

Call for evidence on the EU's energy security framework

CurrENT response to the EC's public consultation

The current EU energy security framework remains heavily reliant on fossil fuels. As Europe moves toward full decarbonisation based on electrification and renewables, major investments in electricity grids will be essential.

The framework must address long-term challenges such as climate change, rising energy use, technological change, hyperconnectivity, and resource scarcity. These pressures are increasing instability in electricity generation and demand. To meet them, Europe must build an electricity system able to adapt to dynamic shifts. This requires investing in interconnection and innovative grid solutions to enable higher renewable penetration, cut fossil fuel use, and create a cost-effective, resilient energy system. Grid investments are also central to Europe's competitiveness. A more integrated and innovative system can lower costs, stabilise prices, and strengthen resilience to external shocks while ensuring affordability.

The costs of solar, wind, and batteries have fallen sharply, but grid constraints and integration challenges still limit the full use of renewables. Unlocking these benefits requires optimising and integrating the EU electricity market through better EU-level planning, maximising efficiency, and ensuring renewables are dispatched where cheapest. It also calls for stronger interconnection and planning for a pan-European grid. Even with improved markets, Europe still needs reinforced infrastructure and innovative technologies to transmit renewable energy.

Grid operators must be equipped to manage new technological challenges. Innovative grid technologies such as Advanced Power Flow Control, Dynamic Line Rating, Digital Twins, Advanced Conductors, High Temperature Superconductors, Inertia Measurement Systems, and Storage as a Transmission Asset are commercially available. They can provide better insight into line and inertia limits, dynamically control power flows, and increase transmission and distribution capacity. Despite their potential to strengthen the grid and support renewables, they are still not deployed at scale.

One reason is that most grid investments occur domestically, meaning system operators need the right incentives to deploy innovative technologies. Remuneration frameworks

in most Member States still favour capital-intensive projects over lower-cost optimisation. A benefit-sharing approach could change this: if an operator meets a system need with a cheaper solution, they would be rewarded with part of the savings. This would encourage operators to adopt innovative solutions that deliver societal benefits despite added effort or perceived risks.

To strengthen Europe's energy security, we must fully use innovative grid technologies that enhance both the physical resilience and cybersecurity of the power system. Properly governed cloud deployments can provide stronger security and availability than isolated local systems, so the upcoming framework should avoid imposing outdated safety requirements that could slow deployment.

Delivering on these goals requires forward-looking grid planning. Since Europe's 2050 climate neutrality depends on a decarbonised electricity system by 2040, today's decisions must align with that pathway. CurrENT recommends developing reference grids for 2030, 2040, and 2050, with the 2050 grid as the benchmark for a fully decarbonised Europe. All intermediate grids must follow the trajectory set by the European Climate Law. The 2040 Ten-Year Network Development Plan should reflect what is required for full decarbonisation by 2050, including a fully decarbonised power sector by 2040 and infrastructure supporting electrification in heating, transport, and industry. Europe should also expand cross-border capacity and lay the foundations of a pan-European grid.

As no European grid model yet defines the infrastructure needed to meet these goals, CurrENT proposes a 'Grid Preparedness and Innovation Strategy' to support resilience and modernization.