

— Accelerating road transport electrification through grid modernisation

Recommendations for a successful European Grids Package | December 2025

1. Summary

Europe stands at a critical moment where it must deliver a net zero transition, while boosting energy security and economic competitiveness.¹ Modernising electricity grids is vital for achieving these goals by cost effectively integrating clean power and meeting surging demand from electrification. Accordingly, the European Commission has promised a Grids Package by the end of 2025 to expand infrastructure, streamline project permitting and accelerate investment.²

To succeed, the Grids Package cannot ignore the demands and opportunities of road transport electrification. Electric vehicles (EVs) are not only major new sources of power demand, but also tools to cut reliance on fossil fuels and flexibly optimise grids: through smart charging and vehicle-to-grid (V2G) capabilities, they can relieve congestion, reduce costs and integrate renewables.

Europe has made strong progress on charging rollout, with over one million public chargers installed.³ But further expansion, especially for medium- and heavy-duty vehicles (MHDVs), is being held back by grid barriers including lack of transparency on available grid capacity, as well as capacity limitations, slow connections and fragmented system planning. Without coordinated action –

¹ In addition to our EV100 members, we are grateful for comments and insights from the Regulatory Assistance Project and the Platform for Electromobility, which aided in the writing of this paper.

² European Commission (2025), *The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52025DC0085>

³ ICCT (2025), "The EV Transition Check: Measuring progress towards zero-emission for passenger cars in the European Union". <https://theicct.org/publication/ev-transition-check-sep25/>

between the EU, national and local governments, regulators and grid operators – these barriers will undermine decarbonisation, security and growth.

Existing EU legislation, including the Renewable Energy Directive (REDIII) and the Alternative Fuels Infrastructure Regulation (AFIR), the Energy Market Directive (EMD) and the Energy Performance of Buildings Directive (EPBD), supported by the Grid Action Plan, provides a solid base by requiring certain regulatory barriers to be tackled on local distribution networks. However, more is needed to deliver the scale, speed and coordination of grid investment and planning to match rising electrification. The Grids Package can tackle these structural gaps and integrate transport into the power system.

Drawing on the views of Climate Group's EV100 members – global companies electrifying their fleets – this paper urges Member States to implement existing legislation, and outlines five sets of reforms for the EU Grids Package:

1. **Systematically integrate EV needs into network planning** – Require transmission and distribution system operators (TSOs and DSOs) to systematically plan for EV demand and legal charging targets, and deepen their coordination on EU-wide Ten Year Network Development Plans (TYNDPs).
2. **Cut grid connection delays** – Prioritise projects by climate and system need, improve grid operator transparency and digitalisation, and enable flexible connection agreements.
3. **Accelerate permitting** – Set deadlines and introduce one-stop-shops for permitting grids and charging projects.
4. **Scale smart charging and V2G** – Mandate more cost-reflective network tariffs and open flexibility markets to EV fleets.
5. **Support MHDV depot electrification** – Promote shared charging infrastructure and ensure fleet operators can receive and sell clean renewable electricity credits.

2. The grid barriers to EV charging

Installing public charging sites (and some private ones, like those in freight depots) involves a complex, multi-stakeholder process from site selection and grid application to planning and permitting.⁴ Even after installation, CPOs must coordinate with DSOs, local authorities and regulators to energise sites, complete testing and manage ongoing grid balancing and maintenance.

⁴ Sustainable Transport Forum (2023), “Best practices guide for permitting and grid connection procedures for recharging infrastructure”. <https://alternative-fuels-observatory.ec.europa.eu/sites/default/files/document-files/2024-05/sustainable%20transport%20forum-MI0423761ENN.pdf>

Throughout, grid-related barriers hinder access to cost-effective charging:⁵

Lack of grid capacity and transparency: In many areas, EV charging demand exceeds grid capacity, and grid hosting maps are not available or not sufficiently granular. CPOs often learn about power availability only after lengthy requests, leading to delays, duplicate applications and poor planning. For MHDV sites needing high power, even megawatt, charging this makes electrification especially difficult.

Fragmented, outdated connection application processes: Procedures vary across countries and DSOs, often remain manual, and lack digitalisation – adding complexity, time and cost.

Lengthy grid connection queues: Legacy “first-come-first-served” queuing allocates capacity inefficiently, leaving ready-to-go, system-beneficial projects waiting unnecessarily behind “zombie” projects.

Planning and permitting delays: Land rights and permitting processes for grid projects to link up charging sites are often slow, inconsistent, and involve multiple authorities, leading to long pre-construction lead times – often delayed further by legal challenges.

Inflexible network charges: Network tariffs for grid use too often do not reflect time-varying system conditions. Traditional demand charges discourage smart charging and can lead to unnecessarily high charging costs.

Uneven smart charging and V2G capabilities: Some Member States (e.g. Sweden, France, Germany) have advanced smart charging and V2G frameworks. But widespread deployment is still limited due to fragmented standards, inconsistent DSO readiness and slow smart meter rollouts.⁶

Fragmented network planning and governance: Misaligned network planning and rules at all levels underlie all these barriers. These create administrative burdens, duplication and slower cross-border rollout due to lack of grid readiness – particularly problematic for e-MHDV charging, which requires high-capacity, cross-border charging corridors.

⁵ ChargeUp Europe (2023), “Hook us Up!: Simplifying and Accelerating the Grid Connection and Permitting Process for EV Chargers”. Available at: <https://clover-gerbil-6h6z.squarespace.com/positions/hook-us-up-simplifying-and-accelerating-the-grid-connection-and-permitting-process-for-ev-chargers>

⁶ Regulatory Assistance Project (2025), “Out of the sandbox: How to scale vehicle-to-grid in Europe”. Available at: <https://www.raponline.org/knowledge-center/out-of-the-sandbox/>

3. What can be done now

The EU has already recognised and tried to address some of these problems. Indeed, many can start to be overcome now through existing legislation, which should be swiftly implemented across Member States.

REDIII sets cross-sector renewable energy targets and places transport electrification at the core of a flexible, clean power system.⁷ It requires Member States to tackle non-financial barriers like permitting, support smart and bi-directional charging, and introduces electricity crediting so CPOs can earn and sell credits for renewable electricity used in transport. Crediting incentivises EV charging investment and encourages better grid data services to align charging with renewable generation. However, Member States have been extremely slow in transposing REDIII obligations, with the Commission issuing a formal notice to 26 of them earlier this year for their failure to transpose the Directive.⁸

AFIR meanwhile sets legally binding, distance-based targets for public charging coverage along the Trans-European transport network (TEN-T).⁹ To meet them, Member States must assess charging needs every three years, helping boost grid flexibility, integrate surplus renewables, and optimise charger siting. AFIR requires coordination between DSOs, regulators, and CPOs to guide investment effectively, and – building on REDIII – mandates that new and refurbished public chargers support smart charging and perform to the latest international V2G interoperability (ISO 15118-20) standards by 2027.

The upcoming AFIR Review in 2026 provides an opportunity to build on these provisions, such as by expanding AFIR funding to cover grid connection costs and depot upgrades. The **Clean Transport Corridor** on MHDV charging on key freight routes will also provide valuable learning, and Member States and DSOs should ensure timely installation of key charging hubs despite the voluntary nature of the initiative.¹⁰

⁷ European Parliament and European Council (2023), *Directive (EU) 2023/2413 of the European Parliament and of the Council*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413&qid=1699364355105>

⁸ European Commission (2025), “Commission takes action to ensure complete and timely transposition of EU Directives – key decisions on energy”. https://energy.ec.europa.eu/news/commission-takes-action-ensure-complete-and-timely-transposition-eu-directives-key-decisions-energy-2025-07-24_en

⁹ European Commission (2024), “Alternative Fuels Infrastructure Regulation”. https://transport.ec.europa.eu/transport-themes/clean-transport/alternative-fuels-sustainable-mobility-europe/alternative-fuels-infrastructure_en

¹⁰ European Commission (2025), “Ministerial Declaration on the Clean Transport Corridor Initiative”. https://transport.ec.europa.eu/document/download/e49b6a7a-8f8a-4901-b8ba-b9f88aed8683_en?filename=CTCI-ministerial-declaration.pdf

Another tool is the **Electricity Market Design Directive (EMD)**. This imposes strong transparency and digitalisation obligations on DSOs.¹¹ Member States must require DSOs to publish regular hosting capacity data, updates on connection requests, and provide digital application systems, giving CPOs clearer and faster pathways to connect.

Finally, transposition of the **Energy Performance of Buildings Directive (EPBD)** will indirectly encourage grid adaptation, as it mandates a “right to plug” in all new buildings – and some existing non-residential buildings – with car parks. This requires installation of a certain number of smart-capable chargepoints per parking space (dependent on building type), as well as pre-cabling for at least 50% of the spaces.

Together with existing Commission guidance, **Member States and DSOs can and should implement these steps now to speed up grid connections and support road transport electrification.**

4. The opportunity of the Grids Package

Despite this foundation, however, Europe needs go further, faster. While existing legislation may help tackle certain procedural and regulatory barriers on local grids, their obligations are often vague, lack binding timelines and depend on uneven national implementation. More fundamentally, they will not deliver the scale, speed and coordination of grid investment and planning needed to make the power available where and when EVs need it.

Europe’s electricity demand is expected to surge by 60% by 2030, driven by clean transport, heat, industry and data centres.¹² Yet grid development is lagging: insufficient capacity already caused €4.2 billion in congestion costs in 2023, and connection delays of up to ten years are holding back renewables.¹³ Around €584 billion of public and private grid investment is needed by 2030, alongside faster planning and greater cross-border coordination.¹⁴

¹¹ European Parliament and European Council, *Directive (EU) 2024/1711 of the European Parliament and of the Council*. [Directive - EU - 2024/1711 - EN - EUR-Lex](#)

¹² European Parliament Research Service (2025), “EU electricity grids”. [https://www.europarl.europa.eu/RegData/etudes/BRIE/2025/772854/EPRS_BRI\(2025\)772854_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2025/772854/EPRS_BRI(2025)772854_EN.pdf).

¹³ European Union Agency for the Cooperation of Energy Regulators (ACER) (2024), “Electricity infrastructure development to support a competitive and sustainable energy system”. https://acer.europa.eu/monitoring/MMR/electricity_infrastructure_2024

¹⁴ European Commission (2022), *Implementing the Repower EU Action Plan: Investment needs, hydrogen accelerator and achieving the bio-methane targets*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD%3A2022%3A230%3AFIN>

The Grids Package can tackle exactly these gaps. Its focus is on accelerating the build-out and modernisation of Europe’s electricity networks through targeted structural reforms, including:

- **Reforming system planning and investment frameworks**, e.g. through a more coordinated, climate-aligned Ten-Year Network Development Plan (TYNDP) process with clearer financing pathways for common projects.
- **Accelerating permitting** for transmission and distribution projects by simplifying procedures and setting legal deadlines.
- **Reducing grid connection waiting times** with clear regulatory timelines for key energy users, including EV charging.
- **Enhancing national distribution planning** with greater transparency, stronger DSO capacity and improved EU-wide coordination.
- **Boosting grid resilience and flexibility** through digitalisation, data sharing and smart grid technology.
- **Strengthening supply chains** for grid equipment and infrastructure.

For transport electrification, getting this Package right is critical. Cost-effective charging depends on robust cross-border transmission networks that can move cheap, clean power to demand centres, and on well-planned, modernised distribution grids that can connect chargers quickly and flexibly.

If it delivers this, the Package will also strengthen the electricity system itself. Smart charging when costs are lowest provides flexible demand to ease congestion and absorb renewable generation – reducing the need for costly grid upgrades. Meanwhile V2G, that is discharging at times best for the grid, can unlock further value by providing more grid services. The Regulatory Assistance Project has modelled that in one representative European region, these capabilities could save 25% on network reinforcement costs.¹⁵ EV-friendly grids therefore make networks more resilient, reduce system costs, and help deliver a faster, cheaper clean energy transition.

5. Recommendations for the Grids Package

1. Systematically integrate EV needs into network planning

Comprehensive, clear and long-term grid buildout plans are vital if European grids are to adequately meet projected increases in EV demand. It is also

¹⁵ Regulatory Assistance Project (2025), “Savings from smart charging electric cars and trucks in Europe: A case study for France in 2040”. <https://www.raponline.org/wp-content/uploads/2025/03/RAP-ICCT-Hildermeier-Jahn-Schmidt-Bernard-Ragon-Basma-Savings-from-smart-charging-electric-cars-trucks-in-Europe-Mar-2025.pdf>

important for encouraging anticipatory investments in grid projects and the technologies that connect to them – like EV charging stations.

Grid planning takes place at transmission level – national and EU-wide – and local distribution level. Starting from the top, EU-wide TYNDPs are coordinated by Europe’s network of TSOs (ENTSO-E). They compile national TSO development plans (NDPs) and identify potential Projects of Common or Mutual Interest (PCIs/PMIs) – cross-border grids that gain faster permitting, regulatory support, and access to EU funding.

However, as ACER has pointed out, TYNDPs and NDPs are often misaligned, with TSOs having varying demand forecasting capabilities and foresight of DSO plans (where EV charging is connected).¹⁶ The timing of these various plans is also often misaligned.

As a result, up-to-date charging demand projections, depot connections and smart charging potential are often underserved in system planning, risking under-investment and costly retrofits later. Given the importance of EVs as a source of demand and grid stability, this must change.

Recommendations

- Require national regulatory authorities (NRAs) to ensure TSOs and DSOs work together to systematically integrate detailed projections for EV demand, charging behaviours, and infrastructure needs – including from AFIR and the Clean Transport Corridor – into national plans.
- Ensure national transmission plans review exemptions for submissions of forecasts by smaller DSOs each year, ensuring as wide coverage as possible.
- Instruct ENTSO-E to also incorporate EV demand projections into TYNDPs, and consider how local grid upgrades for smart and bidirectional EV charging with potential to relieve congestion on cross-border networks can be better supported under the TYNDP process (e.g. designation as PCIs and PMIs).
- Involve DSOs more in the TYNDP process and selection of PCIs and PMIs.

¹⁶ ACER (2025), “Opinion No 07/2025 of the European Union Agency for the Cooperation of Energy Regulators on the Electricity National Development Plans”.

https://www.acer.europa.eu/sites/default/files/documents/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER-Opinion-07-2025-Electricity-national-development-plans.pdf

- Align TYNDPs, NDPs and DSO plans with Commission guidance to ensure consistent, transparent and harmonised assumptions, outputs and publication timelines.

To underpin these changes, national regulators need to be empowered to hold TSOs and DSOs to account. This can be achieved by ensuring their remits include ensuring national electricity systems deliver on EU climate targets. The EU should also support grid operators by expanding, ringfencing and creating one-stop-shops for applying to various grants available for grid upgrades.

2. Cut grid connection delays

As noted above, grid connection queues have become a critical chokepoint across Europe, and existing legislation has not tackled this issue adequately. Under traditional “first-come-first-served” approaches, speculative or poorly prepared projects often secure queue positions, delaying more strategic, mature projects such as EV charging hubs. Some connection timelines exceed 10 years, slowing decarbonisation and raising system costs.

Added to this, transparent data on grid capacity availability and connection queue lengths and positions is often lacking despite EMD provisions, making it difficult for CPOs to plan efficiently.

Recommendations

- Ensure NRAs implement prioritisation frameworks for grid connections beyond “first-come-first-served”, giving precedence to projects providing decarbonisation and system benefits (e.g., proximity to substations, EV hubs along the TEN-T network, renewable generation, battery storage).
- Encourage NRAs to implement target connection timelines for projects, with performance incentive structures for DSOs to deliver against these.
- Reform grid connection queue prioritisation frameworks, bringing to the front only the most mature and system-beneficial applications, and appropriately penalise speculative “zombie” requests.
- Digitalise and standardise connection request processes, including provision of information on costs and timelines, application submission, application status updates and queue position updates.
- Require DSOs to develop standardised, fully accessible and regularly updated capacity maps with clearly defined granularity and open geospatial data.

- Commit the Commission and ENTSO-E to produce regularly updated EU-wide transmission hosting capacity maps in coordination with TSOs and DSOs.
- Encourage temporary or flexible connection agreements to buy time for grid upgrades, particularly for HDV charging (e.g., non-firm connections), ensuring that clear timelines for firm capacity are provided.

3. Accelerate permitting

REDIII obliges Member States to streamline permitting for renewable and grid projects, and AFIR tackles permitting at charging sites. But these measures – where they are implemented – are often applied in parallel rather than in coordination, leading to sequential, time-consuming approvals. Grid connection applications happening separately also adds to delays and bureaucracy.

The permitting process before charging hubs can be installed therefore remains slow and fragmented, often involving multiple authorities and inconsistent rules.

Recommendations

- Introduce digital one-stop-shop mechanisms for permitting of grid and EV infrastructure, as well as connection processes, with special priority given to high system value projects, or projects with strategic value for the grid.
- Streamline permitting for both grid expansion and EV charging installations by introducing clear, binding time limits for approval processes.
- Encourage Member States to offer public tenders for charging hubs mapped onto existing grid and transport infrastructure with bundled planning and permitting.
- Provide funding and technical assistance to local authorities to reduce administrative bottlenecks in urban and rural EV infrastructure deployment.
- Fast-track and bundle legal review processes for grid projects, ensuring multiple claims can be heard at once.

4. Scale smart charging and V2G

Despite support for smart charging and V2G in existing legislation, concrete details of how states can operationalise these capabilities in practice are lacking.

Implementation remains patchy: cost-reflective network tariffs are not consistently in place across the EU, interoperability standards vary and most DSOs and market rules still limit EV participation in flexibility markets. EMD supports flexibility through transparency but does not directly enable V2G market access. As a result, the potential for EVs to relieve grid congestion and integrate renewables is far from fully realised.

Recommendations

- Ensure NRAs enforce and regulate dynamic time-of-use (ToU) network charges across Member States to encourage off-peak EV charging, which is the basis for optimised smart charging.
- Expand the implementation of international interoperability standards into new private charging stations.
- Lower the threshold to allow aggregated EV fleets to participate in flexibility markets at scale, ensuring adequate compensation to incentivise bidirectional charging.

5. Support MHDV depot electrification

Depot electrification is a major opportunity for fleets to reap the benefits of cost-effective, smart charging. Yet existing legislation is not geared to support it.

AFIR focuses on public charging coverage but gives limited attention to depot-based charging for freight, where much MHDV charging will take place. REDIII introduces electricity crediting, which can improve business cases for fleets, but is not explicit that this should apply to depots. Meanwhile, access to grid capacity and finance remains a major barrier.

Recommendations

- Explicitly clarify that MHDV depots must be allowed to benefit from the crediting scheme under REDIII.¹⁷
- Expand the EPBD to include logistics hubs used by multiple fleets under its provisions.

¹⁷ ICCT (2025), “Electricity crediting for depot charging: Assessing a cost advantage for Poland truck operators”. Available at: <https://theicct.org/publication/electricity-crediting-for-depot-charging-assessing-a-cost-advantage-for-poland-truck-operators-may25/>

- Encourage the development of shared-access charging facilities at freight hubs, logistics centres and depots to optimise the use of infrastructure and reduce costs.
- Encourage Member States to introduce financing and guidance schemes for MHDV depot electrification.

6. Conclusion

Europe's clean transport transition depends on modern, well-planned electricity grids that can deliver power where and when it is needed. Existing EU legislation has laid important groundwork, but current grid capacity, permitting and planning gaps risk slowing EV rollout and raising costs – particularly for MHDVs.

The forthcoming EU Grids Package is a critical opportunity to close these gaps by integrating transport needs into grid planning, cutting connection delays, accelerating permitting, scaling smart charging and V2G, and supporting depot electrification. By adopting these reforms, Europe can enable cost-effective charging, strengthen grid resilience and accelerate the shift to a net-zero economy.