
MARKET DESIGN POLICY PAPER

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1 INTRODUCTION

Ensuring economic growth, jobs, secure coverage of basic needs at an affordable and competitive price, and sustainable use of limited resources is at the heart of the EU policies. **The evolution of the energy sector is relevant to achieving all of these aims but remains challenging.**

This is recognised by, and has joint agreement from, the **EU Commission, Council and Parliament and all stakeholders.** The depth, complexity and the inherent interactive nature of this challenge is acknowledged and there is no one single accepted pathway to achieving these goals.

The electric system in all its dimensions is deeply impacted by fundamental changes in the electricity generation portfolio. Managing these changes is politically, financially and technically challenging. The evolution of the European internal electricity market (IEM) is central to meet these challenges.

This paper outlines the key challenges up to 2030 in chapter two, advises improvements to today's electricity market in chapter three, proposes key principles for long-term market design in chapter four and gives policy recommendations in chapter five.



ENTSO-E and its member TSOs have an important role to ensure that the market evolves to facilitate the increased renewable energy (RES) penetration while respecting the technical resilience of the pan-European power system that society relies on.



2 KEY CHALLENGES

The European electricity system faces numerous challenges towards 2030, most of which can be grouped under 2 main categories:

1 EFFECTIVENESS OF PRICE SIGNALS TO STIMULATE APPROPRIATE INVESTMENT AND PERFORMANCE

Today's electricity market shortcomings do not lead to correct price signals that support investments and optimise performance for a number of reasons:

- externalities (adequacy, resilience, location, etc.) are not correctly included in prices;
- society/politicians do not accept shortages and scarcity prices; and

- end consumer prices are not yet dynamic enough to reflect price changes in wholesale markets.

Moreover, national and European regulatory frameworks are often inconsistent or short-term oriented. Considering the very long lead times for generation investments, this regulatory risk further discourages investors.

2 OPERATIONAL ISSUES

Electricity markets should deliver efficient outcomes in line with system needs. To correct deviations between market outcomes and system needs, TSOs require appropriate tools. As such deviations are today increasing in magnitude and complexity, TSOs will need more tools and more control, unless the market can find means and incentives to limit such deviations. For instance, although in the most countries Balancing Responsible Parties (BRPs) are obliged to be balanced or to act to help resolving the system imbalance, this obligation is often insufficiently enforced.¹⁾

In addition to the challenges related to keeping the system in balance, other operational issues include transient and dynamic stability, inertia, fault levels, voltage stability, power flow limits, (n-1) and security etc. The availability of most of these is becoming increasingly scarce, or more difficult to manage, due to the higher penetration of variable RES.

In particular, future market design needs to address capacity adequacy and flexibility needs. The IEM was designed in the 1990s and 2000s, in a time of genera-

tion overcapacity, low price volatility and little cross-border trading.

However the situation has changed, and some European countries now (or in the foreseeable future) face capacity adequacy challenges due to closure or mothballing of generation plants. As demand will continuously increase in the future, it is important to ensure enough new investments in dispatchable generation.

In addition and even where capacity is not an issue, the integration of increasing variable RES production requires flexibility from both generation sources and demand side. In general terms, flexibility is the ability to reconcile volatile consumption and volatile generation. This implies a capability (e.g. ramping), coupled with a high level of controllability and reliability/availability.

The ability of today's market to provide an adequate level of capacity, flexible resources and other system capabilities is not ensured. These resources could become scarce if they are not properly valued.

¹⁾ This can lead to situations where BRPs optimise by comparing day-ahead and intraday prices with the expected imbalance prices and remain imbalanced on purpose. These imbalances put additional risks on the TSOs and should be avoided.

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3 IMPROVING TODAY'S ELECTRICITY MARKETS

Direct enhancements of today's electricity markets will contribute to solving the above challenges, albeit not being sufficient by themselves to completely meet them all.

ALL RES SHOULD BE FULLY INTEGRATED INTO THE MARKET

The continuous development and integration of RES is essential to meet the EU energy and climate policies. RES support mechanisms can be a necessary tool to achieve the EU goals; however, their design should minimise market inefficiencies and operational constraints.

As a general principle, legislative framework and market rules should stipulate that RES producers be bound by the same duties and responsibilities as all other electricity generators. With regard to specific RES support schemes, all mature technologies should be equally exposed to wholesale market price signals. This would imply the progressive phase-out of RES support mechanisms such as feed-in tariffs. Moreover,

priority dispatch should be avoided or reserved only for emerging technologies. To the extent that support may still be needed, new schemes (e.g. tendering) for new RES generation should promote the economic efficiency of the selected resources.

Furthermore, to improve market efficiency, no RES subsidies should be granted when the wholesale prices are negative. Providing incentives for RES producers to correctly forecast their feed-in and hedge their volatility improves system security and economic efficiency. To allow a concrete improvement of the market design, these measures should be implemented as soon as possible.

BALANCING PRICES SHOULD BE REFLECTIVE OF FULL SYSTEM COSTS

By setting the right incentives for BRPs to be balanced during real time operation, they will physically act more in line with system needs. BRPs can then use different tools to manage the risk of imbalances and reduce the associated costs: improve monitoring and take actions in the day-ahead and intraday markets, outsource this task to third parties, or buy specific hedging products.

To create such incentives, it is important that sufficiently high imbalance prices are charged. The calculation of these prices should reflect the full costs

borne by TSOs to balance the system, and possibly reflect the value of lost load. TSO costs for procuring reserves could be charged to BRPs to act in accordance with system needs and hence decrease the reserve requirements.

While proper cost allocation will foster efficient resource allocation, the design of imbalance pricing should be in line with consumers' appreciation of continuous supply and deliver strong incentives to prevent gaming with other wholesale products.

The concrete implementation of this improvement should follow a stepwise approach while carefully observing the incentives given to the market, especially in the intraday timeframe, and assessing their impact. As an immediate first step, a thorough analysis¹⁾ is

recommended. The amount and evolution of balancing volumes contracted by TSOs can be used as an evidence of how urgent it is to implement such measure, as well as to monitor its effectiveness once introduced.

THE DEMAND SIDE SHOULD PARTICIPATE AS MUCH AS POSSIBLE IN ALL MARKETS

The more demand participates in the market, the more it can contribute to overcoming system scarcities, thereby reducing the contribution needed from generation and possibly TSOs demands (e.g. of balancing reserves).

This requires demand side to be able to value its services and to choose over consumption (volume, timing) by participating in all markets: especially day-ahead, intraday and balancing; but also for Ancillary Services, and potentially in new market layers.

Market rules therefore need to be amended and enable the work of aggregators. If demand side could value and more dynamically choose its consumption, it would improve market efficiency, provide flexibility to the system and it could also participate in potential flexibility markets.

As a concrete target for a stepwise implementation, at least large industrial consumers should be active in all markets by 2020. In the meantime, infrastructure (e.g. smart meters) and appropriate market rules must be put in place.

¹⁾ Defining the correct pricing criteria to reflect “full system costs” is a technically complex task. Careful attention should be paid to avoid giving perverse incentives (if the fixed cost component is too high in balancing prices) and to ensure a fair mechanism that doesn't excessively favour BRPs with big portfolios over small players with little possibility to internally compensate imbalances.



4 KEY PRINCIPLES FOR LONG-TERM MARKET DESIGN

Long-term solutions to address the key challenges identified above require an “augmentation” of the market design: complementing the Target Model with additional features, while preserving it. This enhanced Target Model must therefore be consistent with the respective responsibilities of market participants and TSOs.

MARKET PARTICIPANTS SHOULD BE INCENTIVISED TO CONTRIBUTE TO SOLVING THE SYSTEM SCARCITIES FOR WHICH THEY ARE RESPONSIBLE

Within the policy objectives (Security of Supply, decarbonisation, etc.) the market design should allow to decentralise as much as possible to market participants (i. e. BRPs) the overall system requirements.

While TSOs remain responsible for system security, other requirements related to energy supply can be efficiently translated into incentives or obligations placed on BRPs – such as imbalance prices, or capacity obligations where necessary.

By placing the right incentives on market participants, they will interact efficiently and either reduce their impact on the specific system scarcity (capacity,

flexibility, etc.) or contribute to address those system scarcities.

A complementary principle to this approach is that the party that pays for contributing to solving such scarcity should define its own needs, at least within certain limits. To support these principles, two conditions – explained below – need to be in place.

Firstly, short-term prices should be reflective of scarcities so that market participants have an incentive to manage such scarcity risk. Secondly, market participants should have hedging tools at their disposal to efficiently manage such risk.

WHOLESALE PRICE SPIKES AND INCREASING VOLATILITY SHOULD BE ACCEPTED AS AN EFFICIENT MARKET OUTCOME

Provided that markets are properly monitored by regulators to prevent any market abuse, market participants, society and politicians should realise that the transition to a low carbon generation mix (with more variable RES and more technologies with low marginal costs) implies higher price volatility and more frequent and / or extreme price spikes.

This is a natural market outcome that reflects temporary market scarcities (e. g. in days/hours of low wind / sun and high demand) and it is necessary to send the right price signals for investments, and generation and demand performance.

For instance, price spikes and volatility support the financing of flexible generation and incentivise market participants to hedge against their volatile consumption or generation. This implies that price caps in wholesale markets should be avoided and only foreseen – at a level sufficiently high to avoid distorting investment signals – when supply and demand curves don't cross.

As foreseen in the Network Code on Capacity Allocation and Congestion Management, price caps, if introduced, should be harmonised across Europe.

Lastly, as price spikes are estimated over the long-term as investment signals, it is important that the regulatory framework gives investors sufficient certainty and trust that they can generate revenues based on such (unconstrained) price volatility.

HEDGING PRODUCTS FOR CAPABILITY WILL BE NEEDED TO ENSURE EFFECTIVE INVESTMENT SIGNALS

Market participants are incentivised to support adequacy and system resilience when they bear a part of the risk (e.g. price volatility, capacity shortage). This incentive can for instance, be generated by the right imbalance prices, by the introduction of penalty payments for imbalances or by a capacity obligation. If market participants bear those risks, they will develop a need for hedging products such as flexibility products, capacity products, or system service products, which may trigger other market participants to offer them.

Hedging products will act as insurance for market participants to manage their risk of not fulfilling the required capability (e.g. having contracted enough capacity to ensure a continuous supply for themselves or for their customers). However, it is not sure whether these hedging products will be developed by the market and be liquid enough to ensure effective investment signals.

If not, a regulated framework to address the technical scarcities with predefined hedging tools will be required: obligations should be placed on market participants while products explicitly associated to the specific scarcity/capability should be centrally developed. As incentives for establishing hedging products or a regulated framework should be introduced well before technical scarcities are deemed unsolved, an early assessment of potential system scarcities should be performed.

Depending on the foreseen scarcities, different hedging dimensions may be introduced: capacity markets, flexibility markets, system service products. To ensure energy market integration and consistency with the IEM, products developed must be tradable cross-border between market participants.

CAPABILITY OF THE ELECTRICITY MARKET TO ADDRESS OPERATIONAL ISSUES MUST BE ASSESSED

In parallel to the improvement of the current market and the development of hedging products for capability, policymakers should take into account the ability of the electricity market to address technical scarcities beyond capacity and flexibility needs.

Operational issues cannot be solved by the market alone. This should be done on the basis of an objective assessment of the medium/long-term scarcities and on an analysis of TSOs' degree of necessary interventions in the market.

If the market is not able to solve technical scarcities, this should be identified early – by detecting specific warning signals – to avoid the appearance of severe operational issues before solutions can be imple-

mented. Such signals include for instance, a frequent number of curtailments, emergency state situations, or frequency deterioration, excessive redispatch volumes, or an unacceptable value of lost load.

TSOs ARE RESPONSIBLE FOR ASSESSING AND MAINTAINING SYSTEM SECURITY: THE MARKET DESIGN MUST PROVIDE THE MEANS TO CARRY OUT THIS TASK EFFICIENTLY

TSOs establish markets and secondary markets for Ancillary Services and are responsible for procuring them. TSOs, and ENTSO-E even more so, have a legal mandate to provide forecasts for system adequacy and system needs (e.g. SO&AF), thereby assessing potential capacity scarcities to assist policymakers.

These adequacy forecasts need to be further improved to be as technically advanced as possible, fully reliable and of high quality. This will increase policymakers' trust of TSO analysis so that it constitutes a solid

basis for their decisions on market design. Moreover, a study to estimate long-term technical scarcities should be started in parallel.

Lastly, due to their independence, expertise and neutrality in the electricity market, TSOs should have a leading role in any market design amendments. Especially in designing the cross-border features of hedging products and when hedging products do not evolve from the market, TSOs should be leading the discussions

CROSS-BORDER PARTICIPATION MUST BE ENSURED AND THE IEM PRESERVED

In any market design, cross-border participation must be ensured to preserve the efficiency of the IEM and to maintain the European approach to achieving energy policy goals. The design of hedging products – be it referring to capacity, flexibility or system services – should allow cross-border participation.

Hedging products already implemented on a national basis should be amendable to enable cross-border trading and progressive regional harmonisation. In concrete terms, this may imply different solutions with market participants' involvement (i.e. secondary cross-border trading), depending on the spontaneous or regulated nature of the hedging products for capability.

WITH REGARD TO CAPACITY MECHANISMS, MODELS FOR CROSS-BORDER PARTICIPATION ARE BEING PLANNED OR DESIGNED

These “regional projects” are expected to provide tangible results in the next 3–4 years. Based on best practices at a regional level, an EU approach on how to complement the Target Model with a cross-border

component for hedging products should be jointly developed by TSOs, ENTSO-E and relevant stakeholders by 2020.

5 POLICY RECOMMENDATIONS

SHORT-TERM ACTIONS

- 1. The Target Model should be fully implemented as soon as possible.** Integrated and well-functioning markets across all timeframes will maximise the benefits of the IEM. Network codes need to be adopted and implemented.
- 2. Current market design should be improved by fully integrating RES into the market, introducing cost reflective balancing prices, and stimulating demand side participation¹⁾ in all markets.** Action on these issues needs to be taken as soon as possible to remove distortions in electricity markets, improve efficiency and align market outcomes to physical system needs. Having appropriately high imbalance prices should reflect the cost of managing increasing variability.
- 3. Technical system scarcities must be objectively and collectively assessed by TSOs in a coordinated manner and complemented with ENTSO-E's overall adequacy assessment.** Increased coordination and consistency among TSOs is needed to assess all relevant system scarcities in an objective manner, while appropriately taking into account cross-border exchanges. In parallel, the ENTSO-E adequacy assessment methodology needs to be further improved to be more structurally used in complementing national assessments.

MEDIUM-TERM ACTIONS

- 4. Appropriate incentives or obligations should be introduced so that market participants take more responsibility for system adequacy – particularly flexibility and capacity.** By applying the right incentive or obligation to market participants (i.e. BRPs), they will interact efficiently and contribute to solve system scarcities which they contribute to creating. In this context, increasing volatility and price spikes should be accepted so that market participants have an incentive to manage such risk.
- 5. To allow market participants to hedge their adequacy related risk, the hedging dimension of the market design needs to be developed via associated insurance products for capability.** For this purpose, capacity mechanisms²⁾, flexibility markets, or system services products can be implemented based on specific national/regional system scarcities. TSOs should play a facilitating role to establish these products, independently of whether the products are developed by the market or within a regulated framework.
- 6. In implementing hedging products for capability, cross-border participation must be allowed and the IEM preserved to ensure a European approach to market design.** The design of capacity, flexibility or system services products should allow cross-border participation to ensure integration with the IEM. Hedging products already implemented on a national basis should be amendable to enable cross-border trading and progressive regional harmonisation.

¹⁾ ENTSO-E has developed a DSR policy paper, identifying critical issues and proposing concrete solutions to fully deploy and utilise DSR potential.

²⁾ These include strategic reserves, capacity obligations, capacity auctions, etc.

LONG-TERM ACTIONS

- 7. By 2020, long-term technical system scarcities must be assessed at regional and European levels, based on ENTSO-E and TSOs' enhanced system adequacy assessments.** ENTSO-E's system adequacy assessments will need to cover the full scope of potential technical issues and be fully reliable to constitute a solid basis for policymakers' decisions. This will allow the development of a consistent European approach to long-term market design.
- 8. In parallel, based on results from national/regional hedging product solutions for capability (spontaneous or regulated), a consistent European market design model must be designed for implementation.** As markets further integrate and improve – through RES integration, DSR participation and efficient balancing – and hedging products develop with cross-border solutions, a European market design model must be defined based on best practices and long-term system needs.

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