

# CLEANTECH REALITY CHECK



# GRIDS

## Strengthening the backbone of the EU's decarbonisation efforts

### • What are grids ?

Power grids connect power generators to power consumers via high-voltage transmission lines, substations, and distribution systems. They play a crucial part in a net-zero economy where electricity is most likely to supply up to 70% of final energy demand. Two complementary type of actions are required for grids: buildouts, which can take up to 10 years of development in Europe; and modernisation of existing assets, representing an opportunity to deploy new technologies to enhance existing grid infrastructure in a shorter timeframe. The grid system requires decisive action to achieve EU climate goals, ensure stability amid increasing renewables, and unlock cost-saving potential through greater interconnection among Member States.

### • Key take-aways

- Currently, only ~11 million of the 17.8 million kilometers required by 2040 is built. To reach the target by 2040, distribution buildout must be increased by 3x, and transmission grids face a tougher challenge of increasing build-rate by 20x.
- The EU has a good foundation of existing asset base and manufacturing capacity and capability on which to build an improved grid system. The main challenge lies in planning and setting targets for buildouts, resulting in slow permitting processes that add lag time to the construction of infrastructure assets.
- Moving forward, the EU must create a conducive ecosystem for grid buildout by shifting the investment paradigm through prioritisation of grid optimisation before enhancement and expansion, as well as looking at total project expense rather than only capital expenses.
- Addressing ownership issues in grid infrastructure development requires improvements in planning processes and coordination. A more holistic, forward-looking, and collaborative approach to European grid infrastructure planning, supported by legislated targets, should integrate decarbonisation plans, renewable electricity generation, flexibility solutions, and interconnection expansion.

# POWER GRIDS

STRENGTHENING THE BACKBONE OF THE EU'S DECARBONISATION EFFORTS



## STRATEGIC OBJECTIVES FOR EUROPE

- > Grids are critical to **reach 2030 renewables targets** and **2050 net-zero ambitions** and manage a surging **renewable power market** by proactively avoiding curtailment issues.
- > Accelerating the buildout rate and modernising the grid will require **doubling the current annual investment in grid infrastructure, delivering significant economic benefits to the EU economy.**
- > Europe needs to maintain its position as a **global leader for cable manufacturing.**
- > Future-proofing the power grid is essential for the **EU to remain a globally competitive place to do business** with the oncoming steep electrification rate of industry and transport.

## CURRENT PROGRESS OF GRID EXPANSION IN THE EU

OFF-TRACK



ON-TRACK

**STATUS: OFF-TRACK** The EU is home to the biggest connected synchronous grid globally but is facing an unprecedented challenge to meet the EU's increasing power demand. The current annual investment into grid buildout and modernisation needs to double to meet the EU's energy transition power needs.

**10.8** MILLION KMS BUILT  
OUT OF  
**17.8** MILLION KMS REQUIRED

### ANNUAL GRID BUILDOUT (KM)

	Current (2022)		Needed (2025-40)
Distribution	80,000	x3	250,000
Transmission	500	x20	10,000

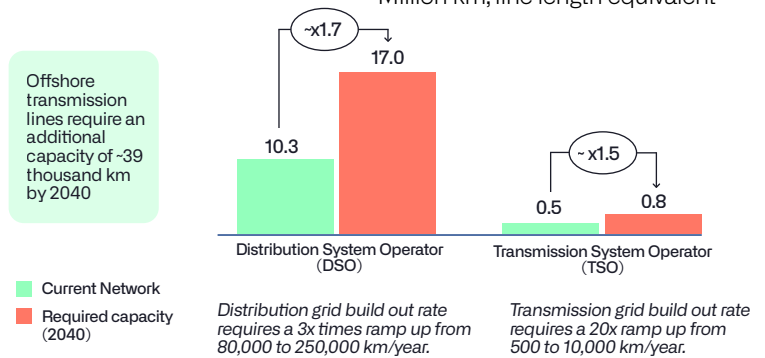
## STEEP GRID BUILDOUT IS REQUIRED TO MEET POWER DEMANDS BY 2040 — MODERNISATION CAN FAST-TRACK

Innovative grid technologies have the potential to speed up realisation of required grid expansion by:

- > 8 years (from 2040 to 2032) for the transmission grid.
- > 7 years (2040 to 2033) for the distribution grid.<sup>1</sup>

### EU grid size requirements for distribution and transmission

Million km, line length equivalent



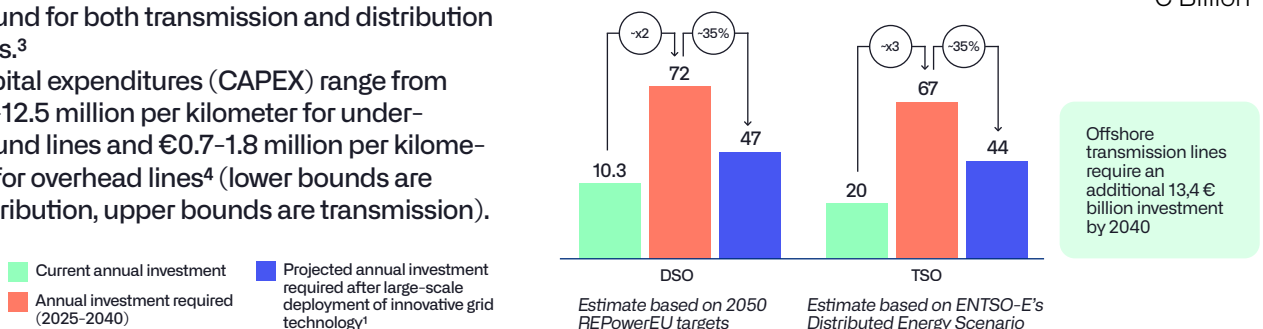
## CURRENT ANNUAL GRID INVESTMENT NEEDS TO ROUGHLY DOUBLE TO MEET GRID EXPANSION TARGETS

- > The nominal cost of building underground power lines is ~7x higher than building above ground for both transmission and distribution lines.<sup>3</sup>

Capital expenditures (CAPEX) range from €5-12.5 million per kilometer for underground lines and €0.7-1.8 million per kilometer for overhead lines<sup>4</sup> (lower bounds are distribution, upper bounds are transmission).

### Annual grid investments required in the EU between 2025-2040

€ Billion



Notes: 1. Estimate sourced from Prospects for Innovative Grid Technologies (CurrENT 2024), assumes 10-20% capacity improvement on existing and all newly built grid assets by deployment of Innovative Grid Technologies, does not include the deployment costs for innovative grid technologies themselves | 2. Assumption that 64% of investment is done in DSO grid, 36% in TSO grid | 3. Averaged over France, Germany, Spain, Italy, Denmark, Netherlands, UK, between 2015-2022; | 4. Averaged over Germany, based on 500km projects with MW capacities of 25/250/2500 for the backbone of the energy transition (ETC,2024); Grids for Speed (Eurelectric, 2024).

# POWER GRIDS

STRENGTHENING THE BACKBONE OF  
THE EU'S DECARBONISATION EFFORTS

## 😊 ENABLERS – WHAT IS GOING WELL

### HIGHLY RELIABLE AND FUNCTIONAL GRID

The EU grid is the largest synchronous connected grid worldwide with high reliability (averaging 32% less outage time versus USA). Current regulations have enabled Distribution System Operators (DSO) to jointly invest €33 billion annually from 2019–2023, a positive starting point for meeting grid transition needs.

### LEADING GRID CABLE MANUFACTURING SUPPLY

Three of the largest Western grid cable suppliers are EU-based and have historically supplied the buildout of new grid infrastructure in the EU. This manufacturing capacity, scaled to the required size, could enable the domestic supply of the EU grid transition.

### INCREASED POLICY AWARENESS ON GRID

Partially driven by increased renewable electricity deployment targets, policies and initiatives such as the Action Plan for Grids, the recent Draghi report, and Green Industrial Deal pay attention to accelerating smart grid capacity buildout and investments to meet EU decarbonisation goals.

## ☹️ BARRIERS – WHAT IS NOT GOING WELL

### LACK OF FORWARD-LOOKING PLANNING AND LEGISLATED TARGETS

EU power grid policies lack an integral, long-term vision and legislated output-based targets to ensure collaboration and alignment across key roadmaps and stakeholders, such as national decarbonisation, grid flexibility, and interconnection capacity targets, renewable power generation siting as well as DSO and Transmission System Operator (TSO) network planning.

### FINANCING / INCENTIVE SCHEMES NOT FIT FOR GRID TRANSITION

Current regulatory and remuneration frameworks are not fit for purpose, mainly having CAPEX-driven decision-making approach to incrementally build out the power grid, as opposed to OPEX or cost-saving. Innovative grid technologies also have limited access to EU funding streams, especially for first-of-a-kind projects or large-scale grid infrastructure that require de-risking.

### PERMITTING & COMPLIANCE PROCESSES RESULTING IN BACKLOG AND LIMITED PACE OF EXPANSION

Transmission deployment can take up to 10 years, much longer than actual construction times (~1–2 years) due to planning and permitting. Compliance processes and tests required for innovative technology (e.g., Long Duration Energy Storage assets) need to act as de-risking mechanism to avoid 'death by pilot' without real scale-ups.

## 📅 ACTION AGENDA – WHAT NEEDS TO BE DONE

- 1 Implement an integral strategic vision and targets for coordinated EU grid buildout and modernisation.** Coordinate between national grid regulators and operators to co-develop holistic, forward-looking European grid infrastructure planning across national decarbonisation plans, renewable electricity generation and siting, as well as flexibility and interconnections buildout. Additionally, develop legislated, output-based targets that stimulate both new grid buildouts and modernisation simultaneously to ensure all stakeholders working on the EU grid are aligned beyond 2030.
- 2 Reform investment paradigm and financing structures to stimulate investment in a future-proof grid.** Reform the existing investment approach to enable anticipatory investment ahead of need (e.g., expanding planning cycles for operators, removing operators' investment cap, and stimulating benefit sharing cost reduction to end customers) and prioritise Total Cost of Expense (Capital + Operational Expense). Additionally, make EU funding more accessible to innovative technologies (e.g., through the EU Innovation Fund) and derisking facilities for grid buildout and modernisation (e.g., participatory investments, public first loss guarantees) to spur private investment.
- 3 Address slow permitting, compliance processes that limits pace of deployment.** Develop regulatory and legislative reform to address barriers (e.g., slow permitting and compliance processes, lack of resources) for TSO & DSO grid buildouts and modernisation. Consider setting prioritisation for grid investment opportunities principles to prioritise grid optimisation before grid enhancement before grid expansion.
- 4 Provide financial incentives to de-risk and speed up adoption of new technologies by system operators.** Accelerate the rate of implementing innovation, for instance through lump-sum innovation funding or covering Weighted Average Cost of Capital (WACC) premiums, regulatory sandboxes, as well as the transfer of best-practices and standards across Member States (e.g. through EU Innovation Fund, EIT Knowledge-Sharing platforms).



«The grid is facing an unprecedented task in supporting Europe's ambitious energy transition, and innovative grid technologies are essential to meeting this challenge. By setting smart, output-based targets, we can ensure that the grid buildout and modernisation efforts are impactful and aligned with Europe's long-term sustainability goals.»

Layla Sawyer, Secretary General, CurrENT