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powering people

Deeper market integration to reduce electricity system costs

Eurelectric position paper

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Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

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WG Wholesale Market Design & Investment Frameworks
WG Market Integration & Network Codes
WG Retail Market Design
WG Regulation & Network Customers

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Key messages

1. **Private investment is key to delivering Europe's energy independence and clean ambitions.** Stable and well-functioning markets are a necessary precondition to attract private capital to invest and efficiently integrate new variable renewable energy sources (RES) into the electricity system.
2. **Encouraging investments in flexibility, digitalisation and upgrading and reinforcing electricity networks help optimise the electricity system, reducing costly market interventions.** Electricity system costs are increasing with variable RES due to curtailment and redispatching. More flexibility, digitalisation and pre-emptive network investments are the answer to this, with electrification spreading costs across a greater number of consumers and delivering the benefits of clean electricity.
3. **Locational investment signals could be implemented.** These signals might be included, for example, as a component in support schemes for new generation or through network connection charges. An improved bidding zone review process should include full stakeholder engagement, based on long-term scenarios and considering multiple options for bidding zone reconfigurations.
4. **Eurelectric does not support a move to locational marginal pricing in Europe**. This would lead to significant disruption in Europe's electricity market and create uncertainty for new and existing assets alike.
5. **Any reform of the governance of the European electricity market should focus on simplification, transparency, and coordination**, rather than creating new entities or adding additional complexity.

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Making Europe's electricity market more cost-efficient

The European Union has set a clear, ambitious target to achieve climate neutrality by 2050. Europe's journey towards a carbon neutral future is already underway, driven by significant investments made into decarbonising Europe's power system as well as a robust and meaningful long-term carbon price signal, set by the EU ETS. In the first half of 2025, Eurelectric data shows that 72% of electricity consumed by European households and industry came from clean sources[1].

The accelerated deployment of renewable energy sources (RES) has not, however, been complemented by the sufficient deployment of flexible resources, reinforcement and expansion of electricity networks, and electrification of end-uses. These elements are essential to ensuring that the power system can be operated at maximum efficiency across all jurisdictions. This creates market imbalances in certain parts of Europe, which can lead to instances of negative spot market prices[2], higher generation curtailment and redispatch costs[3].

Recalling that the European Union's Electricity Market Design was amended in 2024 to boost the development of clean energy, better protect consumers and enhance industrial competitiveness, and in anticipation of the European Commission's White Paper on Deeper Market Integration[4], in this paper Eurelectric considers the most important ways in which the electricity system can be made to run more efficiently in the medium- to long-term. We highlight **the importance of ensuring that investments are made in a way that reduce overall system costs** whilst maintaining a liquid, investable and secure European electricity market.

1. Structural solutions to reducing system costs

As the European electricity market evolves, the best way to bring down system costs will be to implement long-term structural solutions, based on the existing market design. This is the best way to ensure to provide certainty for markets whilst optimising consumer and producer welfare. Below, Eurelectric presents some options for how system costs can be reduced in the medium- to long-term.

a. Clearing the path for flexibility and digitalisation

Flexible technologies, storage and demand-side response (DSR) can help to manage the inherent variability of an electricity system with an increasing share of RES, whilst contributing to security of supply. The market-based development of flexibility and introducing more cost-reflective demand signals can help Europe mitigate price volatility alongside complementary tools such as long-term hedging. Unlocking flexibility requires, among other measures, ensuring the ability of flexible options and dispatchable assets to participate in technology neutral Capacity Remuneration Mechanisms, where implemented and deemed necessary.

[1] Eurelectric, Power Barometer 2025.
[2] Negative pricing accounted for around 5% of hours to date in 2025 and can significantly impact the investment signals for new RES capacity and consumer appetites for long-term hedging and PPAs
[3] For example, Europe-wide, redispatch costs in 2023 reached €8.7bn, whilst in 2024 9TWh of generated electricity was curtailed in Germany alone (costing €2.2bn) according to the Eurelectric Power Barometer 2025.
[4] European Commission, Action Plan for Affordable Energy, 2025.

Ensuring that the European electricity market can optimise flexible generation and storage, and the flexibility that consumers and industries can offer on the demand side, will be fundamental to its efficient future operation. For example, implementing the current Electricity Market Design with regard to allowing TSOs and DSOs to contract flexibility as a complement to grid investments (where and when efficient) would help to optimise the cost of building an efficient future system. Detailed recommendations for incentivising greater flexibility investment in a market- and system-friendly way can be found in Eurelectric's paper on 'Unlocking the Power of Flexibility'[5].

Making the existing electricity system run more efficiently will be enabled by increasing digitalisation in grid management[6]. Smart infrastructure and the widespread rollout of smart meters will be essential to harnessing the full welfare potential of flexibility. Existing infrastructure and technology systems in some Member-States may not be fully able to make use of increasingly granular data available to them. Energy management in some Member-States may therefore need to evolve to cope with future needs.

Network operators should be empowered to improve grid management and ensure a fair allocation of costs through digitalisation and, where appropriate and for non-high-risk solutions, innovative technologies such as Artificial Intelligence[7], whilst ensuring the integrity and cybersecurity of systems.

b. Expanding and reinforcing electricity networks

European grids require significant investment in both additional capacity and reinforcement: to operate the future distribution system alone, €67bn of annual investment will be required until 2050[8] - an essential investment in creating a cleaner, more independent European energy system. Investment can be further optimised through:

- **Facilitating cross-border energy exchange**, allowing for better use of existing infrastructure and greater synergies in the energy mix of European countries. Ensuring adequate cross-border infrastructure, operated efficiently, should reduce system costs and should be encouraged, subject to sound cost-benefit analyses to ensure the infrastructure is developed where it is most needed.
- **Planning investment decisions into new grids ahead of need**, considering the network holistically and in close coordination with expected need at generation and consumption level. This approach would shorten connection times for new customers to the electricity grid. In France for example, the S3REnR mechanism enables TSOs and DSOs to coordinate and define regional hosting capacities for new generation, optimising investment to where it is most needed, and sharing the associated costs among new generation assets. Such anticipatory planning would also facilitate industrial electrification, as consumers could connect more easily to the grid. Proper assessment of the electrification potential of specific areas enables TSOs and DSOs to make anticipatory investments.
- **Streamlining often complex permitting procedures** to ensure that new grid can be built where it is required, when it is required. Simplification of permitting processes at

[5] Eurelectric, Unlocking the Power of Flexibility, 2024.
[6] For examples, see Current Europe, Technologies, 2025.
[7] Eurelectric, Wired for Tomorrow 2024.
[8] Eurelectric, Grids for Speed, 2024.

a Member-State level would be a no-regrets option to boost investment and increase the predictability of the energy market.

c. Electrifying demand

Stagnating electrification rates of around 23% of final demand in Europe, far from the 35% electrification rate required by 2030[9] and behind international competitors such as China, mean that current electricity system costs are spread over fewer end-users. In the current context of over-capacity in many parts of Europe, an increase in electricity demand would lead to lower system costs per MWh consumed, improved outcomes for customers, and a better use of existing electricity generation capacities. Electrification brings additional benefits, for example enabling the switch to more energy-efficient and decarbonised solutions to meet energy needs.

Reducing system costs, as felt at an individual consumer level, therefore requires greater electrification of demand, which can be done through reducing taxes to incentivise electrification and derisking up-front investments[10]. Electricity demand can also be spatially optimised, for example through geographically differentiated connection charges, to further reduce system costs if deemed appropriate.

2. Deepening market integration by implementing locational signals: a way forward?

Locational investment signals can be used to ensure that the cost of investment in new assets (for example RES or clean energy generation) reflects the overall system impact that an investment could have. These could be compatible with the existing European market structure, where bidding zones are used to differentiate wholesale prices. This should not be confused with locational marginal pricing (LMP; also referred to as nodal pricing), which is an alternative target model based on highly granular nodes with individual prices, and which would affect both investment and operational decision-making. The European market design, based on a zonal system and marginal pricing, maximises market liquidity, long-term markets and financial stability, whilst LMP would reduce redispatching costs at the expense of other criteria; the choice between either model is a matter of trade-offs and consideration of the cost of transitioning between models.

A greater use of locational investment signals into wholesale electricity markets has been proposed as a potential solution to address increased redispatch costs in some parts of the European market. Locational signals may bring a degree of improved short-term system efficiency, particularly if remedial action processes are not optimised, but should not be considered a silver bullet that can replace the long-term structural solutions to reducing system costs highlighted earlier in this paper. Any intervention to introduce locational signals at Member-State level should carefully consider the impact this would have on overall system costs, noting both the potential benefit of lower system costs and the risk that interventions in markets could lead to a higher cost of capital (through a risk premium), reductions in investment in new capacity, and potentially more expensive risk management.

a. Options for implementing locational signals within the current market design

[9] Eurelectric analysis of RepowerEU scenarios - Electrification Action Plan, 2024.
[10] Eurelectric, Views on the upcoming Affordable Energy Action Plan, 2024.

There are many different approaches to implementing an effective locational investment signal. Each approach may have different distributional effects, and therefore it will be important that Member-States are allowed a degree of flexibility regarding the appropriate form that a locational investment signal should take. Eurelectric would consider the following high-level principles essential to ensure that, where necessary, locational signals could be incorporated in a market-friendly manner:

- **Locational signals should be limited to impacting investment decisions for new projects**, rather than operational decisions
- **Locational signals should be introduced where they can reduce system costs**, with their introduction justified using a clearly defined cost-benefit analysis using a robust evidence base, a long-term time horizon and considering multiple scenarios (for example, by including alternative zone configurations)
- To maintain regulatory stability, **locational signals should avoid introducing uncertainty in the lifespan of an asset**

Below, Eurelectric addresses some proposals for how greater account of system costs could be reflected in investment and dispatch decisions through locational signals.

i. Locational investment signals provided through support schemes and capacity remuneration mechanisms

Locational signals in support schemes could (where necessary) help direct investments to where they provide the highest system value and reduce overall costs whilst ensuring long-term market functioning and clean energy investment signals. Financial incentives could also be used to help to steer investment made with the support of subsidy schemes into locations where capacity is most beneficial to the overall system. These should therefore be further considered, taking account of national targets and specificities.

Any locational signals incorporated into support schemes should contribute efficiently to the functioning of the electricity market. Competing signals sent through misalignment of different mechanisms must be avoided, as this could reduce the market incentives needed for investment in clean generation. Options for how this could be done include localised auctions (such as for offshore wind), locational price corrections or coefficients (for example in the form of bonus payments), through the application of non-price criteria under the Net Zero Industries Act (if used in a targeted and efficient manner), or through regionally differing grid construction cost payments alongside support schemes. Whilst noting that local specificities are particularly important when discussing locational investment signals, schemes that have implemented these kinds of signals in a market-friendly way include Germany’s previous inclusion of a ‘South Bonus’ payment in support schemes for RES and CHP plant to incentivise siting in areas with higher demand, and Italy’s ‘FER X transitorio’ scheme, which provides additional financial incentives to solar PV based on local site characteristics.

There may also be benefits to incorporating locational signals into Capacity Remuneration Mechanisms (CRMs) in particular circumstances. For example, Ireland’s capacity market applies locational capacity constraints (given its relative market size and current isolation from the European electricity system) so, if a zone is short on capacity, prices clear higher there. Italy’s CRM is based around geographic zones, with varying clearing prices depending on the zone’s supply-demand balance and availability of network capacity. Further time signals are provided to incentivise off-peak electricity consumption. Closer spatial coordination between the market and network planning could be used to incentivise investment in regions with a positive redispatch balance.

Nonetheless, caution should be adopted when considering locational elements in CRMs, given that the reliability criterion will be set at the Member-State or bidding zone level and CRM design will need to reflect national circumstances. Regarding intra-zonal congestions creating local adequacy issues, these could be tackled directly when designing CRMs, or through additional network buildout.

ii. Locational signals as a component of network tariffs

Network tariffs include continuous grid charges (for injection or withdrawal) and connection charges paid when connecting a new asset to the grid. Grid charges should be cost-reflective, transparent and predictable, and using them to reflect congestion at geographical level (or in real time) would likely lead to excessive complexity: for example when there are differences in how locational charges are set at transmission and distribution level (particularly if there is a knowledge gap between the two systems), and may also create greater uncertainty for investors. Using grid charges to reflect congestion may also raise concerns of social acceptance, since they may be perceived as unfair. Without greater understanding of future network buildout across the whole system, it may be difficult for market participants to forecast grid charges as part of investment decisions.

Connection charges are likely to be a more appropriate way of dealing with congestion as an element of network tariffs depending on national policy priorities, given that grid capacity is a scarce economic good and should be priced accordingly to ensure efficient use across demand and supply. Applying locational elements through connection charges, rather than ex post via grid charges, would avoid impacting existing assets that may not have incorporated such charges into their investment decisions. Congestion can also be managed through market-based flexibility schemes, redispatch mechanisms or flexible contractual arrangements with system operators.

iii. Bidding zones

Bidding zones are the fundamental building blocks of the European electricity market, designed to reach the full potential of capacity allocation methods and to ensure liquid and efficient market functioning. An improved bidding zone review methodology should ensure full stakeholder involvement across the stages of the review process, consider a long-term time horizon in line with realistic implementation timelines and consider multiple scenarios of bidding zone reconfigurations. Bidding zone reviews need to provide a comprehensive analysis of all the direct and indirect impacts of a reconfiguration and should include a sensitivity analysis.

iv. Market-based options for congestion management

The development of markets for congestion management, for example for locally contracted flexibility at transmission or distribution level, could complement the additional buildout of electricity networks in the short- to medium-term where cost-effective and depending on local and national specificities. This could help to bring down system costs and address residual congestion issues, depending on the specific circumstances in individual bidding zones or Member-States.

v. <u>Redispatching more efficiently through improved TSO coordination</u>

The coordination and optimisation of remedial actions at the European level, as foreseen under the CACM and SO Guidelines and related methodologies, is a key objective to help bring down overall system costs. The full implementation of these rules would allow TSOs to redispatch assets efficiently regardless of their geographical location and by following polluter-pays principle. At present, redispatching is mostly carried out at the national level, even though more efficient resources may be available in neighbouring countries.

b. <u>Focusing on locational signals, not locational marginal pricing (LMP)</u>

There are positives and negatives associated with different electricity market designs. However, stability and predictability in market structure are essential to sustain investment momentum in the energy transition. Any move away from the existing target model and towards LMP (and therefore likely towards a central dispatch model) would inject significant uncertainty into the market, particularly for existing assets, with uncertainty further reflected in an increased cost of capital for new projects – therefore increasing the cost of investments required to achieve Europe's electrification and climate ambitions.

Transitioning to LMP, after having spent decades implementing the existing target model, would significantly adversely impact market functioning, investment signals for generation, and require reformulating most existing legislation relating to electricity markets – meaning it would be a time-consuming, uncertain process with no guarantee of success. Eurelectric therefore cannot support a move to LMP in Europe, particularly given that most of the benefits of LMP could be achieved by implementing locational investment signals in a market-friendly way[11]. Any potential perceived consumer and/or producer welfare gain that could be achieved as a result of LMP should be weighed against the overall cost of protecting consumers (both industrial and domestic energy users), protections granted to existing assets, and the increased cost of capital associated with market uncertainty.

Some important considerations to be made regarding any transition to an LMP market include:

Investment signals, particularly for RES. LMP sends signals based on supply and demand in a specific node (and therefore based on grid costs alone), meaning that other factors necessary in siting new generation would not necessarily be considered, for example the renewables potential of a certain area. In an LMP market this would create significant issues for specific technologies that can only be located, or would be located most efficiently, in specific areas – for example hydropower and offshore wind but will be relevant for most RES technologies. Moving to locational marginal pricing would therefore risk undermining the investment case in merchant RES generation. If existing assets are not given legacy arrangements that maintain existing market access, there is a further risk of a chilling effect that undermines the investment case for European energy generation at the exact time this should be ramped up to achieve European energy independence and climate ambitions.

Impact on market functioning. The integration of short-term electricity markets at EU level has significantly improved the allocation of resources across Europe through cross-border electricity exchanges, bringing substantial benefits to consumers. Moving to LMP would create an inherently less liquid and more volatile energy system, running contrary to the

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[11] Joint Research Centre Locational Price Signals in Europe, 2025.

aims of the Electricity Market Design of improving liquidity in long-term electricity markets. This would make hedging opportunities significantly more challenging and expensive for energy suppliers and industrial energy consumers. The implementation of LMP further implies moving to a Europe-wide central dispatch model, which would be a significant change to the existing electricity system that could disrupt the existing decentralised energy system that empowers prosumers and flexibility and further complicate local grid management.

Complexity of implementation. Where moves to LMP have either been implemented or considered in the past, significant timelines have been estimated for this transition. For example, a move to LMP in Great Britain was estimated to require around a decade of transitional work before being ruled out in 2024. When LMP was implemented in Texas, the transition took significantly longer than expected (seven years) and two implementation deadlines were missed, whilst in Ontario implementing LMP took nine years – in markets that were less developed, and more isolated geographically, than the European market. Moving to LMP would likely take significantly longer to implement in a European context, given the complexity of existing market architecture, injecting significant long-term uncertainty into electricity markets, create greater operational and regulatory complexity for firms operating in the electricity market, and the cross-border nature of the European market would only increase the complexity of transitioning between market models (for example requiring agreement on rules, market alignment, and ISO development across countries, and complicating interactions with non-EU countries). Once implemented it would still require time to maximise market efficiency through having to regain institutional knowledge.

Combined, these uncertainties could create a significant risk of investment hiatus or an increased cost of investing in new, clean technologies. This would run counter to Europe's clean energy and electrification ambitions and therefore the existing target model should be preserved.

3. Improving electricity system governance

Any revisions to energy system governance should be driven by the need for consolidation and simplification, in line with the Commission's simplification agenda, whilst ensuring that Europe can meet its ambitious climate targets. Given these principles, options that could improve the governance of the European electricity market include:

a. Simplifying data collection and reporting requirements

This could be implemented through leveraging existing reporting processes, to create a "report once" approach to the collection and coordination of European energy information could be investigated to improve energy system governance and transparency. However, any such exercise must ensure that it does not create additional layers of bureaucracy (for example by avoiding the creation of double reporting) and is able to securely host data.

b. A holistic approach to energy system planning

This could be done through incorporating different energy vectors, cross-sectoral interactions, flexibility needs and long-term structural risks can play a dual role in ensuring that Europe's energy system remains robust and secure into the future[12], and would allow

[12] Eurelectric, Ensuring a resilient and secure energy system 2025.

policymakers and market participants to access a reference scenario for the future electricity system. Any modelling exercise such as this should be fully open, flexible and allow for stakeholder engagement, to enable the showcasing of alternative approaches where these would be of benefit to the whole system.

c. Stronger coordination between national and European decision-making

Closer coordination would be an enabler of deeper market integration. National energy plans and support schemes are often developed in isolation, without a structured political space to anticipate and address their cross-border impacts. This fragmentation can create inefficiencies, inconsistent investment signals and potentially increase system costs. Closer coordination, through long-term integrated infrastructure planning, can be facilitated through closer discussion at a technical and political level. For example, strategic political discussion could be held between Member-States, whilst the Energy Union Task Force, announced by the Commission in the Affordable Energy Action Plan, could be mandated to lead or commission the technical work needed to inform these political discussions. As part of this process of deeper integration, closer cooperation between NRAs and ACER would be a low-regrets option to enhancing the simplicity of energy system governance, particularly compared to creating new governance entities. Nevertheless, the principle of subsidiarity should prevail.

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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