WindEurope position on electricity grids

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INTRODUCTION

According to the European Commission Action Plan for Grids, electricity demand in the EU is expected to increase by around 60%[1] from now until 2030. The electricity grid in many countries is not yet on track[2] to accommodate the new electric loads and renewable generation, including 200 GW of wind[3], to be connected in that timeframe. Almost half of our power distribution grids are more than 40 years old. Cross-border transmission capacity needs to double by 2030. Grid deployment at national and cross-border level has only recently started to accelerate.

Picking up the pace requires bigger political oversight and targeted actions at EU and national level. In November 2023 the European Commission launched the EU Action Plan for Grids[4] to accelerate the build-out and modernisation of electricity grids. The recent reform of the EU electricity market design[5] also includes many new and reinforced provisions for electricity grids and flexibility. The implementation of the provisions agreed at EU level and of the EU Action Plan for Grids are critical. In parallel, Europe needs to focus ruthlessly on speedy and efficient delivery of concrete projects on the ground. Waiting to have the perfect framework will just not do. Europe's energy security and climate objectives require that we deliver on concrete projects today, and effectively plan for the medium term at the same time.

This position paper aims to set the wind industry's priorities and give recommendations to guide this implementation.

1 Electricity grid planning and financing

1.1 Anticipate infrastructure needs beyond 2035

The EU Action Plan for Grids and the Electricity Market Design reform highlight the crucial role of anticipatory electricity grid investments. By Q1 2025, the European Commission will propose EU-wide guidance on how Member States should anticipate their electricity grid investments to reach their climate targets by 2050.

Electricity grid needs lead time of around 10–15 years to be built, meaning that development process for new grid infrastructure is longer than new renewable power plants. As it stands hundreds of GW of renewable energy projects are stuck in connection queues across Europe due to insufficient grid capacity[6]. This is the result of reactive grid planning. Most decisions to expand or reinforce existing grids are taken upon new grid connection requests. Instead, national authorities and System Operators should adopt a proactive forward-looking approach, looking beyond 10 years. This should be guided by national renewable energy targets.

In some cases, insufficient grid capacity is due to inefficient approaches such as the 'first come first served' principle on allocating grid capacity. This has often led to an unbalanced mix of renewables e.g. too much solar PV in the same area making the grid insufficient overall only due to some hours of

[1] European Commission, 2023, EU Action Plan for Grids
[2] Ember, 2024, Grids for Europe's energy transition
[3] WindEurope Outlook 2024
[4] European Commission, 2023, EU Action Plan for Grids
[5] European Parliament, 2023, Electricity Market Design reform
[6] WindEurope, 2024, Grid access challenges for wind farms in Europe

high congestion in a day. Therefore, proactive planning guided by efficiency and optimisation to guarantee grid capacity for all strategic technologies in a balanced manner is key.

The EU guidance on anticipatory grid investments should cover two major angles:

- **Define a common EU scope and indicators that national authorities must implement.** Practically there should be a common EU framework on anticipation timeframes, levels of acceptable risk for each timeframe, common grid efficiency and modernisation indicators, and a common methodology to assess hosting capacity and flexibility potential. Certain national authorities and System Operators remain overly focused on the risk of underutilisation of new grid assets and do not adequately factor in the risk of failing electrification and climate targets. In some countries a more forward-looking approach taking up higher risk is even penalised. Having no common EU framework for anticipatory investments will inevitably lead to different interpretations by national authorities.
- **Empower coordination among countries and sectors to ensure consistency of national decisions with EU targets.** Efficient alignment between the National Energy and Climate Plans (NECPs) and the national Network Development Plans (NDPs) can already provide a good basis. But this alignment must also consider the status of deployment of grid projects planned nationally and have strong bilateral feedback loop with the Ten-Year Network Development Plan (TYNDP) and its deployment status. As it stands most of the national NDPs do not underpin NECP targets[7] . NDPs need to break down grid capacity needs into specific projects.

Recommended actions at national level

- **Create two action lines**: one to release grid capacity immediately, one for the long term.
- **Update national Network Development Plans (NDPs) more regularly to underpin NECPs,** break them down into specific grid projects not total capacities, both at transmission and distribution level
- **Plan further ahead (>10 years)** considering national electrification strategy, lead times to deploy various technologies, supply chain needs and technology readiness.
- **Apply common EU frameworks to anticipate investments and risk**, to assess grid hosting capacity for new renewables, to evaluate efficiency and modernisation indicators and flexibility potential.
- **Apply total expenditure (TOTEX)-based Cost Benefit Analyses (CBA) and improve them** to account for all benefits, constraints, short- and long-term costs. **Quantify the impact of grid build out delays on social welfare including CO2 emissions, electricity prices evolution and congestion management costs.**
- **Deepen stakeholder engagement and awareness from early planning stages**. This will also help to realistically assess **technology readiness** and **supply chain capacity**.
- **Align electricity grid planning with gas pipeline decommissioning and repurposing** to ensure consistency with national climate targets.

[7] Ember, 2024, Grids for Europe's energy transition

1.2 Common EU criteria for grid hosting capacity

There isn't a single formula that all countries apply to calculate the hosting capacity of their grids for new renewables. Current tools and simulated scenarios are often based on overly conservative simplifications, for instance that all installed wind and solar PV capacities will be generating at their maximum output at the same time, or that all EVs will start charging or discharging at the same time in a country. There is a need for more transparency around assumptions used to calculate grid hosting capacity for new renewables. The same applies for information about the location of available grid capacity. Even though good practices exist[8], new demand and generation users largely don't have easy access to regularly updated grid capacity information.

The EU Action Plan for Grids calls upon ENTSO-E and the EU DSO Entity to create harmonised methodology to calculate grid hosting capacity in countries across the EU. Additionally, ENTSO-E and the EU DSO Entity should provide guidance to System Operators by mid-2025 for digitalizing and streamlining procedures for grid connection requests.

Recommended actions at national level

- National Authorities should incentivise System Operators to apply **harmonized EU criteria on calculating grid hosting capacity.**
- To enable optimal grid planning, such criteria must be based on **realistic assumptions** about the operation of generation and new demand and the **potential of grid optimisation and flexibility solutions**.
- TSOs and DSOs must provide **transparent data on currently available and planned grid capacity, regularly updated based on dynamic management of grid connection queues**.

1.3 Refine assumptions for electrification

Until now electricity and gas networks have been planned in silos both at national and at European level. The revised TEN-E Regulation and its provision to establish a dedicated Stakeholders Reference Group[9] aim to establish cross-sectoral planning at EU level. This needs to be done also at national level.

National strategies for electrification of demand and decommissioning/repurposing of gas infrastructure will have a big impact on Europe achieving its climate goals. The provisions in the Hydrogen and decarbonised gas market package[10] are unclear about which legislative mechanism at national level will trigger the decommissioning of gas infrastructure due to lower gas demand expectations. It is also unclear how EU policy makers will be monitoring the consistency of such national decisions with the collective achievement of EU climate goals. An EU action plan on electrification would be an excellent support to national authorities for designing efficient incentives for electrification and reinforcing the coordination between their electricity and gas stakeholders.

[8] Examples of good practices: Dutch TSO TenneT, Italian TSO Terna, Spanish TSO Redeia

[9] TYNDP Scenarios Reference Group

[10] Hydrogen and decarbonised gas market package

Recommended actions at national level

- **National Energy and Climate Plans should include clear and detailed strategies to incentivise direct electrification** and the respective necessary investments.
- **National authorities should establish efficient coordination between electricity and gas planning and stakeholders** and clear legislative mechanisms to trigger the decommissioning/repurposing of gas infrastructure.
- **Cost, efficiency, and all emissions assumptions for new technologies** such as renewable hydrogen (imported or domestically produced) or carbon capture **should be realistic** and regularly tested with all relevant stakeholders to be considered in infrastructure planning.

1.4 Assessment of flexibility needs and grid planning

The Electricity Market Design reform mandates ENTSO-E and EU DSO Entity to develop an EU-wide methodology that Member States will have to apply bi-annually to assess their flexibility needs for the following 5-10 years. This assessment will enable them to define indicative targets for flexibility and to design national policies and financial support for non-fossil flexibility assets.

Based on lessons learned from the TYNDP and the European Resource Adequacy Assessment processes, it is essential that all relevant stakeholders and sectors actively engage in the development of the flexibility assessment methodology right from the beginning. This is the only way to make sure that assumptions about technology operation and flexibility potential, technology readiness and costs are realistic and based on actual market trends.

Unfortunately, the Electricity Market Design reform does not mandate such stakeholder engagement. It will be crucial for policy makers at EU and national level to establish this exchange. At EU level creating an expert group such as the TYNDP scenarios Stakeholders Reference Group would be very efficient. However, a strong monitoring mechanism between EU policy makers and national authorities will also be essential to ensure that national decisions remain first consistent with climate neutrality targets and are then technology neutral among net-zero technologies. ACER should have a reinforced role in this coordination.

1.5 Financing

Today most of the grid investments are financed through network tariffs at national level complemented by congestion income for cross-border projects and EU funds such as the Connecting Europe Facility (CEF). However, the foreseen volume of electricity grid investments is unprecedented both onshore and offshore. In many cases it will not be politically viable for grid users to bear these costs through network tariffs especially in countries that will build their grids to export energy to neighbouring countries. To complement network tariffs and EU funds, national authorities must explore additional financing tools such as support by the European Investment Bank or national promotional banks and private funds. There is potential for public-private collaboration for grid infrastructure such as the proposed "super-tender"[11] in the UK.

Considering the scarcity of technical and human resources needed to expand the grid, the regulatory framework in all countries should also allow generation developers to pre-finance and develop part of grid infrastructure. Based on a pre-defined agreement between the TSO and the generator, the relevant grid infrastructure would then be handed over to TSOs with adequate compensation.

[11] UK Labour Party, 2023

Recommended actions

- **Policy makers at EU and national level should as soon as possible explore new finance tools for electricity grids** through general taxation schemes, support by the EIB or national promotional banks, other national or EU funds combined with private finance.
- **A regional level of coordination** among several countries will be crucial to make sure benefit and cost sharing will be fair for all impacted citizens for both onshore and offshore grid investments.
- **Developers** should be allowed to **pre-finance and develop grid infrastructure**. For instance the approach followed in France is to divide the cost of grid expansion among multiple projects in the same grid area undergoing expansion.

2 Grid access for wind farms

Getting access to the electricity grid is the number one bottleneck today for deploying renewable energy at scale as it stands. Grid access starts with grid connection. Today more than 500 GW[12] of total wind capacity in Croatia, France, Ireland, Italy, Norway, Romania, Spain and the UK are waiting for their grid connection assessment. The total capacity figure for Europe is much higher. This is not just due to saturation of the grid, or a lack of grid planning up to 2050. Grid permitting procedures are also inefficient.

Curtailment is the second major factor limiting grid access to renewable generation. Wind farms may be connected to the grid but unable – often during several hours – to export a large part of their generation due to grid congestion. Across Europe there is very limited transparency around curtailed renewable energy volumes and congestion costs. Very few national authorities have taken care of publishing such important data that can justify the need for proactive grid planning and accelerated grid investments.

Europe can make strides towards its climate goals if national Governments take targeted action to accelerate grid connectivity and guarantee grid capacity for all their strategic net-zero technologies in a balanced manner.

2.1 Management of grid connection queues

When assessing grid connection requests for new or repowered projects, System Operators typically adhere to the *first come first served* principle. This has led to significant delays in grid permitting especially in countries with numerous speculative requests by projects that will not materialise. In certain cases it has also led to grid saturation due to an unbalanced generation mix connected to the grid e.g. too many solar PV assets supplying energy simultaneously.

Some countries have started implementing strategies for dynamic and smarter management of grid connection queues. The approach to connection queue management is two-fold. First step is transparent and pre-defined **filtering criteria** to remove those projects from the list that are speculative or that do not advance as expected in the permitting process. Second step is to **prioritise grid capacity reservation for projects** among the ones that have been labelled as mature or viable projects for instance because they fulfil better system integration criteria.

[12] WindEurope, 2024, Grid access challenges for wind farms in Europe

Recommended actions

- **Efficient anticipatory planning of transmission and distribution grids** accounting for new electrified demand and renewable capacity more than 10 years ahead.
- **Accelerated implementation of EU legislation** such as the revised Renewable Energy Directive (RED III) and the EU Emergency Permitting Regulation to mitigate grid access issues and make grid permitting more efficient both at transmission and distribution level.
- **Moving away from the *first come first served* principle** for granting grid access to new generation and demand. This principle has led to an unbalanced mix of technologies in certain areas and suboptimal use of the available grid capacity. Instead, they should apply:
    - **Smart and dynamic management of grid connection queues** with adequately high entry criteria, filtering, and prioritisation practices.
    - **Filtering** based on adequate maturity milestones and financial commitment to reserve grid capacity.
    - **Prioritisation** for specific categories of viable (already filtered) projects contributing to energy system integration for instance with hybridisation, co-location with storage or advanced capabilities. Repowering projects which contribute to better use of the grid should be considered in this prioritisation process. Projects within these categories should then be treated with the *first come first served* approach and not be ranked against each other as this would be a very cumbersome process.
    - **Strategies to guarantee grid access for all strategic net-zero technologies** in a balanced manner.
    - **Fair sharing of grid expansion and reinforcement costs between generators and System Operators**. Also enabling frameworks for generators to develop the grid and hand it over to System Operators upon remuneration.
    - **Enabling grid connection rules for co-located renewables with and without storage** (hybridisation) and fit for purpose revenue stabilisation schemes.

2.2 Curtailment and flexible connection agreements

In many European countries grid congestion and renewables' curtailment are rising due to mismatches between power supply and demand at different timeframes and insufficient roll out of electricity grids and flexibility solutions. As it stands, there is very little transparency about curtailed renewable energy volumes and congestion management costs. More transparency would help to increase awareness and acceptance for investments in grid expansion and flexibility.

The current EU regulation[13] requires asset developers to be compensated for their curtailed volumes through a market-based approach or administrative mechanism. Very few countries have applied a market-based approach and less than half compensate curtailment overall[14]. Given that curtailment is rising unpredictably, this has become a major challenge for the viability of new renewable energy projects in many countries.

[13] Regulation (EU) 2019/943, Article 13

[14] WindEurope, 2024, Grid access challenges for wind farms in Europe

To streamline curtailment and to accelerate grid access in congested areas, some countries have started introducing the possibility of flexible (non-firm) grid connection agreements[15]. The Electricity Market Design reform requires TSOs and DSOs to offer flexible connections as one of the congestion management solutions in areas where electricity grids have limited or no network capacity. The Network Code Demand Response, currently under review by ACER, will include provisions on flexible connection agreements at national level. Unfortunately, in its current draft version the Network Code remains too vague leaving too much flexibility for national implementations. This can lead to severe market fragmentation and to such provisions being designed in a completely unviable way for new generation assets.[16]

Recommended actions at national level

- **System Operators must share transparent and regularly updated data** on curtailed volumes and congestion management costs.
- As mandated by the EU regulation, **National Authorities and System Operators must provide proper and transparent mechanisms to compensate** renewable asset owners for curtailment. Curtailment is a symptom of insufficient grid buildout which leads to a sub-optimal use of carbon free energy sources. ETS revenue should be considered as an additional revenue source to compensate curtailment creating a virtuous effect of carbon policies.
- **Guidance at EU level will be crucial for a harmonised implementation of the Network Code Demand Response.** Flexible connections must be temporary, voluntary, with reduced network charges for the flexible capacity.

2.3 Standardising procurement of grid equipment

The non-harmonised national implementation of Network Codes is a major challenge for the wind industry. It leads to market fragmentation as equipment manufacturers need to develop various versions of their products to satisfy different national rules. This doesn't enable industries to focus their manufacturing capacity on few standardised versions and ramp up production. Moreover, it leads to unnecessary additional supply chain costs. At the same time manufacturers put significant efforts in developing and following international standards for product design which are often not adequately considered in the national implementation of the Network Codes. It is crucial for System Operators and industry to closely collaborate and develop a common list of what must be standardised. Standardization where possible is helpful but it should not constrain innovation or the possibility to offer different technologies.

Recommended actions

- **ENTSO-E and EU DSO Entity supported by ACER and the European Commission should develop guidance and incentives for harmonised implementation of EU Network Codes** based on international standards.
- **Grid equipment tender procedure must be simplified. Tenders need to be more functional and less prescriptive**. This does not mean stricter standardisation of equipment or components but that manufacturers decide how to implement the required function of the technology.

[15] Connection agreement between System Operator and asset owner that includes conditions to limit and control the electricity injection/withdrawal from the network to manage grid congestion and saturation.

[16] Belgian TSO Elia is proposing 100% and indefinite flexible access for offshore assets in the Princess Elizabeth zone. This is a big challenge for bankability of offshore wind projects due to lack of developer control over location and capacity, typically determined through government tendering process.