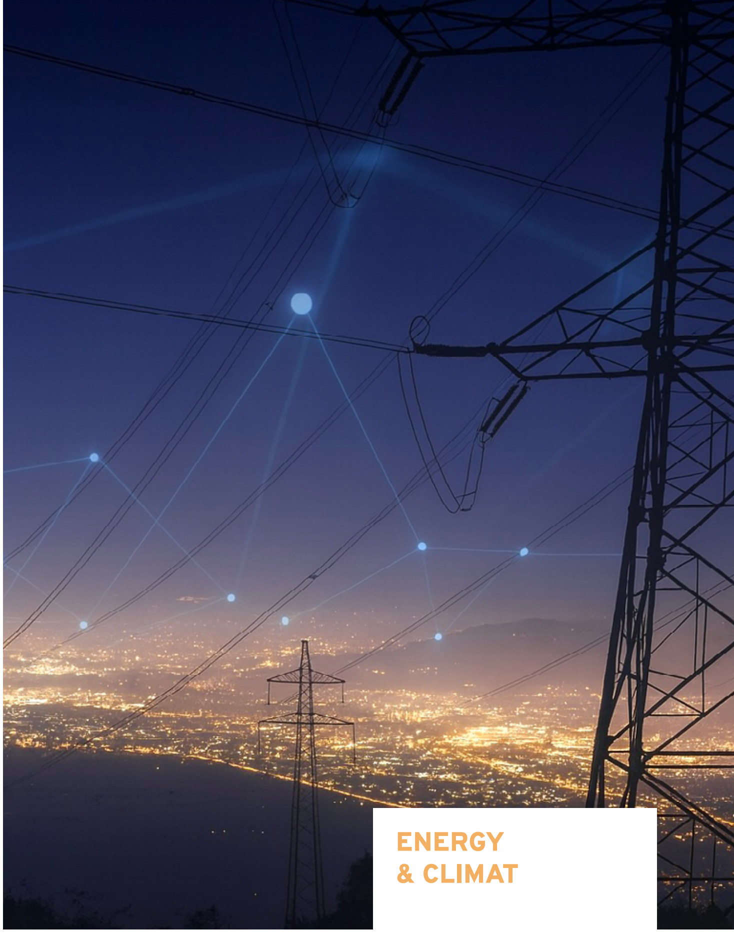

ENERGY & CLIMAT

Grids Package: connecting the dots

POLICY BRIEF
DECEMBER 2025

On December 10, the European Commission will publish its Grid Package. Such a framework will confirm or deny whether Europe's electrification will take off. While the supply side of the energy transition has advanced rapidly, with record growth in renewable electricity generation, the demand side has remained largely stagnant: electrification rates across the EU have barely progressed over the past two decades. In addition, **aging, under-dimensioned grids and slow network modernisation and expansion threaten turning this supply-side progress into stranded potential**, as power systems struggle to absorb rising volumes of variable and decentralised generation. The Grid Package therefore represents a critical opportunity to anchor EU energy policy around electrification to operationalise already existing renewable capacities, and prevent infrastructure from becoming the main brake on Europe's decarbonisation.

This policy paper **proposes establishing EU-wide electrification targets for 2030, 2040 and 2050 :**

- These targets are to be operationalised through **six enabling pillars - efficient planning, adequate financing, streamlined permitting, supply chain resilience, flexibility deployment, interconnection expansion and active energy community participation** - each contributing to completing the internal energy market (IEM).
- Access to EU funding instruments - such as the Connecting Europe Facility, the Innovation Fund, or the Cohesion Fund - would depend on demonstrated progress along these pillars, turning financial support into a performance-based incentive.
- An **updated governance scheme would track interim targets**, assessing each Member States' starting point, and set differentiated but realistic national trajectories that account for domestic constraints and political contexts.

To ground these proposals in operational reality, this paper builds on the results of the European Commission's public consultation on the Grids Package. Stakeholder input is

Alice Moscovici,
Research fellow, industrial and energy policy

Phuc-Vinh Nguyen,
Head of the Jacques Delors Energy Centre, Research fellow, French and EU energy policy

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used to identify primary bottlenecks and quantify how far current policies fall short of their respective objective, using shared EU metrics. For each enabling pillar, the paper links the identified gap to a targeted set of governance recommendations, clearly distinguishing between **measures that require EU-level steering** and those that depend primarily on **Member States action**. This structure ensures that ambition, accountability, and delivery are aligned across all levels of governance in a pragmatic and enforceable way.

Introduction

Electrification has emerged as a central pillar of global decarbonisation pathways, low-carbon electricity accounting for 40% of cumulative emissions reductions from end-use sectors by mid-century in the International Energy Agency's (IEA) Net Zero Emissions Scenario, with electricity's share of final energy use projected to rise from 23% in 2023[1] to 40% by 2040 and 55% by 2050[2]. Reflecting this global trajectory, **the European Commission's Clean Industrial Deal (CID) recently introduced the increase of economy-wide electrification rate to 32% in 2030[3] as a Key Performance Indicator (KPI)** with further guidance expected in the forthcoming Electrification Action Plan[4]. Although electrification was already highlighted in the 2020 Energy System Integration strategy[5], it has now emerged as a central pillar of Europe's decarbonisation strategy.

Historically, the European Union's (**EU**) electricity policy has focused primarily on the supply-side measures, using flagship instruments like the Emissions Trading System (ETS, 2005) and the Renewable Energy Directive (RED, 2009). This combination of a market-based instrument and regulations has driven significant renewable-energy deployment, but has offered little direct support for electrifying end-use sectors - that is, the demand side - resulting in limited progress in electrifying the European economy. **Electricity's share in final energy consumption has remained essentially flat since 2000**, and even declined by 5%[6] between 2022 and 2024 due to the energy-price shock impacting industrial activity and consumer behavior. Currently, electrification rates in EU industry and buildings hover just above 30%, and below 2% in light road transport[7], highlighting a significant gap from what is needed for deep decarbonization. Meanwhile, China has rapidly expanded electrification, surpassing the EU with an electrification rate of about 28% today[8].

In parallel, the EU policy has successfully expanded renewable electricity generation, with solar and wind capacity growing by roughly 150% between 2014 and 2024[9]. The latest revision of the Renewable Energy Directive (RED III, 2023) further cements this trajectory by setting a binding 42.5% renewables target for 2030. Yet scaling renewables alone will not deliver the necessary emissions reductions unless the EU simultaneously increases low-carbon electricity use across end-use sectors and ensures its power-grid infrastructure can integrate this new capacity. Timeframes make the latter condition particularly urgent: solar and wind projects typically take two to five years, while grid infrastructure requires considerably more time - three to seven years for distribution system operators (**DSOs**) projects and between seven and ten years longer for transmission system operators (**TSOs**)[10].

Europe's legacy grid architecture, designed for yesterday's centralised fossil generation, is ill-equipped to manage today's rapid rise of variable and decentralised renewable output. This mismatch has led to costly project delays and congestion expenses surpassing 4 billion euros in 2023 alone[11]. With renewables expected to represent 69% of the electricity mix by 2030[12] - up from 38% in 2020[13] - these grid bottlenecks risk constraining both decarbonisation and energy security objectives. Given the long

1 Eurostat. "Energy statistics - an overview". May 2025.
2 International Energy Agency (IEA). "World Energy Outlook 2025". 2025
3 European Commission. "The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation". European Commission Communication. February 2025.
4 European Commission. "The Clean Industrial Deal".
5 European Commission. "Powering a climate-neutral economy: An EU Strategy for Energy System Integration". European Commission Communication July 2020.
6 Ember. "Electricity Data Explorer"
7 Rosslowe, C. "Shockproof: how electrification can strengthen EU energy security". Ember. October 2025.
8 International Energy Agency (IEA). "Demand – Electricity 2025". 2025
9 Ember. "Electricity Data Explorer"
10 European Court of Auditors. "Making the EU electricity grid fit for net-zero emissions". January 2025.
11 European Parliamentary Research Service (EPRS). "EU electricity grids". May 2025
12 European Commission. "Energy Storage - Underpinning a decarbonised and secure EU energy system". Working Document. March 2023
13 Jones, D. "EU Power Sector in 2020". Ember. January 2021

lead times required for grid investments, any delays today will reverberate well into the next decade. **Unless Europe urgently accelerates grid reinforcement, strengthens interconnections, and scales up flexibility deployment, gains from renewable deployment and future electrification efforts risk being stranded**.

In this context, the European Commission will publish its **Grids Package** on 10 December 2025, a central pillar of the Clean Industrial Deal and the Action Plan for Affordable Energy. This initiative is intended to accelerate the upgrade, digitalisation, and expansion of Europe's electricity networks, addressing grid bottlenecks and strengthening the resilience and efficiency of the EU power system. To inform the development of this package, **a public consultation launched in May 2025**[14]**, gathered evidence on the effectiveness of the current regulatory framework.** The now-concluded consultation reveals critical operational, governance, and coordination challenges facing grid development.

This policy paper follows a four-step approach. First, it **synthesises these main challenges and concerns** expressed by system operators, regulators, industry representatives, and civil society in order to identify and rank stakeholder priorities. Second, for each of these priorities, it assesses the current state of progress by mapping existing measures and highlighting key barriers to advancement. Third, it defines a corresponding EU-level objective - preferably one already endorsed by all Member States - to quantify the remaining gap toward the shared targets. Finally, it examines how governance structures must evolve to enable the completion of the Internal Energy Market. In doing so, it translates the quantified gap into actionable governance recommendations, distinguishing between measures best addressed through **bottom-up action** (e.g. national market design adjustments, administrative reforms) and those requiring **top-down intervention** (e.g. regulatory harmonisation, coordinated financing frameworks, cross-border infrastructure planning). This approach clarifies the respective roles of the EU and Member States in achieving full alignment with the EU's electrification objectives.

I • Adopting binding electrification targets through a dedicated governance framework

For low-carbon electrification to properly take off, several conditions must be simultaneously met - efficient planning, adequate financing, streamlined permitting, supply chain resilience, flexibility deployment, interconnection expansion and active energy community participation. To ensure such alignment, and as already reflected in the Clean Industrial Deal's KPI, we recommend establishing a binding **EU-level electrification target for 2030, 2040, and 2050** - complementing the Union's climate objectives. Progress towards these targets should be monitored annually in the State of the Energy Union report, accompanied by a systematic assessment of persistent bottlenecks and concrete measures to address them.

Experience with previous EU targets, such as those under the RED Directive, shows that binding objectives alone are insufficient without robust implementation and enforcement mechanisms. To avoid repeating past shortfalls, the **electrification target should be operationalised through sectoral milestones, which are the key priority areas and challenges identified in the public consultation.** Each of these milestones is a necessary precondition for successful electrification; failure to advance any area would jeopardise overall progress towards the electrification objective. To strengthen accountability, access to EU funding instruments - including the Connecting Europe Facility, the Innovation Fund, or the Cohesion Fund - should be conditional on demonstrated progress across these milestones. Introducing such financial conditionality would turn EU funding from a passive support tool into an active policy level. The updated governance scheme would oversee the monitoring of interim targets, apply a transparent methodology to evaluate each Member States' starting point, and define realistic national

14 European Commission. "Commission collects views in preparation of the European Grids Package". Directorate-General for Energy. May 2025.

targets reflecting domestic constraints and political contexts. This approach would align ambition, implementation and financial incentives - ensuring that the EU's electrification pathway remains both achievable and enforceable.

II • Public Consultation: An overview

The public consultation on the European Grids Package received 197 public responses, with a **marked predominance of private-sector stakeholders**. Companies and businesses constituted 46% of submissions, followed by business associations at 27%. Non-governmental organisations represented a smaller proportion (7%), while EU citizens and public authorities accounted for 6% and 5% respectively. This composition suggests that many of the raised issues and recommendations reflect a business-oriented viewpoint, particularly concerning investment priorities, permitting processes, and regulatory barriers.

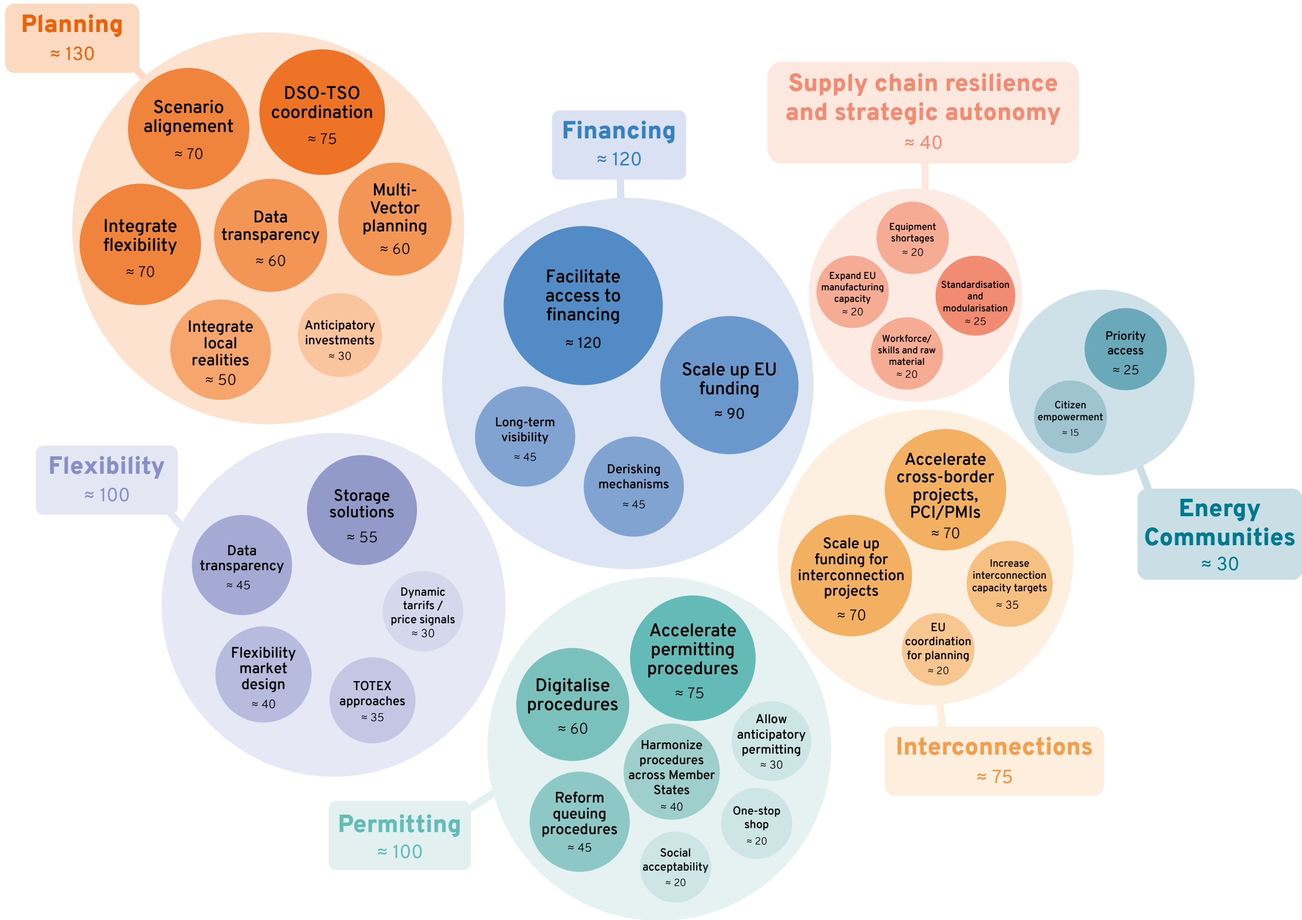
Geographical participation was similarly unevenly distributed. Belgium alone accounted for nearly a quarter of responses (23%), consistent with its role as host to numerous corporate public-affairs offices and EU-level industry associations in Brussels. Germany (12%), Italy (8%), and Spain, the Netherlands, and France (each 7%) also featured prominently. Conversely, contributions from Eastern European Member States were limited: Poland submitted only 3% of responses, Hungary, Slovakia, and Bulgaria approximately 1% each, with several countries, including Romania, absent from the consultation. Consequently, the consultation outcomes predominantly reflect Western and Northern European perspectives, leaving underrepresented the views of Eastern Member States which already face chronic underinvestment, limited market unbundling with associated conflicts of interest and some of the lowest interconnection levels in the Union - with the broader Central and Eastern European region accounting for only 13% of the EU's interconnection capacity[15].

Although 197 contributions were formally received, the following analysis is based on 166 responses - excluding duplicates, citizen submissions and inputs deemed outside the scope of the consultation, ensuring the assessment reflects a coherent assessment of stakeholder priorities. Across these responses, several topics consistently emerge, providing a clear roadmap for where policy intervention is most needed.

- Nearly **80%** of participants identified **planning** as crucial to accelerating grid modernisation
- **70%** of respondents identified securing **improved access to funding** and risk mitigation mechanisms to advance decarbonisation.
- Approximately **60%** called for the **acceleration of permitting procedures**, as well as the importance of integrating **flexibility solutions** as cost-efficient alternatives to traditional grid reinforcement.
- **Cross-border interconnection challenges** were raised by **nearly half** of the participants, stressing the need to bolster market integration.
- **Supply chain resilience** was referenced in about **25%** of submissions, reflecting ongoing concerns over equipment availability
- Finally, **local and community energy initiatives** - mentioned by **nearly 20%** - were considered underrepresented in national and regional energy planning

15 Climate Action Network (CAN) Europe. "Future-Proofing Central Eastern European Grids for Tomorrow's Energy System". CAN Europe. February 2024

FIGURE 1. Key Challenges Identified in the EU Grid Consultation (2025)



▲ *Source : Alice Moscovici, Phuc-Vinh Nguyen (Jacques Delors Institute), based on the Public Consultation Data*
▲ *Reading note: The size of each bubble reflects the approximate number of mentions in the public consultation*

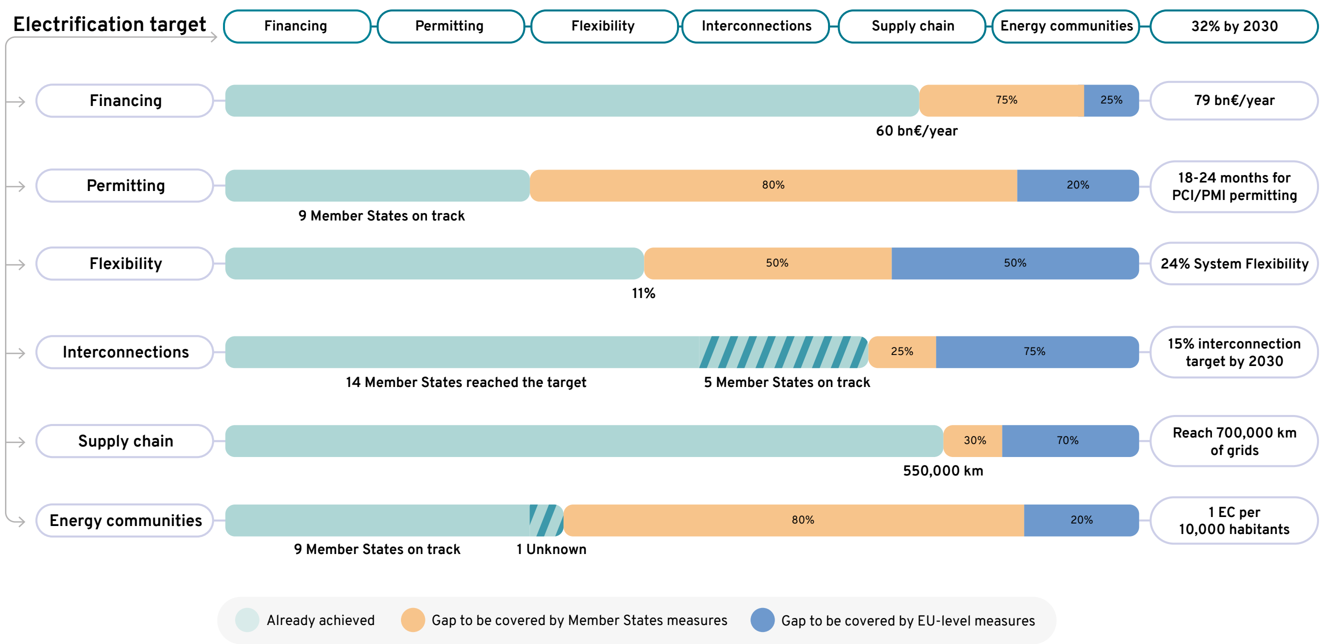
III • What about Governance?

While there is broad consensus on the challenges and many proposed solutions, perspectives on governance diverge significantly across topics. At its core, **governance entails a clear allocation of responsibilities between EU institutions and entities** (such as the ENTSOs and ACER) **and national, regional, but also local authorities**: who sets strategic direction, who holds decision-making authority, who implements policies, and who is accountable for outcomes. Approximately 90 arguments advocate for a stronger EU-led, top-down governance model, whereby the European Commission coordinates grid planning, establishes binding frameworks, and ensures consistent implementation across Member States. Proponents argue that only through enhanced EU-level coordination can the fragmentation of national practices be overcome and grids upgraded rapidly and at scale. Conversely, 114 arguments favor a bottom-up governance approach that assigns primary responsibility to Member States, national regulators, and local actors who possess detailed knowledge of regional energy systems and consumer needs. Supporters warn that excessive centralisation risks disregarding national specificities and undermining the subsidiarity principle.

This polarisation reflects the inherent trade-offs between centralisation and sovereignty in the governance of Europe's energy networks. Countries expecting lower energy prices under a unified market tend to favour deeper coordination (Spain, Germany), whereas others fear higher domestic prices and reduced control over system planning (France, Sweden). These national specificities shape how each government weighs the benefits, risks, and distributive impacts of different governance models, underscoring the fundamental challenge of completing the internal energy market (**IEM**). **Designing a governance framework perceived as legitimate and peremptory, able to advance shared European objectives while accommodating the heterogeneous realities of national energy systems is more than ever needed.** Yet debates too often unfold in silos with issues like financing, flexibility, or permitting examined in isolation. This fragmented approach narrows the space for political compromise and overlooks the critical interdependencies that drive system costs, resilience, and the pace of decarbonisation.

To strengthen both legitimacy and effectiveness, policy negotiations must be anchored in a **multi-vector scenario framework** offering a holistic view of system needs. **This framework must coherently align key parameters - financing, permitting, flexibility, interconnections, supply chain resilience, and energy communities - each progressing along its own timeline but ultimately converging toward a shared target period. Together, these trajectories form the EU's overall electrification target and contribute to completing the IEM.** For each parameter, EU specific targets agreed by Member States should be assessed against objective criteria rooted in technical and economic efficiency. On this basis, a coherent set of recommendations can be developed to bridge the gap between the current situation and the desired outcomes. Given that challenges vary across parameters, each requires a tailored governance approach suited to its scale and complexity. Nevertheless, all Member States must contribute to this newly collective electrification target, despite differing starting points and levels of ambition. Failure by any one could trigger cascading effects undermining progress toward the IEM, underscoring the need for integrated, coordinated, and mutually reinforcing governance.

FIGURE 2. Delivering Europe's Electrification Target: Core Enablers and Governance Model



▲ *Source : Phuc Vinh Nguyen, Alice Moscovici (Institut Jacques Delors)*
▲ *Reading notes : labels to the right of each bar indicate the corresponding objective for each parameter. Each bar represents how much of the remaining gap in a given area should be closed through Member State action (blue) versus EU-level action (orange); grey segments indicate what is already achieved.*

IV . Financing

Where are we now: a moderate yet persistent investment deficit

Despite recent progress, current investment levels remain below what is required. According to I4CE, grid investments reached 60 billion euros in 2023, a 50% increase compared to the €40 billion invested in 2020. This upward trend is encouraging but still leaves a **persistent annual investment gap of nearly 20 billion euros.**

Grid financing can be mobilised at different levels. At EU level, the European Investment Bank (**EIB**) committed a record €11 billion to electricity-grid investments in 2025[16] - tripling the amount of 2023. Under the 2021–2027 Multiannual Financial Framework (**MFF**), key instruments support grid modernisation, including the **Connecting Europe Facility for Energy** (**CEF-E**) with 5.8 billion euros earmarked for cross-border infrastructure, Projects of Common Interest (**PCIs**) and Projects of Mutual Interest (**PMIs**), the **InvestEU** fund crowding in public and private investment, **Horizon Europe** for smart-grid research and innovation, **the European Regional Development Fund** (**ERDF**), and **NextGenerationEU** through the Recovery and Resilience Facility (**RRF**). Revenues from the EU ETS also provide financing to dedicated programmes including the **Innovation Fund**, the **Cohesion Fund** and **Modernisation Fund.** At national level, governments and national development banks provide grants and long-term loans for grid projects - as illustrated by Germany's KfW development bank's GetFiT program. But the primary and most stable source of grid financing remains **network tariffs**, determined by national regulatory authorities (**NRAs**) and allowing TSOs and DSOs to recover costs related to infrastructure investments, operational expenditures, maintenance, and other system-related expenses. On the **private side**, TSOs and DSOs finance grid expansion through a mix of debt and shareholder capital - both of which grew strongly between 2014 and 2022, with equity rising by 72% for DSOs and 120% for TSOs, and debt increasing by 115% and 60% respectively[17]. Yet this overall growth hides major disparities: large TSOs benefit from stable regulation and strong credit ratings, giving them access to low-cost financing, while many smaller DSOs face significantly higher borrowing costs, with over 30% ranked in the lowest credit tiers[18]. This financing imbalance poses a structural risk for the energy transition, as financially constrained DSOs may struggle to fund the local grid upgrades and flexibility solutions essential to electrification.

Objective: Meet the required scale of investments

Meeting the EU's electrification ambitions will require a step-change in grid investment. The European Commission's REPowerEU Plan (2022) estimates that **584 billion euros will be needed by 2030**, averaging €73 billion annually over the remainder of the decade. Yet investment levels in 2022–2024 have fallen short, prompting the Institute for Climate Economics (I4CE) to raise the estimate to around **€79 billion annually between 2025 and 2030,**[19] covering transmission and distribution grids, utility-scale storage and residential batteries. These figures will be further refined in the Commission's forthcoming Energy Investment Strategy, expected in January.

Recommendations:

EU instruments play primarily a catalytic role in grid financing, lowering the cost of capital and steering investment priorities but covering only a limited share of overall needs. By contrast, most funding must still be mobilised at national level, where regulators, TSOs, and DSOs define investment plans, revenue models, and borrowing conditions.

16 European Parliamentary Research Service (EPRS). "European grids package: Lessons learnt from the implementation of the TEN-E framework". Briefing. December 2025
17 European Court of Auditors. "Making the EU electricity grid fit for net-zero emissions". January 2025.
18 Ibid.
19 Calipel, C. Henry, C. and Cornaggia, A. "The State of Europe's Climate Investment: 2025 Edition." Paris: I4CE, June 2025.

<u>Top-Down (~25%)</u>: Strengthening the EU financial framework

- **Ensure strategic alignment and complementarity across EU funding instruments**

Current EU support schemes operate largely in silos, which may lead to overlaps and limited strategic coherence. A more integrated financial architecture should define how each instrument contributes to grid expansion, avoiding duplication and ensuring efficient resource allocation. Establishing a single coordination interface ("one-stop interlocutor") along with harmonised application and reporting procedures would also help project promoters identify suitable support and speed up approvals, while significantly reducing administrative burden and transaction costs.

- **Safeguard and scale up EU budget for grids**

The current €5.8 billion CEF-E envelope for the 2021–2027 period represents only a fraction of the investment needed to deliver the EU's grid objectives. Therefore, **the European Commission's proposal to increase the allocation fivefold to 27 billion euros (in constant 2025 prices) is a minimum requirement to be safeguarded in forthcoming MFF negotiations.** Other major instruments should likewise be re-evaluated to ensure sufficient financial streams to support grid-related investments across different national contexts.

- **Reduce the cost of capital through enhanced de-risking mechanisms**

Lowering financing costs is essential to mobilise private investment at scale. Expanding EIB-backed guarantees, blended-finance facilities, and long-tenor loans would increase project bankability. Coordination with national promotional banks can further stabilise financing conditions, ensuring risk-sharing across public and private partners.

- **Leverage state aid frameworks to drive investment and competitiveness**

In line with the previous state aid regime (TCTF) the new regime (CISAF) explicitly covers electricity grid investments, enabling Member States to use state aid beyond short-term price relief toward structurally lowering system costs. For instance, Germany recently expressed its willingness to use the CISAF for immediate price cuts[20] with no long-term gains, **channeling CISAF resources into grid modernisation and extension would be a far more strategic use of the state aid regime**, enabling lower system costs, facilitating the penetration of renewable energy sources. As the use of the CISAF to derisk private investments remains subject to meeting several conditions including the project's size, a €250 m maximum nominal amount of investment, the fact that the loan or guarantee should not exceed 20 years etc., the ability to finance grid deployment remains limited and Member States should also look into using the through the general regime provided by the Treaties.

<u>Bottom-up (~75%)</u>: Reinforce national and local investment frameworks

Given the scale of grid upgrade needs, national actors - TSOs, DSOs, and private investors - will shoulder the majority of the investment effort. In France alone, the national TSO RTE plans to invest 100 billion euros between 2025 and 2039[21] which far exceed what EU grants can cover. By contrast, even **27 billion euros CEF-E envelope would amount to only 1 billion euros per Member State over seven years, underscoring that EU-level funding can only play a catalytic role.**

Yet even strengthened national frameworks will struggle to meet the required scale of investment. In fact, **network tariffs cannot be increased indefinitely without creating political and social backlash that would threaten electrification.** The priority is therefore not only to mobilise additional capital, but also to use existing financing streams

20 Jäger,P. "Cautionary tale or model for Europe? How member states should react to Germany's new electricity subsidy". Policy Brief. Octobre 2025.

21 Commission de Régulation de l'Energie (CRE). "Public consultation N° 2025-08 of 18 September 2025 on the ten-year development plan for the RTE network drawn up in 2025". September 2025.

more efficiently through incentive-based mechanisms. Models such as Australia's Capital Expenditure Sharing Scheme (**CESS**), which reward operators that deliver projects below approved capital expenditure forecasts retain a share of the resulting savings - 30% for underspends up to 10% of the allowance, 20% beyond this threshold - while the remaining benefits are passed on to consumers through lower future charges. Conversely, operators absorb part of the cost if they exceed their allowance, ensuring symmetrical incentives for cost efficient and timely investments. Adapting similar mechanisms in the EU context would help ensure that scarce national financing is used more effectively.

V • Permitting

Where we are now: delayed and fragmented transposition of EU permitting rules

Despite recent reforms, permitting processes - covering all procedures required to obtain the regulatory, social and environmental approvals necessary to develop grid infrastructure - remain slow and fragmented across Member States, with **uneven transposition and implementation of EU permitting rules**[22]. At the time of the deadline, Denmark was the only Member State to have met the REDIII permitting requirements, prompting infringement procedures against all others. By October 2025, only Ireland had joined Denmark in completing transposition, leaving most of the Union behind schedule[23]. While national frameworks are gradually aligning with TEN-E Regulation requirements, important provisions remain only partially implemented. Permitting processes also suffer from institutional fragmentation: although most Member States have established a single contact point for Projects of Common (**PCI**) and Mutual Interest (**PMI**), this approach rarely extends to other national energy infrastructure projects. In 19 Member States, project developers must still engage with multiple authorities and administrative layers, in contrast to the eight that have adopted a unified authority for all project types, demonstrating a more efficient and less burdensome model[24]. These shortcomings are compounded by **limited administrative capacity** and **insufficient digitalisation** generating repetitive information and slowing processes. In parallel, **outdated connection queuing systems,** based on "first-come, first-serve" logic, encourage speculative applications that block grid capacity and further strain administrative resources.

Objective: A 12-18 months permitting standard for PCI and PMI projects

Permitting process duration remains structurally misaligned with the urgent pace and scale of grid investment needed to complete the IEM, accounting around one quarter of total project lead times and typically lasting 25–30 months for TSO projects and 10-15 months for DSO projects[25]. For energy infrastructure projects[26] - covering national electricity transmission lines, storage infrastructure, smart grids, gas and hydrogen pipelines, and CO_2 transport and storage - the duration of permitting shows substantial disparities across Member States. Available data indicate timelines ranging from 12-18 months in Belgium and in Italy, to 18-24 months in seven other countries[27], and more than 24 months in at least ten Member States.[28]**The objective should be for all Member States to converge toward a 12–18-month permitting duration for PCI/PMI projects.** Given the strong heterogeneity of

22 Solar Power Europe. "EU Renewable Energy Permitting: State of play". July 2025.
23 Agency for the Cooperation of Energy Regulators (ACER). "European hydrogen markets: 2025 Monitoring Report". Report. December 2025.
24 European Commission: Directorate-General for Energy and Milieu. "Study on national permit granting process applicable to energy transmission infrastructure projects with a focus on projects of common interest and projects of mutual interest under Chapter III of Regulation (EU) 2022/869". Overview report. Publications Office of the European Union. 2025.
25 European Court of Auditors. "Making the EU electricity grid fit for net-zero emissions". January 2025.
26 Annexe II, TEN-E Regulation
27 Austria, Denmark, Estonia, Malta, the Netherlands, Slovakia, Spain
28 European Commission: Directorate-General for Energy and Milieu. "Study on national permit granting process". 2025. - Bulgaria, Croatia, Czechia, Finland, France, Greece, Latvia, Lithuania, Portugal, Sweden

energy infrastructure projects across technologies and jurisdictions, **PCI/PMI projects provide the most relevant benchmark, as they share comparable governance, cross-border relevance and regulatory treatment across countries**, making them the closest like-for-like category for defining a realistic and coherent permitting-time objective.

Recommendations:

Permitting processes are primarily determined by national and local procedures, where administrative design, institutional capacity, and public acceptance shape how quickly projects move forward. EU-level rules mainly set common principles and benchmarks and can steer improvements at the margin, but the core levers for acceleration remain in the hands of Member States and sub-national authorities.

> **Top Down (~20%):** Reform grid connection queuing procedures

To accelerate project delivery and prevent speculative grid connection requests, **EU-level guidance must encourage Member States to replace the current "first-come, first-served" approach with a "first-ready, first-served" model.** Queue prioritisation would be based on transparent and verifiable indicators of **readiness** (completed grid studies, secured land rights, technical interoperability, local acceptance) and **project maturity** (secured financing, signed construction contracts, ongoing equipment procurement), ensuring that scarce grid capacity is allocated to the most viable near-term projects.

To combine EU-consistency with national flexibility, the European Commission could establish a **common reference list of readiness and maturity criteria**, which Member States can tailor to their own regulatory frameworks. Early movers such as Denmark's Energinet - set to implement a readiness-based queuing model by February 2026[29] - and Spain's system, which already requires developers to provide economic guarantees and meet milestone deadlines to retain grid access, offer valuable testing grounds, good practices and feedback that the Commission should actively promote across Member States.

> **Bottom-Up (~80%):** Strengthening national permitting systems

- **Improve accountability in permitting :**

Member States should **adopt traffic-light systems to track project progress, identify bottlenecks early, and direct administrative support where it is most needed.** Capacity-use requirements - obliging developers to demonstrate that reserved grid capacity will be used within two years or risk losing allocation and face penalties - would deter speculative connections. This should be paired with regular milestone-based performance checks to remove inactive projects that block the queue and distort investment signals.

- **Identify acceleration zones and build social acceptance :**

Governments should map acceleration zones within their National Development Plans - areas identified as low-conflict or strategically suited for grid and renewable deployment. Projects located in these areas could benefit from simplified permitting, queue priority, or other procedural incentives that align spatial planning with investment priorities **under the condition that public dialogue would be held beforehand and proved conclusive.** For instance in France, this process could be initiated through the National Commission for Public Debate (**CNDP**) to anchor dialogue among citizens, local authorities, and operators - building social acceptance and transparency while accelerating deployment in suitable areas.

- **Strengthen digitalisation to support limited administrative capacity :**

A major bottleneck in grid expansion is the limited capacity and coordination among permitting authorities. Digitalisation can directly overcome this challenge by centralising information, automating procedures,

29 Tisheva, P. "Energinet to replace "first come, first served" model from Feb 2026". Renewables Now. November 2025.

and enabling real-time monitoring across national, regional, and local levels. **A shared digital permitting platform would give applicants real-time visibility on application progress and enable administrations to use standardised templates and automated workflows.** Spain's system, which allows TSOs and DSOs to jointly submit connection requests and enable applicants to follow progress online[30], illustrates how digital tools can turn procedural complexity into transparency and efficiency.

VI • Supply Chain Resilience

Where we are now: increasing demand, increasing constraints

Global electrification is accelerating, spurring demand for new power infrastructure alongside the urgent renewal of ageing assets, which in turn sharply increases the need for **cables, power lines, transformers, inverters** and related components. This pressure is heightened in Europe by the 2030 interconnection target which will require large-scale expansion of high-voltage lines and transformers.

Supply constraints are already biting: **lead times** for cables have now stretch from two to three years and up to four years for major transformers, nearly double pre-2021 levels[31]. These delays are compounded by structural weaknesses in the EU's manufacturing base and continued **supplier concentration**: in 2023, China accounted for 60% of EU transformer imports[32], and Huawei dominated the inverter market with products priced 20 to 30% below competitors[33]. Such dependence on a single, geopolitically assertive supplier not only entrenches economic coercion but also reinforces exposure to economic coercion and cybersecurity risks.

At the same time, **rising aluminium and copper prices are fuelling cost inflation along the entire supply chain.** Aluminium remains essential for overhead lines as well as many underground and subsea cables, while copper dominates high-value underground and subsea applications. Since January 2025, the global price of copper has surged by approximately 30 %, and aluminium by 14 %[34]. This situation is particularly critical as HDVC cable costs fluctuate strongly with copper prices[35]: in real terms, cable costs have nearly doubled since 2019, while transformer prices have risen by around 75%[36].

Objective: scaling transmission infrastructure to meet 2030 demand

The EU's cable manufacturing capacity must expand substantially to keep pace with the grid expansion needed over the coming decade. In 2024, the EU's total transmission infrastructure - comprising Alternative Current (**AC**) lines, AC cables and Direct Current (**DC**) cables - amounted to around 550,000 kilometres[37], far below what will be required to meet the projected electrification. By 2030, the total length of transmission infrastructure will need to increase to about **700,000 kilometres[38], representing a 28% expansion over six years** (nearly 5% per year), compared with only 7% growth between 2020 and 2024 (less than 2% annually), underscoring the pressure on the EU's cable manufacturing capacity.

Recommendations:

Supply chain resilience is predominantly shaped at the EU level, where single market

30 DSO Entity's Task Force Digitalisation of the Energy System (TF DESAP). "Digital Solutions for Handling Connection Requests." October 2025.
31 Ibid.
32 International Energy Agency. "World Energy Investment 2025: European Union." Paris: IEA, 2025.
33 Gehrke, T. "How China Could Crash Europe's Energy Grid – and What the EU Can Do About It." Berlin: ECFR, 2025.
34 Trading Economics. "Commodities Prices". 2025.
35 Sven Neubauer, Reinhard Madlener, M. Granger Morgan, "Future high-voltage-direct-current cable supply and demand as a potential threat to the European Union's energy transition". Energy Strategy Reviews, 2025.
36 International Energy Agency. "Building the Future Transmission Grid: Strategies to Navigate Supply Chain Challenges." Paris: IEA, 2024.iea.core.windows
37 ENTSO. Inventory of Transmission. 2024.
38 ENTSO. Opportunities for a more efficient European power system by 2050. April 2025.

rules, trade policy, and industrial strategy set the main incentives for investment, diversification, and competition in grid manufacturing. Member States operate within this framework, using national industrial support, procurement, and skills policies to implement and adapt these signals to domestic contexts.

Top-down (~70%): strengthening EU grid manufacturing base and supply chain resilience

The Net-Zero Industry Act (**NZIA**) designation of grid components as *strategic net-zero technologies* enables targeted industrial policy tools such as faster permitting and priority access to public funding. Still, its effectiveness in strengthening the European supply chain resilience is undermined by a persistent lack of comprehensive, transparent data on European manufacturing capacity, resulting in **a fundamental absence of visibility into** supply chain vulnerabilities. Without rigorous, data-driven supply chain assessment, the EU risks facing sudden and acute shortages of essential components - exposing critical infrastructure projects to costly delays or failures. The European Commission should therefore urgently **aggregate and consolidate EU-level industrial manufacturing capacities against realistic demand scenarios to determine the domestic market share the EU industry can fill** and identify bottlenecks. Beyond capacity expansions - already ongoing with Europacable and T&D Europe members investments, 4 and 9 billion euros respectively[39] -, the EU must diversify supply sources systematically to mitigate risks.

In addition, a **clear political commitment** is still needed to further strengthen this industrial signal. The proposed Grid manufacturing package could materialise this ambition by coupling its objectives with regulatory levers that drive large-scale demand for EU-made components. For instance, revising the EU public procurement directive to require a minimum share of domestically produced components would directly support local manufacturing. The planned 1.5 billion euros in counter-guarantees from the European Investment Bank (**EIB**)[40] to de-risk manufacturer's investments in capacity expansion is a step towards the right direction, but falls short of the scale required. Given the magnitude of the investments needed, this must be part of a broader comprehensive financing strategy that includes diverse instruments, including the forthcoming Competitiveness Fund.

Yet, this raises the question on who among consumers will bear the higher costs, as Chinese components remain significantly cheaper. The EU therefore cannot afford an abrupt decoupling or it would endanger its electrification progress. Instead, it must **pursue a gradual, dual-track approach - simultaneously scaling up domestic manufacturing capacity while diversifying supply sources**. This approach is critical as the EU current manufacturing base is insufficient, and domestic prices remain too high to support a rapid, large-scale deployment on their own in the short-term.

Bottom up (~30%)

Member States must be responsible for **mapping their domestic level of dependency**, specifically identifying risks from overreliance on single suppliers. This diagnostic should underpin explicit commitments in their planning instruments to reduce such dependencies over the coming five years and beyond. Given the EU's current insufficient manufacturing capacity and limited supplier diversity, immediate ramp-up of domestic production is unrealistic. Therefore, the EU must concurrently pursue strategic, medium-term partnerships with multiple international suppliers as part of a broader mutual de-risking strategy. Crucially, failure to align with these dependency reduction trajectories should lead to tangible consequences, including reduced access to EU funds such as the CEF, thereby ensuring accountability.

39 ENTSO-E, Europacable, DSO Entity, and T&D Europe. "ENTSO-E, Europacable, DSO Entity and T&D Europe Publish Joint Roadmap for Future-Proof Grids: Call for Regulatory Support in Specific Areas". Press release, T&D Europe, 2025.

40 European Commission. "The Clean Industrial Deal".

Crucially, **this dependency mapping must also incorporate a social dimension.** A recent ENTSO-E survey revealed that 88% identified skilled workforce shortage as a critical supply chain bottleneck, the increase in electrification driving demand for technical jobs - grid installers, electrical engineers, maintenance technicians. For instance, France anticipates a 60% increase in grid-related jobs between 2024 and 2030[41], equating to over 100,000 new positions by the end of the decade. As training cycles can take up to 5 years, Member States need to urgently assess current workforce capacity versus future needs. A potential solution is a derogatory regime, negotiated with trade unions, to authorise skilled workers in strategic sectors to train a new generation through apprenticeships or work-study programs, preventing acute labor shortages from becoming a bottleneck to electrification.

VII • Flexibility

Where we are now: an assessment in the making

Under Article 2 of the Electricity Regulation, flexibility refers to the electricity system's ability to adapt to fluctuations in generation, consumption, and grid availability across relevant market timeframes. In their 2023 assessment, the European Environment Agency (**EEA**) and the ACER[42] estimate that Europe's flexibility needs will double by 2030 and triple by 2050 compared with 2021, while the European Commission projects flexibility requirements to "*reach 24% (288 TWh) of total EU electricity demand in 2030 and 30% in 2050*".[43] In practice, flexibility spans a range of services operating across different temporal scales: daily flexibility from short-duration storage technologies such as batteries, hydrogen, or synthetic fuels; weekly flexibility from demand response measures across industrial, commercial, and residential sectors; and seasonal flexibility primarily from dispatchable power generation, including pumped hydro storage. As the share of variable renewable energy sources expands, flexibility becomes a cornerstone of system stability and cost efficiency, reducing the need for costly network expansion and enabling better use of existing infrastructure. Yet, **progress remains uneven across Europe, constrained by fragmented policy frameworks, limited stakeholder coordination and varying national commitments.**

To assess national flexibility needs, the electricity regulation now mandates TSOs and DSOs to prepare biennial reports analysing hourly, daily and seasonal flexibility requirements over a 5-10 year horizon, alongside the adoption of **indicative objectives for non-fossil flexibility.** However, the latest assessment of the NECPs[44] reveals a fragmented approach. Only 6 Member States[45] have set 2030 storage capacity targets, while few others rely on alternative measures - Sweden on non-discriminatory access for demand response or Latvia on broader flexibility measures. Yet, explicit targets for grid capacity development remain rare, highlighting the current asynchrony between RES deployment and grid capacity deployment. As it stands, the three flexibility pillars are progressing at different speeds :

Regarding **storage**, the Commission estimates that more than 200 GW of energy storage capacity would be needed by 2030 and 600 GW by 2050,[46] compared with 70

41 ENTSO-E, Europacable, DSO Entity, and T&D Europe. "Joint Public Webinar on Electrifying Europe." Webinar document, 15 May 2025.
42 Agency for the Cooperation of Energy Regulators (ACER). "Flexibility solutions to support a decarbonised and secure EU electricity system". Report. September 2023
43 European Commission. "Key Facts on Energy Storage." Brussels: European Commission, Directorate-General for Energy, accessed December 6, 2025.
44 European Commission. "Assessment of Final Updated National Energy and Climate Plans: Realising the Energy and Climate Targets of the Union by 2030: Staff Working Document." SWD(2025) 140 final, Brussels: European Commission, 2025.
45 Including Portugal, Greece, Spain, Croatia, Ireland and Hungary.
46 European Commission. "Key Facts on Energy Storage." Brussels: European Commission, Directorate-General for Energy, accessed December 6, 2025.

GW[47] today and around 100 GW expected to be online by 2030[48], leaving a 6,4 billion euros investment gap[49] to meet 2030 targets. However, falling capital expenditure (CAPEX) should strengthen the business case for batteries and accelerate their deployment, but with only 17 Member States including storage policies in their NECPs, the other 10 must act rapidly as all Member States will be required to set national targets for storage and demand flexibility by January 2027. Regarding **demand-response**, McKinsey projects the European demand-side flexibility market value could reach 12 billion euros[50] by 2030 - up from 4 billion today - with 8 billion accruing to industrial players through grid services and wholesale market arbitrages - notably in cement, equipment, metals and paper sectors. On the residential side, measures like Germany's obligation for energy suppliers to offer dynamic electricity tariffs are promising, but the uptake of such a scheme will depend on the effective rollout of smart meter - still inconsistent across the EU[51] - and on ensuring consumer protection against price volatility. Regarding **grid capacity development**, 64 GW should be added by 2030.[52] Despite being identified as a priority, genuine progress will require action across investment, planning, permitting, and supply chain resilience to trigger a real change.

Objective : Scaling system flexibility to meeting 2030 power system needs

In 2030, the need for flexibility in the electricity system is projected to reach 24% of total European electricity demand,[53] up from 10,6% in 2021 (305TWh[54] out of 2888 TWh[55]), underscoring the urgency of flexibility in parallel with RES expansion and electrification.

Recommendations:

Flexibility deployment sits at the intersection of EU and national responsibilities. EU rules shape the overall market design, regulatory framework, and funding signals, while Member States translate these into network regulation and tariffs. Scaling flexibility thus depends equally on coherent EU-level signals and their effective national implementation.

Top down (~50%): Earmark CEF-E funding for Distribution Grids

A dedicated share of CEF-E should target distribution grid financing, as these grids account for around two thirds of the total investment needs. The shift towards a more decentralised energy system elevates DSOs' role in grid balancing, necessitating that National Regulatory Authority (NRAs) recognise investments in digitalisation, flexibility, and storage integration within regulated asset bases of the DSOs.

Bottom up (~50%): Align planning, pricing and regulation to unlock system flexibility

- **Adopt a central planning scenario as a reference based on national modeling**

Each Member State currently applies its own approach to assessing flexibility needs, despite ENTSO-E and the EU DSO entity already providing standardised methodologies and data formats. Unleashing the full potential of flexibility will require a harmonised framework and operational forecasts methodologies to ensure economically optimal system decisions (eg. new grids versus flexibility solutions). **Building a cost-optimal**

47 Gonzalez Cuenca, Isabel. "Overview of Energy Storage Deployment in Europe." JRC Technical Report, Ispra: European Commission, Joint Research Centre, 2025.
48 European Commission, Joint Research Centre. "European Energy Storage Inventory." Online dashboard, Ispra: JRC, accessed December 6, 2025. - The latest ERAA2025 outlook issued by ENTSO-E assumes 136 GW to be installed by the end of the decade while the EASE outlook foresees 163 GW of capacity.
49 Calipel, C. Henry, C. and Cornaggia, A. "The State of Europe's Climate Investment: 2025 Edition." Paris: I4CE, June 2025.
50 Weiss, A., Veillard, X. "Unlocking Europe's 8 Billion Energy Flexibility Opportunity", McKinsey & Company, 2025.
51 Agency for the Cooperation of Energy Regulators (ACER). "Energy retail - Active consumer participation is key to driving the energy transition: how can it happen?". December 2024.
52 European Parliamentary Research Service (EPRS). "EU Electricity Grids". May 2025.
53 European Commission. "Key Facts on Energy Storage." Brussels: European Commission, Directorate-General for Energy, accessed December 6, 2025.
54 Commission staff working document, "Energy storage - Underpinning a decarbonised and secure EU energy system", 2023.
55 Jones,D. and al. "European Electricity Review 2023". Ember. January 2023.

European system demands agreements on initial design assumptions at political level before sharing them with stakeholders. Indeed, while economic efficiency should ideally prevail, political considerations often impose planning constraints - reluctance toward interconnections with limited national benefit - shifting assessments from pure cost-benefit analysis to politically constrained planning. To incentivise cooperation, **at least one core modeling scenario should integrate more consensual, Member States-specific assumptions to illustrate what a politically feasible system could look like and how much it would cost.** Planning tools should also be interoperable, regularly updated, and stress-tested for cross-border efficacy under the ACER's supervision and within its forthcoming open-source modelling framework. Finally, stronger TSO-DSO cooperation, both nationally and at EU level - potentially through legally binding requirements on forecasting, queue management and investment planning - should underpin this effort.

- **Set up dedicated tariff and adjust taxes to better match electricity production**

Ongoing discussions on revising the Energy Taxation Directive remain inconclusive, and even a potential agreement would likely result in only marginal increases in fossil-fuel minimum taxation levels. As highlighted in the Affordable Energy Action Plan[56], the national level therefore remains the most effective scale for action. Member States can independently rebalance the price ratio between electricity and gas[57] - which still favors the latter - or reduce non-energy taxes such as excise duties and value-added tax (**VAT**) on electricity, as was done during the energy price crisis.

In 2023, network costs represented 24% of the average household electricity price, compared to 14% for VAT, around 7% for other taxes and levies, with the remainder covering energy and supply[58]. Electricity taxation typically consists of excise duties (based on kWh consumed) and VAT (based on the value consumed in euros). Therefore, a short term pricing strategy could consist of **gradually increasing network tariffs while proportionally reducing other components (through supplier switch and excise reduction) of the bill, limiting the overall consumer burden and securing predictable revenues for grid investments.**

- **Implement price signals**

Beyond taxation, better price signals can steer consumption toward periods of abundant renewable generation. Currently, network costs remain largely consumption-based, with limited incentives to shift demand. Denmark's approach[59], reducing excise duties to the minimum foreseen under EU law while maintaining VAT levels, illustrates how a lower excise can amplify tariff differentiation and encourage electricity use when clean power is plentiful. France's differentiated tariffs offer a similar model by offering reduced rates during low-carbon periods and higher tariffs when demand peaks, incentivising flexibility while obtaining economical gains. Dynamic pricing, enshrined in EU law, can build on these mechanisms by reflecting real-time market conditions. However, its success depends on adequate consumer protection and understanding through clear market information and predictable consumption patterns. The recent energy crisis, notably in Spain, showed that many households were unaware their contracts were indexed to wholesale prices, exposing them to sharp fluctuations. Dynamic pricing should therefore be introduced carefully, accompanied by smart meters deployment, still incomplete in several countries.

- **Mandate national TOTEX Frameworks to promote TSOs and DSOs flexibility**

Most European TSOs and DSOs are currently remunerated under a model based that favors new infrastructure and grid expansion - capital investments directly generates steady returns over asset life-

56 European Commission. "Affordable Energy Action Plan". February 2025
57 European Heat Pump Association."2025 market report". 2025.
58 Agency for the Cooperation of Energy Regulators (ACER). "Energy retail - Active consumer participation is key to driving the energy transition: how can it happen?". December 2024.
59 https://energywatch.com/EnergyNews/Policy___Trading/article18457321.ece

times and inflates revenues - while flexibility services such as storage, real-time monitoring or digital automation yield minimal financial returns, hampering innovation and inflates long-term system costs. National regulators must remove this bias by mandating frameworks where capital (CAPEX) and operating (OPEX) expenditure are summed to produce total operating expenditure (TOTEX). By doing so, they would enable flexible, digital solutions to compete with traditional reinforcements and drive DSOs and TSOs to choose the most cost-efficient mix of investments and operational strategies.

VIII . Interconnections:

Where we are now: between strategic priority and persistent underinvestment

Interconnections are often discussed through the lens of flexibility, yet they stand out in the consultation for their strategic importance and political sensitivity. The EU's first interconnection target, set in 2002 at 10% per Member States and extended to 2020, is still unmet by eight countries (France, Greece, Spain, Italy, Netherlands, Poland, Cyprus, Ireland). In 2014, the European Energy Security Target proposed raising the ambition to at least 15% by 2030, later enshrined in the 2018 Regulation on the Governance of the Energy Union, meaning that each country should be able to import 15% of its domestic electricity production from neighbours. As of 2025, 14 Member States have reached this threshold[60] (Bulgaria, Czechia, Denmark, Estonia, Croatia, Latvia, Lithuania, Luxembourg, Hungary, Malta, Austria, Slovenia, Slovakia, Finland), and 5 may be on track (Belgium, Germany, Sweden, Romania, Portugal). Yet, Ember estimates that 80%[61] of the EU power system will still fall short by 2030, calling into question the adequacy of the current metric and prompting the EU to complement it with additional indicators "*based on price differential in the wholesale market and the ratio of nominal transmission capacity of interconnectors in relation to peak load and to installed renewable generation capacity*"[62]. In addition, with only 54%[63] of capacity reserves for cross-border exchanges, the EU will most likely not meet its 70% target by the end of the year.

To help meet these objectives, the CEF dedicates 5.8 billion euros to energy projects for 2021-2027. The fivehold increase proposed by the European Commission is ambitious, but **past MFF negotiations have shown that such envelopes can be significantly reduced during negotiations** (from an initial €8.65B proposal to a final €5.84B), highlighting the need to safeguard this funding. The CEF's effectiveness must also be assessed alongside the PCIs and PMIs lists, which grant access to EU financing and streamlined permitting. The latest lists, unveiled in early December 2025 and updated biennially, predominantly feature electricity projects (113) but also conveys a necessary multi-vector approach encompassing hydrogen and electrolyser projects (100), carbon transport (17) and smart gas grid (3). Despite complementary instruments such as the EIB, the Innovation Fund or the Modernisation Fund, Ember[64] has however estimated that a €30 bn in grant funding is still missing to close the interconnection investment gap by 2040.

Objective: reaching the 15% interconnection target

Achieving the current 2030 interconnectivity target of 15% remains the core objective for Member States. Despite appearing increasingly unattainable for many, adopting a new goal for 2040 would have little value unless accompanied by measures tackling the well-known hurdles (financing, permitting). Despite the clear economic rationale - expected annual gains from further electricity market integration are estimated at 40 to 43 billion euros by 2030, up from around €34 billion in 2022 - **the real challenge remains political.**

60 European Commission. "Electricity interconnection targets".
61 Geneletti,G. Cremona, E. "Money on the line: scaling electricity interconnection for Europe's energy future". Ember. December 2025
62 https://energy.ec.europa.eu/topics/infrastructure/electricity-interconnection-targets_en
63 ACER. *Monitoring Report 2025: Cross-Zonal Electricity Trade Capacities*. Agency for the Cooperation of Energy Regulators, 2025.
64 Ember. *Money on the Line: Scaling Electricity Interconnection for Europe's Energy Future*. London: Ember, 2024.

Recommendations:

Interconnection development rests on a genuine dual governance layer. EU institutions set common targets, planning tools, and funding for cross-border projects, while national TSOs and authorities take the concrete investment, permitting, and delivery decisions that determine whether these projects materialise.

Top down approach (~50%): strengthen EU-level planning and fair cost-sharing

As mentioned before, CEF funding should be prioritised for countries that have met intermediate milestones aligned with the electrification objective. For cross-border projects, where costs and benefits are often unevenly distributed, stronger EU-level planning is essential to ensure fair compensation - either through alternative projects where non-benefiting countries become primary beneficiary, or through partial cost coverage via European instruments such as EIB loans. Overall, **a coordinated approach that balances costs and benefits across electricity, gas, heat, and CO_2 infrastructures would strengthen trust in long-term gains from deeper market integration**, with potential economical gains estimated at over 560 billion euros between 2030 and 2050[65].

Yet so far, planning practices - methodology, assumptions, timeframes - currently vary across stakeholders. The TYNDP process should be synchronized EU-wide, **with the European Commission issuing unified assumptions for scenario-building, particularly on energy demand, electricity uptake, and security of supply.** While prioritising cost-effective solutions, a coordinated EU approach to identifying and revolving energy bottlenecks would help foster acceptance of interconnection projects. In that regard, the Baltic approach - one shared LNG terminal and underground storage across three countries - demonstrates how resilience can stem from integrated cooperation and planning.

Bottom up (~50%): enhance TSO accountability through robust scenario-based planning

TSO interconnection planning should integrate at least three scenarios - a baseline, an optimistic one, and a degraded one - to robustly assess economic viability amid forecast uncertainties. This would be to ensure that the economic justification of a project has been carefully assessed even if noticeable forecasts changes were to happen. TSO would be responsible for providing structured data-backed justifications, particularly if anticipatory investments were to be reduced.

IX • Renewable Energy Communities

Where we are now: an uneven uptake of renewable energy communities across the EU

Renewable Energy communities (**RECs**) have **strong potential to democratise the energy system and build local support for renewables and grids.** They were given a dedicated EU framework under the 2019 Clean Energy for All Europeans package - designed to promote participatory governance and scale up community-driven energy initiatives.

Although all Member States have now transposed the relevant directives, implementation quality varies widely, resulting in uneven development of RECs across the EU. According to the 10th State of the Energy Union report, published in November 2025, an estimated 8,000 energy communities operate across the EU, but activity is concentrated in a few frontrunners - Germany, Denmark, Austria and the Netherlands. Germany alone hosts nearly half of all RECs and, as early as 2020, private citizens owned 30.2% of national renewable capacity[66]. By contrast, countries like Bulgaria, Malta, Romania, and Hungary are only beginning to develop such initiatives. Persistent structural, administrative, and financial barriers

65 Anderson, Megan, and Christian Redl. *Designing Energy Infrastructure for a Climate-Neutral Europe: Solutions for Cost-Effective System Development*. Berlin: Agora Energiewende, 2024. Accessed December 6, 2025.
66 Neij, L. and al. "Lessons learnt, challenges, and policy recommendations". Oxford Open Energy. March 2025.

remain significant, including **inconsistent transposition of EU regulations and guidance** that creates burdensome procedures, **high upfront investment needs**, **limited access to finance** despite targeted schemes such as the 2024 *European Energy Communities Facility*, and insufficient technical expertise and institutional support, which leaves RECs poorly recognized by public authorities and incumbents market actors.

Objective: one RECs per municipality by 2030

In 2023, the REPowerEU Plan established a shared non-binding political target of creating at least one renewable energy community in every municipality with over 10,000 inhabitants by 2025. Crossing Eurostat's Local Administrative Units (LAU) data[67] - allowing us to identify municipalities above this population threshold - with the Advanced Building and Urban Design (ABUD) database on registered energy communities[68] reveals significant disparities across the EU with only 9 Member States currently meeting this goal[69]. Given the lagging process in most countries, extending the target to 2030 is necessary to make this target realistic while allowing additional time to address structural barriers.

Recommendations:

Energy community development is primarily determined by national and local frameworks, since domestic regulation, tariff design, and municipal engagement ultimately decide whether projects can emerge and scale. EU-level action sets the legal basis and offers targeted support and guidance, but the pace and depth of rollout depend on how Member States and municipalities implement, adapt, and promote these opportunities on the ground.

> **Top-Down (~20%):** building a coherent EU framework and incentives for RECs

At the EU level, the priority is to establish a coherent enabling framework that reduces structural barriers and ensures a proper and harmonised deployment of RECs. This means closely monitoring the proper transposition of REDIII and the IEMD, ensuring a robust legal definition for RECs, and strengthening EU financing programmes such as LIFE to tackle early-stage hurdles like business-plan development and staffing support.

Sharing best practices between Member States, and **using RECs more prominently in EU communication on the green transition, would further strengthen their visibility and legitimacy.** Establishing an official, dedicated network in that regard could be proven useful.

> **Bottom-Up (~80%):** address regulatory, financial and technical obstacles

Because RECs ultimately emerge and operate within national, regional, and local frameworks, most of the enabling effort must take place at these levels. Governments should first **remove regulatory barriers** by giving RECs clear legal status and simplifying procedures. The Netherlands provides a useful model by explicitly integrating RECs into its Energy Law, giving them the legitimacy needed for their broader development. Governments should also publish practical guidelines and best practices to facilitate replication. **Financial barriers** must be tackled by reforming cost structures to ensure economic viability, including exemptions from excessive grid charges, targeted tax incentives, and a stronger reliance on grants rather than loans. Greece shows how coherent support schemes - through guaranteed tariffs and lower bank guarantees - can unlock RECs deployment. **Technical barriers** hinge on predictable grid access and local administrative capacity. Member States should reserve dedicated grid capacity for community projects, simplify collective self-consumption procedures, and provide targeted funding and technical assistance to municipalities to accelerate project processing.

67 Eurostat. "Local administrative units (LAU)"
68 Bukovszki, V., Abdullah,N.H. "Counting Energy Communities in the European Union". Advanced Building and Urban Design (ABUD). 2025.
69 Denmark, Germany, Austria, Greece, Estonia, Ireland, Luxembourg, Finland, Netherlands

Appendix 1: Responses to the European Consultation on the future Grids Package

Topic	Number of respondents	Recommendations
Planning	≈ 130	DSO-TSO Coordination (≈ 75) Scenario alignement (≈ 70) Integrate flexibility in planning (≈ 70) Data driven and transparency in planning (≈ 60) Multi-Vector Planning (≈ 60) Integrate local realities into planning (≈ 50) Integrate anticipatory investments in planning (≈ 30)
Financing	≈ 120	Facilitate access to financing for grid projects (≈ 120) More EU funding (CEF, IF, EU budget, EIB) (≈ 90) Long-term visibility (≈ 45) Reducing cost of capital / derisking mechanisms (≈ 45)
Permitting	≈ 100	Accelerate permitting procedures (75) Digitalise procedures (≈ 60) Reform queuing procedures (≈ 45) Harmonize permitting procedures across Member States (≈ 40) Allow anticipatory permitting (≈ 30) Implement one-stop shop (≈ 20) Strengthen social acceptability (≈ 20)
Flexibility	≈ 100	Integrate storage solutions in the system (≈ 55) Data needs for flexibility (signals, locational, hosting capacity) (≈ 45) Flexibility market design and local markets (≈ 40) TOTEX to enable flexibility-first approaches (≈ 35) DSO access to flexibility (≈ 30) Dynamic tariffs and price signals (≈ 30)
Interconnections	≈ 75	Accelerate strategic cross-border projects and PCI/PMIs (≈ 70) Funding needs for cross-border projects (≈ 70) Increase interconnection capacity targets (≈ 35) EU-level coordination for interconnection planning (≈ 20)
Supply chain resilience and strategic autonomy	≈ 40	Standardisation & modularisation (≈ 25) Equipment shortages (≈ 20) Expand EU manufacturing & industrial capacity (≈ 20) Workforce / skills and raw material concerns (≈ 20)
Energy Communities	≈ 30	Priority access / reserved capacity in the grid & connection queues (≈ 25) Citizen empowerment / participation (≈ 15)

▲ Source : Alice Moscovici and Phuc-Vinh Nguyen (Jacques Delors Institute)

Institut Jacques Delors
Penser l'Europe • Thinking Europe • Europa Denken
17 rue d'Antin, 75002 Paris, France
www.delorsinstitute.eu • info@delorsinstitute.eu

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