



European Union Agency for the Cooperation
of Energy Regulators

Market integration report

EBSG 28 October 2026

- **Balancing chapter structure**
- **Balancing energy**
- **Balancing capacity**

Balancing chapter structure

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01	Imbalance-price evolution	The gap to day-ahead prices fell significantly in Member States connected to both platforms; no similarly clear trend for other Member States.		
02	PICASSO and aFRR prices	Extreme price incidents fell sharply as additional TSOs connected and elastic demand was introduced between 2024 and 2026.		
03	mFRR prices	Fewer price incidents than for aFRR. Concentrated in some specific events.		
04	Triggers for extreme prices PICASSO & Nordic mFRR Limited cross-zonal capacity remains the main constraint.	CORE mFRR One two-hour incident, with insufficient response from potentially flexible assets (e.g. solar).	Baltic mFRR Incidents occurred at the beginning of operation, when market liquidity was limited.	

01	Cooperation benefits	ALPACA, Baltic and Nordic cooperation lowers procurement costs; benchmark scenarios to assess the remaining potential.
02	Cross-zonal price spreads	Larger balancing-capacity spreads outside current cooperations indicate further benefits from balancing capacity cross-zonal exchange when they exceed day-ahead spreads.
03	Entry of flexible assets	Batteries and decentralised flexibility reduced costs in the Baltic region and Belgium, as well as market concentration in the Baltics.
04	Pay-as-bid pricing	Bidding strategies differ across pricing mechanisms.

Part 3: TSO approaches and future challenges

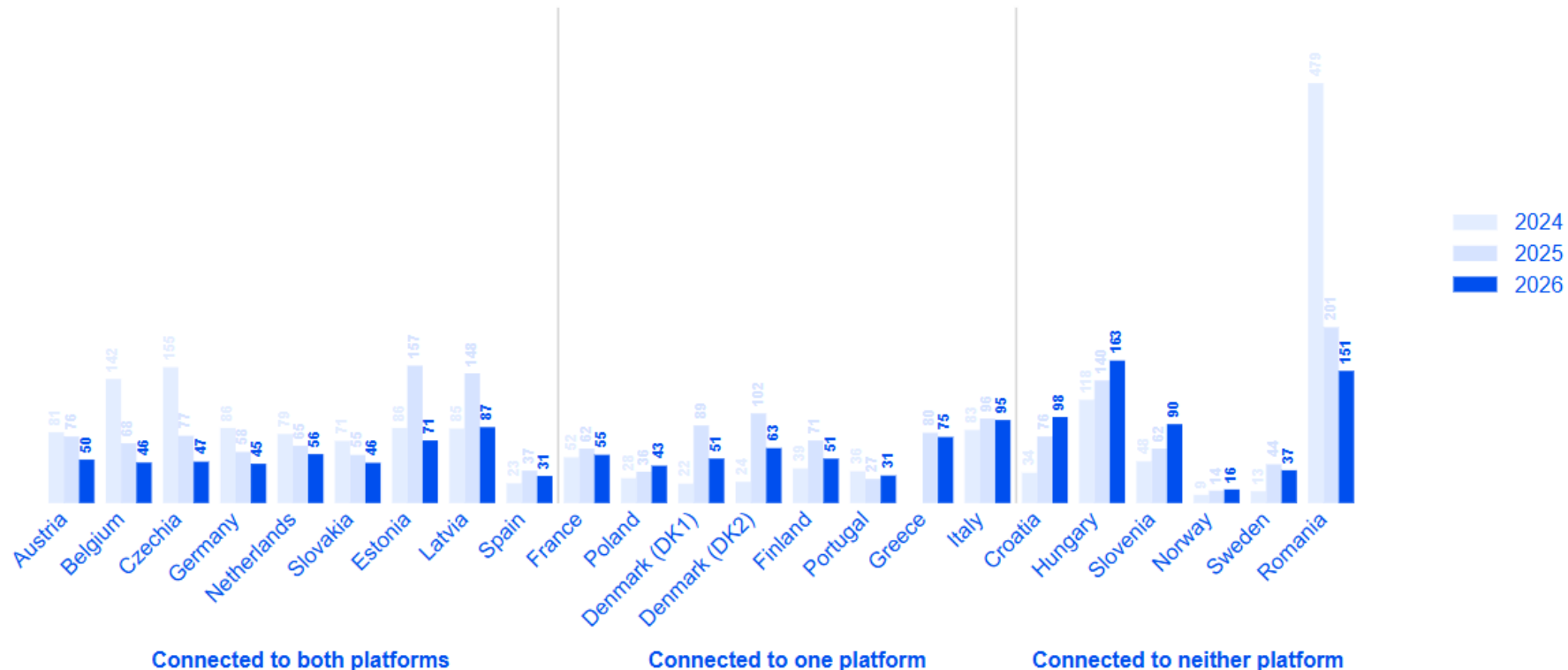
01	Balancing approaches	Reactive systems leave a larger role to BRP self-balancing, whereas proactive systems rely more on earlier TSO dispatch.
02	Activation strategies	Some proactive TSOs have non-zero mFRR demand in more than 75% of MTUs; most reactive TSOs do so in less than 3%.
03	Imbalance settlement	Settlement approaches cluster around the two balancing models and influence the incentives faced by BRPs.
04	Future challenges	Faster decentralised assets, real-time congestion and evolving balancing platforms will pose new challenges for balancing approaches.

Balancing energy

High-level statistics

The imbalance-price gap declined most in countries connected to both platforms

Average absolute difference between day-ahead and imbalance prices, by platform connection status, Jan–15 Jul 2024–2026 (EUR/MWh)



Observation: The gap between imbalance and day-ahead prices fell markedly in most countries connected to both platforms, while no similarly clear downward trend is visible elsewhere.

Price incidents fell sharply on PICASSO

Evolution of annualised aFRR prices outside $\pm 7,500$ EUR/MWh by TSO, 1 January 2024 - 15 July 2026.

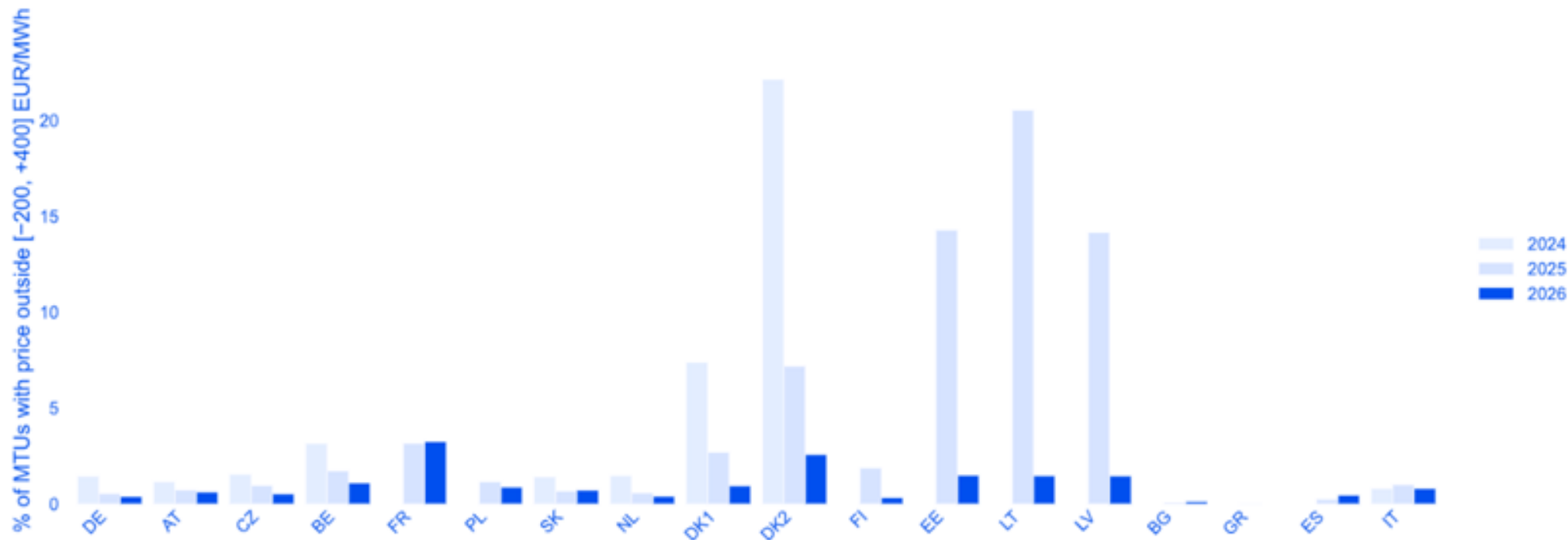


Analysis: Compare annualised hours with aFRR prices outside $\pm 7,500$ EUR/MWh by TSO in 2024–2026.

Observation: Price incidents became substantially less frequent, with marked reductions in Czechia, Austria and Italy.

Price stability improved on the PICASSO platform

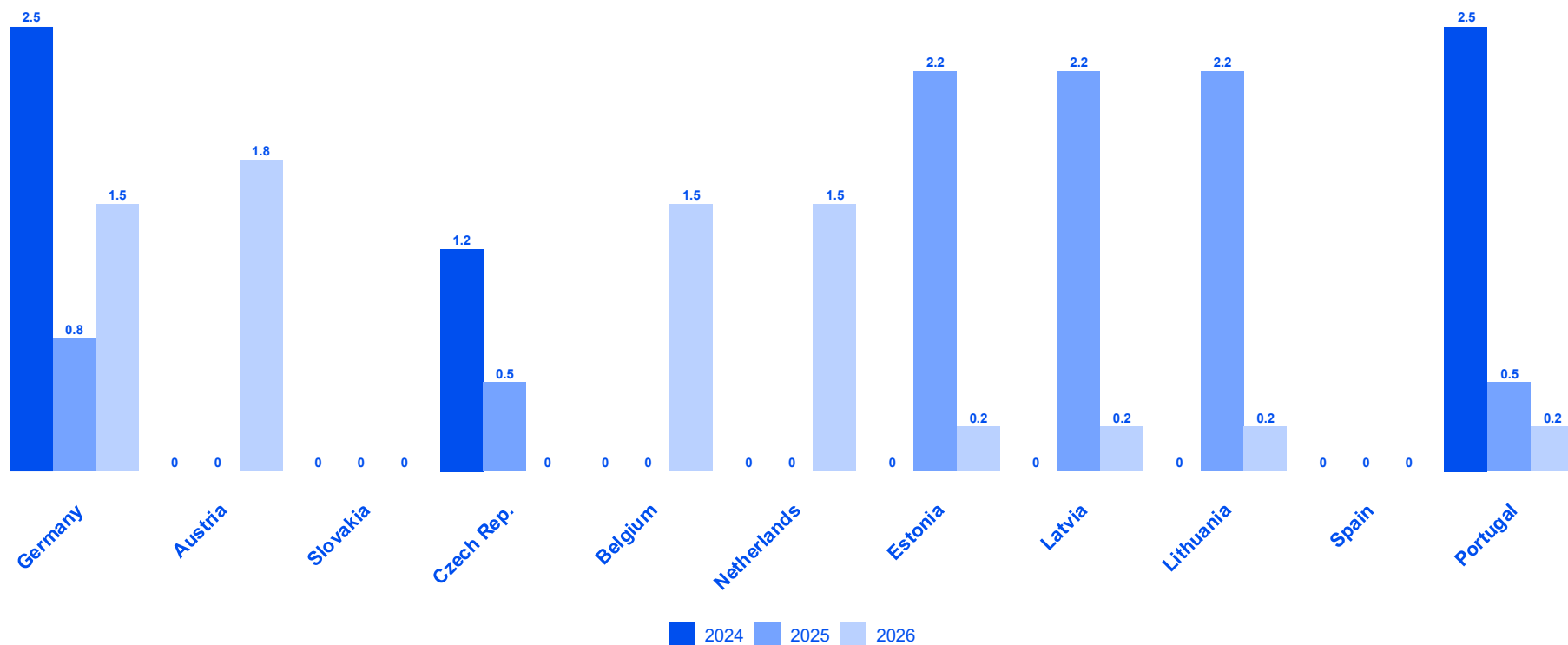
Share of aFRR prices outside the range [-200, +400] EUR/MWh by TSO, 1 January 2024 - 15 July 2026.



Analysis: Compare the share of aFRR prices outside [-200, +400] EUR/MWh by TSO in 2024–2026.

Observation: This share decreased across most TSO areas, particularly in the Nordic and Baltic areas.

Price incidents less frequent in MARI



Evolution of
annualised mFRR
prices outside $\pm$
7,500 EUR/MWh by
TSO, 1 January
2024 - 15 July 2026.

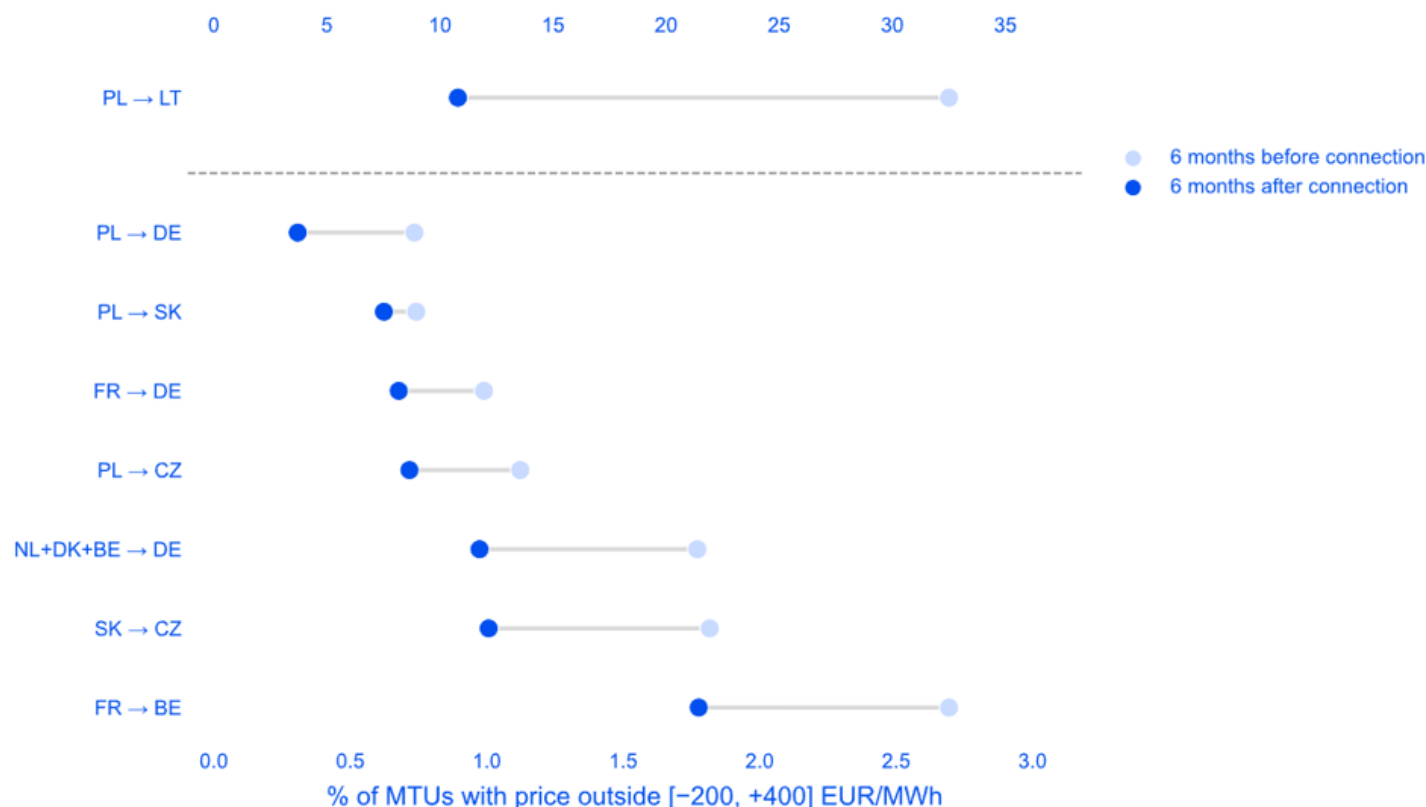
Analysis: Compare annualised hours with mFRR prices outside $\pm 7,500$ EUR/MWh by TSO in 2024–2026.

Observation: Extreme mFRR price incidents have been less frequent than aFRR incidents and are more event-specific. In 2026, the observations in AT, BE, DE and NL stem from a single event, while the 2025 Baltic observations were similarly concentrated in one episode.

Impact of new TSO connection

New TSO connections increased price stability

Percentage of MTUs with aFRR prices outside $[-200, 400]$ EUR/MWh before and after selected TSO connections.



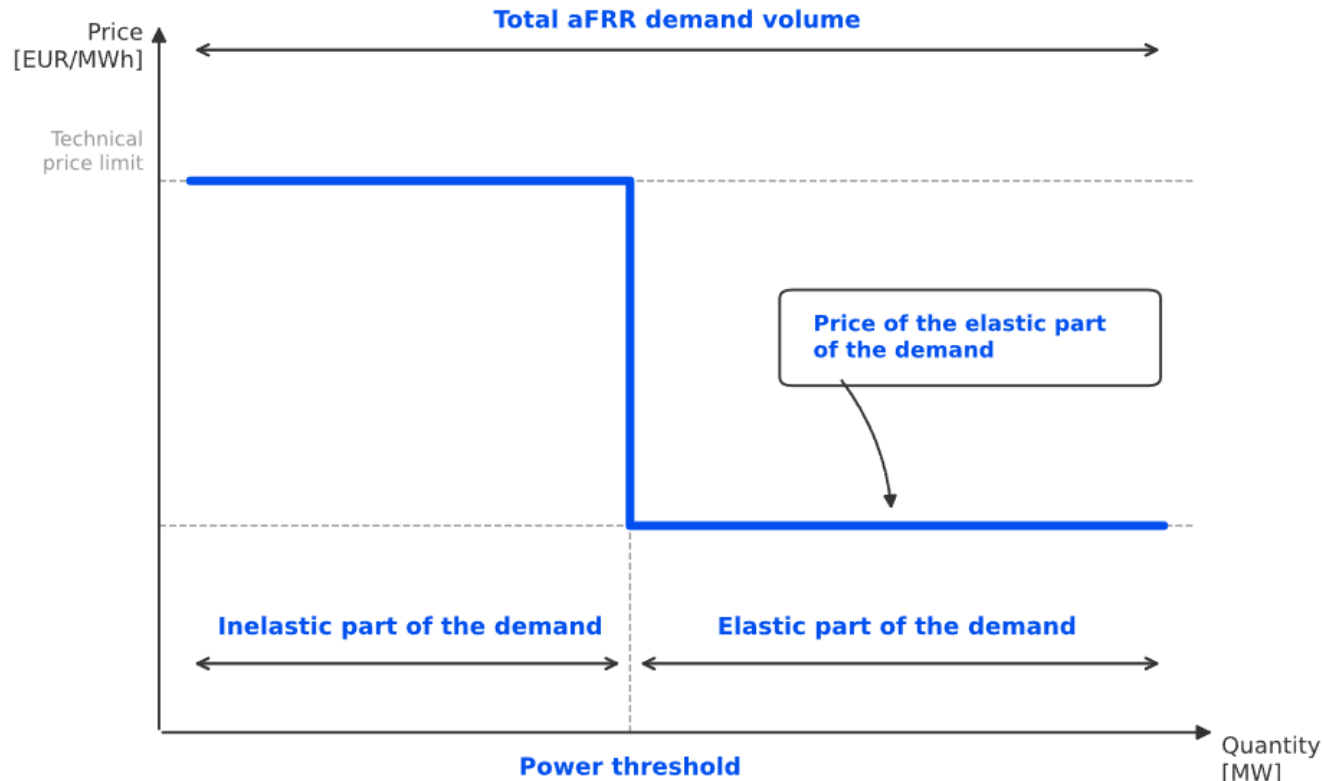
Analysis: Compare aFRR price outcomes in neighbouring TSOs during the six months before and after new connection to PICASSO.

Observation: For every connection shown, the share of MTUs with prices outside $-200/+400$ EUR/MWh decreased markedly afterwards.

Conclusion: Additional connections enlarge the common bid pool and, where cross-zonal capacity is available, improve access to balancing resources in neighbouring areas, contributing to more stable prices.

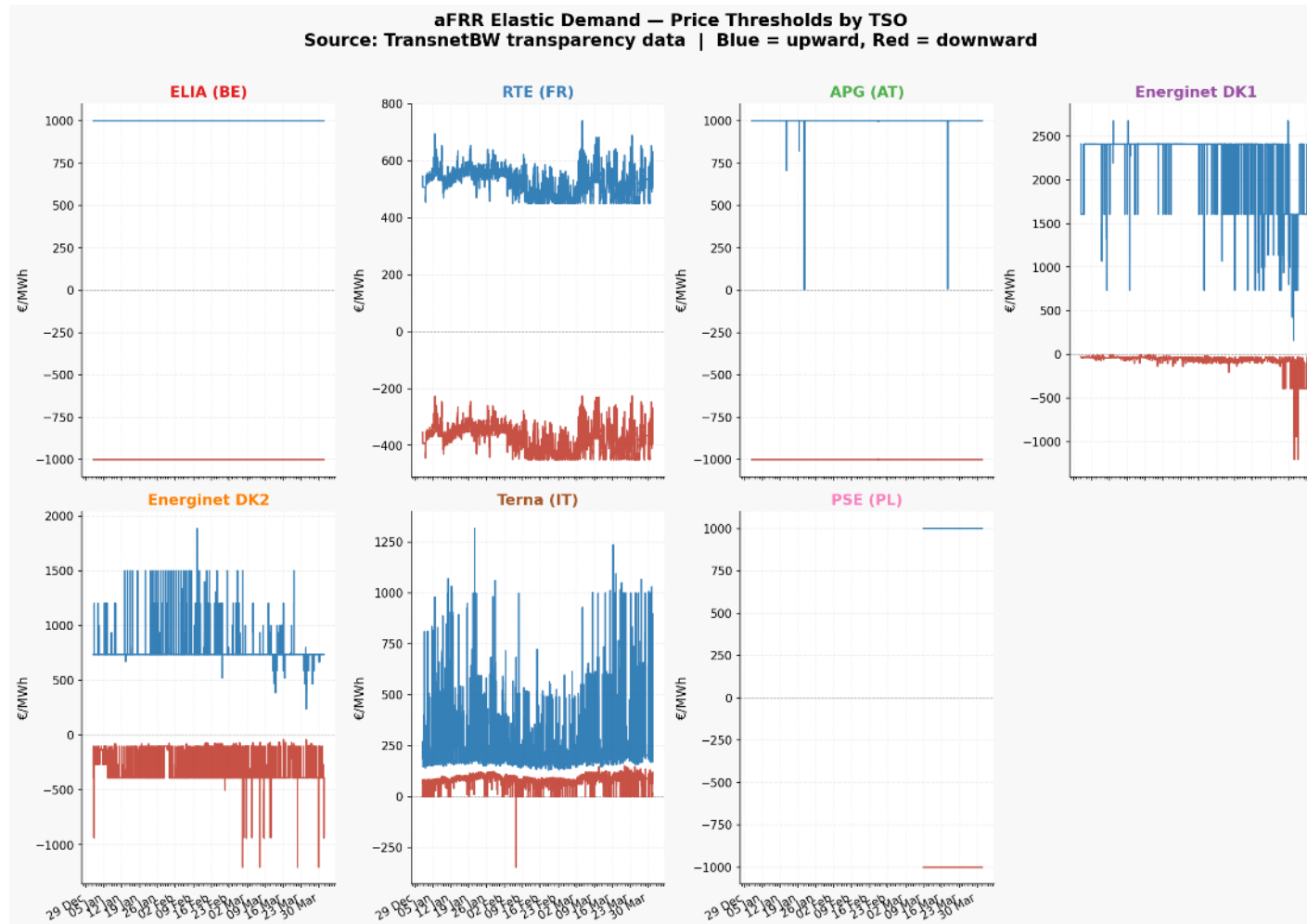
Elastic demand

Components of an elastic demand



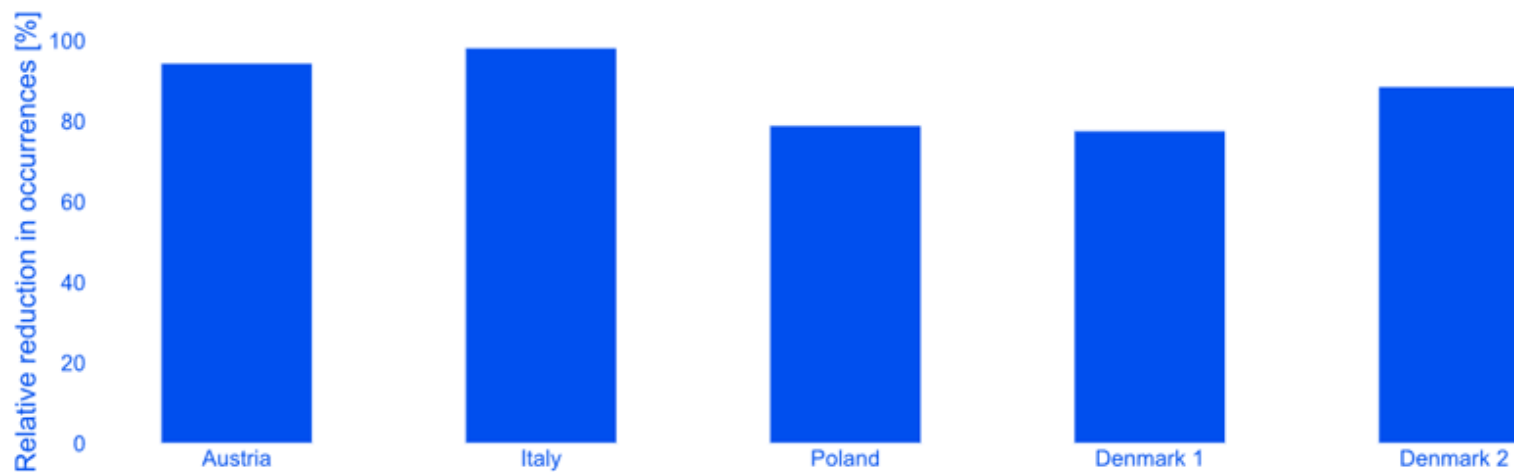
- The elastic demand considered by TSOs is characterised by three components:
 1. The volume of the aFRR demand
 2. The power threshold: the volume before which the price of the elastic demand is set at the technical price limit and after which the price of the elastic demand is set at the price submitted by the TSO;
 3. The price of the elastic demand: the price a TSO is willing to pay or receive for the activation of aFRR balancing energy bids for the part of the elastic aFRR demand exceeding the power threshold;

Price threshold of the elastic demand



- AT, BE, PL and SI: **fixed** price thresholds at $\pm 1,000$ €/MWh
- FR: **formula** based on spot price, weighted average aFRR & mFRR bids
- IT: **formula** based on historical national aFRR bids
- DK: **formula** based on historical data, calibrated to avoid excessive area control error

Relative reduction in the frequency of aFRR prices outside $[-1,000, 1,000]$ EUR/MWh following the introduction of elastic demand



Analysis: Compare the frequency of extreme aFRR prices before and after the introduction of effective elastic-demand parameters.

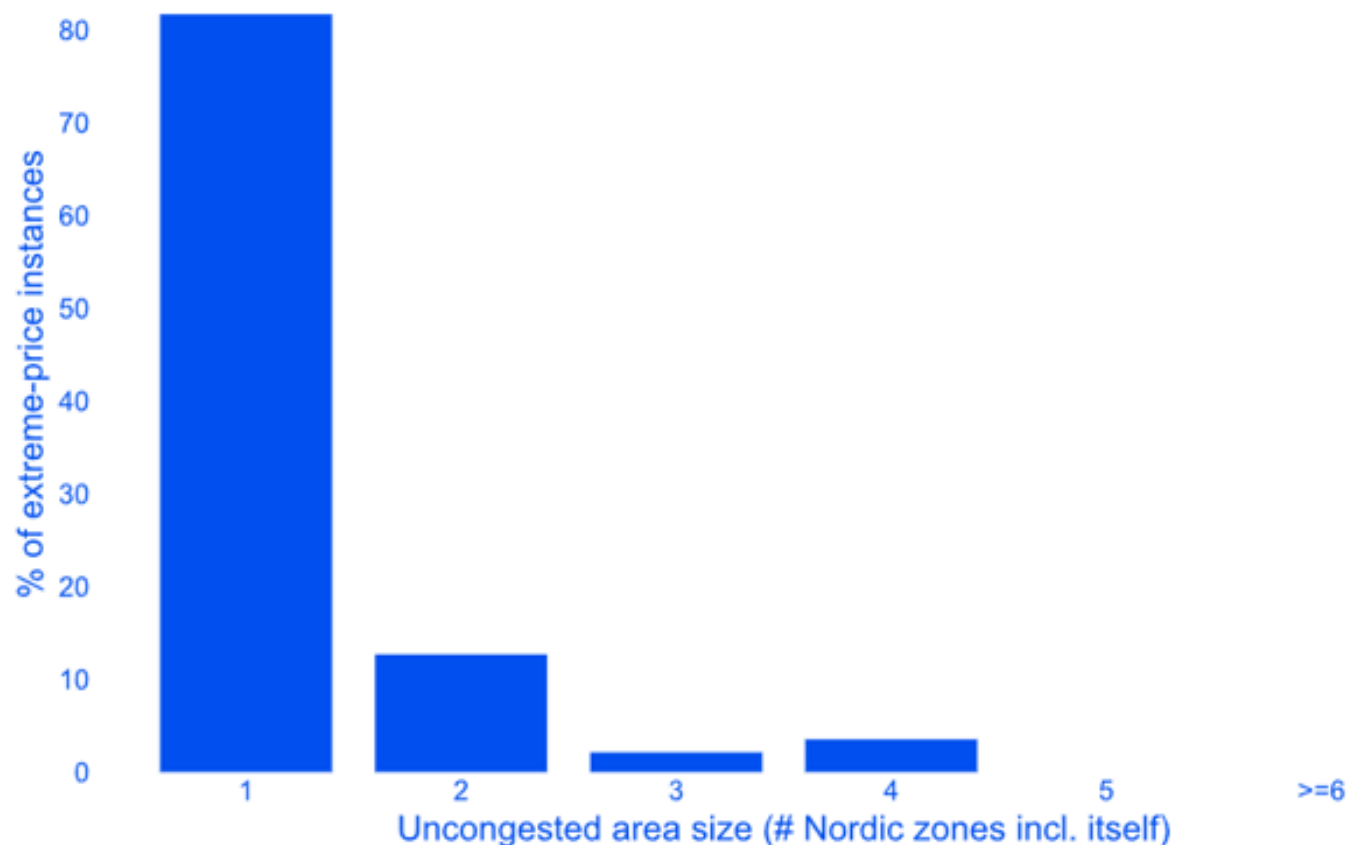
Observation: Extreme-price occurrences decreased by 78–98% after implementation.

Conclusion: Elastic demand contributes to reducing the likelihood that very expensive bids are activated.

Triggers for remaining extreme prices

Nordic high mFRR prices mainly occurred in isolated areas

Number of Nordic zones sharing the same mFRR price as the most extreme zone, in market time units where that price exceeds $\pm 1,000$ EUR/MWh, 4 March 2025 – 3 March 2026 (%)

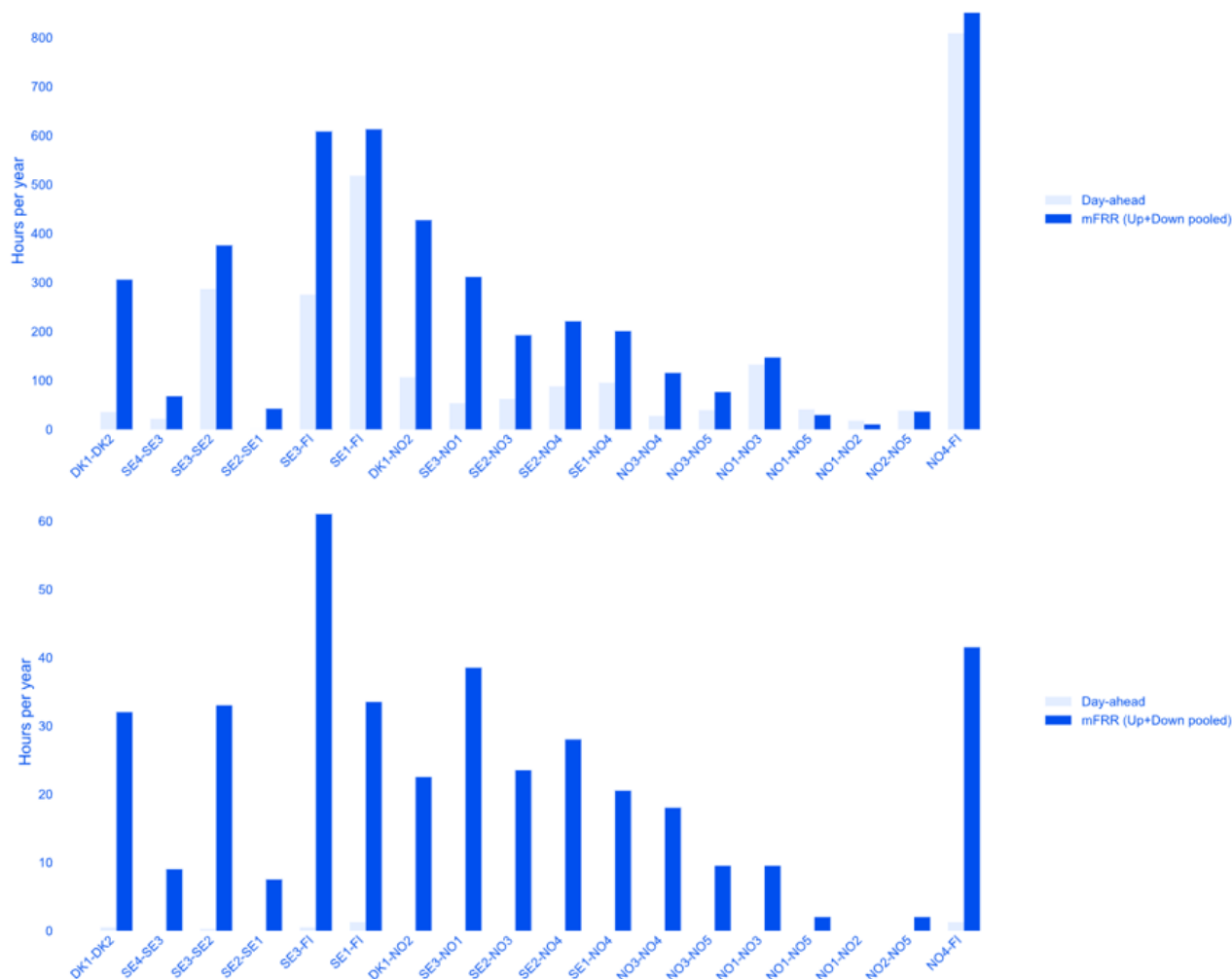


Analysis: For each MTU in which the most extreme mFRR price in the Nordic region was outside $\pm$ EUR 1,000/MWh, count the number of bidding zones with that price.

Observation: More than 80% of extreme-price occurrences arose when the affected bidding zone was isolated, indicating that limited cross-zonal capacity contributed to these events.

Conclusion: Most extreme mFRR price incidents reflected local scarcity combined with insufficient cross-zonal capacity, rather than scarcity across the whole Nordic market.

Nordic mFRR price differences



Hours per year with Nordic cross-border price differentials above 100 EUR/MWh and 500 EUR/MWh in the day-ahead and mFRR markets, 4 March 2025 – 3 March 2026 (h)

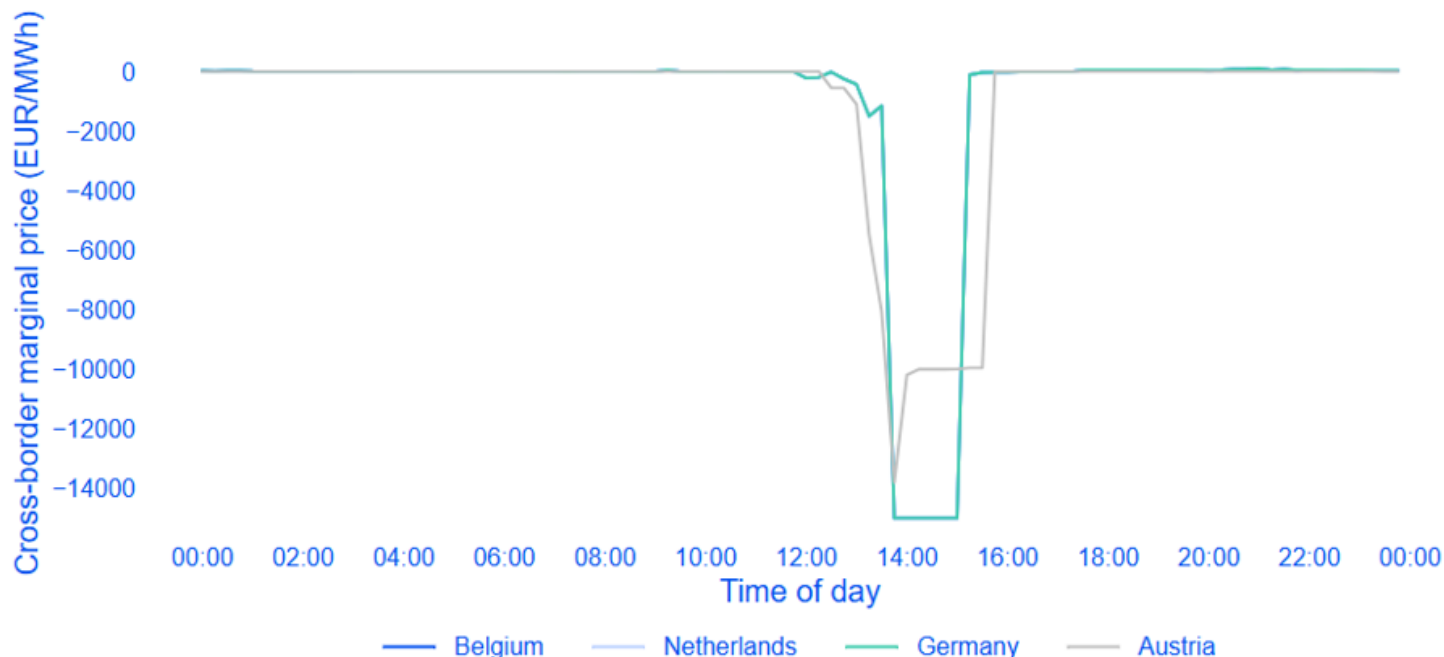
Analysis: Compare cross-border price separation in the Nordic day-ahead and mFRR markets.

Observation: Cross-border mFRR price spreads are substantially more extreme than day-ahead price spreads.

Conclusion: With volatile balancing price spreads, allocating capacity ex ante to specific borders under ATC can leave insufficient capacity where it is most needed. Flow-based allocation would prioritise the most valuable exchanges within network constraints.

A regional surplus led to prices at the technical floor

Downward mFRR prices in selected Core bidding zones
on 6 April 2026



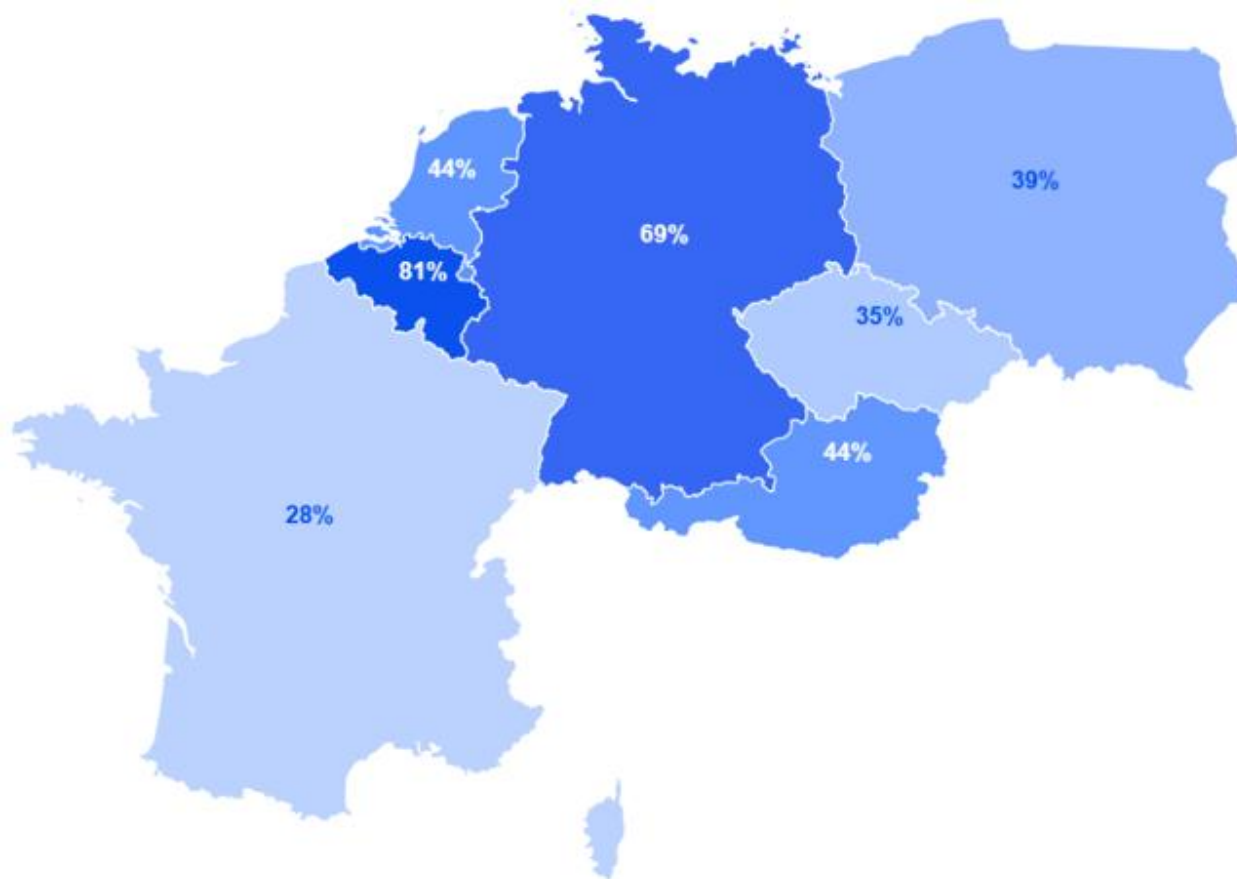
Analysis: Examine cross-border marginal mFRR prices during the 6 April 2026 event.

Observation: Several CORE bidding zones recorded sharply negative mFRR prices for multiple MTUs around 14:00.

Conclusion: Several neighbouring systems were long at the same time, creating regional scarcity of downward mFRR bids accessible to the platform.

High solar output amplified the need for downward regulation

Share of load met by solar generation on 6 April 2026,
12:00–16:00.



Analysis: Compare solar generation with load during the midday mFRR price incident.

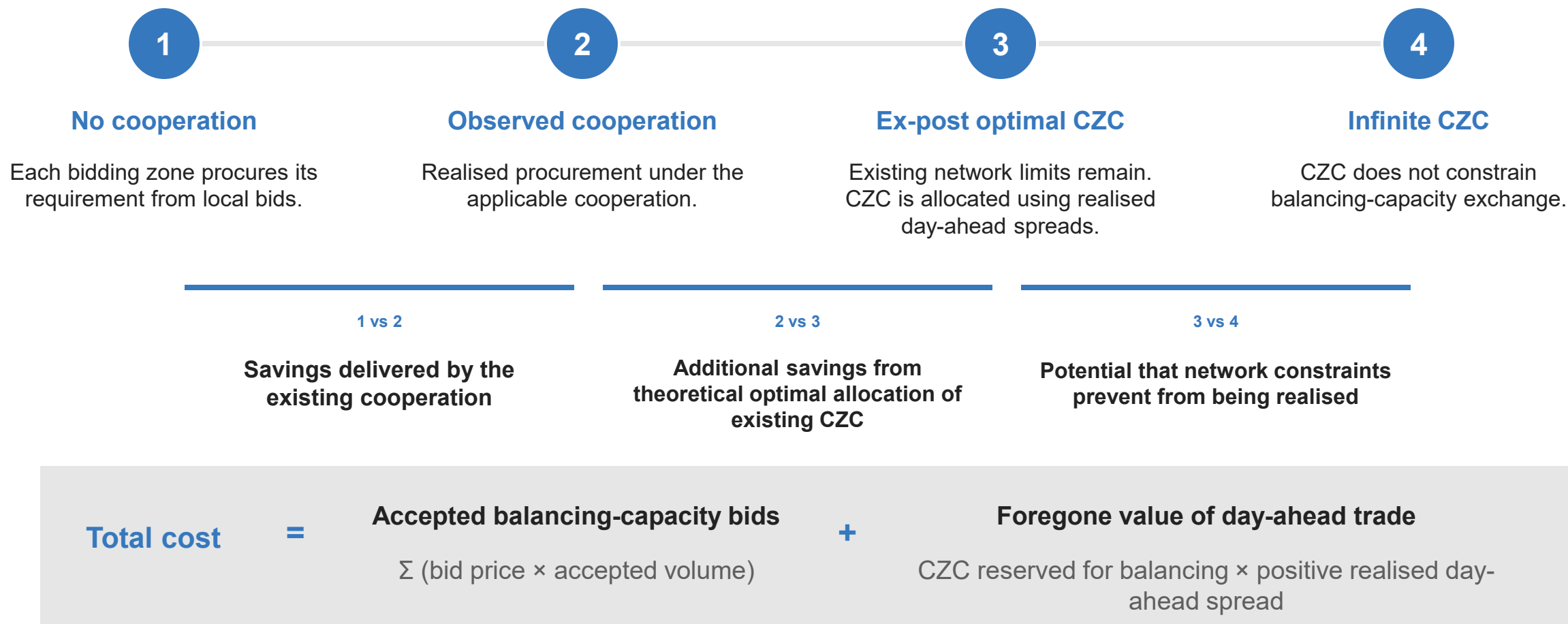
Observation: Solar generation supplied 28–81% of load across the zones shown.

Conclusion: A large volume of potentially curtailable solar was available, but did not respond to the balancing price signal, indicating that this flexibility was not fully accessible to the balancing market or was not adequately incentivised to react.

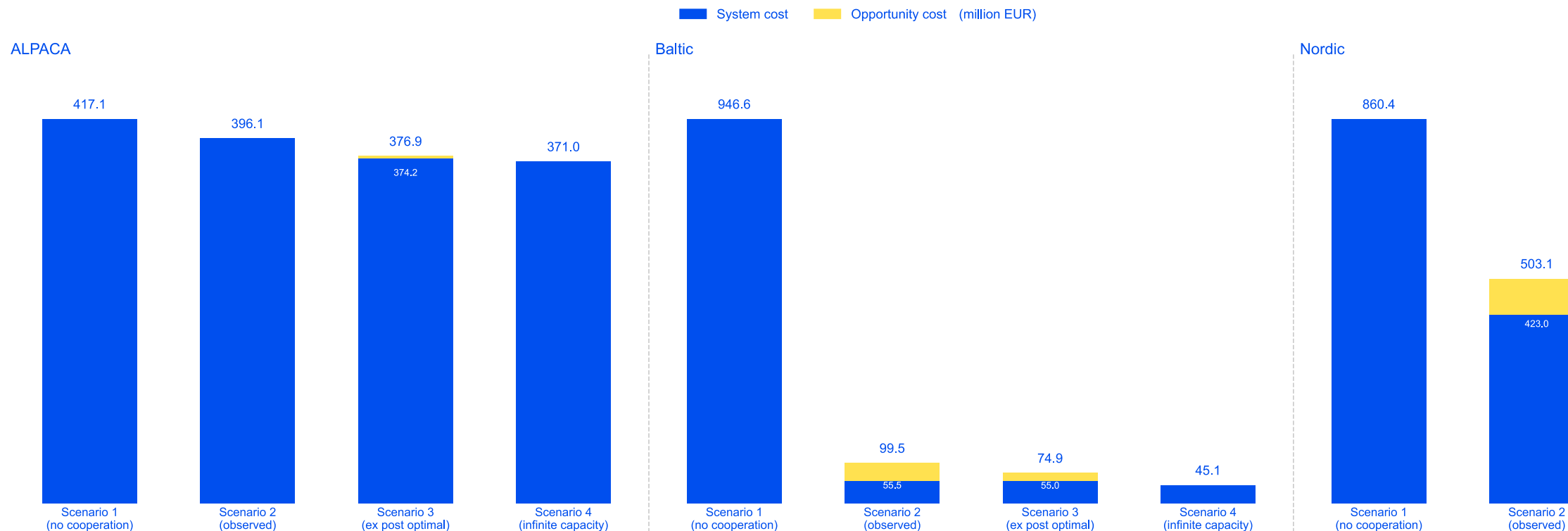
Balancing capacity

Balancing capacity cooperations

Four indicators to quantify cooperation benefits



Indicator 3 uses perfect foresight and therefore represents an ex-post benchmark.



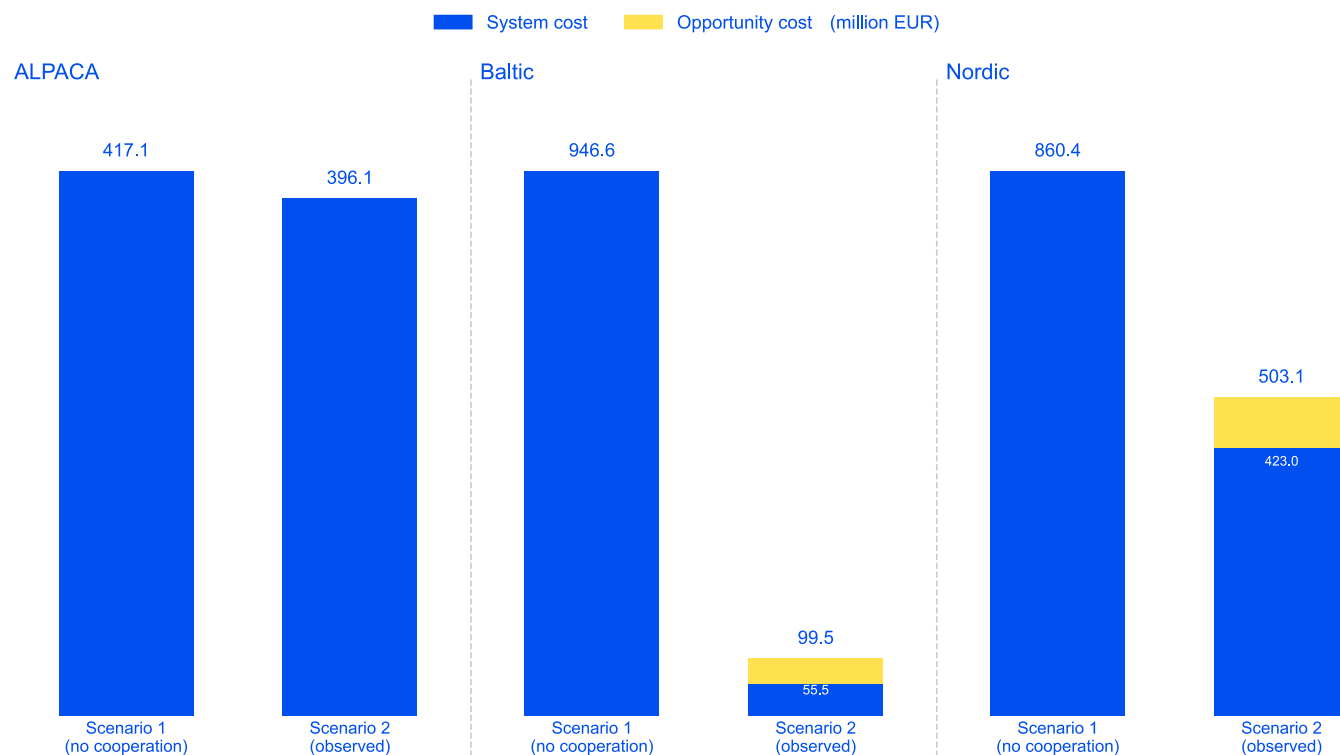
Assessment period

ALPACA: 4 Sep 2025 – 31 May 2026

Baltic: 1 Oct 2025 – 31 Aug 2026

Nordic: 1 Jan – 31 Dec 2025

Balancing cooperations delivered significant benefits



In both the Baltic and Nordic cooperations, the savings in balancing-capacity system costs substantially exceed the foregone value of day-ahead trade associated with allocating cross-zonal capacity to balancing.

Compared with separate national procurement:

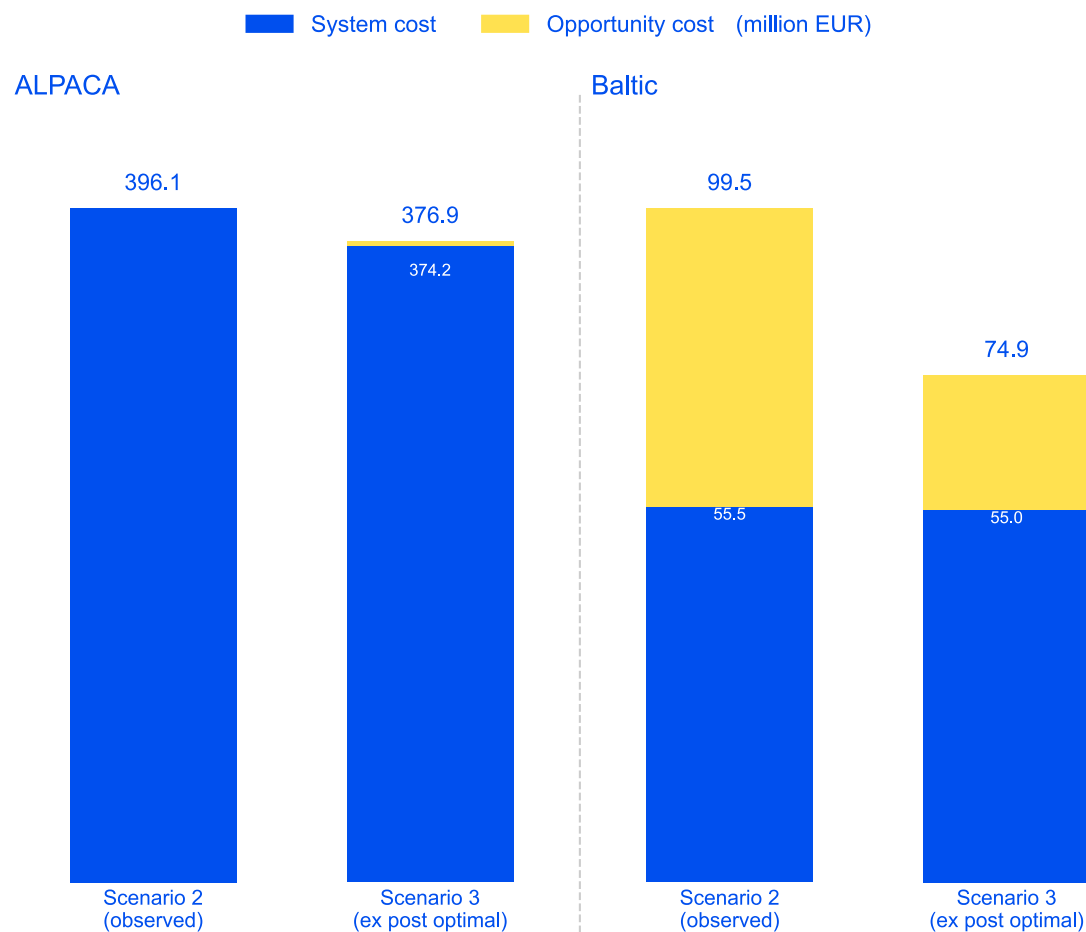
ALPACA: Cooperation reduces balancing-capacity system costs by **EUR 21.0 million (5%)**.

Baltic: System-cost savings of **EUR 891.1 million**, less **EUR 44.0 million** in foregone day-ahead value, yield a **net benefit of EUR 847.1 million (90%)**.

Nordic: System-cost savings of **EUR 437.5 million**, less **EUR 80.1 million** in foregone day-ahead value, yield a **net benefit of EUR 357.4 million (42%)**.

- Beyond their monetary benefits, the cooperations have other impacts that are not monetised in this study:
 - **Baltic:** Cooperation enables an additional **18.5% of reserve demand** to be met.
 - **Nordic:** Cooperation enables an additional **8.52% of reserve requirements** to be met.
 - **ALPACA:** Without reserved cross-zonal capacity, planned exchanges may not be feasible at balancing time.
- Separating economic benefits from system-security benefits is difficult, as cooperation may encourage more competitive bids while prompting some higher-cost providers to stop bidding if they expect not to be selected.

Ex-post theoretical benchmark



ALPACA: EUR 19.2 million in further savings from optimising cross-zonal capacity allocation, comparable to the benefit already delivered.

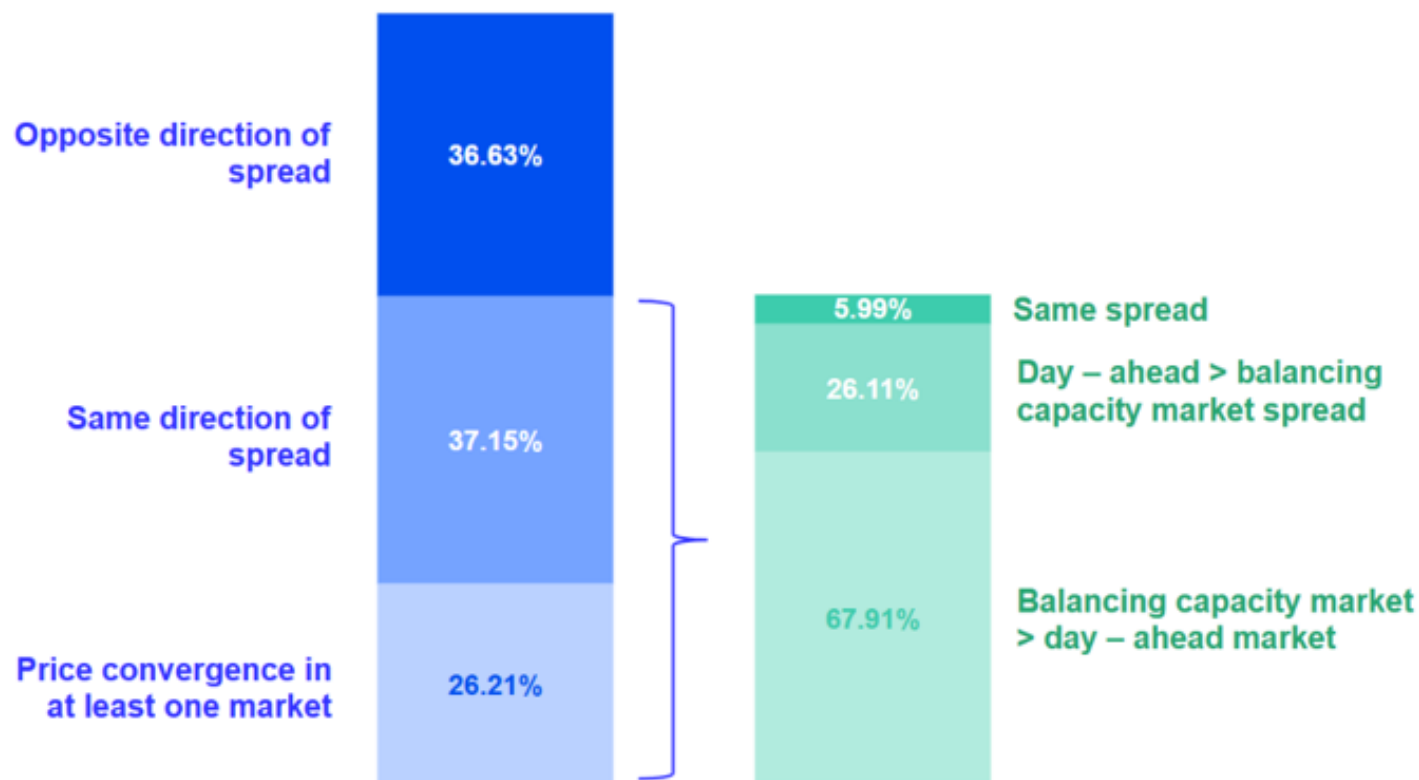
Baltic: EUR 24.6 million in further savings from lower foregone day-ahead value. Existing cooperation already captures **around 97% of the benefit** estimated under the optimal-allocation benchmark.

As TSOs must allocate capacity under uncertainty, Indicator 3 should be interpreted as an ex-post perfect-foresight benchmark.

Price spreads

Balancing-capacity and day-ahead spreads often point in opposite directions

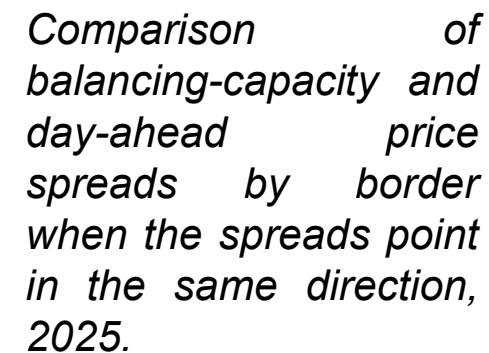
Direction and relative magnitude of balancing-capacity and day-ahead price spreads, 2025.



Analysis: Compare the direction of day-ahead and balancing-capacity price spreads across borders.

Observation: Price spreads pointed in opposite directions in 36.63% of observations, almost as often as they pointed in the same direction (37.15%).

Conclusion: Day-ahead and balancing-capacity markets often value cross-zonal capacity in different directions. This creates scope to allocate capacity to balancing capacity at limited day-ahead opportunity cost.



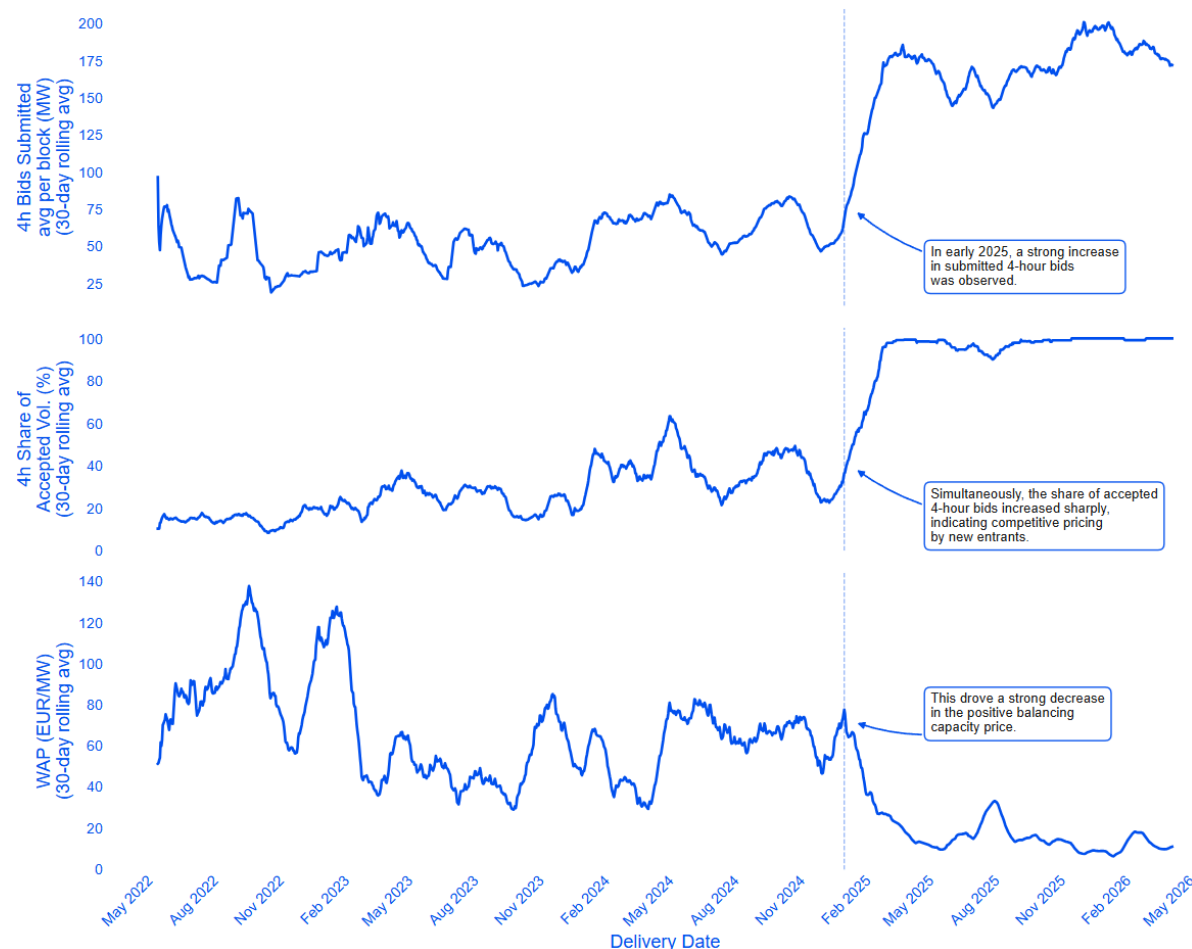
Observation 1: Outside existing cooperations, balancing-capacity spreads are often larger than day-ahead spreads (on some borders in more than 80% of observations), indicating significant potential for balancing-capacity exchange.

Observation 2: On Nordic and Baltic cooperation borders, the picture is much more balanced, consistent with cooperation bringing balancing-capacity price differences closer to day-ahead price differences.

Participation of new resources

Evolution of the positive aFRR balancing capacity price

Submitted four-hour upward bids, their share of accepted aFRR capacity and procurement prices in Belgium, May 2022-May 2026.



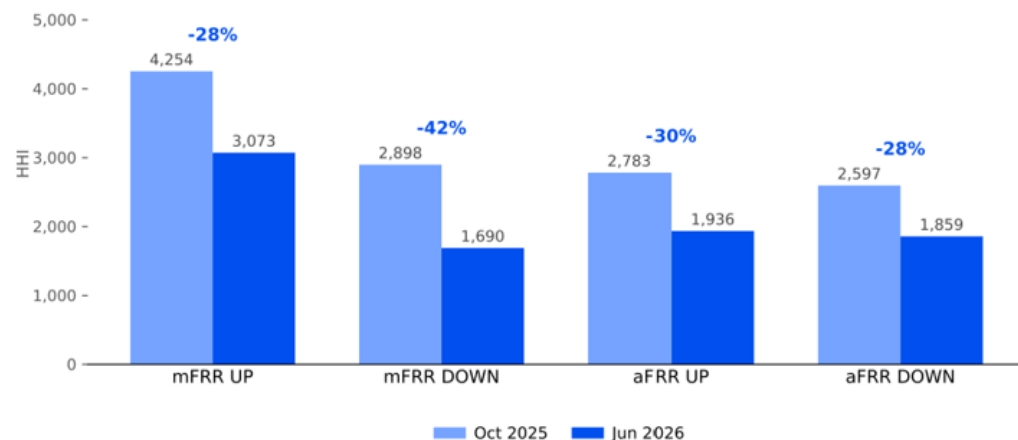
Observation: The entry of new 4-hour bids from early 2025 is associated with a strong decrease in the aFRR upward balancing capacity price, suggesting that new flexible assets are capable of delivering the service at a lower cost (reflecting the absence of must-run/start-up costs).

Interpretation 1: Granular products allow new flexible assets to properly reflect their constraints (e.g. energy reservoir limits), enabling them to participate and bid at prices reflecting their lower cost structure.

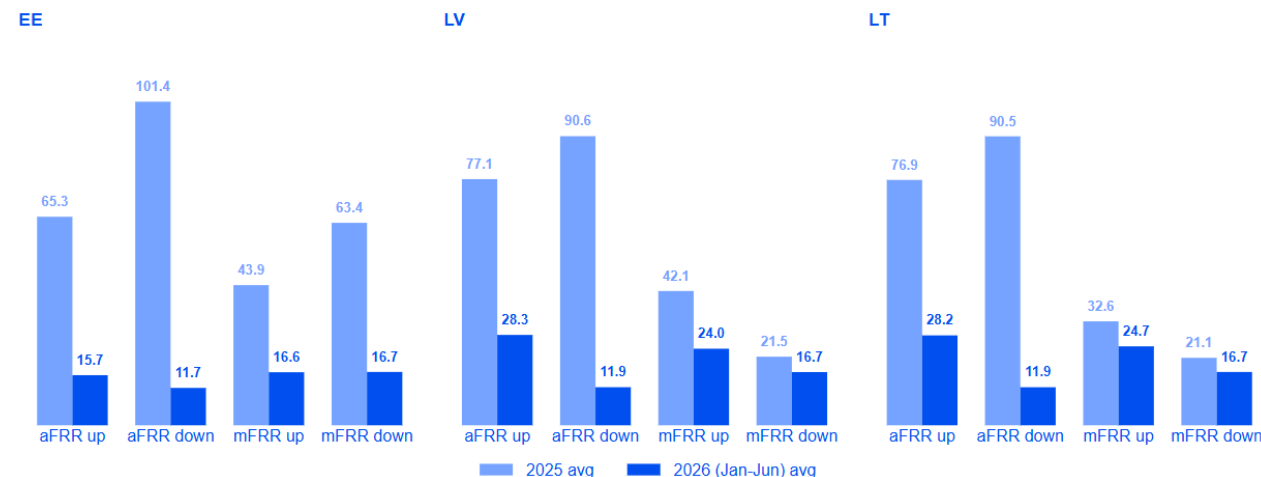
Interpretation 2: Low entry barriers can support the entrance of multiple providers in the market, increasing competition.

Battery entry coincided with stronger competition and lower Baltic capacity prices

Concentration decreased across Baltic balancing-capacity products, October 2025-June 2026.



Baltic balancing-capacity prices decreased between 2025 and the first half of 2026.



Analysis: Compare market concentration and procurement prices following the entry of new batteries in the Baltic balancing-capacity market.

Observation: HHI decreased by 28–42%, while average procurement prices fell across every product and country shown.

Conclusion: Battery entry coincided with lower market concentration and lower prices, providing evidence that new assets can strengthen competition and reduce procurement costs.

Thank you. Any questions?

The contents of this document do not necessarily reflect the position or opinion of the Agency.



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