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# CAPTURING THE BENEFITS OF THE EU'S ELECTRIFICATION

## BETTER GOVERNANCE FOR DELIVERING THE GRIDS AGENDA

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Electrification of the EU's economy promises significant benefits to affordability, competitiveness, security, and climate. Yet capturing these benefits is at risk: without stronger governance of grid planning and investment, Europe will struggle to build a more resilient, smart and interconnected power system at pace.

The EU has outlined a path towards a competitive, decarbonised future powered by electricity. To deliver on this ambition rapidly, cost-effectively and at scale, grid planning and investment must be governed more effectively to address bottlenecks, connection queues, conflicts of interest and misaligned objectives.

Better planning, stronger political leadership, and more effective oversight of decision-making **at both EU and national levels** can accelerate the roll out of Europe's electricity grids and enable a competitive and affordable energy transition. Good practice among Member States, coupled with a strong political mandate at EU level, offer an opportunity for policymakers to speed the delivery of cost-effective grid solutions across all geographies.

The timing is crucial. The recently launched Energy Union Task Force is well placed to provide the political vision needed to deliver "a genuine Energy Union" built on better interconnection, improved system flexibility and faster permitting. This vision can be implemented swiftly in the next two years through the upcoming European Grids Package, the Electrification Action Plan, and possible reviews to the governance and cross-border infrastructure regulations.

To address this, we recommend the EU and Member States to take bold action in four key areas:

1. **Demonstrate political leadership at EU level**, including strengthening governance of energy system planning by considering a new European Independent System Operator and Planner, or reforming existing institutions to enhance oversight and transparency.
2. **Enhance financing and regional cooperation** by harmonising regional cooperation structures for clearer decision-making, strengthening benefit assessment and cost-sharing for cross-border projects, and complement EU funding with tools that also support national infrastructure of cross-border relevance.
3. **Complete the internal market at distribution level** by supporting the rapid adoption of digitalisation and flexibility through a European Grid Modernisation Lab, standardising distribution planning, and strengthening delivery mechanisms for flexibility.
4. **Improve transparency at national level,** by strengthening independent national planning, empowering Regulatory Authorities via climate-aligned mandates, and ensuring national plans and scenarios fully reflect renewable and electrification objectives.

## Grid governance at the heart of competitive electrification

Recent years have seen the EU ramp up renewable energy production at record pace. In 2024, wind and solar delivered nearly half of the EU's electricity needs for the first time.[1] However, the electrification f the economy has largely stagnated, rising by only 1-2 percentage points in the last two decades. Without progress, the EU will miss its ambition to deliver long-term competitiveness and electrify 32% of final energy consumption by 2030.[2]

The EU's ability to build and modernise electricity networks is at the heart of this challenge. Improving institutions and decision-making processes will be key to unlock efficient delivery of grid solutions, alongside further action to mobilise

[1] Ember, 2025, **European Electricity Review 2025**

[2] EUI Florence School of Regulation, 2025, **Electrification, where are we?**

capital and tackle outstanding challenges to grid modernisation and digitalisation, especially at distribution level (Figure 1).

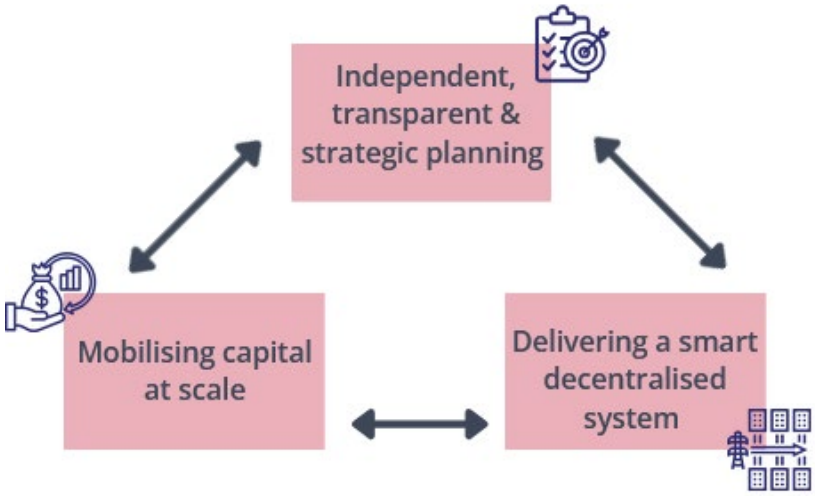


*Figure 1. Priority areas to ensure grid modernisation supports economy-wide electrification*

## The need for reform: aligning objectives, overcoming complexity and addressing fragmentation

Independent, future-oriented planning will be critical to ensure private and public funds are allocated towards the most competitive and strategic priorities. Improvements to governance are needed to streamline existing processes and ensure decision-making across governments, network companies and energy regulators is simpler, more efficient and coordinated to ensure alignment with EU decarbonisation and electrification targets and Member State needs.

Despite pockets of good practice across the EU,[3] many planning processes remain fragmented and misaligned. For instance, climate targets are formally embedded in law or policy documents in all but one Member States (see Annex 1),[4] but are publicly recognised as objectives by only a third of TSOs and a fraction of national energy regulators (Figure 2). Ten out of 26 European

[3] See Annex 2 and Beyond Fossil Fuels (BFF), Ember, E3G & the Institute for Energy Economics and Financial Analysis (IEEFA), 2025, **How Europe's grid operators are preparing for the energy transition**

[4] **Net Zero Tracker**, 2025

transmissions system operators use grid planning scenarios with lower wind and solar ambition than national targets.[5]

The energy security and competitiveness impact of this lack of coherence can be significant. There are three times more renewable energy projects stuck in grid connection queues than the capacity needed to meet the EU's 2030 energy and climate targets, while renewable curtailment cost over 7.2 billion in 2024 across just 7 of the EU's member states.[6] Industry, as well as electric vehicles and heat pump users are also impacted by long connection queues. Waiting times for the connection of new industrial users can reach 5–15 years in some member states, according to anecdotal evidence. Often, lack of reliable data like grid capacity maps prevents grid users from making effective decisions on where to connect and hinders the monitoring and evaluation of grid investment plans.

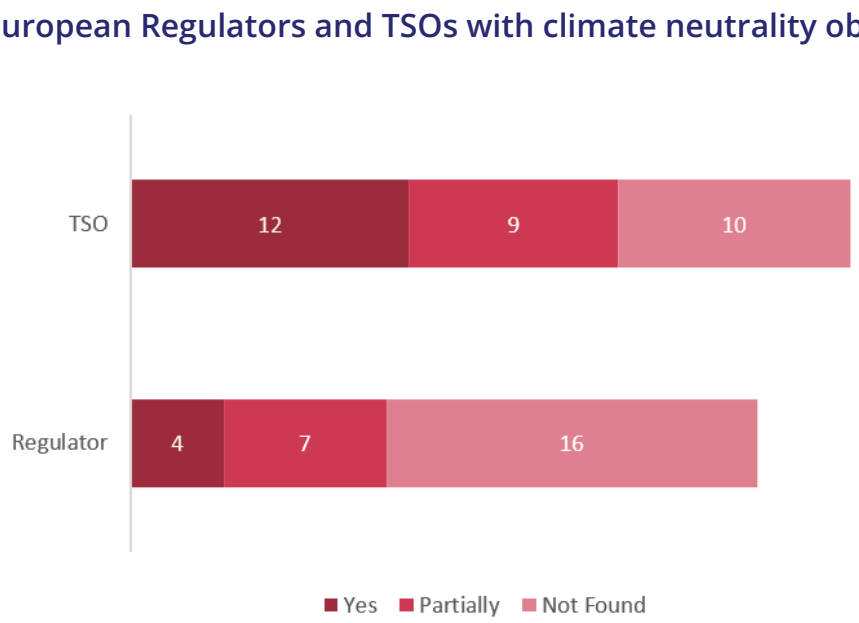


*Figure 2. Number of EU regulators (out of 27) and TSOs (out of 31) with public reference to climate neutrality objectives as part of their activities. Source: E3G elaboration on data from BFF, Ember, E3G and IEEFA.*[7]

[5] Ember, 2024, **Putting the mission in transmission: Grids for Europe's energy transition**

[6] Beyond Fossil Fuels (BFF), Ember, E3G & the Institute for Energy Economics and Financial Analysis (IEEFA), 2025, **How Europe's grid operators are preparing for the energy transition**

[7] Beyond Fossil Fuels (BFF), Ember, E3G & the Institute for Energy Economics and Financial Analysis (IEEFA), 2025, **How Europe's grid operators are preparing for the energy transition**

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## EU-level planning: Strategic potential undermined by complexity

Europe is a global leader in cross-border integration of both infrastructure and markets with vast potential to transport affordable renewable electricity from southern and northern regions to high-demand centres. Enhanced regional cooperation and strategic financing have already played a key role in lowering prices for European industry and citizens, with enhanced cross-border trade delivering €34 billion in benefits in 2021.[8]

Despite the success of the ten-year network development planning process (TYNDP), nearly half of the cross-border infrastructure needs identified as economically viable are not backed up by investment plans.[9] Complex and fragmented decision-making processes, administrative and delivery bottlenecks, and lack of trust and shared oversight are contributing to this gap. In many cases, cross-border projects remain largely bilateral, missing key opportunities to distribute both cost and the benefit of renewables across the EU.

Enhanced European coordination is even more critical to deliver energy security today – as demonstrated both by success stories like the synchronisation of the Baltic countries to the continental European electricity grid, and by the disruptions caused by the recent blackouts in Spain and Portugal.[10] Without the necessary political steer via top-down EU and regional cooperation forums, cross-border infrastructure projects cannot overcome the practical barriers that stem from crossing multiple jurisdictions.

## Distribution grid fragmentation: A barrier to innovation

Flexibility is widely recognised as vital for the cost-effective transition towards electrification. Yet despite, the strong regulatory basis provided by EU's internal electricity market rules, implementation on the ground remains slow. Thie need to speed delivery is most acute at distribution level – a space expected to attract up to 60% of all grid investments,[11]and where the potential for digitalisation to offer cost-savings for citizens and businesses is largely untapped.

[8] ACER, 2022, **Final Assessment of the EU Wholesale Electricity Market Design**

[9] ACER, 2024, **Electricity infrastructure development to support a competitive and sustainable energy system 2024 Monitoring Report**

[10] MIT CEEPR, 2025, **The (Hopefully) Enlightening Blackout in Spain: Questions and Lessons for the Future**

[11] European Commission, 2025, **Investment needs of European energy infrastructure to enable a decarbonised economy – Final report**

The challenges of adopting new planning and operating practices to speed the energy transition are multiplied by the number and variety of distribution networks (DSOs). There are more than 2500 DSOs in the EU,[12] ranging from over 850 in Germany to six in Hungary and even fewer elsewhere.[13] While no "one size fits all" solution exists for distribution grids, the EU single market remains largely incomplete at this level, strengthening the case for the EU to support the roll out of best practices.

At this level, there is substantial potential for clean technology innovators to take advantage of the emerging smart grids market, which is estimated to more than double in value to $185 billion in 2029.[14] Achieving scaled requires harmonisation of standards across the EU to avoid past mistakes, such as the fragmentation of EV charging approaches that resulted in interoperability issues and limited consumer choice. Standardisation and rapid deployment of good practices will allow EU innovators, such as demand aggregators, the opportunity to scale more rapidly, while enabling DSOs to take advantage of digital and flexibility technologies and strengthening the competitiveness of EU businesses.

## Emerging changes to grid governance at national level

The decarbonised energy system of the future will look very different from today. Ensuring it is planned and operated with clear public interest in mind is key to maintain public trust, deliver efficiently and attract long-term investment. The need to deliver economy-wide electrification will put pressure on electricity network companies to increase expenditure, which can significantly impact consumer bills if not accompanied by stronger monitoring and regulatory scrutiny. At the same time, as the energy transition evolves, it is expected to deliver a rapid decrease in fossil gas use,[15] but planning for this transformation is not aligned with the commercial interest of incumbent gas network companies. In these circumstances, the value of unbiased advice and high-quality technical standards can only increase.

[12] Eurelectric, 2024, **Distribution Grids: a Eurelectric Handbook**

[13] Euractiv, 2024, **Map the Green Deal's drivers: Distribution grids across the EU**

[14] Markets and Markets, 2025, **Smart Grid Market Report**

[15] E3G, 2024, **Gas transition in the EU: What's next?**

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## Creating the next generation of system operators and planners

Over the last 15 years the EU set up a strong framework to govern its internal energy market, taking steps to create independent network and regulatory institutions, improve transparency and support Member State coordination. The process of market liberalisation led to the separation between network, generation and retail activities across the gas and electricity sectors. Policy attention today is rightly shifting to the decisions made within network companies, given the volumes of investment at hand.[16]

Regulatory incentives that limit the potential bias of network companies towards capital-heavy expenditure are a minimum first step to safeguard public interest when solutions like digitalisation, storage and demand-side flexibility are rapidly falling in cost.[17] Enhanced separation of network asset ownership from network operation and planning functions – though separate staff, incentives and management – can further support efficient decisions within existing network companies. Creating a fully Independent System Operator and Planner (ISOP), as done in the UK, goes a step further by completely separating system operation and planning functions in a separate organisation. This model has additional benefits: it allows the newly created National Energy System Operator (NESO) to act as an expert, impartial public body, with cross-cutting responsibility across electricity and gas network planning, and with a clear mandate to support the delivery of climate targets while minimising costs and ensuring energy security[18] (Figure 3).

[16] See recent guidance from European institutions on network charges and anticipatory investment, which supports the implementation of good practice but remain voluntary in nature.

[17] CEER, 2025, **Incentives in Regulatory Frameworks with a Focus on OPEX/CAPEX neutrality**

[18] Department for Energy Security and Net Zero, Ofgem, 2024, **Designation of the National Energy System Operator (NESO)**

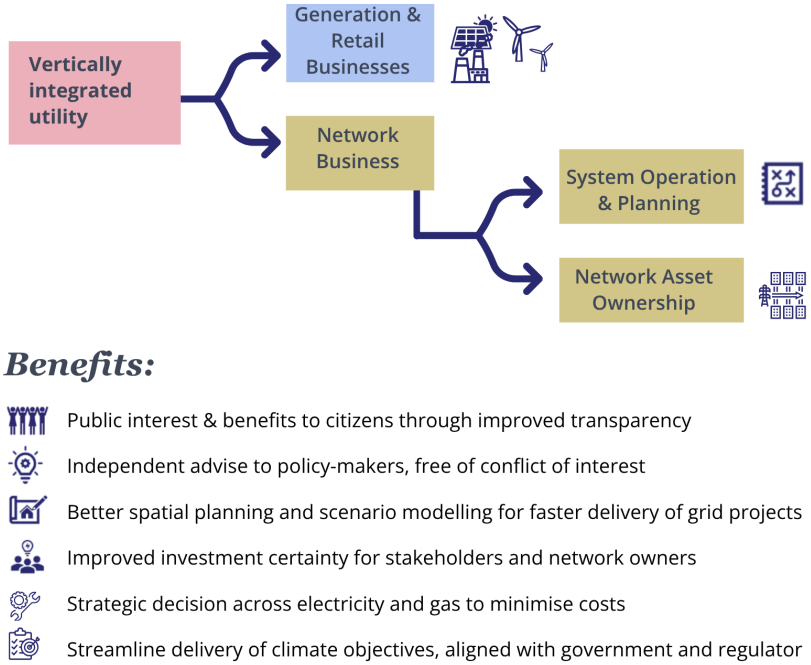


*Figure 3. Independent System Operator and Planner model, as implemented in the UK.*

### Moving to cross-vector planning and strengthened public oversight

Several EU Member States are trialling innovative approaches to better align electricity and gas network plans and strengthen oversight to deliver decarbonisation (see Annex 2). These early examples of a "whole energy system" approach showcase the value of coordinated planning. They also raise important questions around institutional design – including how to ensure organisations involved in the planning process invest in the right skills to deliver more integrated plans and ensure effective oversight.

> **In Austria**, the integrated network plan is driven by the Federal Ministry of Economy, Energy and Tourism, providing clear public sector guidance, coordinated network planning and alignment with national climate targets.

> **In Denmark**, the long-term network development plan is built by Energinet – a public sector owned TSO operating across electricity and gas under the scrutiny of the national regulator and energy ministry.

> **In Belgium**, the ruling coalition is exploring ways to strengthen the oversight of their network development plan via a new body.

> **In Ireland,** the government is contemplating strengthening the mandate of its energy regulator to enable better oversight of network development and ensure accountability for delivery of projects.

## The role of public institutions in delivering better grid governance

The EU, Member States and regional fora share responsibility for cooperation and efficient grid delivery. Political leadership from EU institutions that combines clear climate commitments with the policies to deliver them will remain a critical enabler of grid investment, given long lead times for projects. Strengthening cooperation among EU institutions, Member States and regions, improving existing processes and driving innovation will be key to maintaining EU unity and delivering the grid needed for a secure, affordable energy future.

Better alignment between EU and Member States can support the financing of strategic projects at lower cost of capital, while stronger oversight by public institutions, such as the European Commission or ACER will be essential to guide bottom-up processes towards coherence. At regional and EU level, strengthened shared oversight and joint monitoring of projects, supported by exchange of best practice, can help speed delivery.

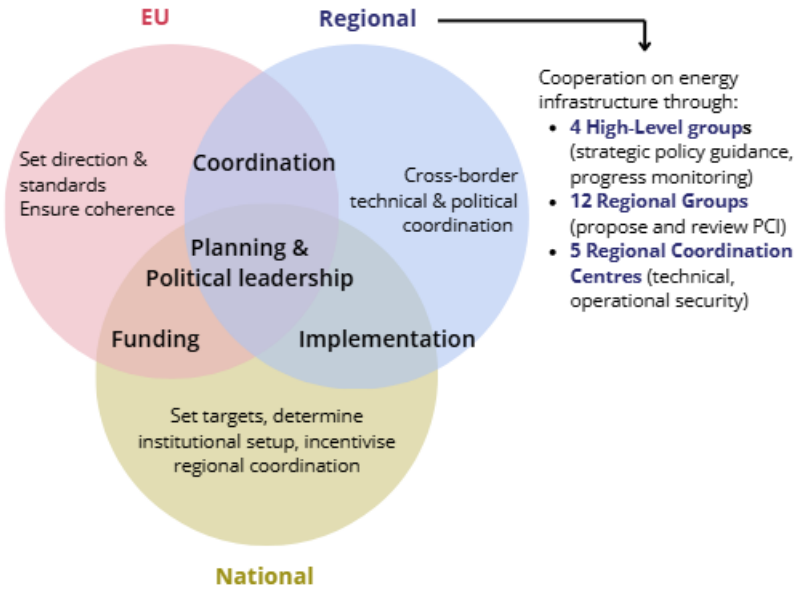


*Figure 4. Opportunities to enhance decision-making across EU, Member States and regional fora.*

# Recommendations

The following recommendations set out actions that can be driven at EU level with support of Member States and regional bodies.

### Planning and political leadership at EU level

The incremental reforms of existing processes undertaken so far may deliver short term impact, but they fall short of building trust and securing long-term political buy-in. The following options for fundamental reform aim to overcome this challenge:

> **European Independent System Operator and Planner:** Work with Member States to assess the political and technical feasibility of a new institution to streamline the operation and planning of the European electricity system.[19] Such a body can pilot an independent top-down assessment of infrastructure requirements to meet the EU's climate and competitiveness goals cost-effectively, laying the groundwork for a pan-European investment plan.

> **Reform the ENTSOs:** Review the mandate and structure of ENTSO-E to ensure it is fit for purpose in a fast-changing electricity landscape. This includes streamlining its legal obligations and separating its dual role as an industry association working on behalf of TSOs.[20] Apply a similar assessment to the gas transmission operators' network ENTSO-G, and the newly established network for hydrogen, ENNOH. At a minimum, shift the source of institutional funding from membership fees to public budgets to ensure the Secretariat's independent functioning.

> **Strengthen public oversight:** Adapt the role of ACER, the European Commission and member states in European network planning by shifting more responsibility for scenario development and oversight to public institutions. This could mean issuing fewer but binding ACER opinions, mandating faster methodological improvements,[21] improving data availability and transparency, and moving towards open-source scenario modelling.

### Enhance cross-border financing and regional cooperation

> **Harmonise regional structures:** Clarify cooperation structures and responsibilities to enable clear decision-making and alignment with EU and

[19] See Bruegel, 2025, **Upgrading Europe's electricity grid is about more than just money**

[20] See also ACER, 2023, **Opinion No 02/2023**

[21] See E3G, 2025, **How EU market design can make power clean and affordable**

national priorities. Regional bodies, including Regional Coordination Centres (RCCs), Regional Groups and High-Level Groups, should be empowered to support cross-border coordination, providing stronger leadership and supporting project implementation by facilitating political cooperation, and unlocking faster agreements on key decisions, including on Cross-Border Cost Allocation.

> **Redesign cost sharing:** Update benefit assessment and cost sharing for cross-border projects, drawing on lessons from offshore grid planning.[22] Moving from project-by-project agreements to regional approaches can better reflect system-wide benefits, strengthen incentives for cooperation among Member States, and ensure consumers across Europe gain from more efficient and integrated grid expansion.

> **Complement EU financing to support domestic projects with cross-border relevance:** beyond the Trans-European Networks for Energy (TEN-E) and Connecting Europe Facility, EU instruments should further acknowledge national needs[23] and provide dedicated funding for EU-relevant domestic infrastructure. The 2028–2034 Multiannual Financial Framework, including through dedicated National and Regional Partnership Plans, should help unlock cross-border benefits and cost-effective renewable integration.

### Complete the internal market at distribution level

> **Accelerate best practices:** Support Member States to rapidly adopt digitalisation and flexibility solutions and prioritise implementation. For example, establish a European Grid Modernisation Lab to promote the rollout of innovative grid technologies, and support the standardisation and speedy delivery of distribution network development plans, including thought technical support for smaller DSOs.

> **Harmonise flexibility markets:** Assess the existing delivery mechanisms for flexibility, including the upcoming national flexibility assessments, and streamline deployment at EU and Member State levels. ACER could be tasked with harmonising the implementation of market standards and developing guidance on local flexibility market design and demand-side response.

[22] European Commission, 2024, **Guidance on collaborative investment frameworks for offshore energy projects**

[23] ENTSO-E, 2024, **Opportunities for a more efficient European power system by 2050: Infrastructure Gaps Report**, TYNDP 2024

### Improve transparency at national level through clear mandates

> **Independent planning**: Conduct a review of transmission system operator roles and responsibilities and support the shift towards Independent System Operators and Planners. The white paper on Electricity Market Design presents an opportunity to explore this.

> **Empower regulators:** Establish clear and forward-looking mandates for National Regulatory Authorities to ensure alignment with climate objectives and empower them to better scrutinise the adequacy of grid flexibility and investment plans.

> **Climate alignment:** Member States should ensure that National Energy and Climate Plans, TSO scenarios and spatial plans accurately reflect climate objectives to support the build-out of a competitive and future-fit energy system in line with the rapid acceleration of renewables-based power and an electrified economy.

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# ANNEX

## Annex 1: Member states' climate targets and network plan alignment

| Country | Climate target in law | Expected share of RES in power in 2030 | Wind energy trajectory for network plan vs NECP | Solar energy trajectory for network plan vs NECP |
|---|---|---|---|---|
| AT | Yes (2040) | 94% | Higher | Aligned |
| BE | In policy document | 56% | Aligned | Aligned |
| BG | In policy document | 49% | Much lower | Much lower |
| CY | In policy document | 38% | Aligned | Aligned |
| CZ | Yes (2050) | 31% | Lower | Lower |
| DE | Yes (2045) | 75% | *No data* | *No data* |
| DK | Yes (2050) | 99% | Much lower | Much higher |
| EE | In policy document | 90% | *No data* | *No data* |
| ES | Yes (2050) | 81% | Aligned | Aligned |
| FI | Yes (2035) | 63% | Much higher | Much higher |
| FR | Yes (2050) | 38% | Aligned | Lower |
| GR | Yes (2050) | 81% | Lower | Lower |
| HR | In policy document | 89% | Lower | Much higher |
| HU | Yes (2050) | 42% | Much lower | Aligned |
| IE | Yes (2050) | 81% | Lower | Much lower |
| IT | In policy document | 69% | Aligned | Aligned |
| LT | In policy document | 89% | Lower | Much lower |
| LU | Yes (2050) | No data | Higher | Lower |

| Country | Climate target in law | Expected share of RES in power in 2030 | Wind energy trajectory for network plan vs NECP | Solar energy trajectory for network plan vs NECP |
|---|---|---|---|---|
| LV | In policy document | 96% | *No data* | *No data* |
| MT | In policy document | No data | *No data* | *No data* |
| NL | Yes (2050) | 75% | Higher | Much higher |
| PL | No | 51% | Aligned | Lower |
| PT | Yes (2050) | 96% | Lower | Much lower |
| RO | In policy document | 57% | Lower | Lower |
| SE | Yes (2045) | 75% | Aligned | Higher |
| SI | In policy document | 49% | Aligned | Aligned |
| SK | Yes (2050) | 26% | Aligned | Aligned |

Sources: Climate targets: Energy & Climate Intelligence Unit, **Net Zero Tracker**, 2025 (retrieved 20 September 2025); 2030 expected share of RES in power: Ember, **Live EU NECP Tracker** (retrieved 20 September 2025); wind & solar energy trajectory assessments: Ember, March 2024, **Putting the mission in transmission: Grids for Europe's energy transition**

## Annex 2: National action for better grid governance

| Member State | Action | Source |
|---|---|---|
| Austria | The Energy Ministry's integrated network infrastructure plan (ÖNIP) is an overarching strategic planning tool that integrates electricity, gas and hydrogen infrastructure needs. The ÖNIP should underpin infrastructure decisions, is independent of infrastructure operators, and embeds the objective of a climate neutral energy system by 2040. | **Integrierter österreichischer Netzinfrastrukturplan (ÖNIP)** |
| Belgium | Belgium will establish a High Council for autonomous and independent energy supply, tasked with providing oversight by harmonizing models, providing objective data, and advising authorities on investment plans and CRM volumes. It will coordinate long-term integrated energy planning across federal and regional levels and ensure consistency with the national climate strategy. This step aims to strengthen independence and transparency, improve coordination across jurisdictions, and enable reliable advice to policymakers. | **Accord de coalition fédérale 2025-2029** |
| Denmark | As Denmark's TSO for both gas and electricity, Energinet develops long-term network development plans across sectors, incorporating all energy vectors within a single framework. By jointly considering sector coupling, flexibility, digitalisation and socio-economic developments, the process can optimise the use of infrastructure, avoid stranded assets and identify cost-efficient solutions. Close involvement of the Danish Energy Agency and the Ministry of Climate, Energy and | **Integrated National Network Development Plans, DUR and Energinet** |

| | | |
|---|---|---|
| | Utilities support the use of robust input and oversight, policy alignment and accountability, and a direct link between planning and investment decisions. | |
| Ireland | The Irish government is planning to strengthen the powers of the national regulator, a positive development that will enhance transparency, market oversight, consumer protection, and accountability in delivering grid investments. Streamlined processes, stronger stakeholder engagement and aligning transmission and distribution development will further accelerate and align the delivery of the grids agenda. | **Programme for Government. Securing Ireland's Future** |
| The Netherlands | The Netherlands offers a good example of aligning strategic climate goals with grid development. National law sets a 2050 climate-neutrality target, which is also reinforced regionally as part of the North Sea Energy Cooperation. With clear strategic direction in place, the Dutch TSO, TenneT, launched its innovative 2GW Program – a large-scale tender approach to deliver offshore infrastructure more cost-effectively. The new model aims to provide supply chain visibility, this providing additional certainty so manufacturers can invest in additional capacity. | TenneT's **2GW Program** and example of **long term procurement** |
| United Kingdom | The UK has recently established the National Energy System Operator (NESO) – an independent system operator and planner for Great Britain. NESO is tasked with real-time operation of the power grid, strategic spatial planning spatial planning for the UK's electricity and gas networks and providing independent advice to government. This move is a further step in the unbundling hierarchy, splitting the operation and planning of electricity and gas networks, from network asset | **National Energy System Operator** |

| | | |
|---|---|---|
| | ownership. Moving to fully integrated planning by including hydrogen network planning is currently under consideration. NESO is also developing regional and strategic spatial energy plans – pulling together a coherent "whole energy" view of cost-effective pathways to meet energy needs. | |

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## About E3G

E3G is an independent climate change think tank working to deliver a safe climate for all.

We drive systemic action on climate by identifying barriers and constructing coalitions to advance the solutions needed. We create spaces for honest dialogue, and help guide governments, businesses and the public on how to deliver change at the pace the planet demands.

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