

Energy 4.0: the IoT backbone of the net-zero grid in Europe

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Abstracts

This report examines how utilities, grid technology vendors, and flexibility players can leverage IoT to make power systems more observable, controllable, and resilient between 2026 and 2030.

It argues that the net-zero grid is no longer solely a generation and transmission challenge; it is increasingly a matter of grid-edge intelligence, data orchestration, and operational integration—driven by renewable growth, electrification, DER expansion, congestion, and resilience pressures.

Furthermore, the report maps the technologies, architectures, use cases, and ecosystem shifts shaping this ongoing transition, and identifies where measurable value will emerge first.

It also analyses the structural barriers impeding scale, including fragmented regulation, weak interoperability, legacy integration complexity, cyber exposure, and uneven flexibility monetisation.

The report concludes with strategic recommendations on where to invest, which capabilities to prioritise, how to reduce implementation friction, and which market and policy levers are required to scale Energy 4.0 across Europe.

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