The Net-Zero manufacturing industry landscape across Member States

Presentation for RGI Expert Exchange Workshop: "Powering Security”
25 September 2025

ECORYS

Today’s agenda

Introduction

1. Research Methodology, Scope and Limitations
2. Grid component manufacturing
3. Supporting frameworks
4. Policy recommendations

Closing: Other related Ecorys Work

Source: European Commission: Directorate-General for Energy and ECORYS, The net-zero manufacturing industry landscape across Member States – Final report, Publications Office of the European Union, 2025, https://data.europa.eu/doi/10.2833/2249632

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Net-Zero Manufacturing

- The **manufacturing capacity** of technologies and products that support the **clean energy transition**
  - ***Distinct from the deployment/installation of renewable energy***
- Reasons for its **strategic importance**:
  - Net-Zero manufacturing is essential to meet 2030 and 2050 climate goals.
  - It supports energy independence, cost reductions, and the industry's shift towards sustainability.
- On a global scale, there is intense and **growing competition**, particularly from China and the US

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Research objectives

Objective 1

Map the Net-Zero industrial landscape in each Member State:

Identify the production and manufacturing for each Net-Zero technology

Review the policies and frameworks they have in place to support Net-Zero industries.

Objective 2

Identify the drivers, opportunities, and barriers to (scaling-up) Net-Zero industries manufacturing.

Scope: Selection of 8 Net-Zero technologies for EU27

Sources: factory level data; production & trade flows; stakeholder input

Technologies in focus

Net-zero technologies*

- Solar photovoltaic and solar thermal
- Onshore wind and offshore renewables
- Batteries and storage technologies
- Heat Pumps and geothermal energy technologies
- Electrolysers and fuel cells
- Sustainable biogas/ biomethane technologies
- Carbon Capture and Storage technologies
- Grid technologies

The Critical Role of Grid Technologies

- Renewable integration – Manage variability of solar & wind
- Decentralisation – Support distributed generation & storage
- Industry – Electrification for efficiency & decarbonisation
- Smart grids – Enable real-time optimisation & reliability

Risks of underinvestment: delays could slow energy transition, increase emissions & gas reliance (IEA).

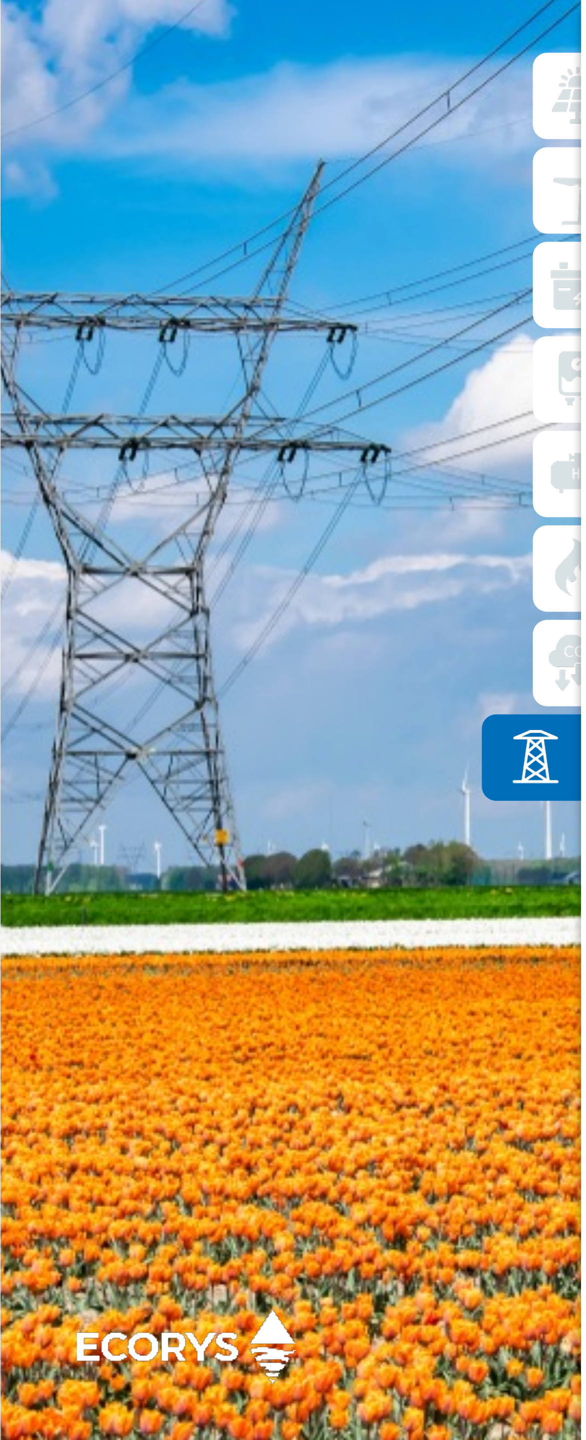
* The revised NZIA covers an additional 10 technologies

Grids in focus

- Scope in NZIA: Grid technologies defined under the Net Zero Industry Act
- Study coverage: Products in **bold** were analysed in detail
- Classification: Trade analysis is based on the HS and CN product codes. PRODCOM codes were used for EU production

Regulation - C(2025)2901

- Substations
  - **Switchgears, circuit breakers, protection relays, disconnectors**
  - **Inverters, converters**
  - [...]
- Electricity transmission and distribution
  - **Electrical conductors** (including advanced conductors and high-temperature superconductors)
  - **Cables, lines and associated accessories**
  - **Insulators**
  - Towers
- **Power transformers**
  - Transformer cores, windings, tap changers
- Electric charging technologies for transport
- Technologies to digitalise the grid and other electricity grid technologies
  - **High- and medium-voltage power electronics equipment and components**
  - Flexible alternating current transmission system (FACTS) technologies
  - **Smart meters / advanced metering and control infrastructures**



Grid technologies - Cables

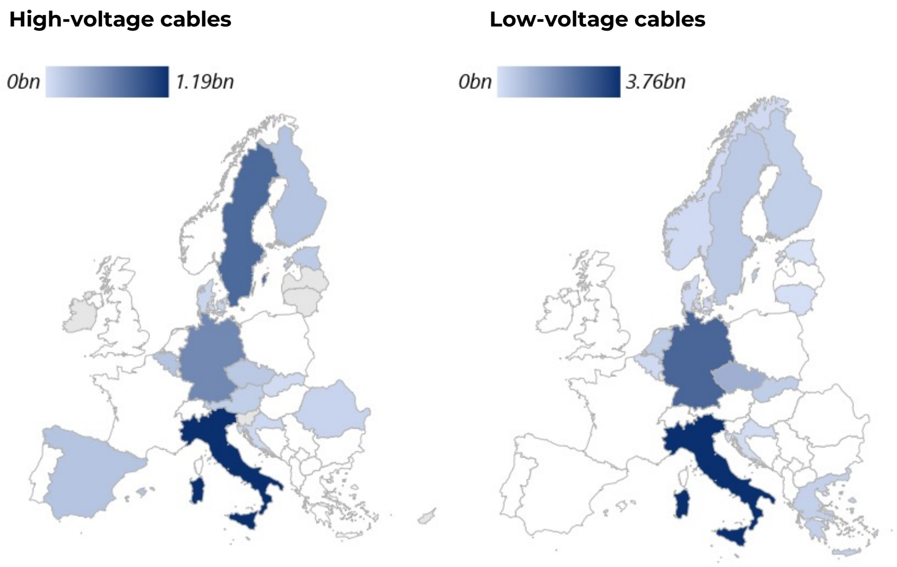
The EU holds global leadership in grid infrastructure, particularly in the production of high-voltage cables

Strong increase in global demand, paired with increasing competition

Total EU production: €5.8 billion (2022)*

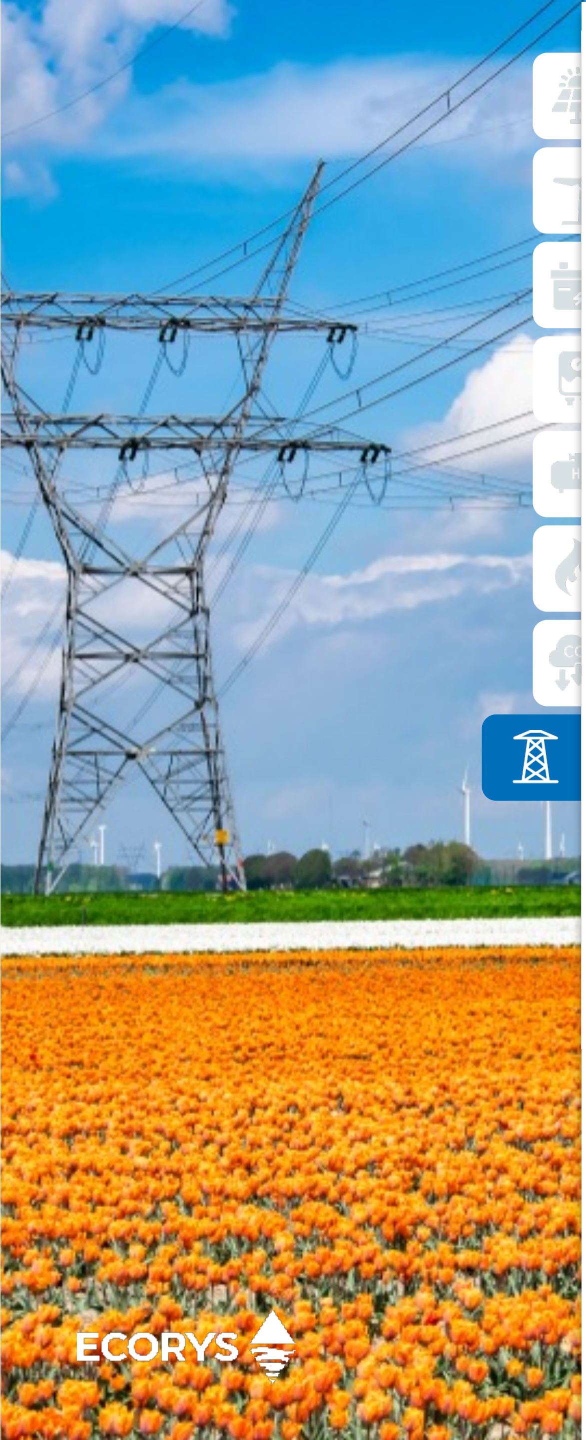
- Italy (€1.2B), Sweden (€0.8B), Germany (€0.6B)
- France & Poland: significant capacity but data confidential
- Main producers: Prysmian Group (Italy), Nexans (France), NKT (Denmark), Tele-Fonika (Poland), Hellenic Cables (Greece)

Similar trends in the manufacturing of low-voltage cables, but limited data available



Note: *The visual shows industrial production value (€) in 2022. Source: PRODCOM. White = no data, Grey = zero production. Some values may be underreported due to missing product codes for sub-components for given countries.*

High-voltage refers to more than 1,000 volts



Grid technologies

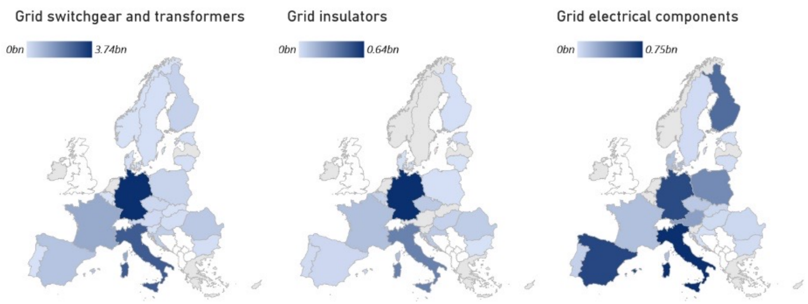
The EU maintains a strong and integrated ecosystem

- **Germany & Italy** dominate production across switchgear, transformers, insulators, and electrical components.
- **France & Spain** show notable capacities, reinforcing Southern Europe's role.
- Eastern Europe contributes modestly

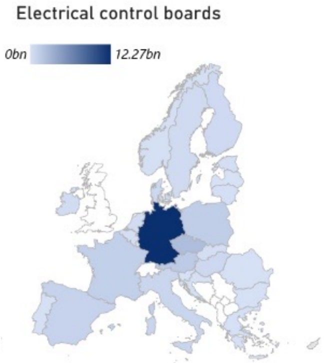
Overall: a concentrated but diverse industrial base, anchored by a few leading Member States.

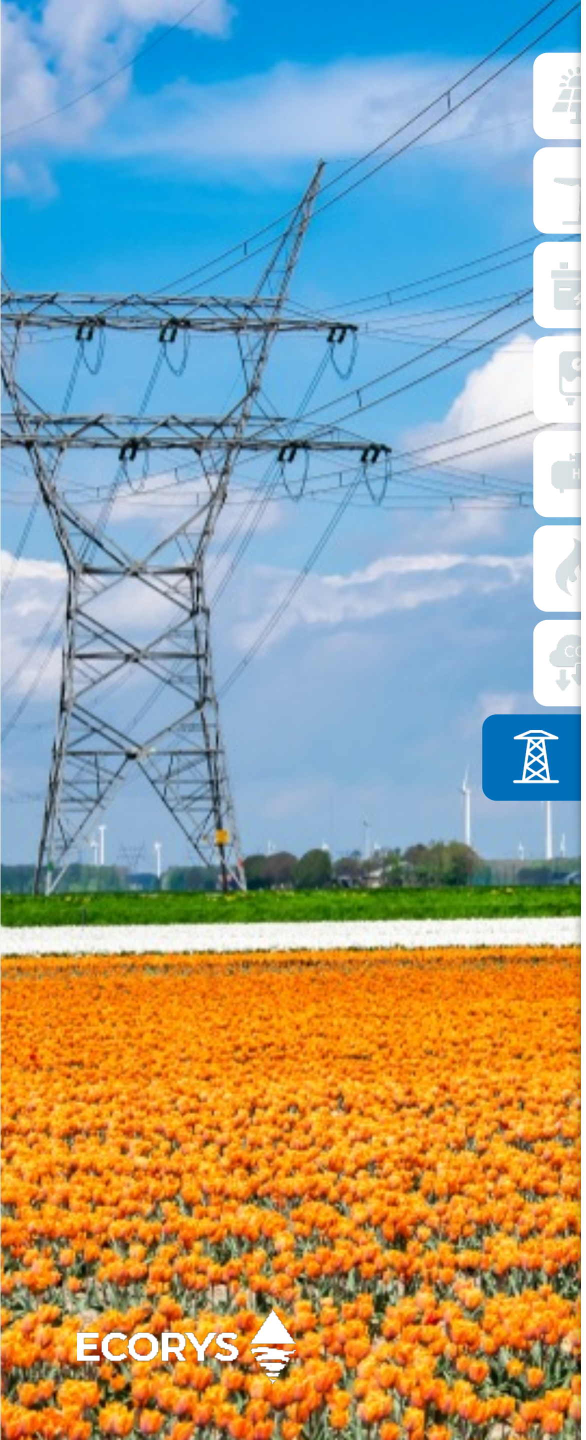
Smart grid & metering

- Challenge to isolate specific smart metering products
  - Electrical control boards (proxy indicator, though general-use too)



Note: *The visual shows industrial production value (€) in 2022. Source: PRODCOM. White = no data, Grey = zero production. Each map depicts a grouping of relevant components or end-use products.*
Some values may be underreported due to missing product codes for sub-components for given countries.





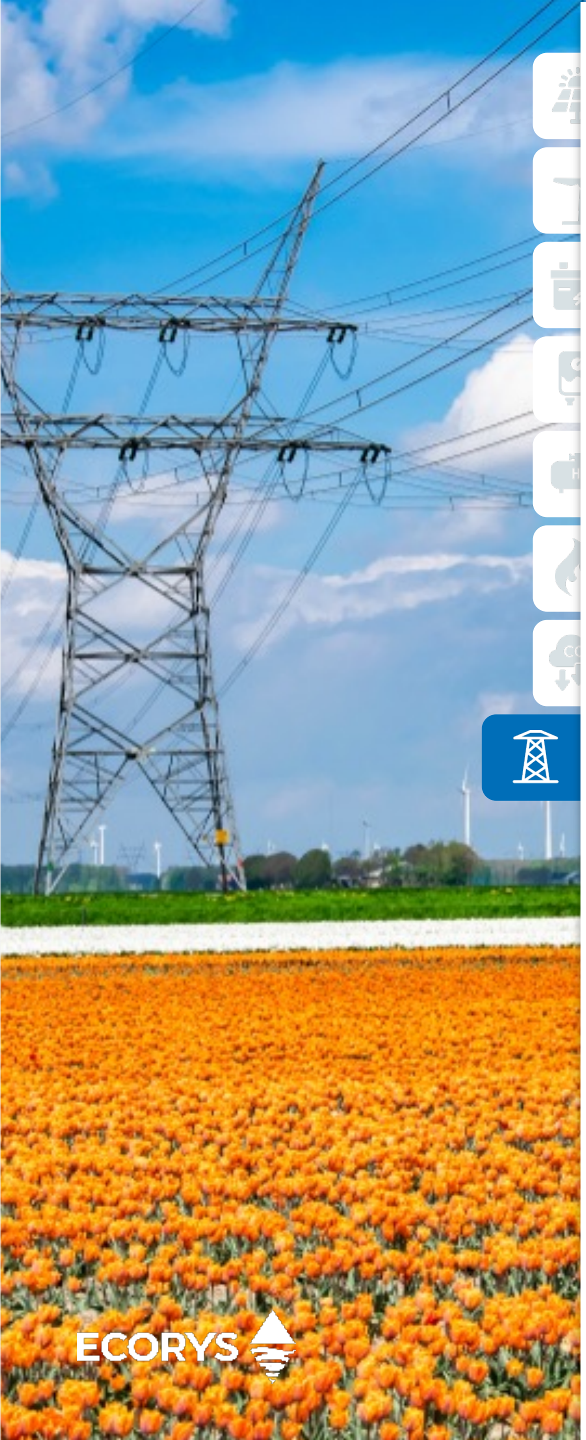
Supporting frameworks

Policies identified: 13 policies across 8 Member States address grid technologies through general policies.

- Less dedicated policy attention compared to other technologies

Policy tools observed

- Sectoral and national strategies reference grid technologies as part of broader clean-tech ecosystems, mainly via R&I support, permitting simplification, and recovery/resilience funding.
- Financial incentives mobilise subsidies, guarantees, and tax breaks to expand Net-Zero and grid-related manufacturing.
  - Germany’s BKR,
  - Spain’s PRTR,
  - France’s Green Industry Law



Supporting frameworks

"long lead times* in permitting and for ramping up production capacity are an *important barrier"

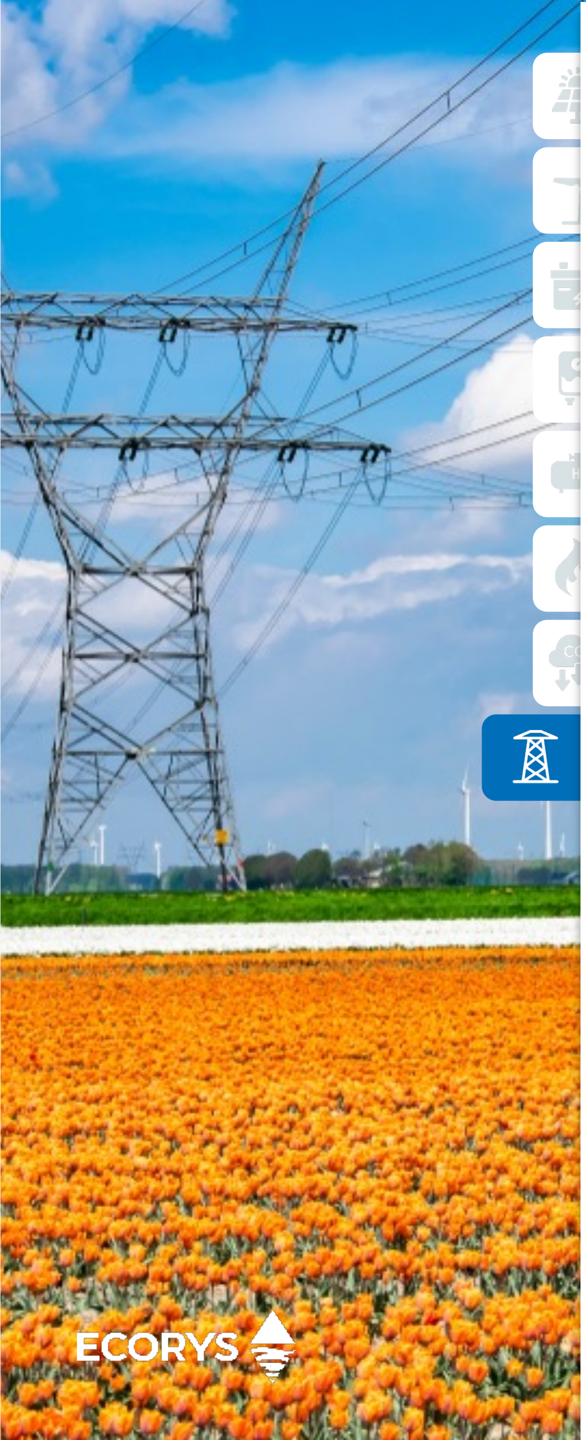
- Major bottleneck: Lengthy, complex, and unpredictable permitting (often 1–4+ years) delays new manufacturing capacity.
- Reform efforts: Some Member States are testing one-stop shops, fast-track procedures, and priority status for green projects (e.g. Italy, France, Finland, Germany, Spain).
  - Yet a larger focus on accelerating deployment rather than growing manufacturing capacity

Public procurement

- Requirements focusing on rules of origin and sustainability for the manufacturing of Net-Zero technologies are extremely limited in public procurement

European Court of Auditors (2025):

Permitting is one of the **main causes of delay** for grid investments, taking up around a **quarter of the total time** needed



Industry challenges and threats

Lack of **skilled workers**	Bottlenecks for **critical raw materials** and **volatile prices**	Global grid expansion leading to **demand outpacing the supply** of grid components	Need for **sustained innovation** to maintain European leadership

Challenges:

- Workforce shortages (engineers, installers, digital skills).
- Reliance on critical raw materials (aluminium, copper, silicon metals).
- Rising production costs (CBAM impacts, global demand pressures).

Threats:

- Uncertainty in future grid investment hinders scaling up manufacturing capacity
- Intensifying technological competition from China and other global players

High level recommendations

“Increase in global demand is an opportunity to scale EU production”

1. Secure Long-Term Planning & Investment
    - Use the (EU) policy tools to lock in long-term, predictable demand signals.
    - Mandate binding national grid expansion & investment plans
    - Pair with industrial roadmaps to give manufacturers visibility and enable scaling.

2. EU’s sustainability standards can be leveraged as a competitive edge
    - Integrate sustainability & resilience criteria into public tenders.
3. Promote innovation & patenting support in next-gen grid technologies and prioritise low-material innovations
4. Scale recycling & reuse of cables, transformers, and conductors and push for resource efficiency
5. Increase visibility of the sector in (supporting) policy

Other related Ecorys Work

- **Study on pathways and policies for accelerating electrification and use of renewables in industry** – European Commission, DG ENER
- **Regulatory frameworks for geothermal energy in the EU** – European Commission, DG ENER
- **Study for the Assessment of the framework of European Grids** – European Commission, DG ENER
- **European Hydrogen and Circularity Panel** – Clean Hydrogen Joint Undertaking

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