initiatives such as the EU Action Plan for Grids [4] and the European Grids Package [5]. Therefore, **it is important to ensure that RD&I investment in electric power system components is aligned with Europe's climate objectives, energy security and strategic autonomy and that potential barriers for the application of results of these investments are removed.**

Strategic RD&I investment in electric power system components can play a critical role in accelerating electrification while strengthening Europe's competitiveness, industrial resilience and technological leadership. In particular, targeted innovation support can help address key bottlenecks related to grid deployment, critical materials, system flexibility and industrial capacity, while reinforcing Europe's long-term energy security and strategic autonomy.

A **coordinated strategic effort** is therefore needed to:

- **unlock faster grid capacity expansion and reduce lead times** for integrating renewable energy and meeting rising electricity demand from industrial electrification, clean-tech manufacturing, data centres and other strategic loads;

- **replace phased-out and scarce materials** through the development of sustainable alternatives, efficient recycling methodologies and innovative component designs;

- **strengthen Europe's industrial base and European manufacturing value chains**, ensuring resilience against extreme weather events and human-made disruptions, also taking into account **strategic stockpiling**;

- **improve the efficiency and flexibility of grid operation through digitalisation**, distributed automation, edge intelligence and advanced control systems, while reducing congestion and optimising the use of existing infrastructure;

- **strengthen Europe's innovation trajectory** for next-generation power system components, securing long-term technological leadership and innovative manufacturing methods reducing lead times and strengthening European industrial competitiveness;

- support the testing, validation and system-level **integration of innovative technologies**, ensuring **interoperability, cybersecurity and suitability** for real operating conditions across both transmission and distribution grids;

- reinforcing research-based education and **reducing the skills gap** identified in the Draghi report [6] through stronger pan-European research cooperation.

- Build **European strategic sovereignty** in key technologies, strengthening the EU grid technology industry to develop and manufacture the required equipment for future digital grids.

Call to action

Europe cannot achieve decarbonisation, competitiveness and strategic autonomy without a resilient, modern and technologically advanced electricity system.

As the EU shapes the next generation of industrial, energy and research policies — including FP10, the European Competitiveness Fund, the implementation of the Clean Industrial Deal and the European Grids Package — electric power system components and grid-enhancing technologies must be recognised as strategic priorities for targeted RD&I investment.

We, the signatories, urge the European Commission, the European Parliament and Member States to:

- strengthen support for collaborative European RD&I programmes dedicated to electric power system components and grid-enhancing technologies;

- ensure stronger alignment between industrial, energy and research policies to accelerate the deployment of innovative grid technologies across Europe;

- support the development, testing and industrial scale-up of sustainable electrical grid components manufactured in Europe, with reduced dependence on critical raw materials;

- reinforce Europe's industrial and technological leadership in strategic grid technologies essential for electrification, resilience and energy security;

- accelerate innovation pathways enabling the integration of renewable energy sources, increased system flexibility and more efficient use of existing infrastructure.

If Europe fails to accelerate RD&I in electric power system components, the energy transition risks slowing down significantly, leaving the continent increasingly exposed to supply shocks, technological dependencies and geopolitical risks.

References

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[3] A Competitiveness Compass for the EU (2025) https://commission.europa.eu/document/download/10017eb1-4722-4333-add2-e0ed18105a34_en

[4] EU Action Plan for Grids (2023) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023DC0757

[5] European Grids Package (2025) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025DC1005

[6] Draghi, M. (2024). The future of European competitiveness: A competitiveness strategy for Europe. European Commission https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en

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