ENTSO-E
Balancing Report 2024

entsoe

ENTSO-E Mission Statement

Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the **association for the cooperation of the European transmission system operators (TSOs)**. The **40 member TSOs**, representing 36 countries, are responsible for the **secure and coordinated operation** of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E **brings together the unique expertise of TSOs for the benefit of European citizens** by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the **security of the interconnected power system in all time frames at pan-European level** and the **optimal functioning and development of the European interconnected electricity markets**, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

Our vision

ENTSO-E plays a central role in enabling Europe to become the first **climate-neutral continent by 2050** by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires **sector integration** and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources.

ENTSO-E acts to ensure that this energy system **keeps consumers at its centre** and is operated and developed with **climate objectives** and **social welfare** in mind.

ENTSO-E is committed to using its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

Our values

ENTSO-E acts in **solidarity** as a community of TSOs united by a shared **responsibility**.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by **optimising social welfare** in its dimensions of safety, economy, environment and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and **innovative responses to prepare for the future** and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with **transparency** and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

Our contributions

ENTSO-E supports the cooperation among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its **legally mandated tasks**, ENTSO-E's key responsibilities include the following:

- Development and implementation of standards, Network Codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- Assessment of the adequacy of the system in different timeframes;
- Coordination of the planning and development of infrastructures at the European level (**Ten-Year Network Development Plans, TYNDPs**);
- Coordination of research, development and innovation activities of TSOs;
- Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in the **implementation and monitoring** of the agreed common rules.

ENTSO-E is the common voice of European TSOs and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

ENTSO-E
Balancing Report 2024

Content

Executive Summary

European electric power systems are currently facing profound changes from both the regulatory and technical perspectives, derived from the implementation of the **EB Regulation**.

In this sense, the implementation of the TERRE platform in Q1 2020, the IGCC in Q2 2021 (platform for netting of aFRR needs), the PICASSO platform in Q2 2022 and the MARI platform in Q4 2022 have been important milestones for fulfilling the EB Regulation roadmap, improving synergies among TSOs in Europe, and increasing the liquidity and competition of balancing markets. European balancing energy platforms imply an improvement of security in the systems and an increase in the global social welfare of the European system.

Since the establishment of the 4 European balancing energy platforms described above, an increasing number of TSOs are being connected to each of them, improving step by step the efficiency of these markets. 2024 is a key and challenging year in which many TSOs are planning to connect to both the MARI and PICASSO platforms. The adequate planning of necessary tests between platforms and individual TSOs is being performed to ensure seamless integration and to preempt any potential bottlenecks.

In parallel, the implementation of the Capacity Management IT Solution in 2023 supports the platforms' ability to continuously update and provide the availability of interconnection capacity after intraday market to the platforms, which is crucial for the seamless progression of the balancing activation process up to real-time operations. This enhancement factors in additional limits such as profile limits and sharing/exchange capacity agreed cross border limits.

The establishment of the abovementioned platforms and the further connection to them of individual TSOs is facing significant challenges due to: a) the ambitious road map outlined in the EB Regulation; b) associated deep changes from both the regulatory and technical scopes at both European and local TSO levels (for example, several TSOs in Europe are evolving from aFRR pro rata activation towards aFRR merit order activation); and c) the impact of the Ukraine war on balancing projects. Nevertheless, TSOs' high level of cooperation and engagement has underscored the successful implementation and operation of these platforms.

Despite these advancements, challenges persist, particularly evidenced by frequent price incidents, at the PICASSO and MARI platforms. This has particularly been the case at the PICASSO platform due to several reasons including inelastic demand, the continuing low liquidity of the aFRR activation market, BSPs' strategic bidding behaviour (through hockey stick shape bid curves) and limited cross-zonal capacity for the exchange of balancing services. The fact that market clearing with marginal pricing applies for each 4 seconds when a lack of competition arises aggravates the observed price incidents (marginal pricing is not adequate under scenarios of lack of competition) and increases related concerns. Thus, it has become necessary to introduce the price mitigation measures submitted by All TSOs to ACER in February 2024.

In parallel to balancing energy platforms, important regulatory developments took place with the approval in July 2023 of a Methodology for harmonising processes for the allocation of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves in accordance with Article 38(3) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on **electricity balancing and associated Sizing** and **Procurement** RCCs supporting tasks for the sharing of reserves and exchange of reserve initiatives. Since then, several necessary amendments have been developed by All TSOs, focusing on the market-based scheme described in the HCZCAM . Already, go-live sharing/exchange regional initiatives and sharing/exchange reserves such as the Nordic and DE-AT initiatives should be further adapted in accordance with the HCZCAM. A group of 13 TSOs (COBRA-project) is already leading the harmonised set of requirements to develop the harmonised software common for any future harmonised market based regional reserve sharing/exchange initiatives in Europe; these can be used to split in an efficient manner the day ahead available interconnection capacity between reserve markets and day ahead energy markets.

Regarding Imbalance Settlement Harmonisation, all TSOs have adapted their IT systems since January 2022 to this methodology, although the process for migrating towards an imbalance settlement period equal to 15 minutes remains ongoing until 1 January 2025 (maximum derogation date).

Finally, regarding the FSkar methodologies, a review process has taken place for the FSkar methodologies of EB Regulation Article 50(3), 51(1) and (50(4), 51(2) (FSkar Within Synchronous Area Continental Europe and FSkar Between Synchronous Areas). The reviews found that no adjustments were necessary at the current point in time for the FSkar Within Synchronous Areas CE methodology, which was also shared in a report with each concerned national regulator. For the FSkar Between Synchronous Areas methodology, recent market changes required inclusion and were amended in the Methodology.

Introduction

The Commission Regulation (EU) 2017/2195 of 23 November 2017 (from here on referred to as the EB Regulation) lays down the guidelines for creating balancing markets where countries can share their resources to make electricity generation equal to the demand in real time.

The balancing markets will provide access to new players in areas such as demand response, storage elements and integrated renewables, where increased efficiency and competition are key levers required to bring the market forward. The balancing market ensures security of supply, fairness and transparency. Furthermore, it will lead to social welfare gains by limiting emissions and reducing costs for customers. Thus, the final goal of the EB Regulation is the integration of balancing markets and promotion of the possibilities for exchanges of balancing services while contributing to operational security.

The EB Regulation lays down the principles for the exchange of balancing energy and the associated TSO–TSO settlement and TSO-BSP settlement, regarding the following set of products: frequency restoration reserves (FRR) both automatic and manual, Replacement Reserves (RR), Imbalance Netting (IN) and a common methodology for the exchange and sharing of reserves, as well as for the procurement of Frequency Containment Reserve (FCR).

To comply with the obligations derived from the EB Regulation, ENTSO-E has committed to provide a biennial joint balancing report, the **first edition** of which was in 2020. Correspondingly, ENTSO-E has prepared the publication of a third edition for 2024, which is presented here. It will provide the reader with the latest developments in European balancing that have occurred since the publication of the **second version** of the report in June 2022 and also includes developments that took place until May. The performance indicators listed in this report are calculated considering the data available for the period from January to December 2023. Furthermore, each TSO's executive summaries, related to its biennial report, covers the period 2022–2023.

This report describes the design and implementation of balancing markets at pan-European, regional and national levels. The report emphasises cross-border balancing capacity procurement, development and harmonisation of methodologies; balancing energy platforms (regulatory and technical aspects); and the Imbalance Settlement Harmonisation (ISH) process.

The report is divided into the following chapters:

- Chapter 1 describes the main regulatory developments regarding the EB Regulation roadmap, with an emphasis on the cross-border balancing sharing/exchange capacity procurement development, the ISH process, and the implementation of the FSkar process (focused on financial settlement of unintended exchanges).
- Chapter 2 provides an update on the main accomplishments and new accessions to the respective balancing energy platforms TERRE, MARI, PICASSO and IGCC.
- Chapter 3 addresses the on-going development of regional platforms/applications for reserve sharing or the exchange of balancing capacity purposes.
- Chapter 4 provides an overview of the EB performance indicators for natural year 2023.
- Chapter 5 contains the respective executive summaries of the national balancing markets of each TSO, addressing respective regulatory and technical developments in each system related to respective terms and conditions to accomplish EB Regulation.

In addition, a glossary is included at the end of this report for the readers' convenience, as well as the legal references and requirements on which this report is based.

1 Electricity Balancing Regulation

The EB Regulation establishes a set of technical, operational and market rules to govern the functioning of electricity balancing markets, and to integrate balancing energy markets across the European Union (EU). It sets out rules for the procurement of balancing capacity, the allocation of cross-zonal transmission capacity for cross-border trades, the activation of balancing energy, and the financial settlement of balancing responsible parties (BRPs) and BSPs.

This part of the report describes the main achievements regarding the EB Regulation roadmap, with an emphasis on cross-border balancing capacity procurement development, the ISH process, the implementation of the FSkar process (focused on financial settlement of unintended exchanges) and regulatory developments on high balancing energy prices mitigation measures.

1.1 Regulatory developments regarding procurement of balancing capacity and allocation of cross-zonal transmission capacity for cross-border trades

On 16 December 2022, All TSOs submitted the proposal for a HCZCAM for the exchange of balancing capacity or sharing of reserves per timeframe in accordance with Article 38(3) of EB Regulation. This methodology for a harmonised allocation process per timeframe includes the co-optimised allocation process pursuant to Article 40 and the market-based allocation process pursuant to Article 41 of the EB Regulation and consists of cross-border procurement processes taking place day ahead of the provision of the balancing capacity pursuant to Article 6(9) of Regulation (EU) 2019/943. In July 2023, ACER approved the methodology with the request to TSOs to begin an amendment of the HCZCAM with the aim of further specifying some provisions on governance and the assessment of the maximum volume limit for the exchange of balancing capacity. TSOs began work on these amendments immediately after receiving the ACER decision on the methodology and plan to submit the amended documents to ACER in July 2024.

The core of the approved market-based allocation defined in the HCZCAM is a decentralised manner of managing multiple Balancing Capacity (BC) platforms. This means that different regions (e.g. Capacity Calculation Regions [CCRs]) and/or smaller applications inside a CCR (for instance two TSOs who wish to share or exchange capacity) can build their own BC platforms, with, however, one unique blueprint Cross Zonal Capacity Allocation Optimisation Function (CZCAOF) for all BC platforms. Therefore, all TSOs together currently draft the set of business requirements for the CZCAOF harmonised software development (known as blueprint). The implementation of the software is the responsibility of a sub-group of TSOs who have nominated themselves on a voluntary basis to contribute to the development and implementation of the CZCAOF that should determine at D-1 the amount of cross-border (XB) capacity that should be provided for reserve sharing/exchange purposes. In this manner, the CZCAOF blueprint remains the same for all BC platforms in the EU, whereas the operation of BC platforms and specifications of individual BC cooperation remain regional.

In addition, the HCZCAM assigns specific tasks to the RCCs regarding day ahead aggregated bid curves forecast validation for the market-based allocation process. Therefore, the blueprint TSOs are in alignment with RCCs to coordinate work on the implementation of the HCZCAM, especially to clarify the RCCs' tasks (Day-ahead Market [DAM] forecast validation, market efficiency analysis and transparency publications) and to support them in implementing these tasks, where necessary.

1.2 Regulatory developments regarding Imbalance Settlement Harmonisation

In July 2020, ACER decided on the ISH methodology, EB Regulation Article 52(2), which aims to further specify and harmonise imbalance settlement rules. The ISH methodology was to be implemented nationally at the latest by January 2022, with an option of further derogation.

The ISH methodology harmonises the number of additional price components each TSO may apply in its imbalance price calculation and harmonises the number of conditions for the application of dual imbalance pricing. Furthermore, the ISH establishes a 15-minute Imbalance Settlement Period (ISP) for which BRPs' imbalances must be calculated, in accordance with Article 53 of the EB Regulation. The ISH also sets the minimum time interval for Nominated Electricity Market Operators (NEMOs), by which they shall provide market participants with the opportunity to trade in energy, for both day-ahead and intraday markets. The 15-minute ISP is either already implemented within 3 years of the EB Regulation's entry into force (January 2021), subject to derogation (at the latest until 1 January 2025), or subject to an exemption for the whole of a synchronous Area (SA) in which case the ISP shall be 30 minutes (at the latest by 1 January 2025). The status of implementation of the 15-minute ISP and of choices regarding the ISH Methodology is displayed in Table 1 – BRP T&Cs.

After the implementation of this methodology, each connecting TSO applying a self-dispatching model shall calculate, in each imbalance area for each ISP, one single final position for each BRP, as equal to the sum of a scheduling unit's external and internal commercial trade schedules. Each connecting TSO applying a central dispatching model shall calculate, in each imbalance area for each ISP, one single final position for each scheduling unit of each BRP, equal to the sum of this scheduling unit's external and internal commercial trade schedules of each scheduling unit (under Article 54(3) (c) of the EB Regulation).

The state, progress and limitations of ISH are visible in the evolution of the Terms and Conditions (T&C) for BRPs. These should include, among other information, the following content:

Option	Status
Was the 15-minute ISP implemented by 1 January 2024?	Implemented: 13 | Derogated: 8 | Exemption: 3
Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2024?	Yes: 17 | No: 7
Has your TSO made use of dual pricing as of 1 January 2024?	Yes: 6 | No: 18

Table 1 – BRP T&Cs

1.3 Regional implementation of the FSkar process

A first review report performed by CE TSOs with regards to the review of the FSkar methodologies (financial settlement of FCR support, unintended deviations and ramping among systems) was finalised in May 2023, in accordance with EB Regulation Article 50(3) and Article 51(1). The report showed that at this stage no adjustments to the methodology for FSkar within a SA was necessary, which followed the report being sent to relevant National Regulatory Authorities (NRAs) for information.

Similar to the FSkar Within SA CE review, an FSkar between SAs review was conducted by the asynchronously connected TSOs, in accordance with EB Regulation Article 50(4) and Article 51(2). The review was triggered by a review mechanism in the methodologies. The review report described and analysed the methodologies since go-live in 2020 and finally concluded that no major changes or further harmonisation of the methodologies would be possible for now.

During the review process, asynchronously connected TSOs found that recent market changes needed to be included in the methodologies. Therefore, the asynchronously connected TSOs amended the following in the methodologies[1]: inclusion of the settlement rules for the High-Voltage Direct Current (HVDC) interconnector owned by TenneT DE and Statnett SF in annex 10 and changes to the annexes following the introduction of single imbalance pricing as part of the Nordic imbalance settlement. Finally, asynchronously connected TSOs also corrected the spelling and punctuation mistakes in the methodologies. After the review, all documents were shared with the concerned NRAs for the final approval. The **approval** of all concerned NRAs was received on 23 January 2024.

1 See **here** and **here**.

1.4 Regulatory developments regarding high prices mitigation measures

The European energy landscape has taken a significant step forward with the integration of balancing energy markets, facilitated by European balancing energy platforms. This integration promotes a cost-effective system operation, which in turn enhances social welfare across Europe.

In 2022, two European balancing energy platforms, PICASSO and MARI, were launched. They play a crucial role in the cross-border activation of FRR with aFRR and mFRR activation. These initiatives complement existing cross-border collaborations for balancing capacity, TERRE and imbalance netting (IN), contributing to increased social welfare. Alongside TERRE and the International Grid Control Cooperation (IGCC/IN Platform), PICASSO and MARI are integral to realising a European integrated market for balancing energy. With the increasing participation of European TSOs planned for 2024, the European balancing energy platforms will establish unified principles and harmonised methodologies, ensuring the efficient functioning of domestic balancing energy markets across Europe. The successful go-live of MARI and PICASSO in 2022 is a testament to the fruitful collaboration among TSOs, promising a significant increase of economic surplus in the years to come.

Together with the successful go-live and operation of European balancing platform monitoring activities on balancing energy market developments were launched. The integration of balancing energy markets via the European balancing energy platforms may lead to additional competition but this is not guaranteed as Cross-Zonal Capacity (CZC) is not available by default for the exchange of balancing energy. Sufficient competition is essential for an efficiently functioning market. In isolated local balancing energy markets, BSPs face little competition and have the potential to exercise market power. Therefore, the European balancing energy platforms may be a more effective means to mitigate local market power in the short term than the entry of a few/small BSPs in one country as they allow for increased competition in the balancing energy market between BSPs in different countries if sufficient CZC is available in real time for balancing purposes. The exercise of market power may lead to strategic bidding, meaning economic withholding, which involves bidding in prices higher than the marginal cost expected under perfect market conditions and finally leads to inefficient market outcomes. As emphasised by All TSOs in the Electricity Balancing Stakeholder Group (EBSG) 2023 meetings, a significant share of balancing energy bids was submitted, with bid prices higher than 50 % of the

transitional price limit (e.g. more than 10 % of the submitted bids for positive aFRR energy exceeded 7,500 €/MWh over a period of several months). In addition, stakeholders have acknowledged that BSPs consider strategic aspects, e.g. the possibility of a congestion, in their bids. Consequently, the risk of high prices for balancing energy exists but rarely materialises compared to the number of quarter hours considered.

The evaluation of the submitted balancing energy bids to the markets integrated via the European balancing energy platforms shows a significant number of bids not related to the level of wholesale energy prices (or a low ratio of them), as presented by All TSOs to Stakeholders during the EBSG meeting on 25 May 2023. This is further underlined by the 'ACER report on the progress of EU electricity wholesale market integration' published in November 2023, which stated that on average, prices in the day-ahead and intraday timeframes correlate the best (0.97), followed by prices in the intraday and balancing timeframes (0.84). The correlation between prices in the day-ahead and balancing timeframes was found to be the lowest (0.83). ACER states in their report that the numbers are justified by the fact that in theory, market prices in day-ahead and intraday timeframes share the same main driver: economic efficiency, whereby security of supply is a strong fundamental in the balancing timeframe. From All TSOs' perspective, it is at least questionable whether such a de-coupling of fundamental spot-market prices and balancing energy bids is justified, where bidding close to marginal costs should take place across all markets and thus also in the balancing energy market according to the fundamentals of the applied market design established through EB Regulation. As ACER acknowledges fundamental differences regarding the drivers of prices at day-ahead and intraday markets and balancing energy markets, All TSOs consider that these fundamental differences also need to be acknowledged by market design aspects.

Due to the above-mentioned developments and observations on balancing energy markets integrated via the European balancing energy platforms, All TSOs identified that amendments to the regulatory framework are needed for the efficient functioning of the market. Therefore, All TSOs considered it necessary to propose amendments of the **Pricing Methodology** and the **Implementation Framework** (IF) for the European platform for the exchange of balancing energy from aFRR (aFRR IF), namely:

- the introduction of permanent maximum and minimum prices for balancing energy below the level of the current technical price limit for balancing energy;
- reduction of currently valid transitional price limits for balancing energy;
- introduction of elastic TSO demand for the activation of aFRR balancing energy via PICASSO platform to be applied on voluntary basis; and
- adaption of determination of aFRR Cross-Border Marginal Price (CBMP).

The measures address possible inefficiencies across the three fundamental pillars of price formation: demand side (voluntary price elastic aFRR demand), supply side (maximum and minimum prices for balancing energy), and price determination (aFRR CBMP better reflecting aFRR activated).

Specific provisions on amendments of maximum and minimum prices for balancing energy

The necessity of harmonised maximum and minimum prices for balancing energy also results from the fact that the balancing energy market is not subject to the same free price formation as is the case in the day-ahead and intraday market. In a wholesale market, energy providers and consumers can determine the quantity and prices they are willing to pay. This is not the case in the balancing energy market. While providers can set the quantity and price of the energy they are willing to offer, there is – at least for most TSOs' a/mFRR demands – no price sensitivity on the demand side as TSOs balance the system at any costs, i.e. TSOs are required to take whatever amount is necessary to restore system balance (Inelastic demand side). The amount required is determined by an external variable, namely the sum of feed-in and withdrawal of the system's energy.

With the massive development of intermittent Renewable Energy Sources (RES), All TSOs expect an increase in needs for balancing reserves, although real experience shows that this effect can be reduced through short-term market access for market participants, netting of imbalances, the improvement of renewable forecasting and enabling renewables to provide balancing services. This may imply capturing more flexibility in the balancing energy market and investing to develop more liquidity. The level of harmonised maximum and minimum prices for balancing energy that would still allow this is unknown at this stage. In any case, there is no valid reason why harmonised maximum and minimum prices for balancing energy should be higher than the Value of Lost Load (VoLL), for which a value of 15,000 €/MWh was considered by ENTSO-E as a base case for the former European resource adequacy assessment. Considering the challenge to determine a unique, stable reference value for the VoLL that would be relevant for all European balancing energy markets, the value of 15,000 €/MWh may have to be adjusted in future. Therefore, All TSOs committed to develop and propose for approval an alternative adjustment mechanism applicable

from ±15,000 €/MWh as a starting point after the transitory price limit expires. This will allow All TSOs to thoroughly develop an appropriate adjustment mechanism considering the special conditions at balancing markets and discuss these with relevant stakeholders.

Specific provisions on amendments for the determination of the aFRR CBMP

The determination of the CBMP for positive (negative) energy by the aFRR Platform is currently set by the highest (lowest) price of all aFRR bids selected by the aFRR platform Activation Optimisation Function (AOF) in the same un-congested area. As the aFRR bids selected by the aFRR platform AOF are only used as input of the frequency restoration controller within each Load-Frequency Control (LFC) area, this leads to situations where the CBMP does not reflect the price of the bids that are locally activated. In such a case the CBMP is a theoretical value, not corresponding to the value (nor the bid price) of the balancing energy activated. The operational experience with aFRR platform operation and the reports established in accordance with the first amendment of the Pricing Methodology show high activations costs and a significant number of aFRR price incidents (meaning that the aFRR CBMP exceeds the threshold of 7,500 €/MWh). The observed price incidents mostly occur only for a small time ≤ 1 min.

Due to the distortive effect of these price peaks on the balancing energy markets, a short-term solution to reduce these price peaks is seen as beneficial, considering that mentioned price spikes often correspond to a CBMP that does not reflect the value of the activated aFRR balancing energy bids. Under the current conditions, the aFRR CBMP can be determined by a bid that is not even considered for activation by a local frequency restoration controller. The occurrence of aFRR-related price incidents of short duration can be reduced by considering the local set-points for automatic FRR activation within the determination of the CBMP. This allows the CBMP to better reflect the locally activated aFRR balancing energy bids and will reduce overall activations costs and price incidents.

Specific provisions on amendments for the voluntary price elastic aFRR demand

When drafting the IFs for aFRR and mFRR, All TSOs requested to use the possibility offered by Article 29(13) of EB Regulation to allow each TSO to access all bids in the Common Merit Order List (CMOL), subject to sufficient CZC available on the borders. Such a full access to CMOL has several advantages, such as the maximisation of netting opportunities and the possibility for TSOs to access additional FRR liquidity and thereby improve their Frequency Restoration Control Error (FRCE) and frequency quality, but nothing in the legislation imposes the requirement on TSOs to keep improving at any cost their FRCE above the agreed threshold. This is, however, what happens with the current design of the aFRR balancing energy platform, where all aFRR demand will be satisfied 'at any price' regardless of its volume and of the obligations of the TSO resulting from the reserve dimensioning. This design may lead to the activation of extremely expensive bids, including in situations where such activation is not needed to ensure an acceptable frequency quality, resulting (directly or indirectly) in unnecessarily high costs for the consumer. It is to avoid this situation in the future that All TSOs propose to introduce the concept of voluntary (price) elastic aFRR demand.

2 Procurement and Activation of Balancing Energy

The main achievements of this reporting period are the accession of:

- The Austrian TSO APG (June 2023) connected to the mFRR platform, joining the German TSOs and ČEPS;
- Italian TSO Terna successfully joining PICASSO on 19 July 2023[2]; and
- Baltic TSOs (Litgrid, AST and Elering) becoming full members of IGCC and PICASSO in Q1/2024.

Several TSOs must join the MARI and PICASSO platforms in the upcoming years. Detailed information regarding this integration can be accessed through the respective accession roadmaps.

In general, TSOs have made significant strides in leveraging standard products, either by connecting to various balancing energy platforms or by pre-emptively aligning their local market designs with upcoming connections. This proactive approach underscores notable progress in enhancing operational and interconnectivity across the region.

2.1 RR Platform (led by TERRE Project)

The TERRE project is the European implementation project for exchanging replacement reserves in line with **EB Regulation** (Article 19). The EB Regulation which entered into force on 18 December 2017 provides the technical and operational framework and defines the market rules for governing the functioning of balancing markets. It sets out rules for the procurement of balancing capacity and for the allocation of cross-zonal transmission capacity for cross-border trades, for the activation of balancing energy and the financial settlement of BSPs.

Main events and achievements

A major decision was taken by TERRE TSOs at beginning of Q2 2024: 96 clearings will not be implemented in the TERRE platform, although it is legally mandatory to implement this change (RR IF article 11.5, EBGL article 53(1) and article 24.2(b) and Reg. (EU) 2019/943 article 8). This decision was taken after numerous exchanges with RR NRAs and because of the Electricity Market Design Reform, which was approved also in Q2 2024. In brief, this reform forces the Intraday Gate Closure Time to be set to 30 minutes before the time of delivery, which is not compatible with any RR process.

In this context, TERRE TSOs assessed it was not efficient to make important changes to implement 96 clearings as the project is forced to end in 2026, when the EMDR will come into force. The RR platform will continue to operate with 24 clearings until end 2025; at this moment the TERRE platform will aim to stop all operations. This information was shared to stakeholders during a public stakeholder workshop on 17 May[3].

In this context, TSOs will gradually disconnect from the platform as follows:

- PSE plans not to connect to the TERRE platform;
- CEPS will disconnect in July 2024;
- Terna will disconnect in Q1 2025; and
- Red Electrica, REN, RTE and Swissgrid will stay connected until end of operations expected at end 2025.

On the operational stream, the year 2023 was marked, as last year, by numerous exchanges between TSOs in Region 1 (comprising Red Eléctrica, REN, RTE, Swissgrid and Terna).

The LIBRA platform has proven to be a robust and reliable IT solution: only one price incident occurred in the platform due to an unlikely configuration of the market on 30 July and four critical incidents due to technical issues. The TERRE platform hosted offers reaching 309,498 MWh in total for the whole year 2023 (monthly offered volumes per direction and per TSO see Figure 1).

2 The **PICASSO project took note** of the resolution n° 60/2024/R/EEL of the Italian NRA published on 1 March 2024 regarding the operational participation of the Italian TSO (TERNA) in the PICASSO platform. Based on the formulated request, TERNA suspended their participation of the PICASSO optimisation platform at 15 March 2024, 09:00 (UTC+1). TERNA remains part of the project and the platform is ready for the renewed operational participation of Terna at any time.

3 More information on the webpage of the **TERRE Project Online Stakeholder Workshop**

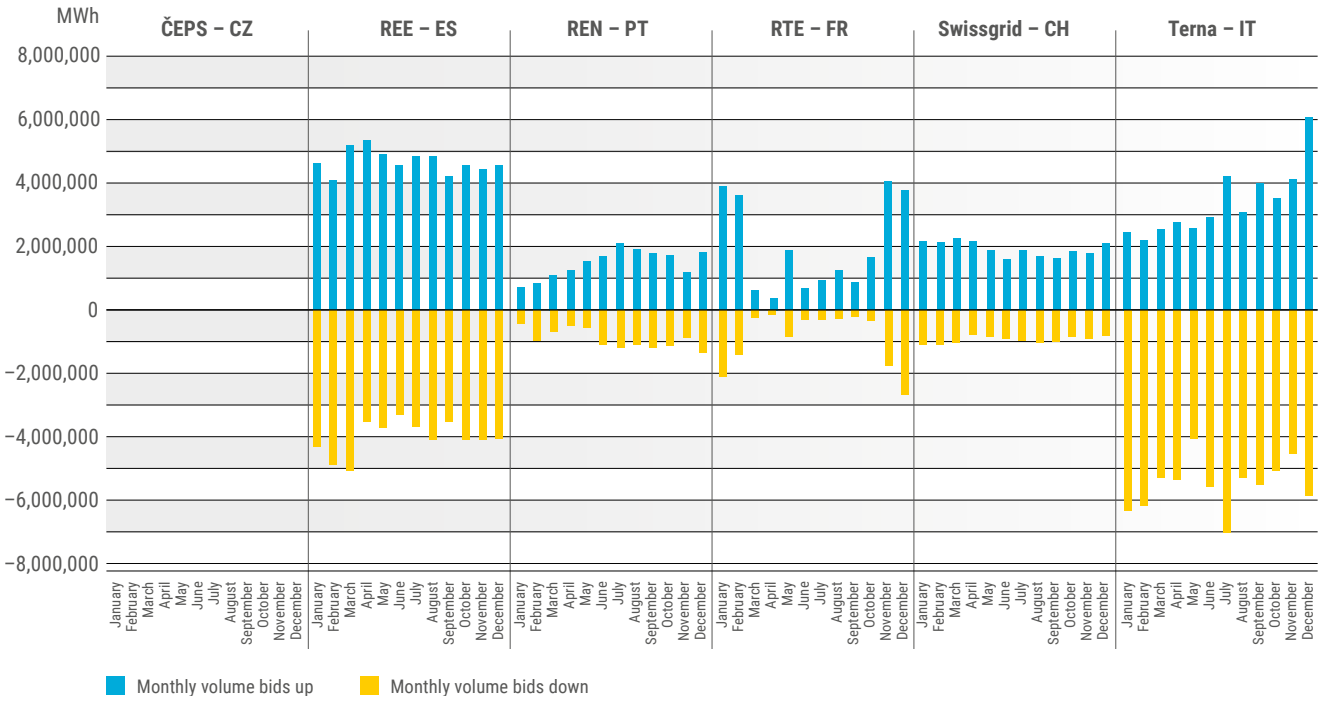


Figure 1 – Monthly offered volumes of submitted bids per TSO in 2023 (MWh)

All these offers aim to fit and satisfy TSOs' up and down needs. On average, TSOs needs are satisfied more than 91 % of the time as in normal operations, offers provided by BSPs are much more numerous than TSOs needs. In 2023, 7,116,530 MWh of needs were satisfied by the platform (monthly activation volumes per direction and per TSO see Figure 2); The highest volume of activations occurred in the Spanish system.

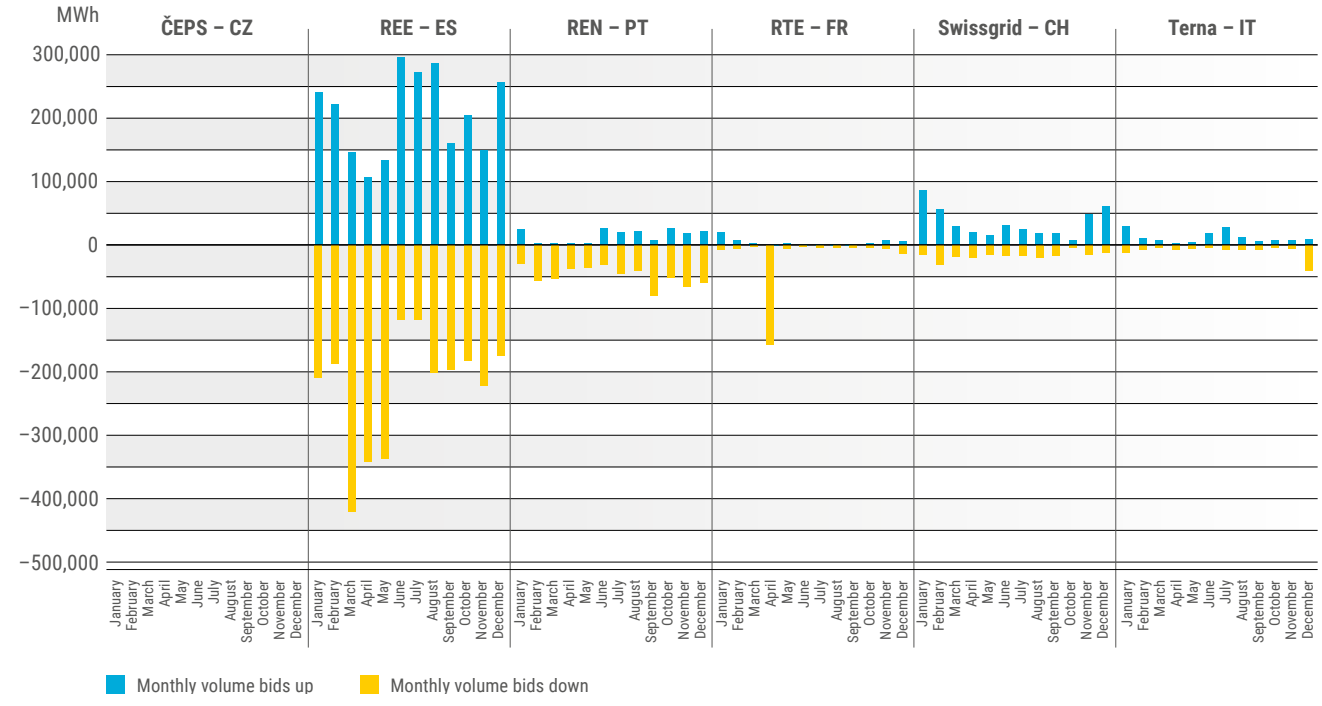


Figure 2 – Monthly volumes of selected bids per TSO in 2023 (MWh)

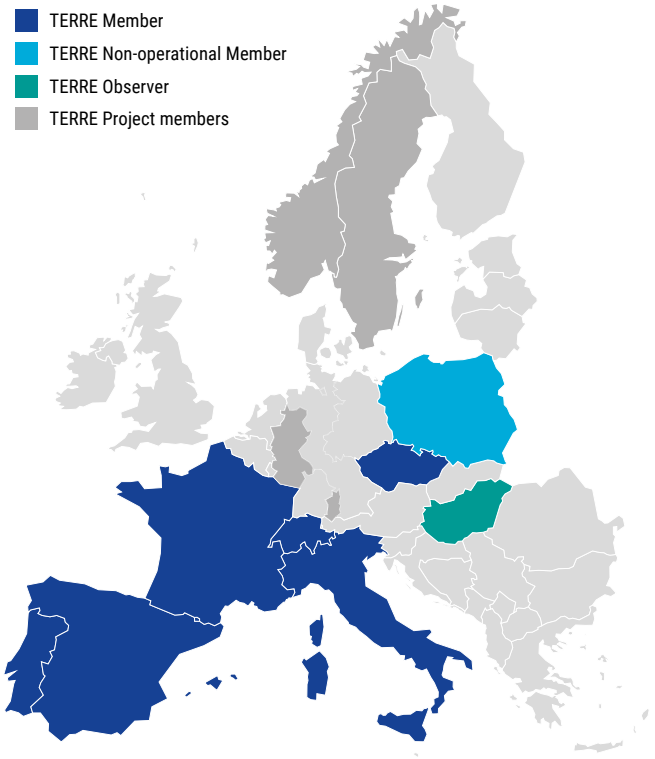
During the previous year, the LIBRA platform allowed some significative financial savings due to all RR exchanges being registered between TERRE TSOs. The global amount of the economic surplus generated by these exchanges is estimated at around € 280,000,000. Further information on the high-level architecture of the platform can be found in the **Market Report 2020**, page 18–21.

Governance of RR Platform

The TERRE project comprises seven TSO members, namely ČEPS, PSE, Red Eléctrica, REN, RTE, Swissgrid, Terna and one Observer: MAVIR.

The RR platform (TERRE) has been operational since January 2020. Since then, six TSOs have connected to the platform (ČEPS, Red Eléctrica, REN, RTE, Terna and Swissgrid). In April 2021, the TSO National Grid ESO (Great Britain) gave notice to the TERRE Steering Committee (TSC) of their desire to exit the TERRE project as part of the decision on Brexit and in line with the provision included in the Cooperation Agreement. After the settlement of all operational, financial and legal terms including contractual framework, the National Grid ESO officially exited the TERRE project in December 2022 through an official decision from the project's Steering Committee (SC).

In addition, three TSOs are TERRE project members: Amprion, Statnett and Svenskä Kraftnät. The term 'project member' was intentionally distinguished from TERRE members. Project members joined the TERRE project for the sole purpose of participating in the development operation and management of the IT solution (LIBRA software) and obtaining the intellectual property rights of the IT solution in order to make use of and continue to develop it as part of a regional project in the case of the Nordics TSO, or as part of the MARI project.



TERRE Members (7 TSOs)	
Czech Republic	ČEPS, a.s.
France	RTE Réseau de transport d'électricité
Italy	Terna
Poland	PSE
Portugal	REN
Spain	RED ELÉCTRICA CORPORACIÓN
Switzerland	swissgrid
TERRE Observers (2 TSOs + ENTSO-E)	
Hungary	MAVIR
ENTSO-E	entsoe
Project Members (3 TSOs)	
Germany	amprion
Norway	Statnett
Sweden	SVENSKA KRAFTNÄT

Figure 3 – RR platform: TSOs part of the TERRE project (as of January 2024)

The TERRE project is governed by the TSC, the decision-making body of the project. The Chairmanship of the project is assumed by each TSO in turn, followed by a 6-month rotation. More information about the governance structure is available in the Market Report 2023.

Evolution: Accession and Project Timelines

Recent and upcoming significant milestones of the TERRE project can be summarised as follows:

- **PSE connection:** PSE plans not to connect to the TERRE platform regarding the context of the project.
- **MSM reports generation:** TERRE members worked to simplify the creation of Market Supervision Module (MSM) reports and improve the reporting to be compliant with Article 15 of the RR IF, following its second amendment approved in August 2023. MSM reports are now publicly available and published on the ENTSO-E website towards the end of Q1 2024.
- **RR process & number of clearings:** In the course of May and June 2023, a public survey was conducted to gather feedback from market parties on the preferred options for the future design of the RR process. Indeed, compliant with the legal framework, an increase in the number of clearings in the RR process will have to be evaluated. Following this public survey, TERRE TSOs organised several meetings with RR NRAs to share the main results of the public survey, TSOs constraints and selected solution for the future RR process.
- **Improvement of the Affected TSO procedure:** Design and implementation of the Affected TSO procedure (red button functionality) aligned with MARI and PICASSO projects.
- **CM IT solution implementation for TERRE:** The TERRE platform is now connected to the Capacity Management IT tool (CM IT). After successful tests performed in course of 2023, it was connected to the first version of the tool in October 2023. After another testing session, the platform was connected to the second version of CM IT in Q2 2024.
- **Second RR IF amendment:** The second amendment of the RR IF was officially approved by all RR TSOs and NRAs on 8 August 2023.
- **End of the TERRE project:** all information is given in the previous section.
-

TERRE Expenditures

The annual expenditures on establishing, amending, and operating the RR platform from 2018 to 2023 are shown in Figure 4.

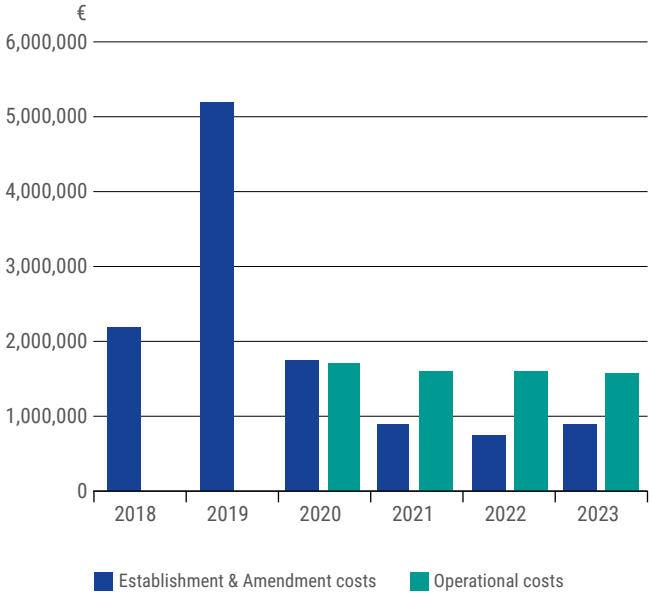


Figure 4 – Overview of costs for establishing and operating the RR platform (EUR)

2.2 mFRR Platform (led by MARI Project)

The Manually Activated Reserves Initiative (MARI) is the European implementation project for the creation of the European mFRR platform. On 5 October 2022, the platform was brought successfully into operation with the accession of the four German TSOs and ČEPS.

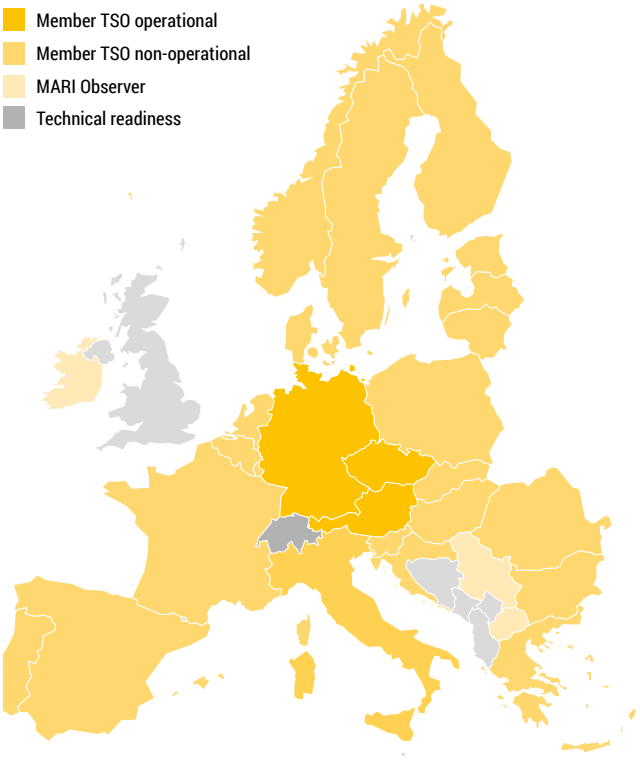
Main events and achievements

During the time period May 2023 to May 2024, the following main goals have been achieved in the scope of the MARI project:

- The Austrian TSO APG (June 2023) connected to the mFRR platform, joining the German TSOs and ČEPS;
- Design, development, testing and deployment regarding two mFRR platform releases with improved and new functionalities (versions 5 & 6);
- EU tender identifying the suppliers to support the further development, maintenance and support of the mFRR platform from 2024 onwards; and
- The balancing energy platforms stakeholder's workshop, held on 30 November 2023, informing stakeholders of the evolution of the platform and gathering feedback for future developments.

Governance of mFRR platform

MARI consists of 29 member TSOs and five observers, including ENTSO-E. There are currently six TSOs connected to the mFRR platform. 50Hertz, Amprion, ČEPS, Tennet Germany, and TransnetBW connected on 5 October 2022, and APG connected on 20 June 2023



All MARI member TSOs (countries) are:

APG (AT)	Elia (BE)	Swissgrid (CH)	ČEPS (CZ)
50Hertz, TenneT DE, Amprion, TransnetBW (DE)	Energinet (DK)	Elering (EE)	IPTO (GR)
RE (ES)	Fingrid (FI)	RTE (FR)	AST (LV)
HOPS (HR)	MAVIR ZRt. (HU)	Terna (IT)	REN (PT)
Litgrid (LT)	Statnett (NO)	TenneT NL (NL)	ELES (SI)
PSE S.A. (PL)	Transelectrica (RO)	SvK (SE)	SEPS (SK)
ESO (BG)	Creos Luxembourg (LU)		

In addition, the following TSOs (countries) are observers: Eirgrid (IE), SONI (NI), MEPSO (MKD) and EMS (SRB). ENTSO-E is also an observer.

Figure 5 – Map of MARI Members

The structure of governance of the MARI project is specified in the mFRR IF, Article 14. The mFRR platform project has a two-level governance structure: an SC and expert groups. The SC has at least one representative from each TSO. As of May 2024, there are five active Working Groups (WGs); IT WG, TSO Testing WG, Technical WG, Legal WG[4] and Capacity Management IT solution WG. The WGs report directly to the SC. In addition to the WGs, there is also an Operational Committee (OC) which serves the main purpose of dealing with the day-to-day operational decisions related to MARI. In the SC and WGs, all TSOs have the right to vote, while in the OC the right to vote is reserved for the TSO participating on the platform[5]. In addition to the WGs and the OC, there are joint task forces with PICASSO and TERRE.

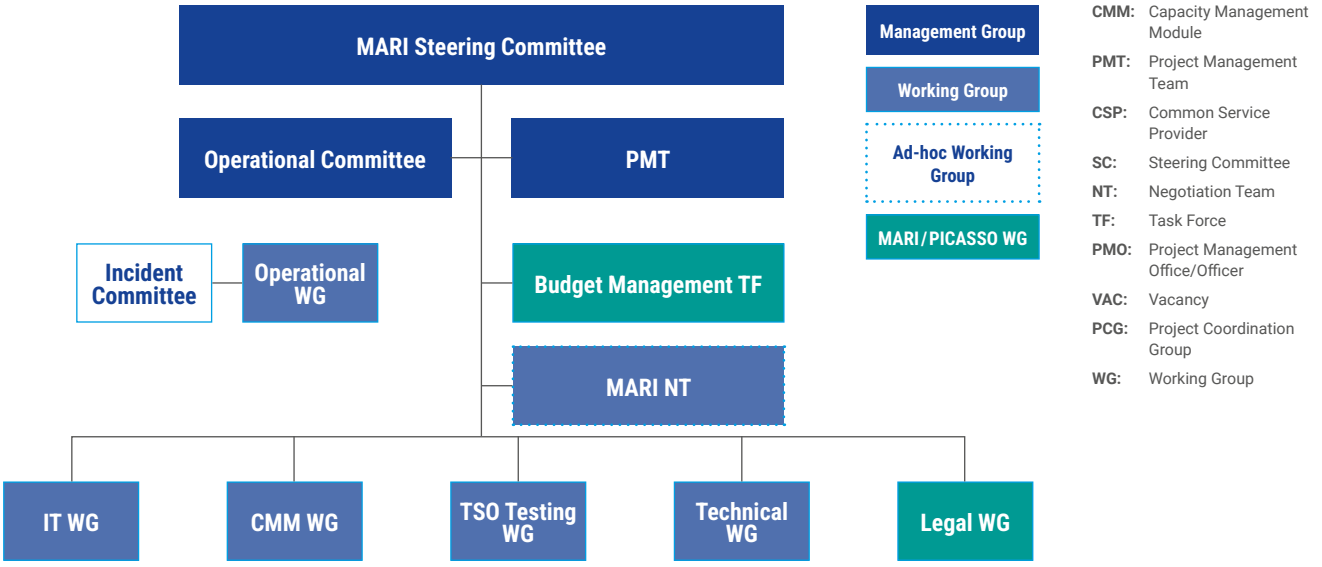
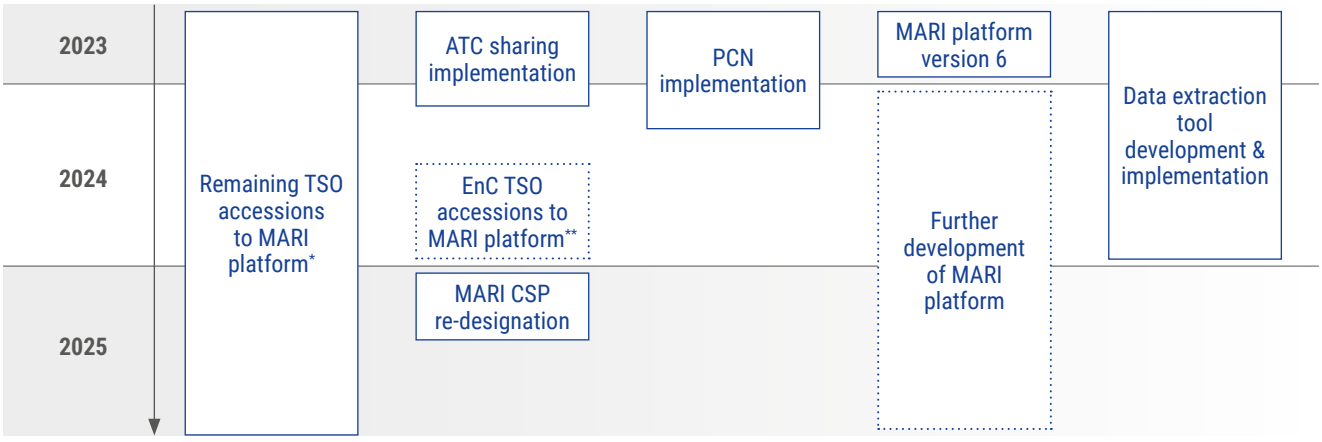


Figure 6 – MARI governance structure

Evolution: Accession and project timelines

As imposed by the IF article 5, an accession roadmap is established for the implementation of the mFRR platform which is updated at least twice per year, normally in April and October. The latest version of the accession roadmap can be found on the MARI webpage on the ENTSO-E website under Publications. As shown on the April 2024 accession roadmap, several TSOs are planning to connect during the second half of 2024. The main steps within the MARI project for the years 2023 to 2025 is described in Figure 7.



* See accession roadmap on next slide for further details.
** The accession date of EnC TSOs by end of 2024 is based on publicly available information, balancing platforms are aware of the possible derogation times and consider a later accession as likely. Further information on the next steps regarding EnC TSOs involvement is provided on slide 20.

Figure 7 – Project timeline for MARI

4 Legal WG is shared with PICASSO.

5 Participating TSOs means TSOs connected to the MARI mFRR platform or that will connect within the next 6 months.

Expenditures

Development activities continued at a high level in 2023, keeping the development costs close to the 2022 level. The implementation costs for 2023 were € 5.7 million with an accumulated establishment cost of € 23.6 million. 2023 was the second year with recurring costs in MARI, 2022 being the year of technical and market go-live (15 September and 5 October). The cost for operations were € 1.4 million.

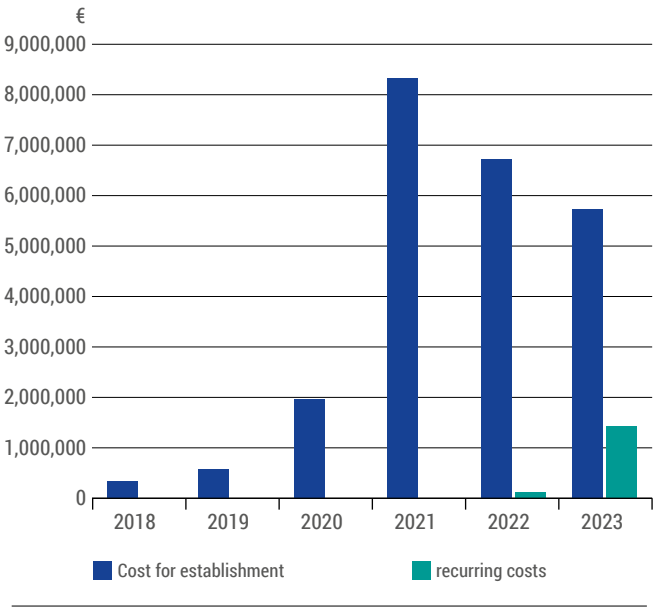


Figure 8 – Costs for establishment and operations of the MARI platform

2.3 aFRR Platform (led by the PICASSO Project)

The PICASSO project is leading the design and implementation of the aFRR platform, which comprises 26 TSO members and 4 TSO observers. Since 2017, the PICASSO project has been responsible for TSOs implementing the aFRR European platform. On 1 June 2022, the platform was brought successfully into operation (according to the EB Regulation, 24 July 2022 was the legal deadline to implement and make the platform operational). After connecting to the platform, all TSOs will use the aFRR platform to submit all standard aFRR balancing energy bids, exchange all aFRR balancing energy bids and strive to fulfil all their corresponding balancing energy needs.

Main events and achievements

In former reporting periods, go-live preparations and the go-live itself on 1 June 2022 were the focus of the project group. Due to ČEPS accession on the go-live date and the subsequent accession of APG and the four German TSOs, on 22 June 2022, these TSOs were the first with a national market for balancing energy from aFRR in operation and that are connected to PICASSO in accordance with the EB Regulation. For the current reporting period between June 2023 and May 2024, the focus is on further accession to the platform, e.g. go-live of Terna on 19 July 2023 and scheduled several following go-lives in 2024. In addition the three Baltic TSOs (LitGrid, AST and Elering) joined PICASSO as full members in Q1/2024.

Furthermore, the following points can be highlighted:

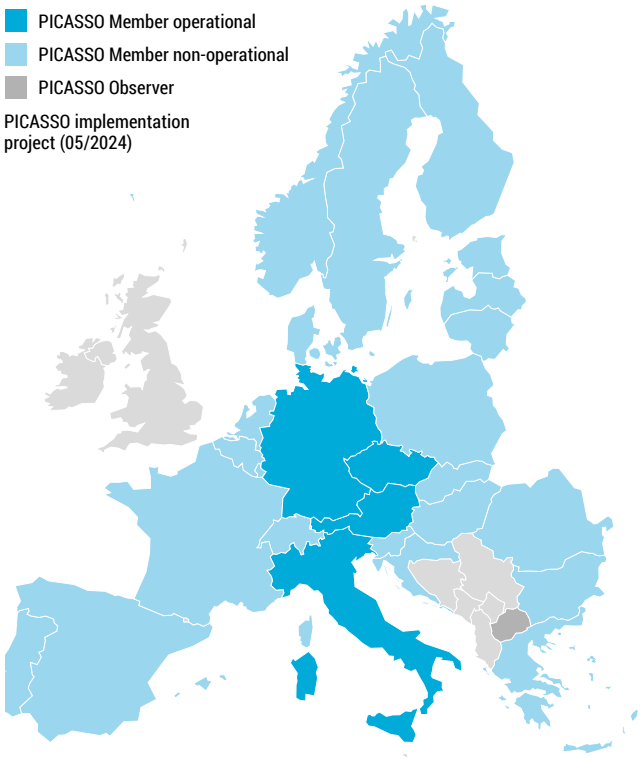
- Creation and revision of main documents such as the aFRR Implementation Guide;
- Update of the mathematical description;
- Design, implementation and testing for 'access to operation & settlement data';
- Creation and revision of the 'PICASSO Key Performance Indicator (KPI) report';
- Security approach and business impact analysis inside the 'IT Security plan' for PICASSO; and
- Development of an 'Annual Working Program' for stakeholders.

In addition, several operational topics were tackled:

- Update of the Operational Handbook;
- High prices in PICASSO (see Chapter 1.4);
- Full Access to CMOL; and
- HVDC topics: Start to include inter-SA HVDC lines in PICASSO AOF.

Governance of the PICASSO platform

The PICASSO project leads the development of the aFRR platform in close coordination with other implementation projects via ENTSO-E and the IGCC project (see subsection 2.4 of this report).



All PICASSO member TSOs (countries) are:

APG (AT)	Elia (BE)	ESO (BG)	Swissgrid (CH)
ČEPS (CZ)	50Hertz, TenneT DE, Amprion, TransnetBW (DE)	Energinet (DK)	Elering (EE)
RE (ES)	Fingrid (FI)	RTE (FR)	IPTO (GR)
MAVIR ZRt. (HU)	HOPS (HR)	Terna (IT)	Litgrid (LT)
Creos Luxembourg (LU)	AST (LV)	TenneT NL (NL)	Statnett (NO)
PSE S.A. (PL)	REN (PT)	Transelectrica (RO)	SvK (SE)
ELES (SI)	SEPS (SK)		

In addition, the following TSO (country) is an observer: MEPSO (MKD). ENTSO-E is also an observer.

Figure 9 – PICASSO Platform: Members and Observers

Further information on the governance and the high-level design can be found in previous reports such as in the **ENTSO-E Market Report 2021** (Chapter 6.1.4.2 for high-level design of the platform) or **Balancing Report 2022** (Chapter 3.1.2 for governance structure).

PICASSO Evolution: Implementation Timeline and TSOs' Accession Roadmap

According to the aFRR implementation framework, the TSOs must develop and update the platform's implementation timeline (Table 5). The accession of new PICASSO TSO members to the aFRR platform is planned in accordance with the accession roadmap. Further detailed information can be found in the latest accession roadmap developed by TSOs that are members of the aFRR platform. This accession roadmap is updated at least twice a year to provide stakeholders with current information on the developments. The latest version of the accession roadmap can be found on the **PICASSO webpage** on the ENTSO-E website under 'Press releases and updates'.

Compared to the last report, the Italian TSO TERNA joined PICASSO on 19 July 2023 successfully. For 2024 several accessions are expected; the details can be found in Table 5.

PICASSO expenditures

The annual expenditures on establishing, amending and operating the aFRR platform from 2018 to 2023 are shown in Figure 10. The 'Costs for establishing and amending' include general project costs (such as project management costs for the Project Management Office (PMO), convenors and secretary; costs for the development of the algorithm (including developing, software and hardware costs); third party costs (e.g. for the invoicing process); and finally other common costs (such as change requests). The 'Costs for operating' the platform include IT costs (such as Hardware hosting, Algorithm hosting and IT Monitoring) and other common costs (such as customer support).

From 2021 to 2022, the general project costs remained nearly constant. The significant increase of costs for 2022 can be explained by the fact that in this year, the costs for the development of the IT and algorithm were included as well as (in comparison minor) costs for third parties and other common costs in the values. In particular, the IT development costs can be seen as one-time costs in 2022, so establishing and amending costs sharply declined for 2023 and were on a similar level as before. Cost for operating in 2023 increased marginally as one TSO acceded to the platform (Terna) in 2023: with more TSOs operating PICASSO, the operating costs will also increase (not necessarily in a linear manner).

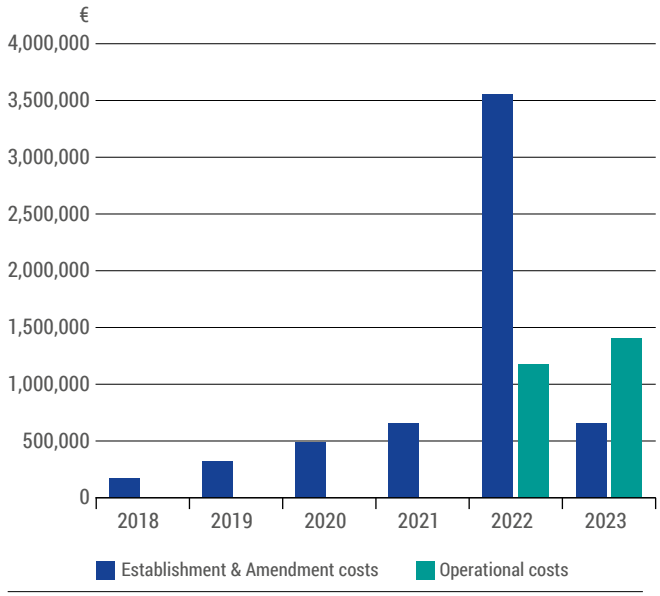


Figure 10 – Overview of costs for establishing and operating the aFRR platform[6]

6 Since the platform went 2022 into operation, there are no operating costs for the years before.

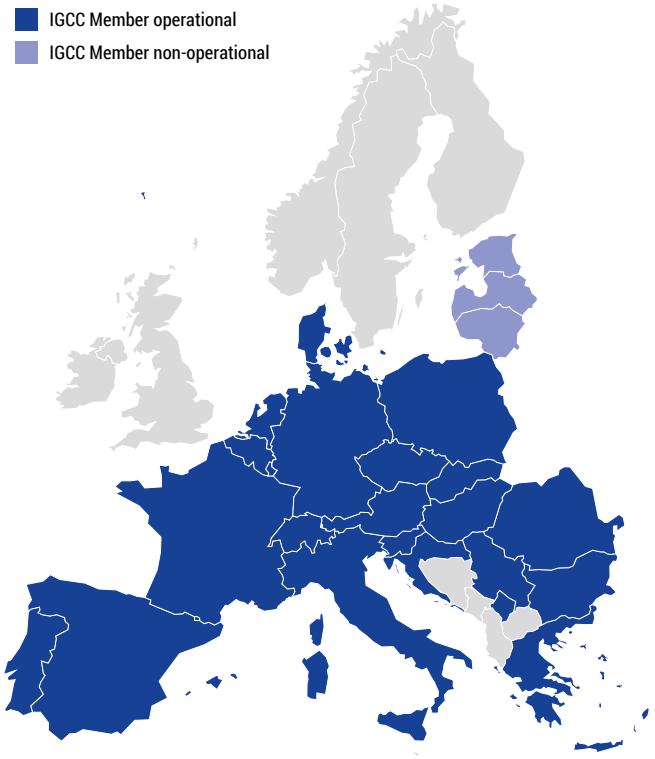
2.4 IN Platform (led by the IGCC Project)

The IGCC is the implementation project chosen by ENTSO-E in February 2016 to become the European Platform for the imbalance netting process (IN-Platform) as defined by EB Regulation Article 22 and established in the IN IF.

IGCC was launched in October 2010 as a regional project and has grown to cover 28 countries and all TSOs that need to implement the IN-Platform according to the EB Regulation.

IGCC Governance

The design and implementation of the IN platform is led by the IGCC implementation project, which counts 31 TSO members and observers[7]. The three Baltic TSOs (LitGrid, AST and Elering) joined the IN platform as full members in Q1/2024.



All IGCC member TSOs (countries) are:

APG (AT)	Elia (BE)	ESO (BG)	Swissgrid (CH)
ČEPS (CZ)	50Hertz, TenneT DE, Amprion, TransnetBW (DE)	Energinet (DK)	ADMIE (EL)
RE (ES)	RTE (FR)	HOPS (HR)	MAVIR ZRt. (HU)
Terna (IT)	Creos Luxembourg (LU)	TenneT NL (NL)	PSE (PL)
REN (PT)	Transelectrica (RO)	ELES (SI)	SEPS (SK)
EMS (SRB)	AST (LV)	Elering (EE)	Litgrid (LT)

In addition, ENTSO-E is also an observer.

Figure 11 – IN platform: TSO members of the IGCC implementation project

7 23 TSOs are operational members: 50Hertz, Amprion, APG, ČEPS, HOPS, Elia, Energinet, ELES, EMS, ESO, IPTO, MAVIR, PSE, REE, REN, RTE, SEPS, Swissgrid, TenneT NL, Transelectrica, TransnetBW, TenneT DE and Terna; 4 TSOs are non-operational member: Creos, LitGrid, AST and Elering; and ENTSO-E serves as observer.

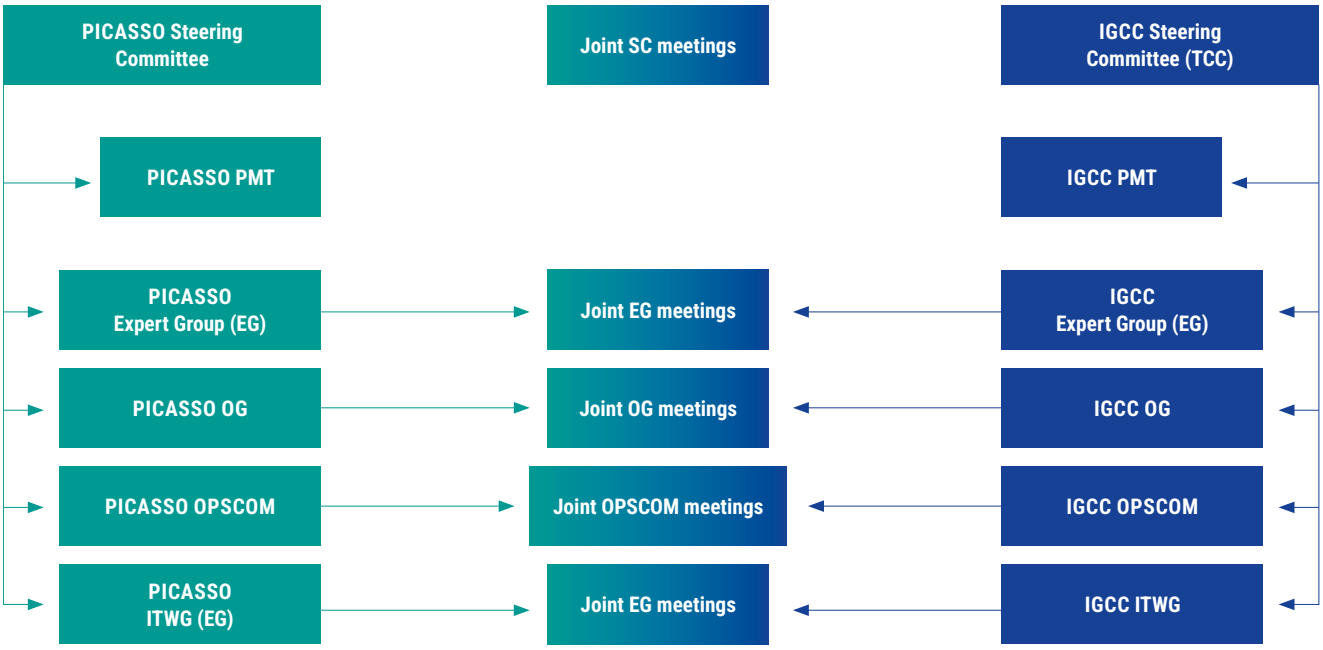


Figure 12 – PICASSO and IGCC governance structure

Since Q1 2022, PICASSO and IGCC projects have a common project management and meeting organisation to capitalise on the numerous similarities of both projects. Governance structures and decisions processes remain separated. Further information on the high-level design of the IN-platform can be found in the ENTSO-E Balancing Report 2020, page 29.

IGCC Evolution: Performance indicators on Monetary saving due to imbalance netting

The increase in the participation of TSOs in the imbalance netting process has enabled energy savings to reach the record of more than 1.25 TWh in November 2023, corresponding to a value of monthly savings of nearly € 60 million. Not only does this have a positive effect on the more efficient energy usage, but the additionally available aFRR capacity leads to an increase of the security of the European electricity transmission system.

The quarterly evolution of volumes and financial savings on the netted imbalances are depicted in Figure 13.

The cumulative savings generated through international cooperation by the IGCC since the start of the project in October 2011 up until Dec 2023 have surpassed € 2 billion. The data related to the IN-platform have been published on the Transparency Platform since June 2021. The reports on imbalance netting volumes are published on a dedicated site at ENTSO-E .

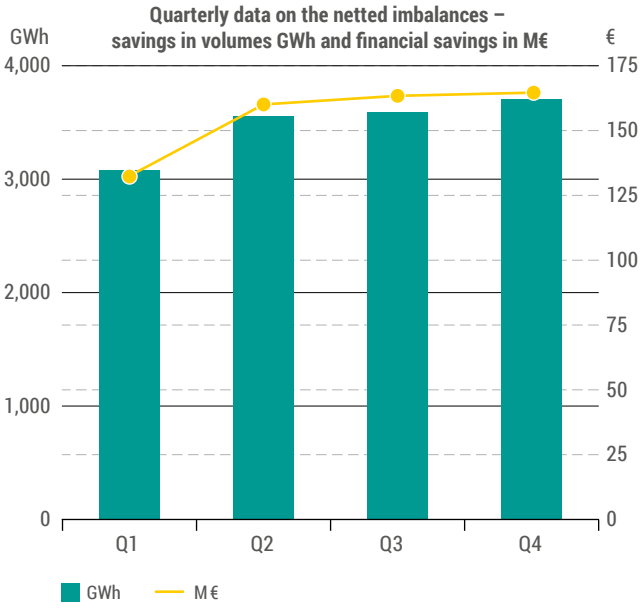


Figure 13 – IN Platform quarterly savings in volumes GWh and financial savings in Euro

IGCC Evolution: TSOs Accession Roadmap

Baltic TSOs (Litgrid, AST and Elering) became full members in Q1/2024.

IGCC Expenditures

The annual expenditures on establishing, amending, and operating the IN platform from 2018 to 2023 are shown in Figure 14.

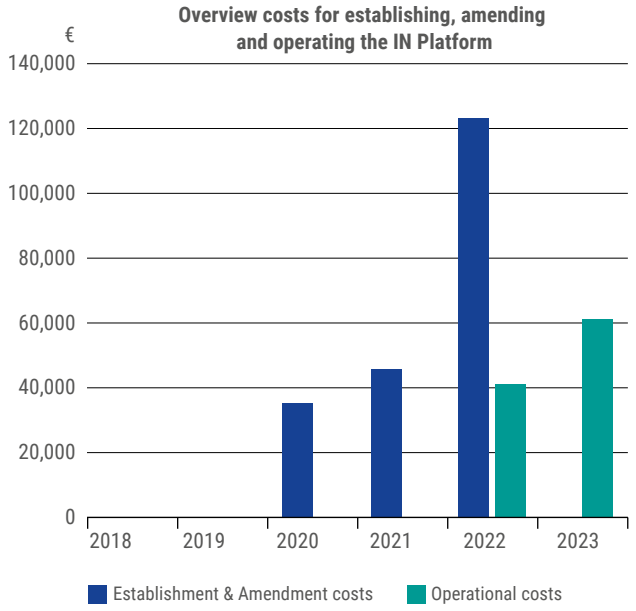
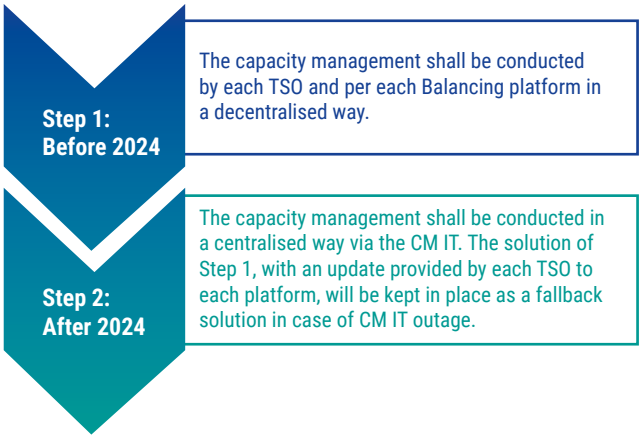


Figure 14 – Overview costs for establishing, amending and operating the IGCC platform

2.5 Capacity Management in Real Time (CM IT solution)

All the European balancing energy platforms must be provided in real time with the available cross-zonal capacity limits (CZCL) to optimise the cross-border activation of balancing energy. It is the responsibility of the TSOs of the respective border to provide and manage the capacities while respecting the operational security limits. TSOs have agreed to implement a centralised approach to capacity management via a dedicated IT tool that would allow TSOs to provide, manage and amend the CZCLs for all balancing energy platforms.

Figure 15 – Capacity Management approach



Through the year 2022, TSOs were developing the Capacity Management IT tool with the aim to test and go live with the so-called minimum viable solution by the end of 2023. As of 24 November 2023, the minimum viable solution is operational. Through 2024, the TSOs are focusing on the go-live of the full scope of the IT solution, as well as on the continuous accession of the TSOs to CM IT. The following figure represents the high-level design of the CM IT tool:

- Each TSO sends the information about the CZC calculated for the intra-day timeframe and the information about the already allocated capacity during the previous timeframes (long-term, day-ahead, intraday) for the relevant borders;
- Each TSO in a balancing capacity cooperation, or a dedicated TSO per balancing capacity cooperation, sends the information per border about the already allocated capacity for exchange of balancing energy in relation with the exchange or sharing of balancing capacity;
- In addition, each TSO may submit additional limits to the available capacity (in the form of CZCL max or net position limits), according to operational conditions;
- The CM IT tool determines the CZCLs after intraday for each border and sends the information on the relevant borders to the RR platform;

- The CM IT tool receives the optimised flows on the borders from the RR platform and determines the CZCL to be sent to the mFRR platform on the relevant borders;
- The CM IT tool receives optimised flows on the borders from the mFRR platform and determines the CZCL after each mFRR AOF run (either direct or scheduled);
- The CM IT forwards the CZCL on the relevant borders to the aFRR and IN platforms. As the same IT system is used for the aFRR and IN platforms, the CM IT sends the data for both platforms at the same time. The updates between aFRR and IN processes are managed by the PICASSO/IGCC platforms;
- At any point in time, the TSOs can update their operational situation data (for example, in the case of an application of the affected TSO procedure[8]); and
- The CM IT tool stores all the data related to capacity management.

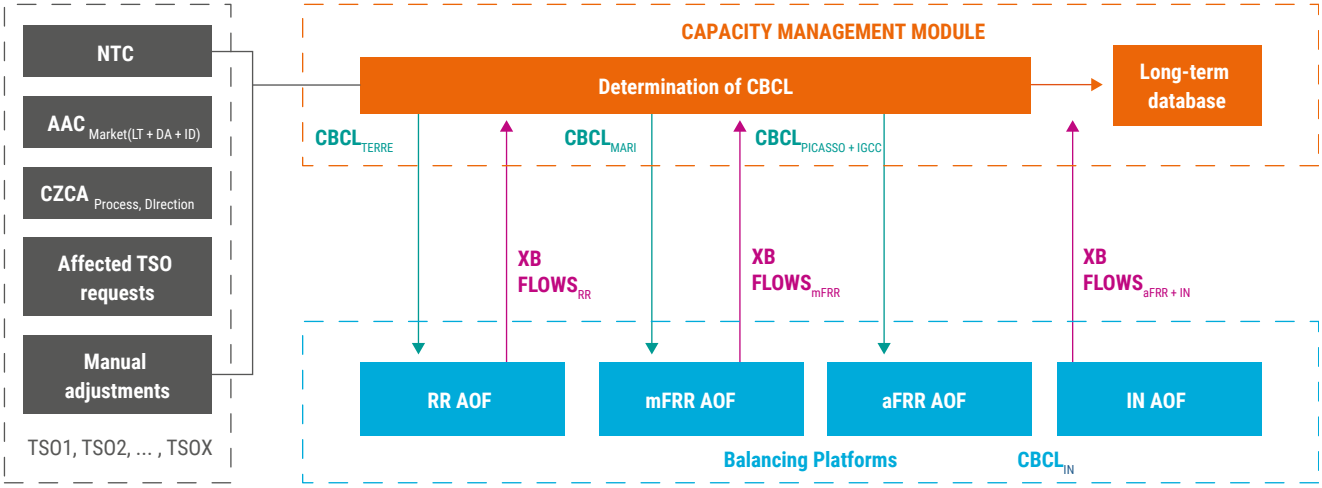


Figure 16 – CM IT tool high level design

8 The input data that can be updated at any time is the one provided by each TSO for their borders (NTC, AAC (Already Allocated Capacity), CZCA, CZCL, NPL (net position limit), etc.). Furthermore, the affected TSO procedure enables a TSO to establish limitations to the available capacity on a border to which is not directly connected.

3 Reserve Platforms Development

This section provides an overview of the existing sharing/exchange reserve platforms in Europe which are operating on a voluntary basis.

3.1 Nordic aFRR Market

The Nordic aFRR Capacity Market is a common market between the four Nordic TSOs: Statnett, Svenska kraftnät, Fingrid and Energinet. The market was launched in December 2022 and consists of the bidding zones (BZs) NO1, NO2, NO3, NO4, NO5, SE1, SE2, SE3, SE4, FI and DK2. The purpose of the aFRR CM is to utilise capacity resources across the Nordic bidding-zones, to improve overall Nordic socioeconomic welfare and ensure security of supply by sharing capacity across borders.

The Nordic TSOs have in general experienced a well-functioning market, where it has been possible to always transfer capacity from high-liquidity areas to low-liquidity areas. In addition, we have seen that the increased competition across the Nordic area has impacted the volume of the bids submitted to the aFRR capacity markets. At the same time, the average price across all BZs has gone down and price volatility has decreased, as indicated in Figure 16. Thus, in addition to the commonly realised benefits, the market integration itself has affected the competition and thereby reduced the price differences of the offered capacity between the bidding areas.

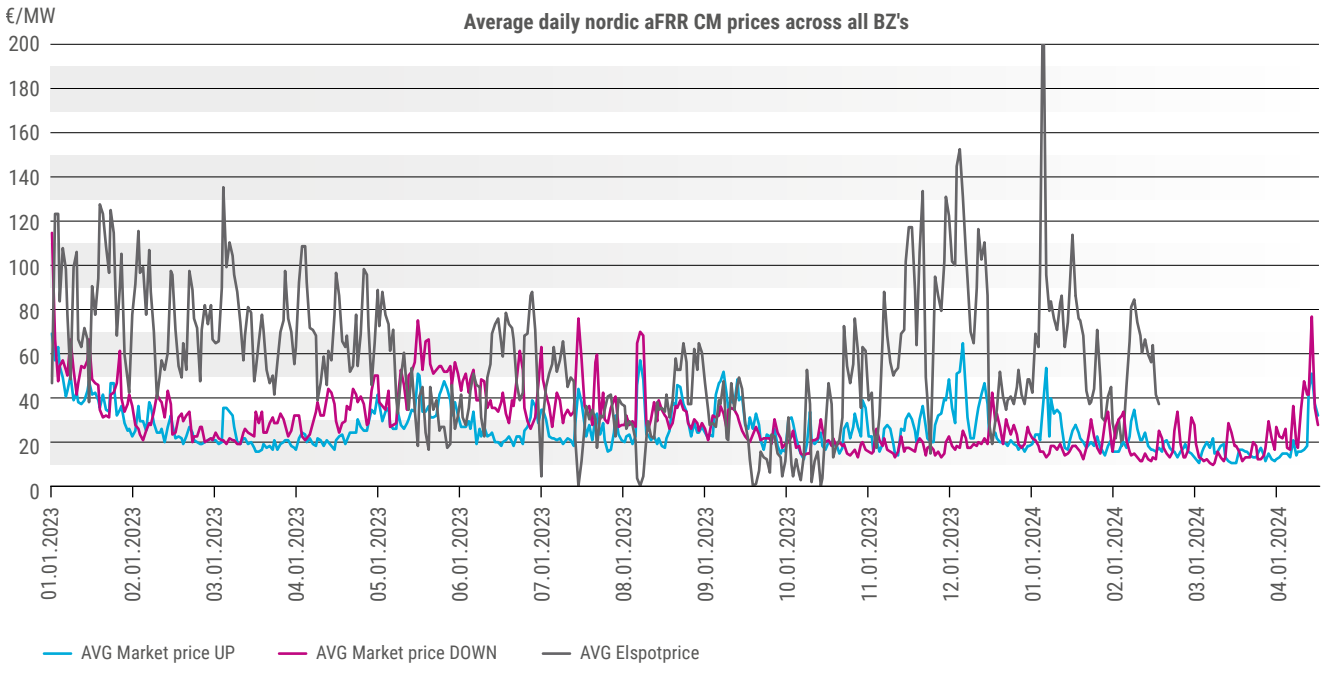


Figure 17 – Average daily Nordic aFRR CM Prices before/after go-live

Total Economic Surplus of the Nordic aFRR CM

The Nordic aFRR CM has experienced a positive surplus of app. € 46.9 million, while the possibility of exchanging aFRR between price areas in the Nordics has affected the Single Day Ahead Coupling (SDAC) by reducing the available transfer capacity and, consequently, had a negative economic effect on the SDAC market for 2023 of app. € 18.1 million. This has had a positive total socioeconomic surplus of € 28.7 million. The graph below shows daily socioeconomic impact on both markets and a total (the sum of the two).

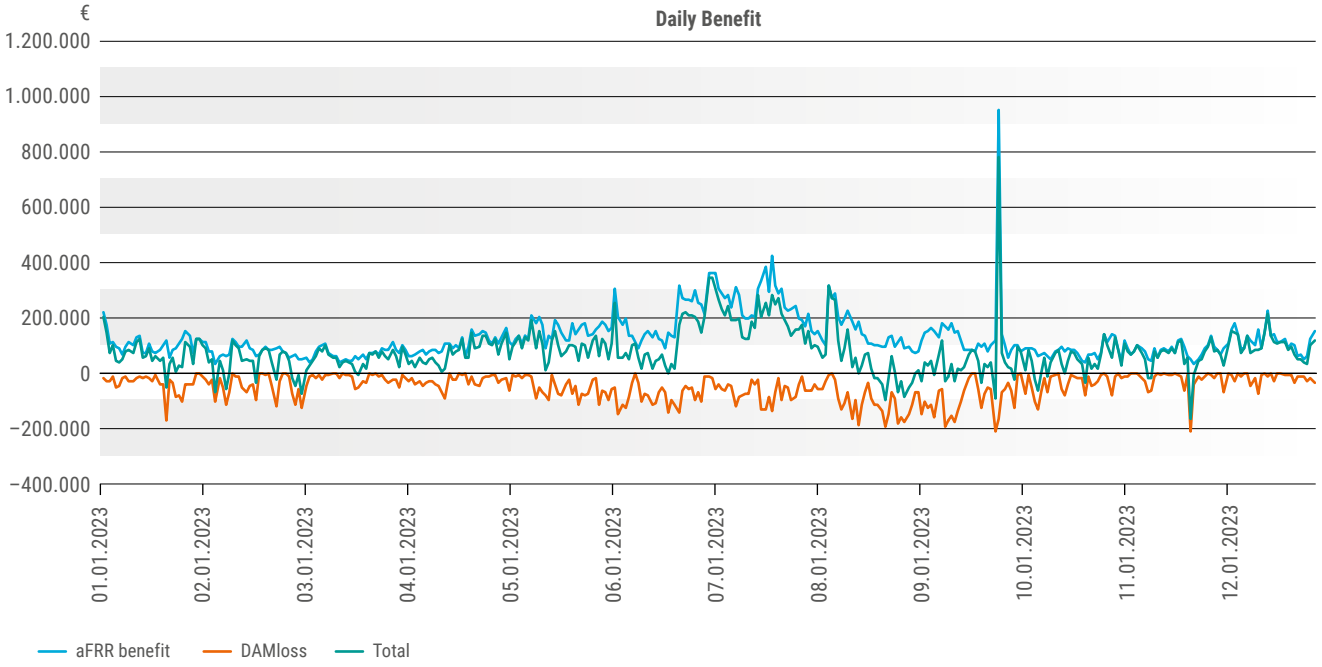


Figure 18 – Total economic surplus (million €). Excl.SE4 procurement benefit

The table below summarises the total economic surplus results.

	SDAC surplus	aFRR surplus	Total surplus	Avg. daily surplus
All bidding zones	−18,153,469	391,476,853	373,323,384	1,022,804
Excl. SE4* cons.surplus	−18,153,469	46,895,664	28,742,195	78,746

*Due to very high-priced bids in SE4, the consumer surplus becomes very high when calculating the total economic surplus (surplus is calculated for isolated bidding zones vs. Common capacity market). As these benefits in SE4 account for an extremely large amount of the total benefits, the Nordics have chosen to separate the benefits in two for transparency reasons. This is also because these bids were also there and not activated before the common Nordic aFRR capacity market.

Table 2 – Economic surplus summary (€)

Perfect Foresight vs. Nordic forecasting method

The Nordic TSOs also did an analysis with perfect foresight (realised DAM values) compared to the forecasted DAM values. The table below summarises the economic surplus results comparing the two methodologies. The results show that the surplus from the aFRR market is more or less unchanged, but that the calculated loss in SDAC is €1.69m lower by using the perfect foresight method than the D-1 original method. The Nordic TSOs believe this highlights that the reference day method of forecasting the DAM prices is in general well-functioning.

	SDAC surplus	aFRR surplus	Total surplus	Avg. daily surplus
Original (isolated bz) excl.SE4	−18,153,469	46,895,664	28,742,195	78,746
Perfect Foresight (isolated bz) excl. SE4	−16,464,058	46,861,185	30,397,127	83,278
Total	1,689,411		−1,654,932	

Table 3 – Economic surplus original vs perfect foresight (€)

More information

The Nordic TSOs publish a yearly report analysing the performance of the aFRR CM. This report not only expands on the points highlighted here but also delves into various other facets of the market.

3.2 German–Austrian aFRR Balancing Capacity Cooperation + future ALPACA cooperation

The cooperation known as 'DE–AT–BCC' was created end of 2017 with the intention to allocate not more than 80 MW of CZC for the exchange of aFRR between Germany and Austria. German TSOs and Austrian TSO APG want to extend the current cooperation to other TSOs (including Czech TSO ČEPS) for the common procurement of aFRR BC through a BC platform called the 'Allocation of CZC and Procurement of aFRR Cooperation Agreement' (ALPACA). The initial interest concerned the application of the CORE market-based methodology as a basis. However, since it is no longer possible to apply the implementation of the CORE-market-based allocation method, ALPACA is pursuing the application of the probabilistic method in accordance with Article 33(6) EB Regulation.

Market Development in 2023

The cooperation has defined a maximum of 80 MW for the allocation of CZC. As already stated in the Market Report 2020, the optimisation will be performed on both a monthly and weekly basis. The result of the monthly optimisation will be considered in the monthly capacity auction by the Joint Allocation Office (JAO) for the upcoming month. The result of the weekly optimisation will be limited by the monthly result which it re-evaluates. In the event that the result of the weekly optimisation is smaller than the monthly result, the difference will be returned to the energy market. The monthly and weekly optimisation uses the same methodology, but the weekly optimisation is based on more recent data. The result of the weekly optimisation is used as a limit for the common procurement optimisation.

Furthermore, six TSOs (ČEPS, APG and German TSOs) have formed ALPACA, with TenneT NL, MAVIR, ELES and HOPS observing the progress. Within ALPACA, the TSOs intend to commonly procure aFRR BC, by the application of the probabilistic methodology according to Art. 33 (6) EB Regulation. This cooperation will complement the ongoing AT–DE aFRR BCC which firmly allocates CZC for the exchange of balancing capacity between Germany and Austria, which will remain after the go-live of ALPACA.

In 2023, the ALPACA cooperation drafted and publicly consulted on the methodologies according to Art. 33(1), 33(6) and 58(3) EB Regulation. The methodologies have been submitted for approval to local NRAs at the end of 2023. The intention of the ALPACA TSOs is to implement the methodologies in 2024 and to start the common procurement in 2025.

The application of the probabilistic methodology is an intermediate step and will most likely result in an application of the harmonised market-based allocation process proposed in All TSOs methodology submitted pursuant to Article 38(3) of EB Regulation. ALPACA TSOs intend to apply this methodology and are therefore supporting the amendment of CORE methodologies (day ahead/intraday capacity calculation methodology, congestion income distribution methodology, regional operation security coordination methodology) and processes as well as the definition of a blueprint of the harmonised market-based allocation process as part of the COBRA project.

Evaluation of the Benefits

German and Austrian TSOs have commonly procured aFRR balancing capacity since February 2020. The reduction in procurement costs, which we saw in previous years, was also reached in 2023. The total balancing capacity costs of the cooperation was € 571 million (€ 533 million for Germany and € 38 million for Austria) in 2023, while the costs without cooperation would have been € 595.6 million.

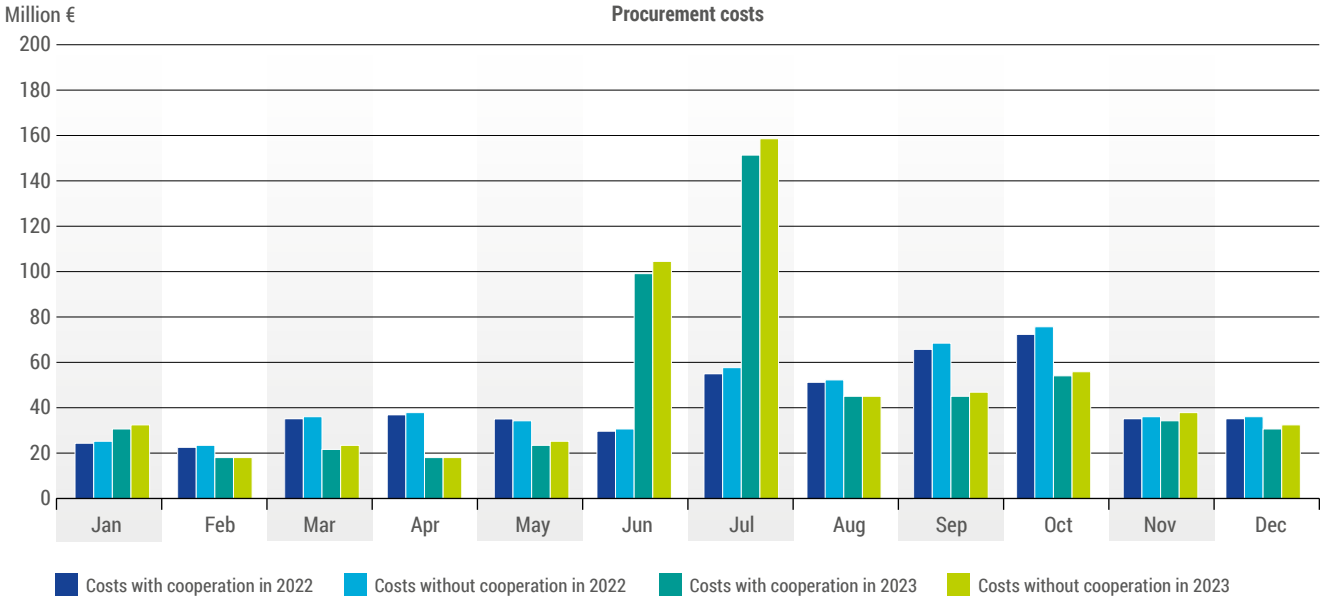


Figure 19 – Comparison of procurement cost with and without the aFRR cooperation

Figure 20 shows the savings per month due to the cooperation in comparison to 2022.

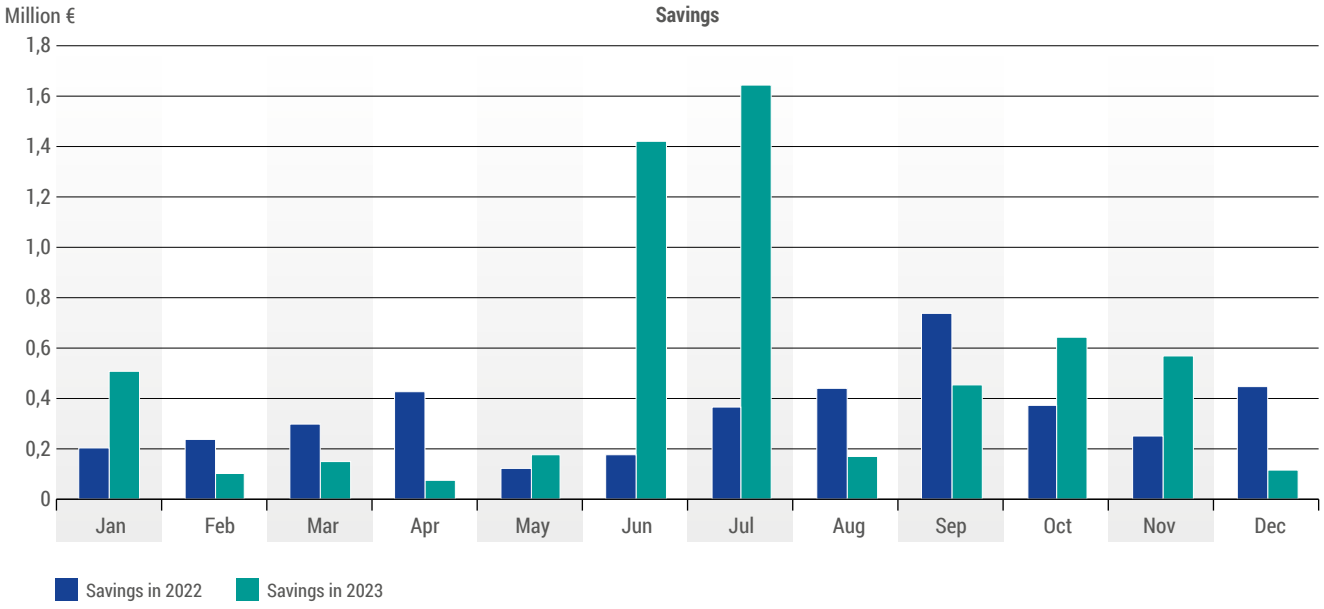


Figure 20 – Savings of the aFRR cooperation

3.3 FCR Cooperation

In accordance with the objectives of the EB regulation, the FCR cooperation, a voluntary common market for procurement and exchange of FCR capacities, currently involves 12 TSOs from 9 countries. The main principles, governance and decision-making process did not change in 2023. A detailed overview can be found in the ENTSO-E **Balancing Report 2020** (page 31) and **Market Report 2021** (pages 101–108).

Market development

MAVIR (the Hungarian TSO) and SEPS (the Slovak TSO) have joined the FCR Cooperation as observing members. TSOs can become an observing member of the FCR Cooperation to learn more about the common procurement of FCR in the Cooperation.

Extreme market event Netherlands, 2 November

On 1 November, a bid with an extremely high price (77,777 €/MW/4h) was selected in the Dutch FCR market for the time of 16:00 to 20:00 on 2 November. The outcomes of auction followed normal procedures; the selection of the bid was primarily due to the unavailability of other FCR providers (scheduled maintenance or outages).

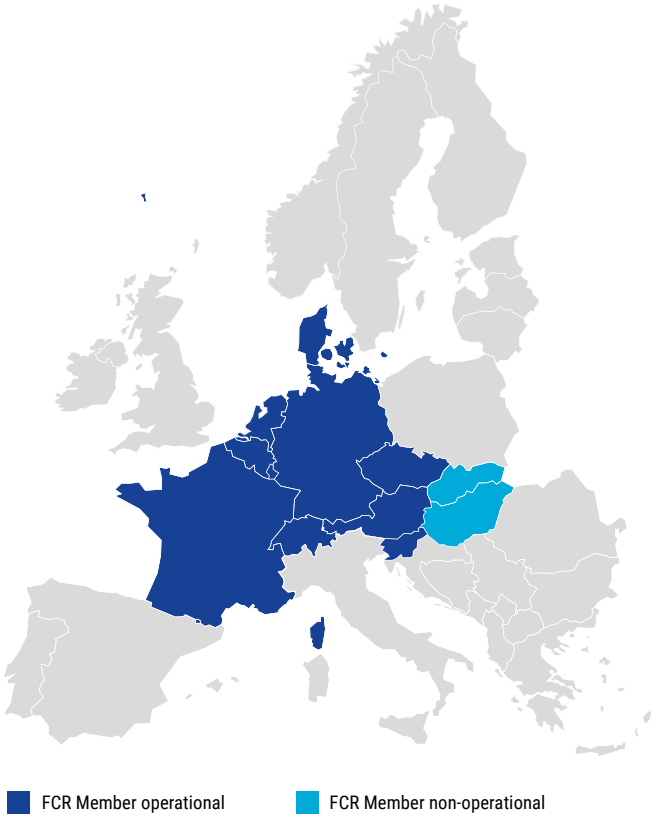


Figure 21 – The FCR Cooperation countries, with Hungary and Slovakia (MAVIR and SEPS are observing members of the FCR Cooperation).

Evolution of the FCR prices in 2023

The analysis of the evolution of the annual prices for FCR procured by the FCR Cooperation shows a significant decrease of the prices between 2017 and 2020, except for Belgium and the Netherlands, where the transition to marginal pricing seems to have broken the downward trend over the past years. The overall downward trend until 2020 can be linked to the accession of new entrants in the market, associated with increased competition due to the exchange of FCR capacities.

The evolution of the market design (for example, auctions in D-2/D-1, marginal pricing) also contributed to the improvement of conditions for new market participants. However, in 2021 the prices rose, explicable by the overall high energy prices in Europe. For 2022, the price increase has overall significantly slowed down or even decreased in the case of Germany. In the case of Denmark, the price rose in 2022 due to low competition on the FCR market between May and September but decreased to a normal high afterwards. For 2023, FCR prices decreased for all TSO back to a similar level like end 2020 / beginning 2021.

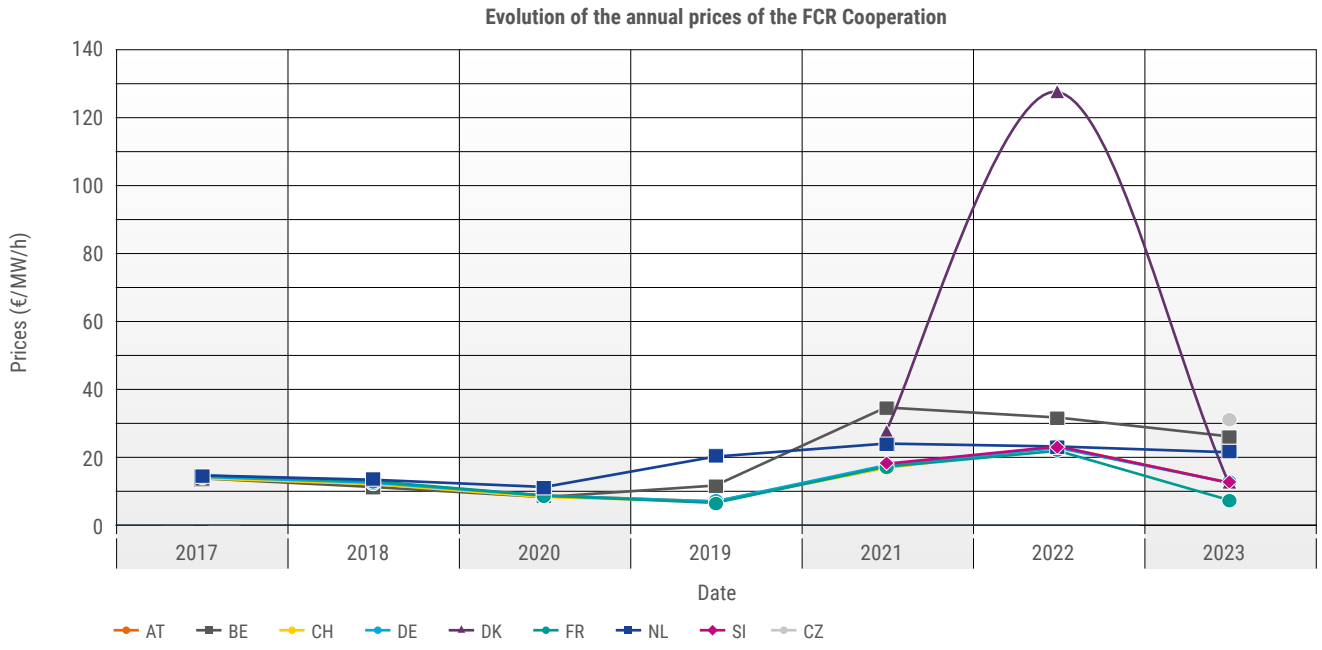


Figure 22 – Evolution of the annual prices of FCR Cooperation[9]

Note: As the prices in Austria, Switzerland, Germany, France and Slovenia are very close to each other or even the same, it is not always possible to distinguish the corresponding lines on this graph.

Figure 22 shows the monthly prices for each country of the FCR cooperation for 2023, and the level of convergence of prices. The price converges when the Locational Marginal Price (LMP) is equal to the CBMP. This is usually the case when no constraints are hit (e.g. import or export limit) which could influence the LMP. Austria, Denmark, Germany, the Netherlands, Slovenia and Switzerland had a very high convergence of prices in 2023, which reached or were close to 100 % – with only a few situations with higher or lower LMP. On the other hand, Belgium and Czechia often reached their core share, resulting in prices decoupled from the rest of the cooperation and a price convergence comparably lower than for other countries. In the case of France, situations with price convergence were also comparably low for 2023, as France frequently hit its export limit. This results in a price lower than the CBMP.

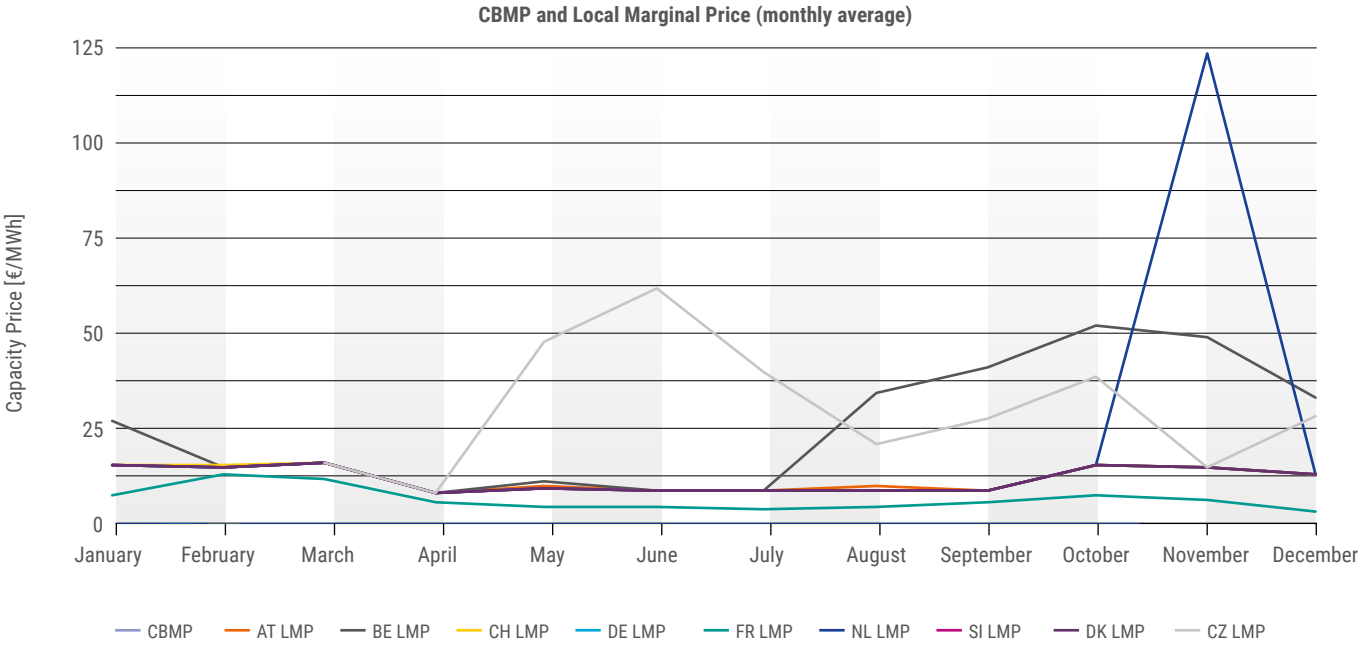


Figure 23 – Evolution of CBMP and (monthly) local marginal prices, 2023 (EUR/MWh)

9 Czech Republic joined the Cooperation in 2023 therefore only the one value for 2023 exists.

Note: As the CBMP and most LMPs (Austria, Germany, Switzerland, France, The Netherlands and Slovenia) are very close to each other or even the same, it is not possible to distinguish the corresponding lines on this graph.

The following figure shows the level of price convergence per TSO for 2023.

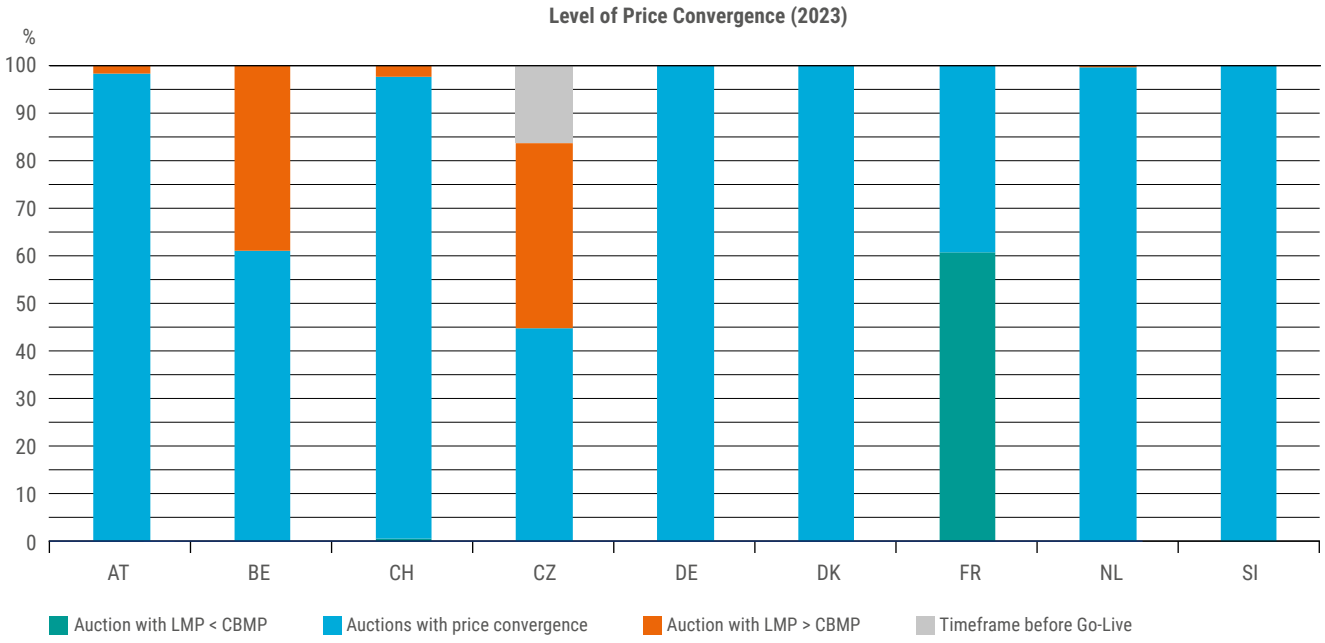


Figure 24 – Level of price convergence, 2023

Figure 24 shows the amount of imported (negative value) or exported (positive value) FCR as mean value over all 2190 auctions for 2023. Figure 25 shows the percentage share of export and import (or auctions with no exchange necessary). It is clear that the main exporting country, both in the total amount and as percentage share, was France – which frequently reached its export limit – followed by Germany. Austria and Switzerland have also a mean exporting position. France exports FCR in nearly 100 % of the auctions, followed by Germany with over 80 % and Austria with 68 %. Swissgrid has a balanced share of import and export periods. Meanwhile, Belgium, the Czech Republic, Denmark, The Netherlands and Slovenia were importing FCR to fulfil their demand.

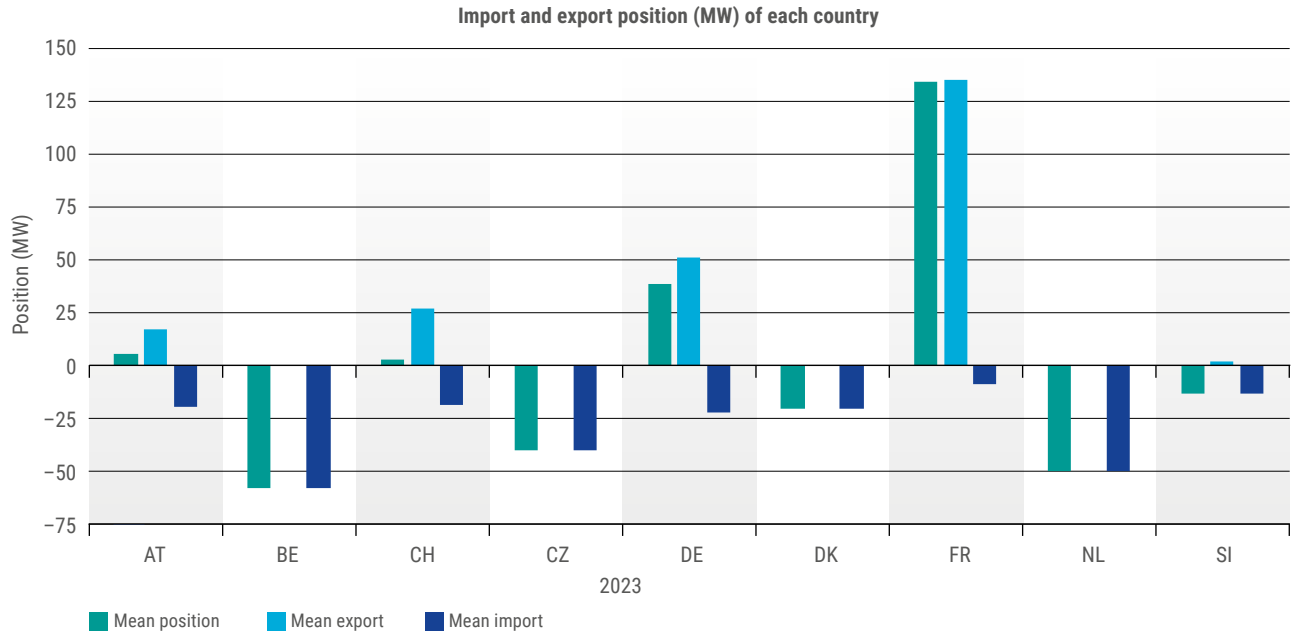


Figure 25 – Mean positions of each country, 2023

Note: Because import and export positions are calculated on a different number of occurrences, the mean positions are not the average of the mean import and export.

	AT	BE	CH	CZ	DE	DK	FR	NL	SI
	68.08	0.00 %	46.71 %	0.00 %	82.24 %	0.00 %	99.36 %	0.00 %	0.05 %
	2.42	0.00 %	2.19 %	0.33 %	0.73 %	0.00 %	0.05 %	0.00 %	0.00 %

Figure 26 – Import and export position of each country, 2023

Note: cases with no exchange were not because of capacity reasons but rather because there are auctions where the maximum social welfare for the FCR-Cooperation was reached without the need to import or export FCR from that specific country.

Evaluation of the benefits

The benefits of the FCR Cooperation are evaluated based on a comparison between two situations:

- Case A: each country procures its FCR demand separately.
- Case B: joint procurement of FCR (while taking into account core share and export limits of each country) which reflects the current situation.

These scenarios are analysed for a 1-year period from January 2023 to December 2023, using the merit order lists used in auctions in 2023. The starting assumption is that in both cases the bids would be the same. In reality, it is likely that the different conditions of the scenarios would affect the bids. The FCR Cooperation tries to account for that in two ways:

- Valuing the under-procured volumes at the LMP.
- Removing extreme high-priced bids.

For the two scenarios, the procurement costs and the BSP surplus (i.e., the difference between the marginal price and the bid price for the activated bids) are compared. The overall impact on procurement costs and BSP surplus provides an indication of the benefits linked to the joint procurement in terms of social welfare.

Under-procurement of FCR

Under-procurement occurs in a country when there are insufficient local bids to cover the demand for that country. In case B, this does not (or very rarely) occur: with imports, the entire demand of each country can be covered by bids in the merit order list. Using the same bids, in simulation A, there is a significant volume of under-procurement (i.e., 118 MW on average per auction). It is likely indeed that the cooperation discouraged some BSPs from bidding their entire FCR flexibility as the most expensive bids were unlikely to be selected. It can be concluded that, without FCR Cooperation, more assets would have been offered in the market. Therefore, the FCR Cooperation assumes that the under-procurement in a country would be resolved with more bids at the respective local marginal price.

Extreme high-priced bids

Sometimes, BSPs submit bids with extreme prices (sometimes over 1000 times the LMP). If the FCR Cooperation uses the existing merit order list for the simulation of FCR procurement without exchanges, these bids cause extreme procurement costs that are considered to be unrealistic (in the case where there is no regular exchange of BSPs, it is the expectation that BSPs would submit additional bids with a lower price). Therefore, the simulation has been executed with a price cap, removing all unselected bids with a price at or above € 10,000/MW/4h.

Results

Under the limitations of the simulation analysis described above, the impact on social welfare is estimated at over € 120 million per year. The calculated benefit for 2023 is higher than in recent years (e.g. 2022 with € 67 million). The results are summarised in Table 4.

	Procurement costs (Million € p.a.)	BSP surplus (Million € p.a.)	Under-procurement (MW)	Impact on social welfare (Million € p.a.)
Simulation A	459	307	118	–
Simulation B	148	116	~ 0	–
B-A	311	–191	–	120

Table 4 – Evaluation of the benefits of the FCR Cooperation


99.99
5.412
71.45

4 Electricity Balancing Performance Indicators

The EB performance indicators are a tool which allows the analysis and assessment of the results of the integration of balancing markets, following the EB Regulation. This section of the Market Report has been created based on data available on the Transparency Platform, provisions from voluntary reserve exchange TSO cooperation, and the balancing energy platforms which are currently operational.

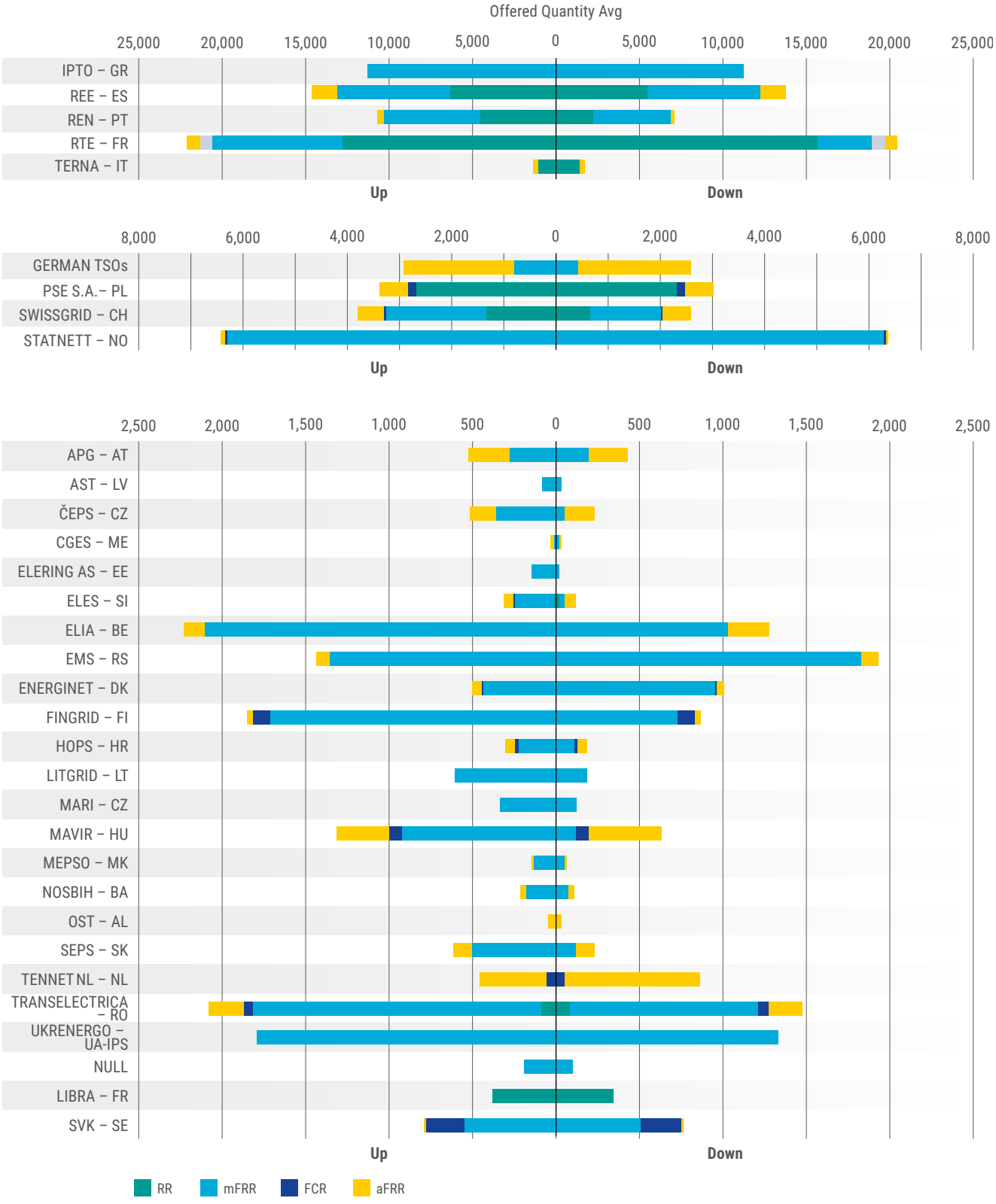
4.1 Availability of balancing energy bids, including the bids from balancing capacity

Definition	Yearly average values of submitted available (MW) and unavailable (MW) bids of balancing energy per process (FCR, aFRR, mFRR and RR), per direction (upward/downward) and per type of product (standard/specific)* as collected by TSOs. The indicator includes per TSO/load frequency control (LFC) area/BZ/LFC Block: 1. Available upward balancing energy bids for each type of processes and each type of product 2. Available downward balancing energy bids for each type of process and each type of product 3. Unavailable upward balancing energy bids for each type of processes 4. Unavailable downward balancing energy bids for each type of processes
Legal reference	Article 59(4)(a) of the EB Regulation
Time reference	Yearly

* with specific including both specific and local products

Table 5 – Indicator 4.1 on the availability of balancing energy bids

KPI 4.1.1 – Available upward/downward balancing energy bids (standard/non-standard incl. specific)MWh/h (Part 1)[9]



Disclaimer: The values reported for Eirgrid and SONI are SEM (Single Electricity Market) values – it is not possible to breakdown volumes between mFRR and RR as they are using an integrated scheduling process. The values reported for Eirgrid/SONI are 110 MWh/h in the upward direction and 122 MWh/h in the downward direction.

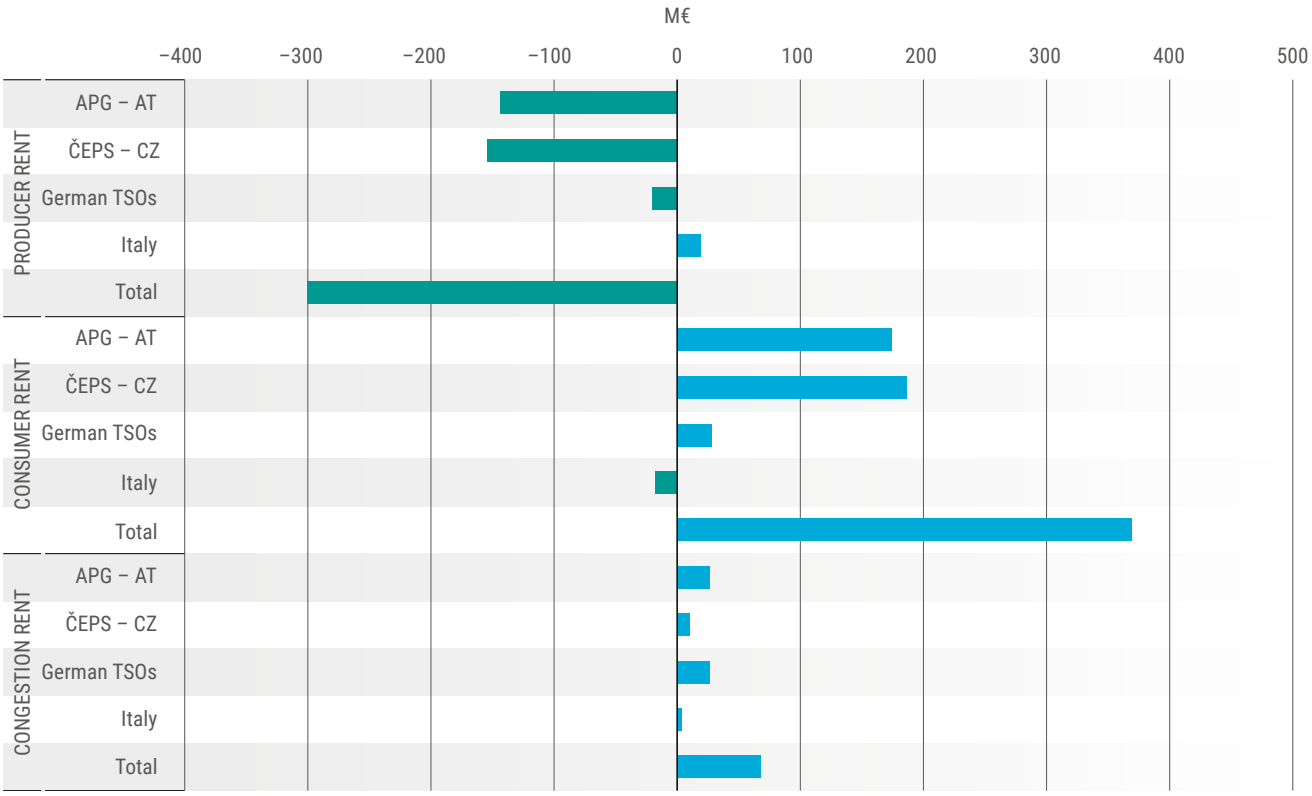
9 IPTO – GR: Quantities presented refer to both aFRR and mFRR energy bids

4.2 Social welfare impact due to exchange and sharing of reserves and activation of balancing energy platforms using standard products and savings derived from imbalance netting

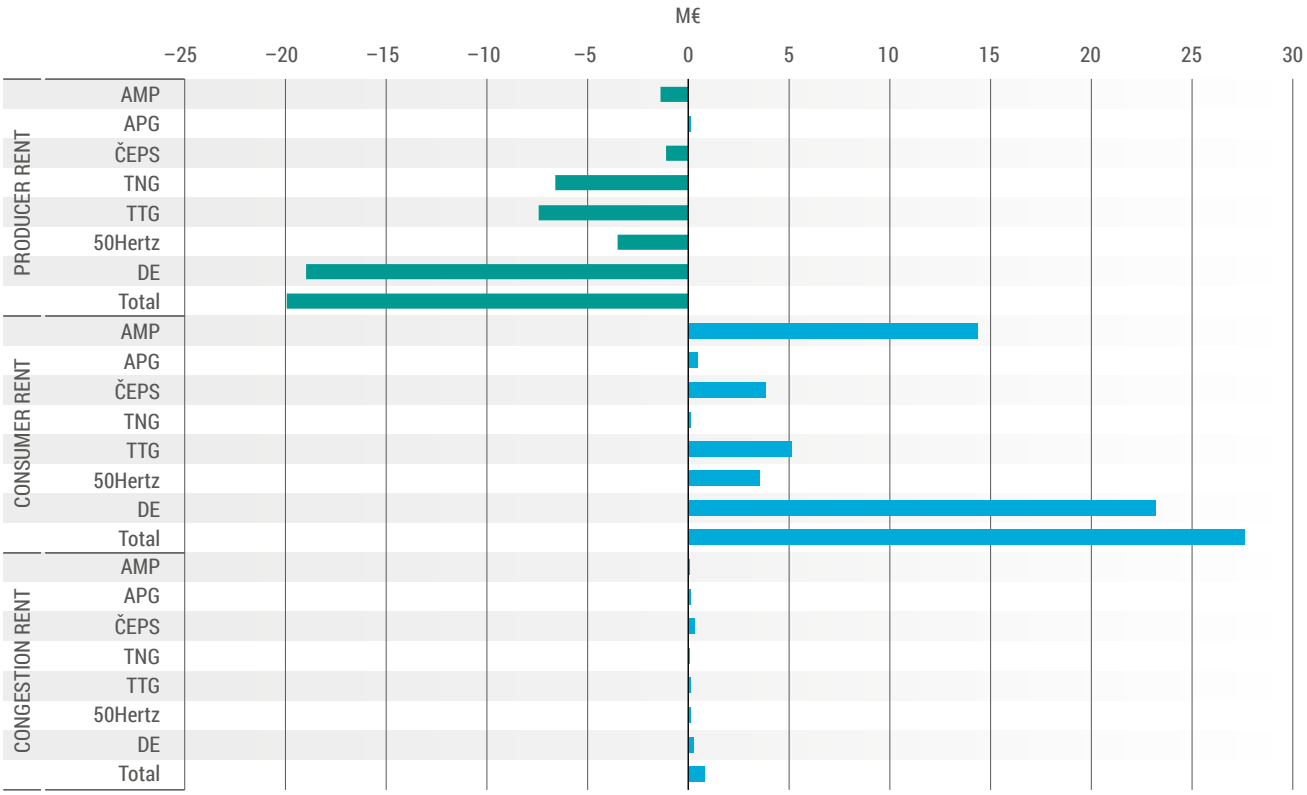
Definition	1. IN monetary savings: for each TSO involved in the IN platform, the yearly monetary savings will be assessed, based on the rules for the TSO–TSO settlement and on the opportunity prices reported to the platform by each TSO. 2. Annual gains and savings for each cooperation due to the exchange of balancing capacity or sharing of reserves: in this case, to assess the monetary gains and savings, two or three situations will be compared: • Situation A (actual situation): actual bids, actual CZC available for the exchange of balancing capacity or sharing of reserve, actual CZC available for the SDAC and actual TSO needs • Situation A' (situation with exchange of balancing capacity but without sharing of reserve; in case of exchange of balancing capacity without sharing agreement, A and A' are identical): actual bids, actual CZC available for the exchange of balancing capacity or sharing of reserve, actual CZC available for the SDAC and fictive TSO needs without sharing of reserve • Situation B (local procurement): actual bids, but with only local procurement and fictive TSOP needs as in situation A', and no CZC allocated for the exchange of balancing capacity 3. Monetary gains for each balancing platform due to the exchange of balancing energy, per TSO and in total (for TERRE): to assess the monetary gains, two situations will be compared: Situation A (actual situation): actual bids, actual CZC available for the exchange of balancing energy and actual TSO needs Situation B (local procurement): actual bids, actual TSO needs but only local activation
Legal reference	Articles 59(4)(b) and 59(4)(c) of EB Regulation
Time reference	Yearly

Table 6 – Indicator 4.2. on balancing energy activation social welfare impact

KPI 4.2.1: aFRR platform: social welfare impact: Producer rent, consumer rent and congestion rent



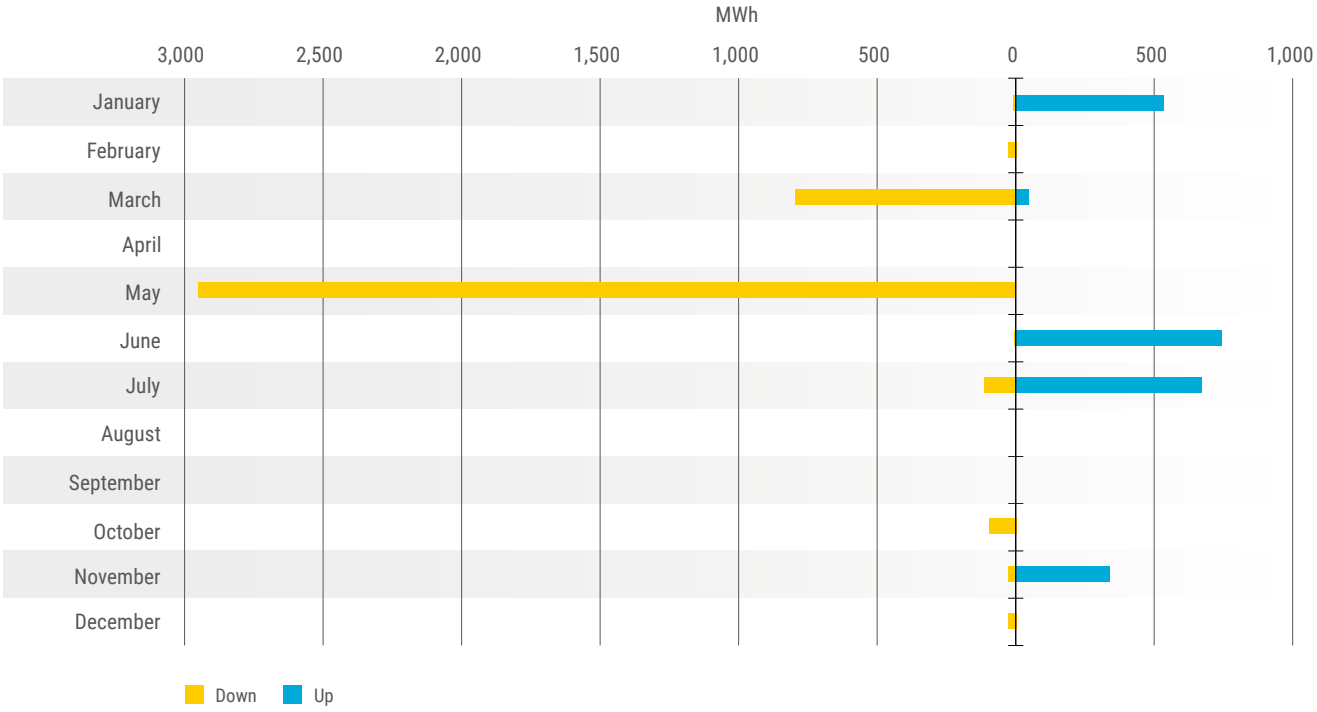
KPI 4.2.1: mFRR platform: social welfare impact: Producer rent, consumer rent and congestion rent



KPI 4.2.1: aFRR platform: potential upward/downward inelastic balancing energy not supplied at decoupled run compared to coupled run (MWh)

Inelastic Demand not supplied (MWh)	With PICASSO	Without PICASSO
APG	3.58	16.81
CEPS	4.07	13.51
Germany	0.29	0.51
Italy	161	183.42

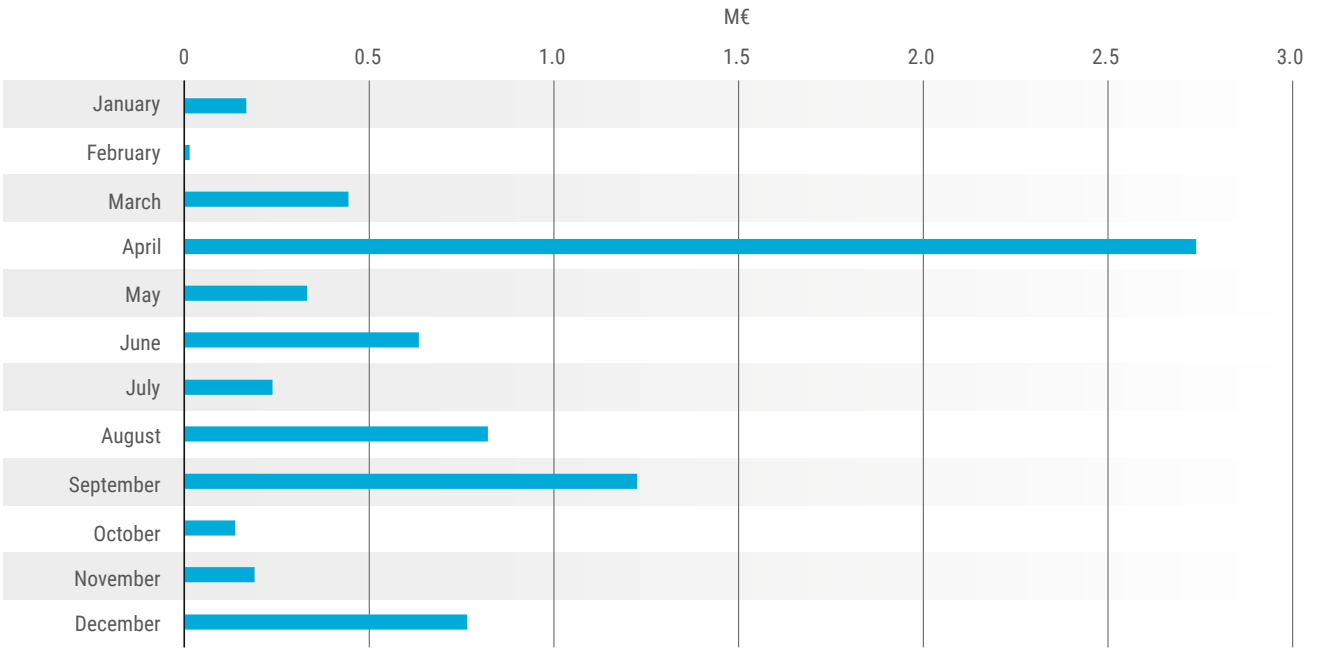
KPI 4.2.1: RR platform: potential upward/downward inelastic balancing energy not supplied at decoupled run compared to coupled run



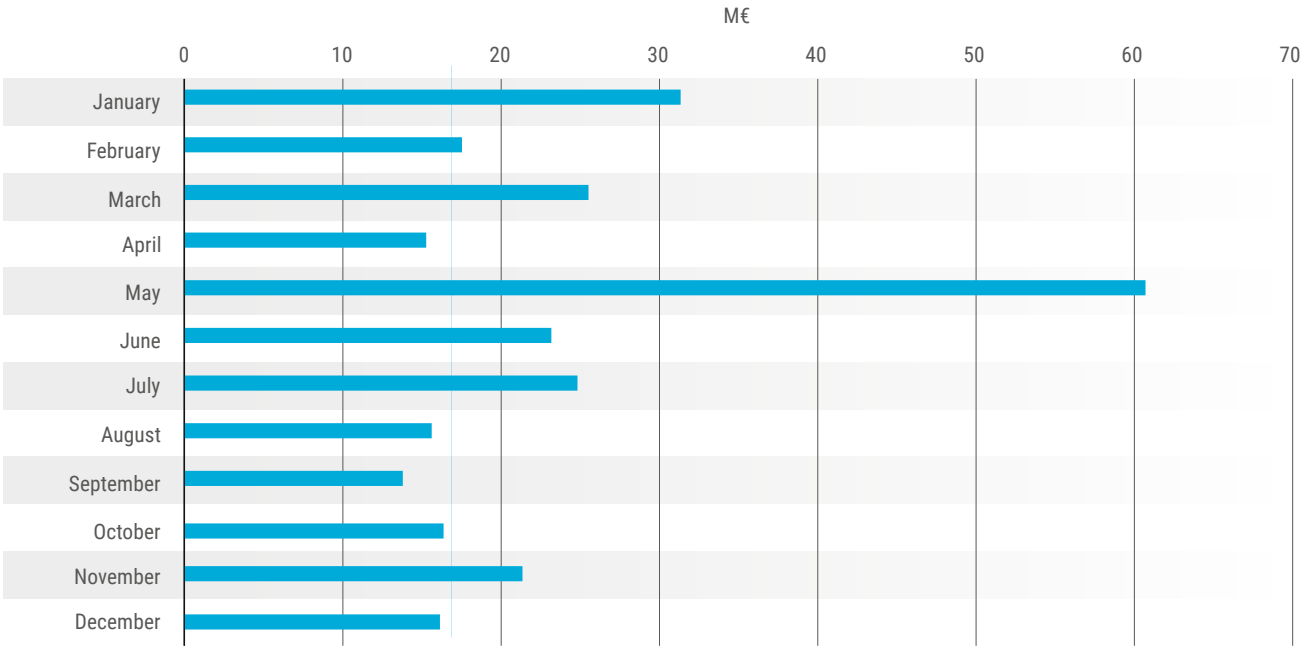
KPI 4.2.1: aFRR: Differential Final vs DC (Social Welfare Final - Social Welfare decoupled run)

The reported value for Differential Final vs DC equals 136.67 M€ for the year 2023.

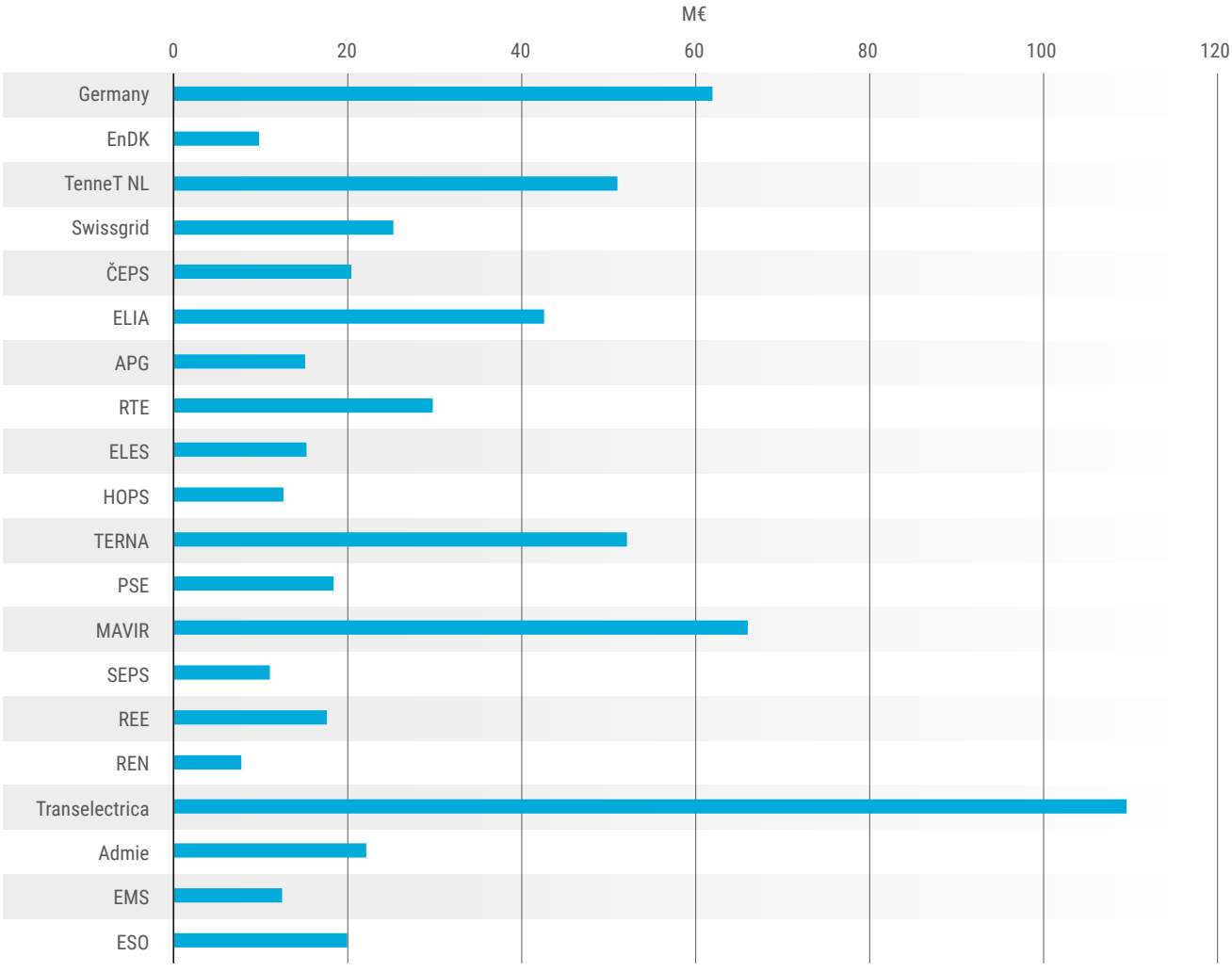
KPI 4.2.1: mFRR: Differential Final vs DC (Social Welfare Final – Social Welfare decoupled run)



KPI 4.2.1: RR: Differential Final vs DC (Social Welfare Final – Social Welfare decoupled run)



KPI 4.2.2: Imbalance netting (IN) savings – IN platform: monetary annual savings per TSO



KPI 4.2.3: Sharing and exchange of reserves – Nordic aFRR market

Included in the balancing section 3.1.

KPI 4.2.3: Sharing and exchange of reserves – DE–AT Cooperation

Included in the balancing section 3.2.

KPI 4.2.3: Sharing and exchange of reserves – FCR Cooperation

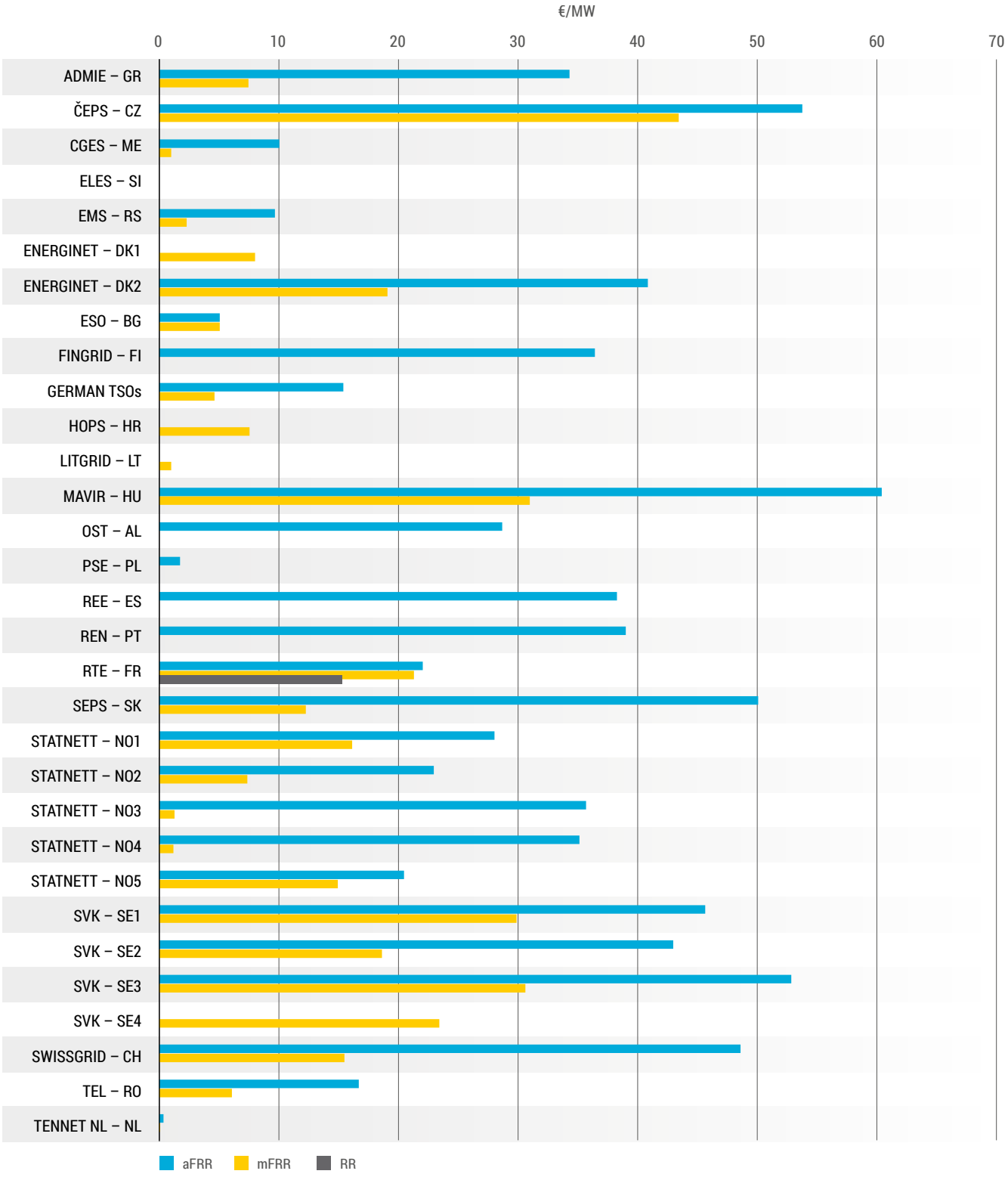
Included in the balancing section 3.3.

4.3 Total cost of balancing

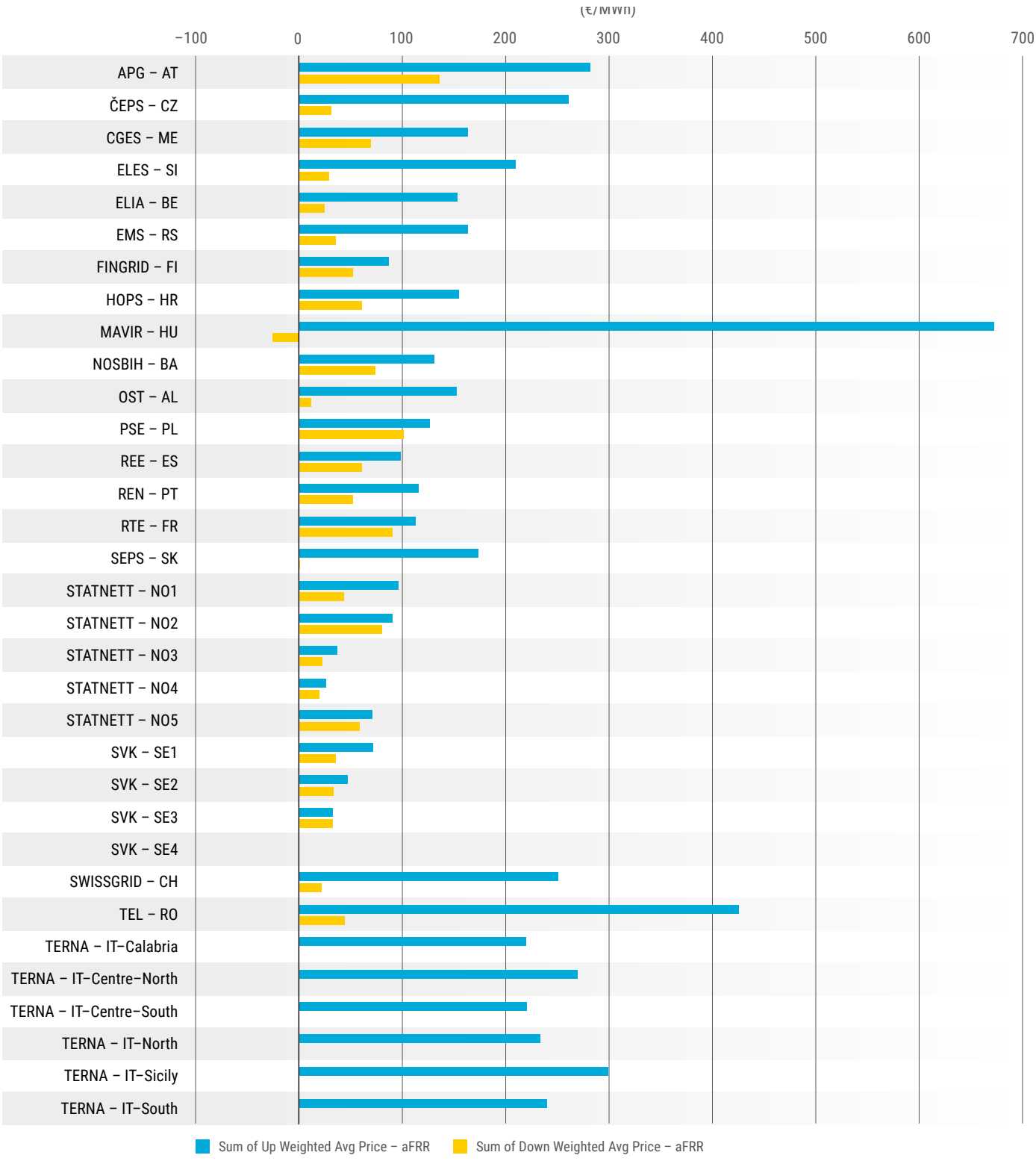
Definition	This indicator calculates the annual costs (€-year) for each TSO for specific and standard products (both balancing energy activation and reserve procurement costs). For each TSO or country (e.g. Germany), the total costs of balancing will be segmented by: a) FCR, aFRR, mFRR and RR procurement reserve costs from its connected BSPs, adjusted for the results of TSO–TSO settlements of FCR, aFRR, mFRR and RR reserves (adjusted only when any sharing/exchange of reserve schemes applies), b) the costs for the activation of balancing energy (FCR, aFRR, mFRR and RR) from its connected BSPs (payment to BSP´s minus incomes from BSPs), adjusted when applicable with the results of TSO–TSO settlements of balancing energy, and c) the net result (cost) of TSO–IGCC settlement of Imbalance Netting. Regarding TSO–TSO settlement in the case of balancing energy platforms, congestion rents of non-participating countries should not be considered.
Legal reference	Article 59(4)(d) of the EB Regulation
Time reference	Yearly

Table 7 – Indicator 4.3 on the total cost of balancing

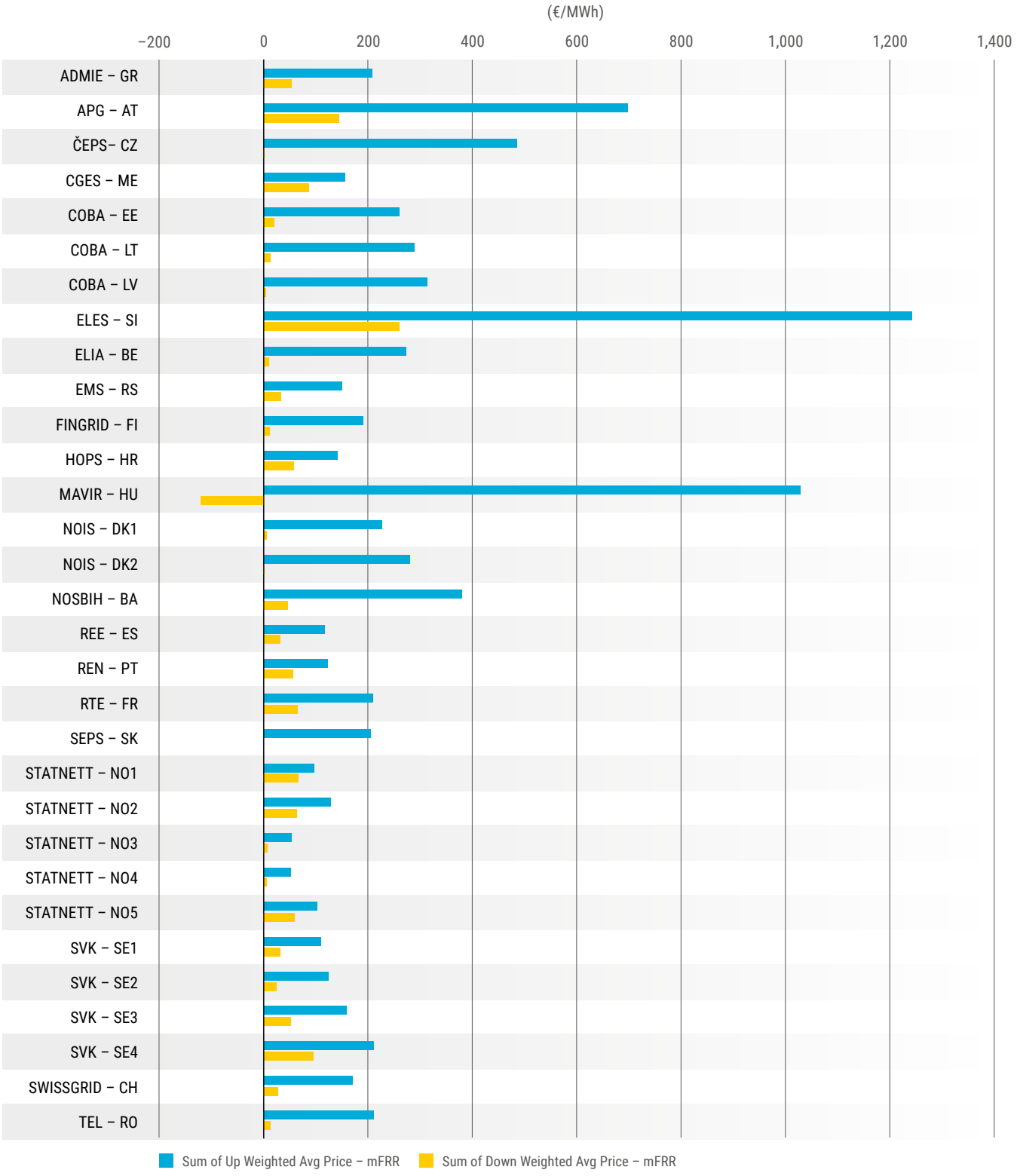
KPI 4.3.1: Volume-weighted average price for the procured capacities (upward/downward) across balancing products



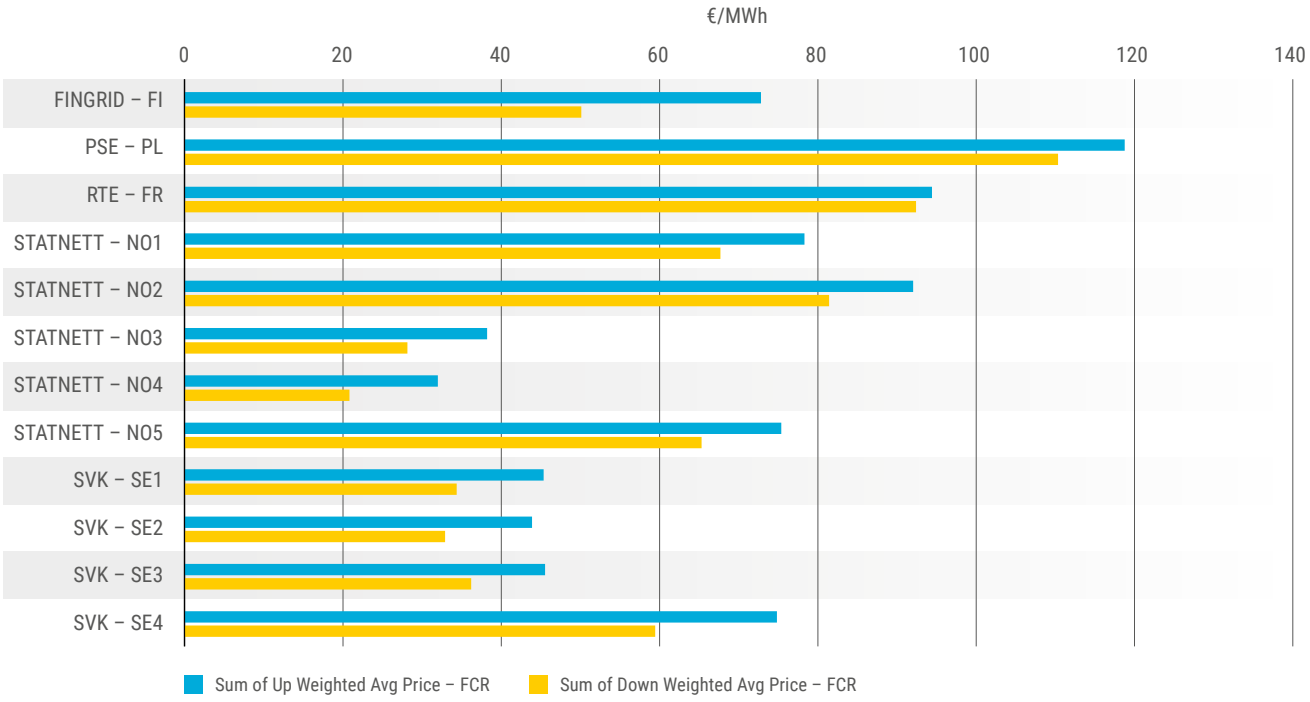
KPI 4.3.2/4.3.3: Volume-weighted average price of balancing energy activation (upward/downward) for aFRR



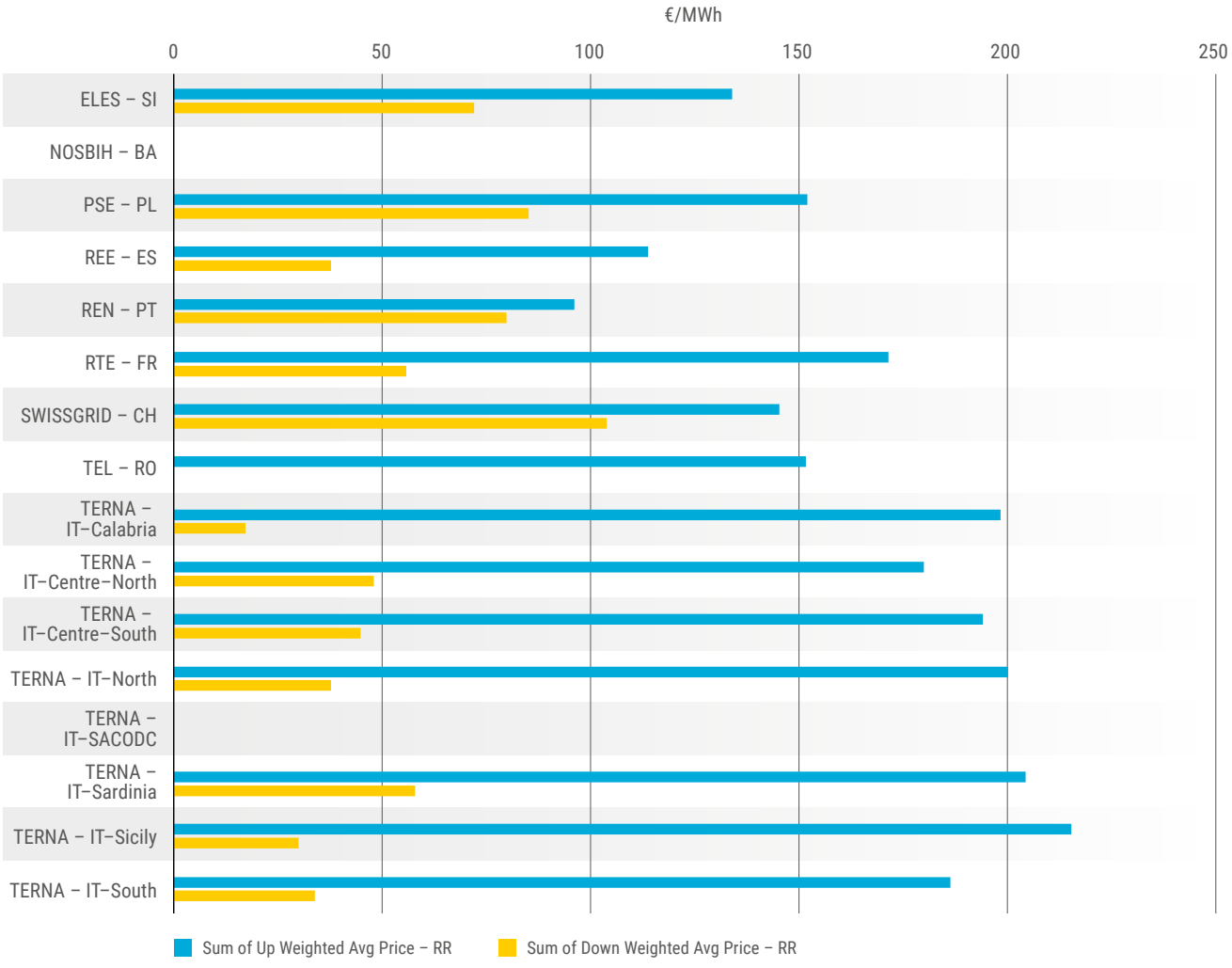
KPI 4.3.2/4.3.3: Volume-weighted average price of balancing energy activation (upward/downward) for mFRR



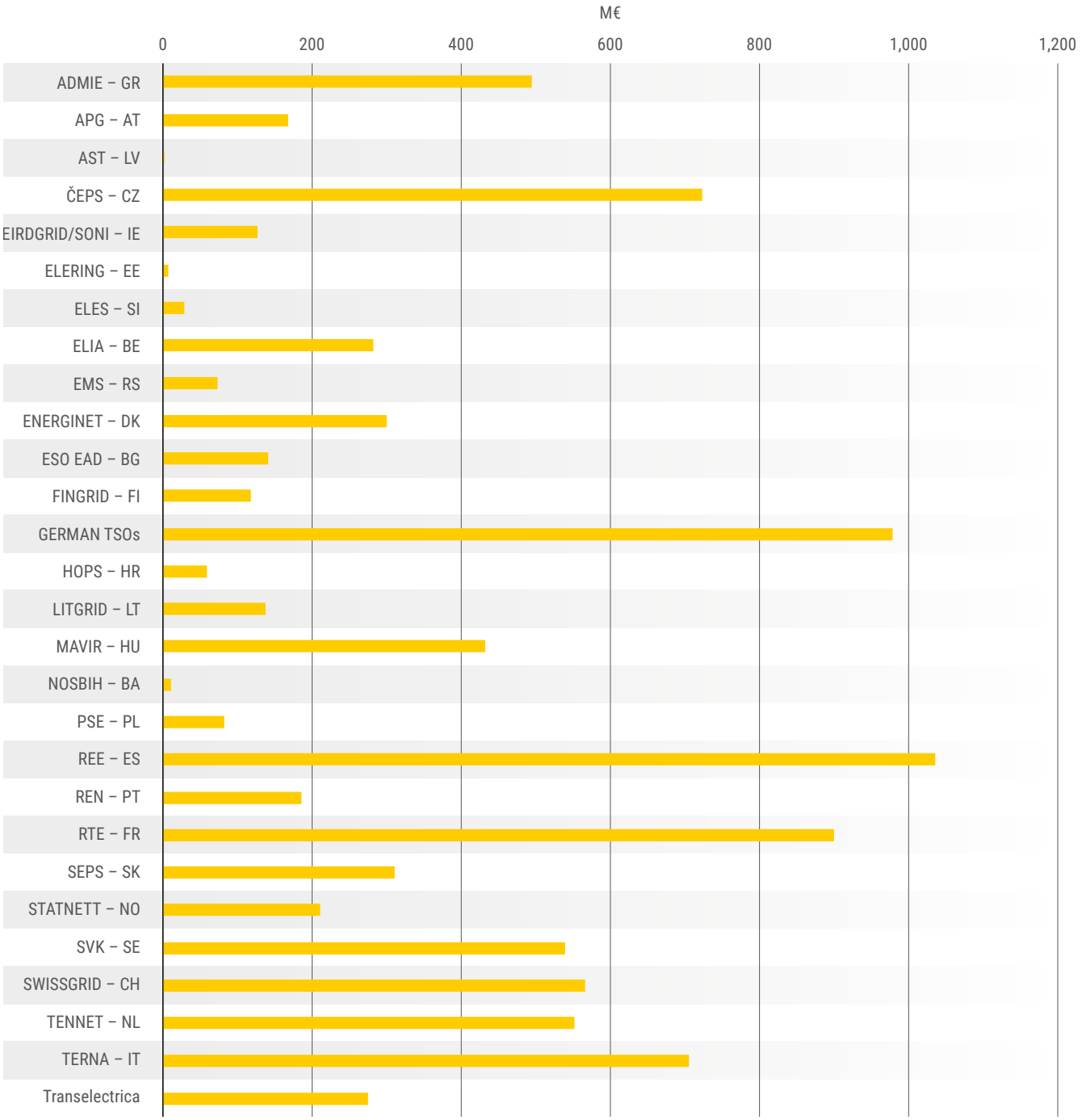
KPI 4.3.2/4.3.3: Volume-weighted average price of balancing energy activation (upward/downward) for FCR



KPI 4.3.2/4.3.3: Volume-weighted average price of balancing energy activation (upward/downward) for RR (€/MWh)



KPI 4.3.4: Total cost of balancing

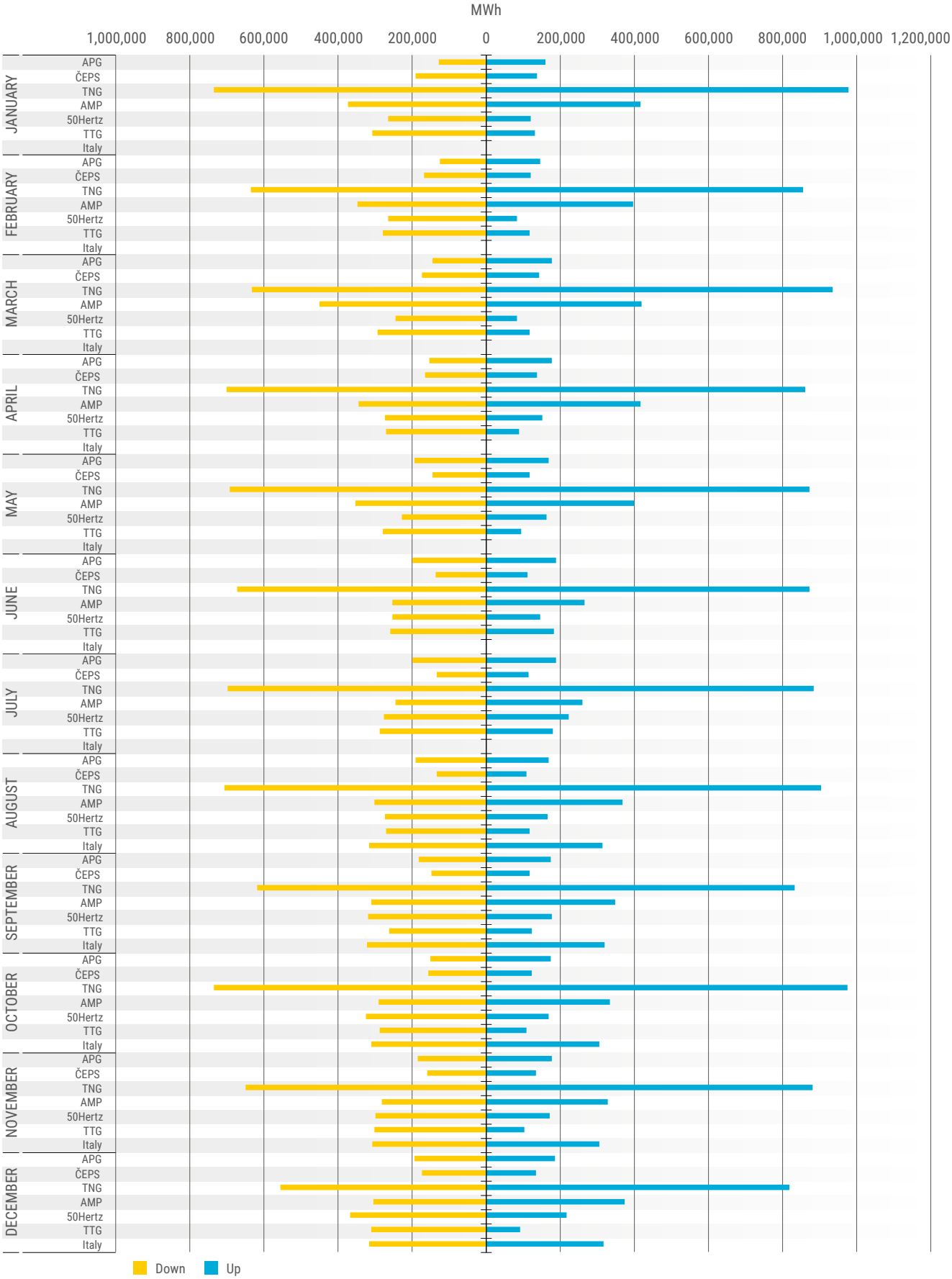


4.4 The economic efficiency and reliability of the balancing markets

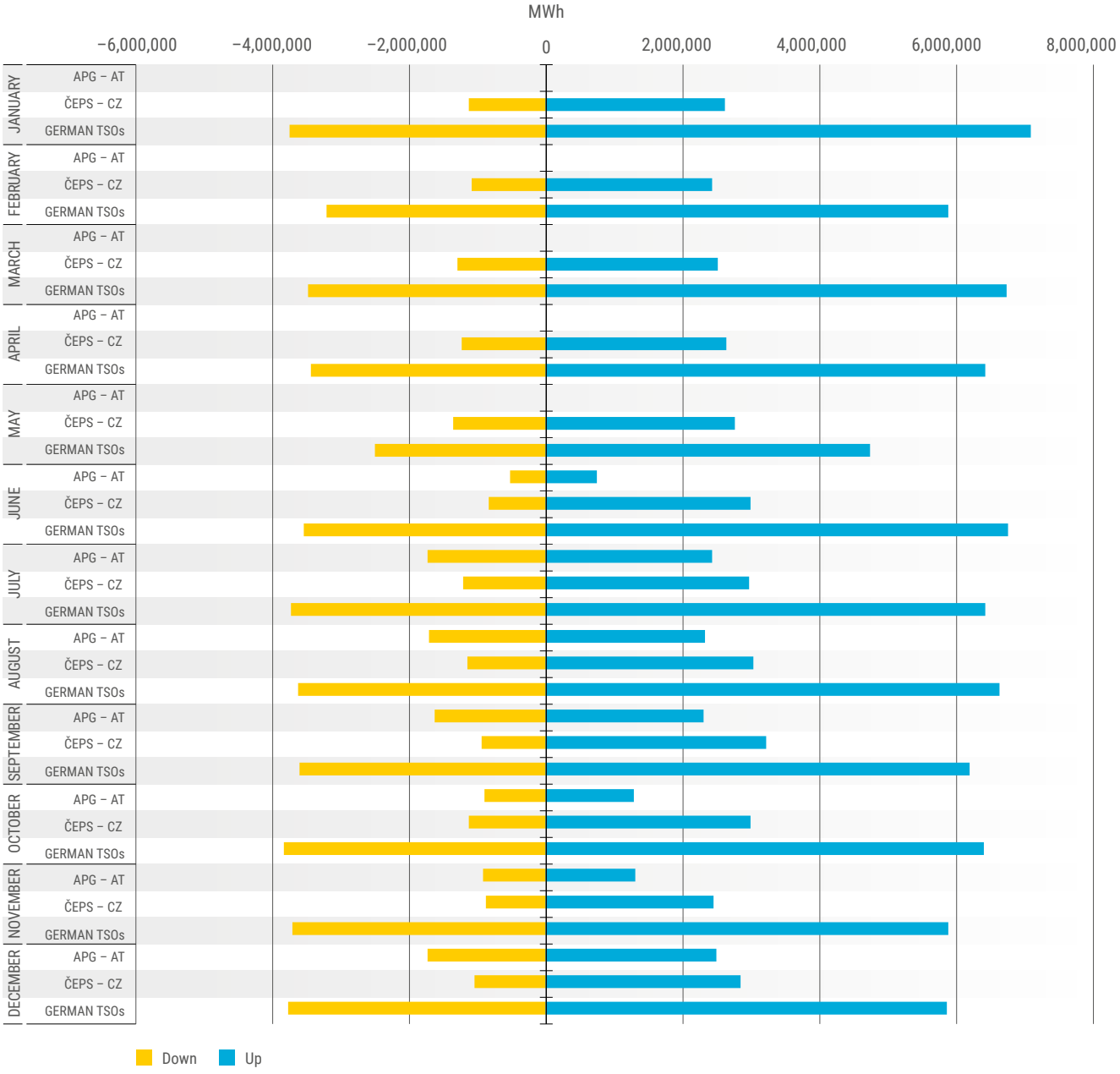
Definition	This indicator assesses the efficiency and reliability of each balancing platform. This indicator focuses on the balancing energy markets only. This PI includes the following for each balancing platform: 1. Monthly volume (MWh) and volume weighted average prices (€/MWh) of submitted bids per direction and per TSO 2. Monthly volume of demand per direction and per TSO (MWh) 3. Monthly volume of selected bids per direction and per TSO (MWh) 4. Monthly volumes of exports per TSO (MWh) 5. Monthly volumes of imports per TSO (MWh) 6. Repartition of the use of inelastic and elastic need per TSO (% of share of total demand that is being covered by elastic and inelastic demand) 7. Monthly average and standard deviation values and distribution of the CBMP per TSO (percentiles 1 %; 5 %, 10 %, 90 %, 95 %, 99 %) 8. Monthly average value of the available and used CZC per BZB and per direction (MW) 9. Monthly average value of the number of uncongested areas 10. Number of occurrences (% of MTU) of unsatisfied inelastic need /TSO and its volume (MWh) 11. Incident overview
Legal reference	Article 59(4)(d) of the EB Regulation
Time reference	Yearly

Table 8 – Indicator 4.4 on the economic efficiency and reliability of the balancing markets

KPI 4.4.1: aFRR Platform: Monthly volume (MWh) of submitted bids per direction and per TSO



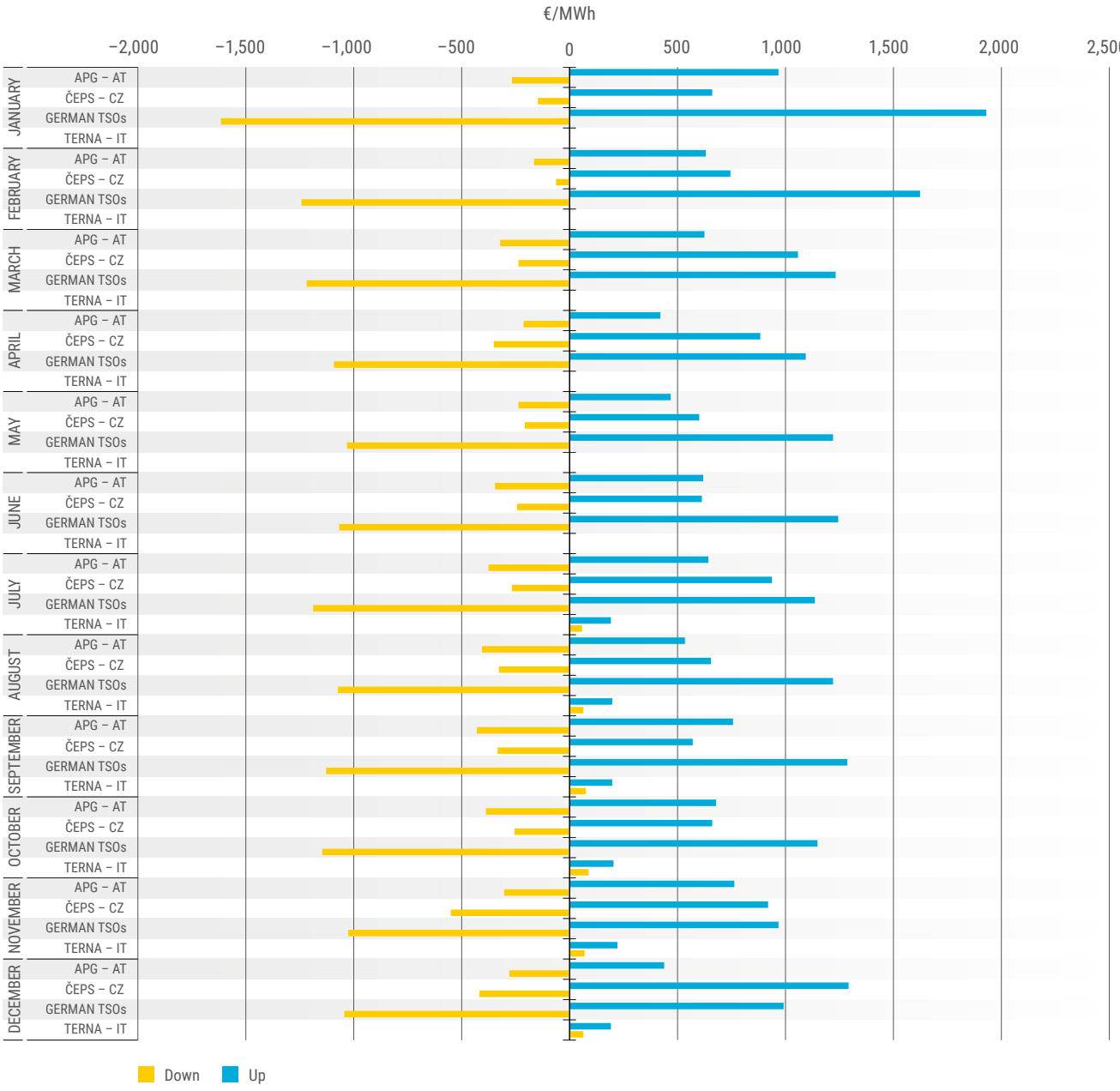
KPI 4.4.1: mFRR Platform: Monthly volume (MWh) of submitted bids per direction and per TSO



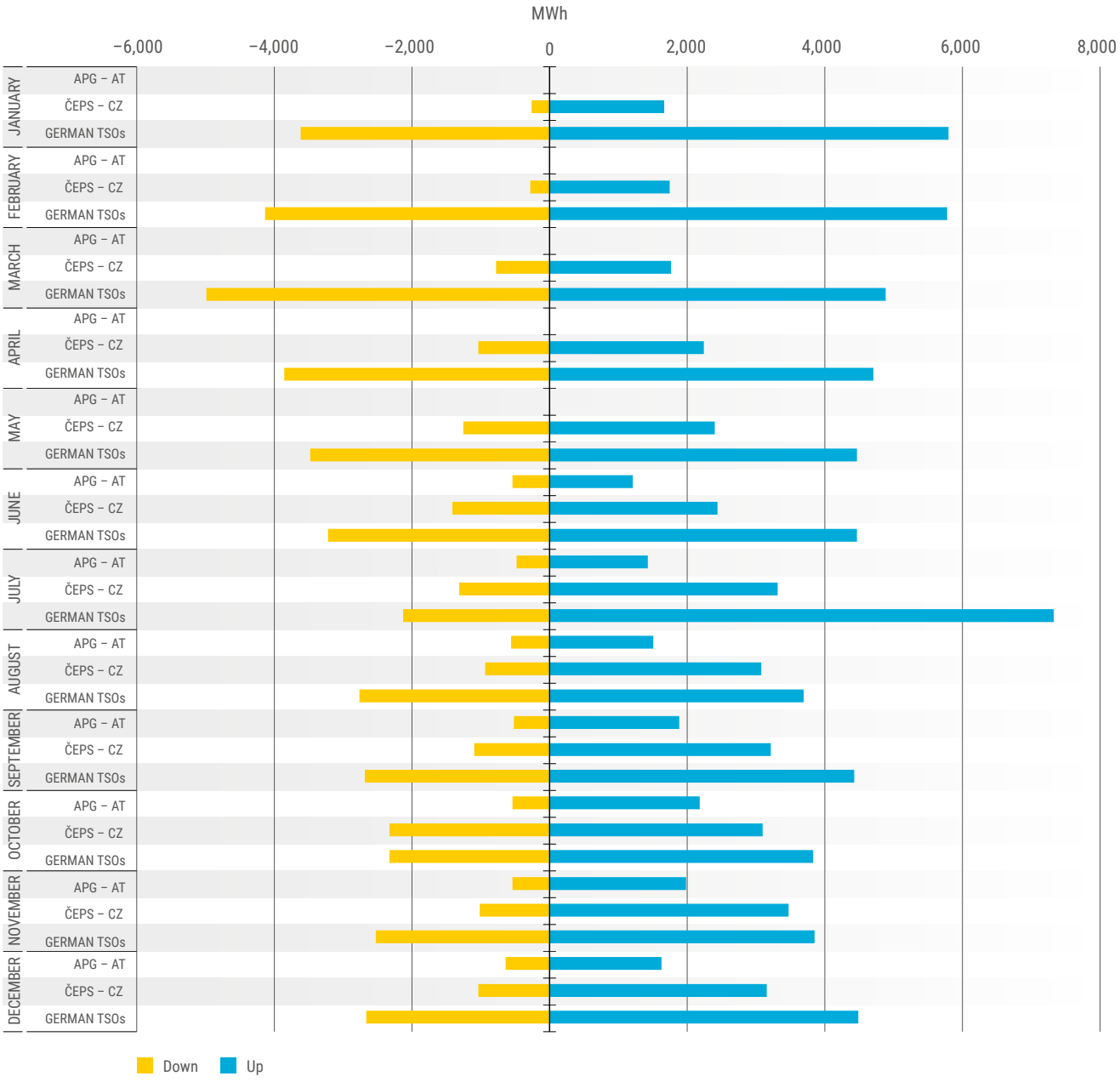
KPI 4.4.1: RR Platform: Monthly volume (MWh) of submitted bids per direction and per TSO

Included in the balancing section 2.1 RR Platform

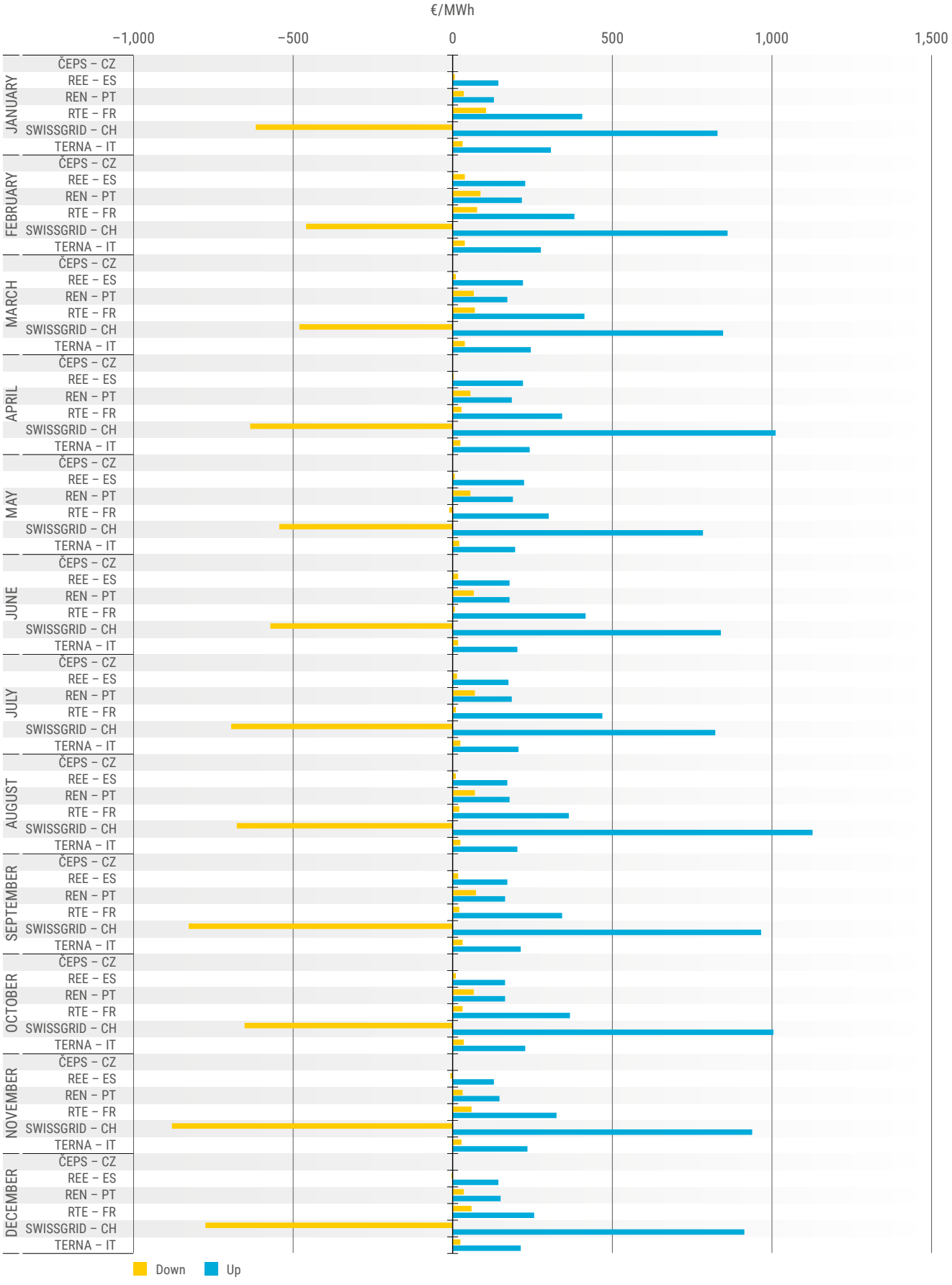
KPI 4.4.1: aFRR Platform: Volume weighted average prices (€/MWh) of submitted bids per direction and per TSO



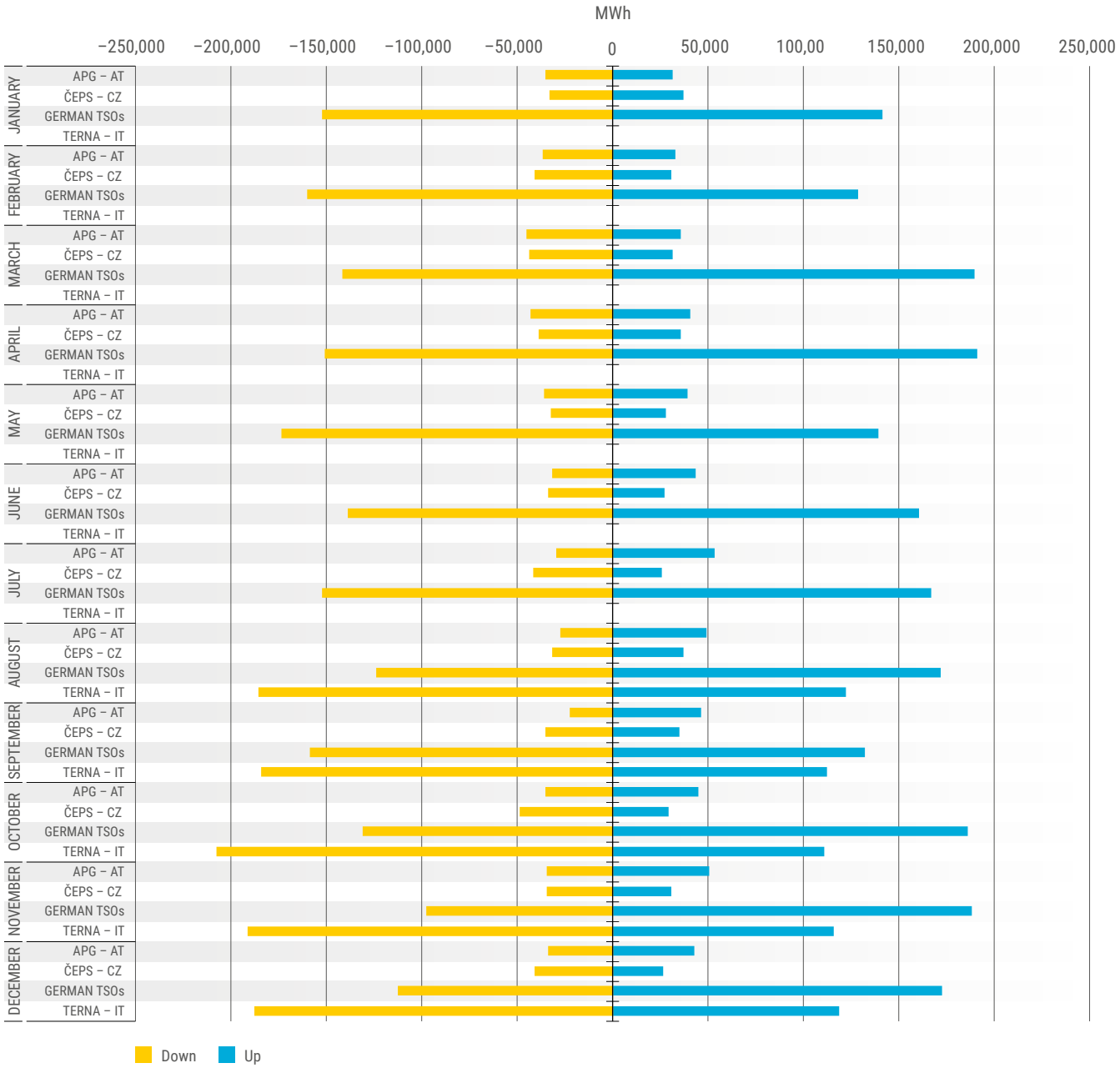
KPI 4.4.1: mFRR Platform: Volume weighted average prices (€/MWh) of submitted bids per direction and per TSO



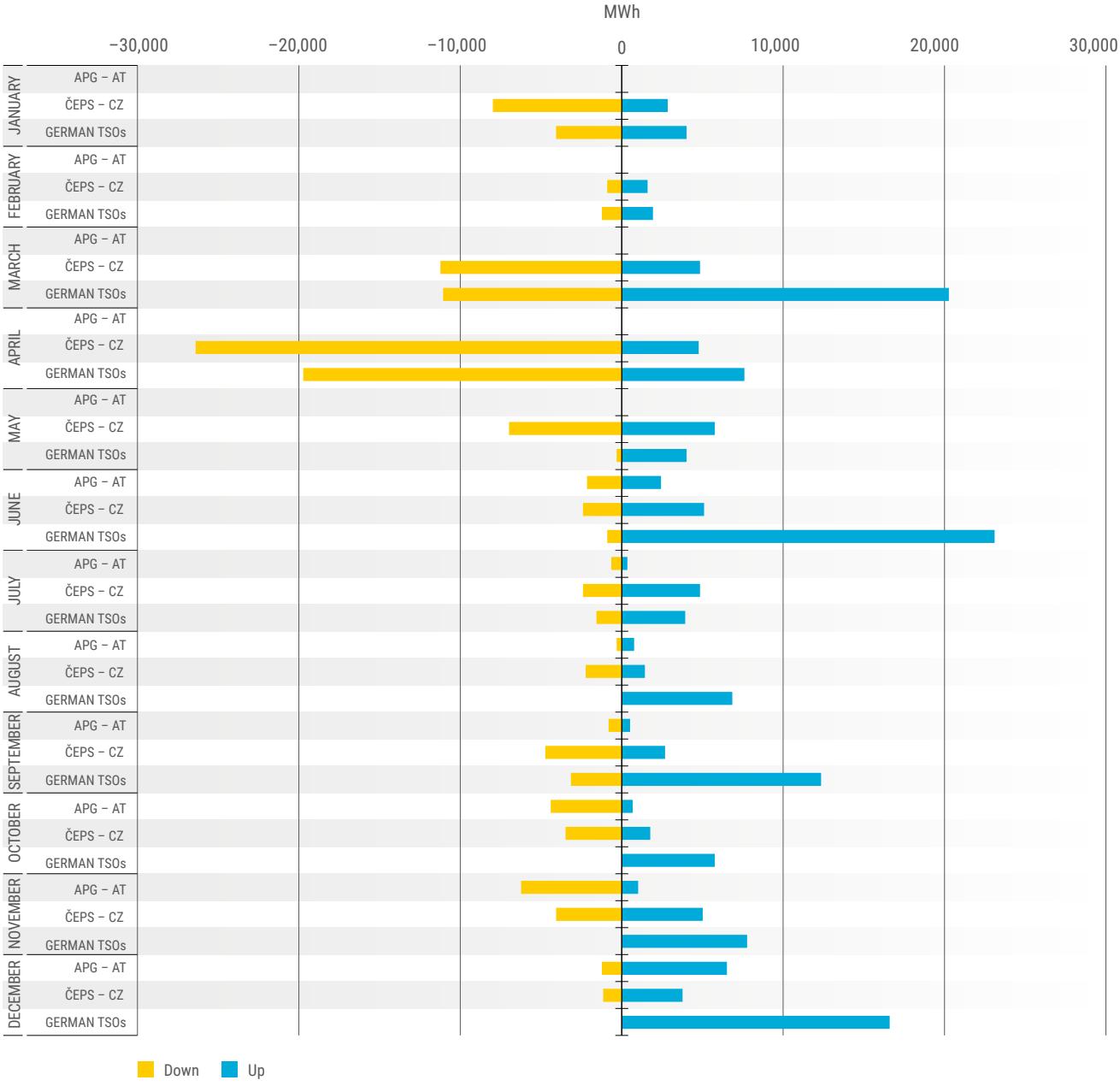
KPI 4.4.1: RR Platform: Volume weighted average prices (€/MWh) of submitted bids per direction and per TSO



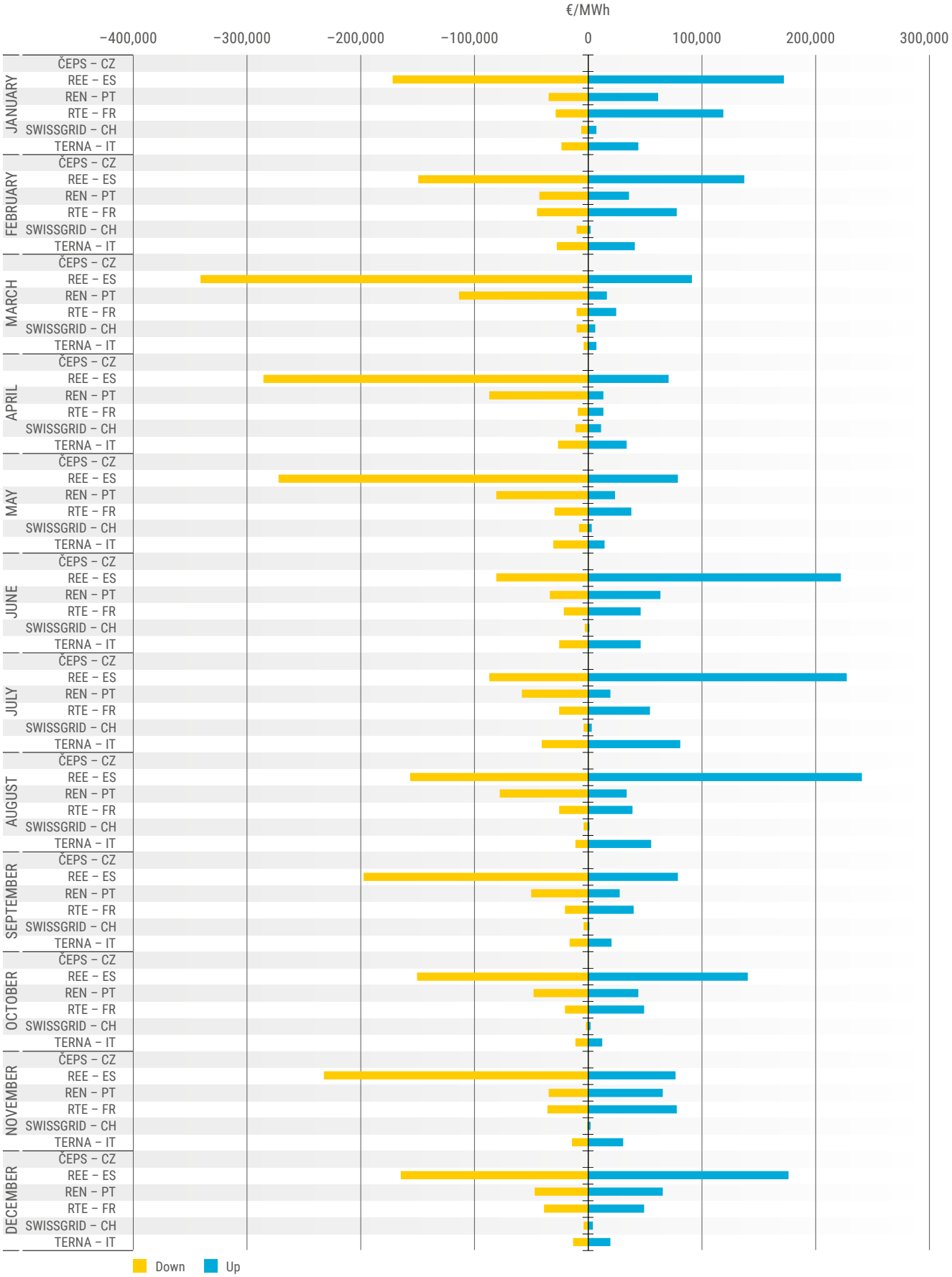
KPI 4.4.2: aFRR Platform: Monthly volume of demand per direction and per TSO



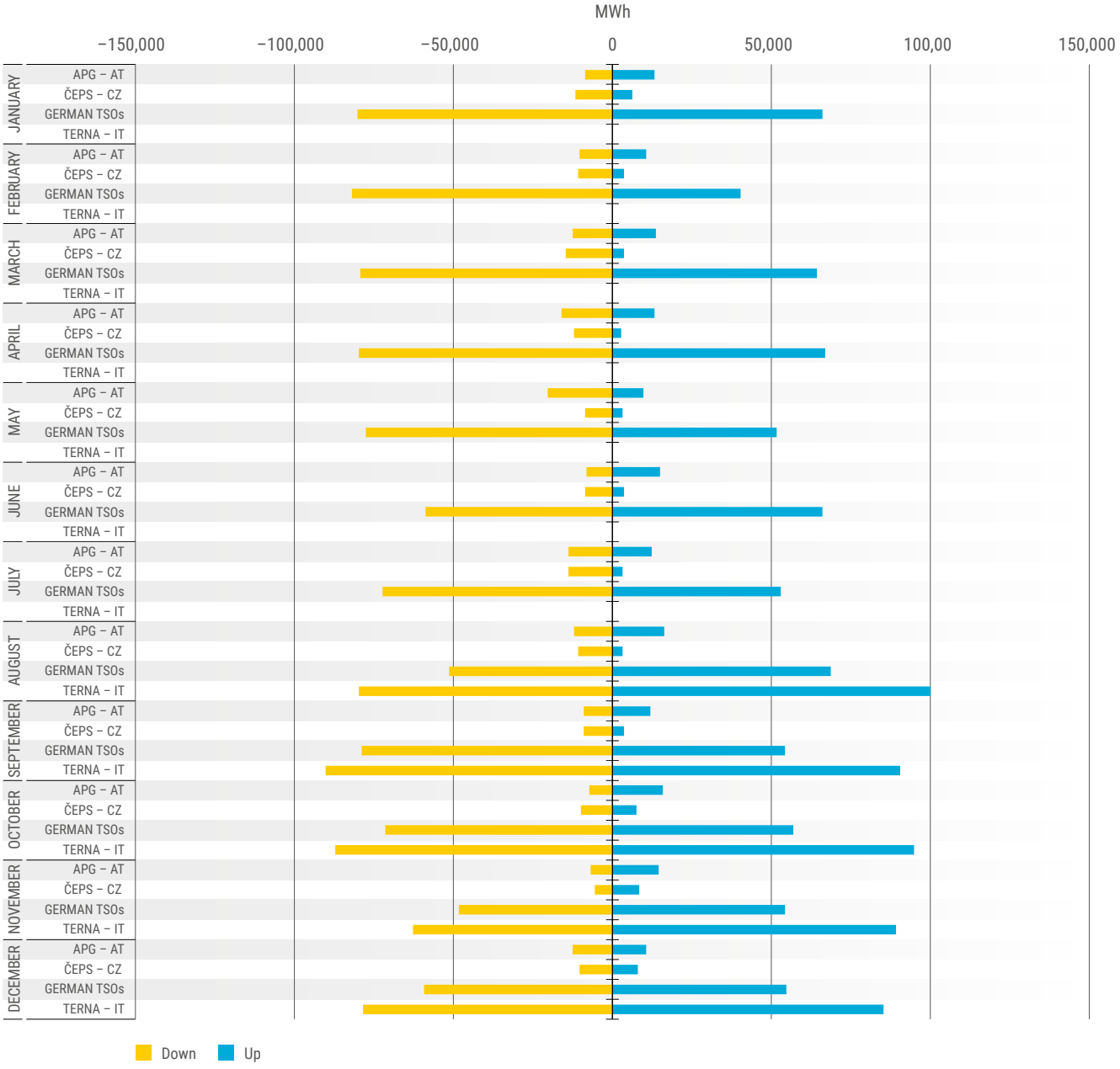
KPI 4.4.2: mFRR Platform: Monthly volume of demand per direction and per TSO



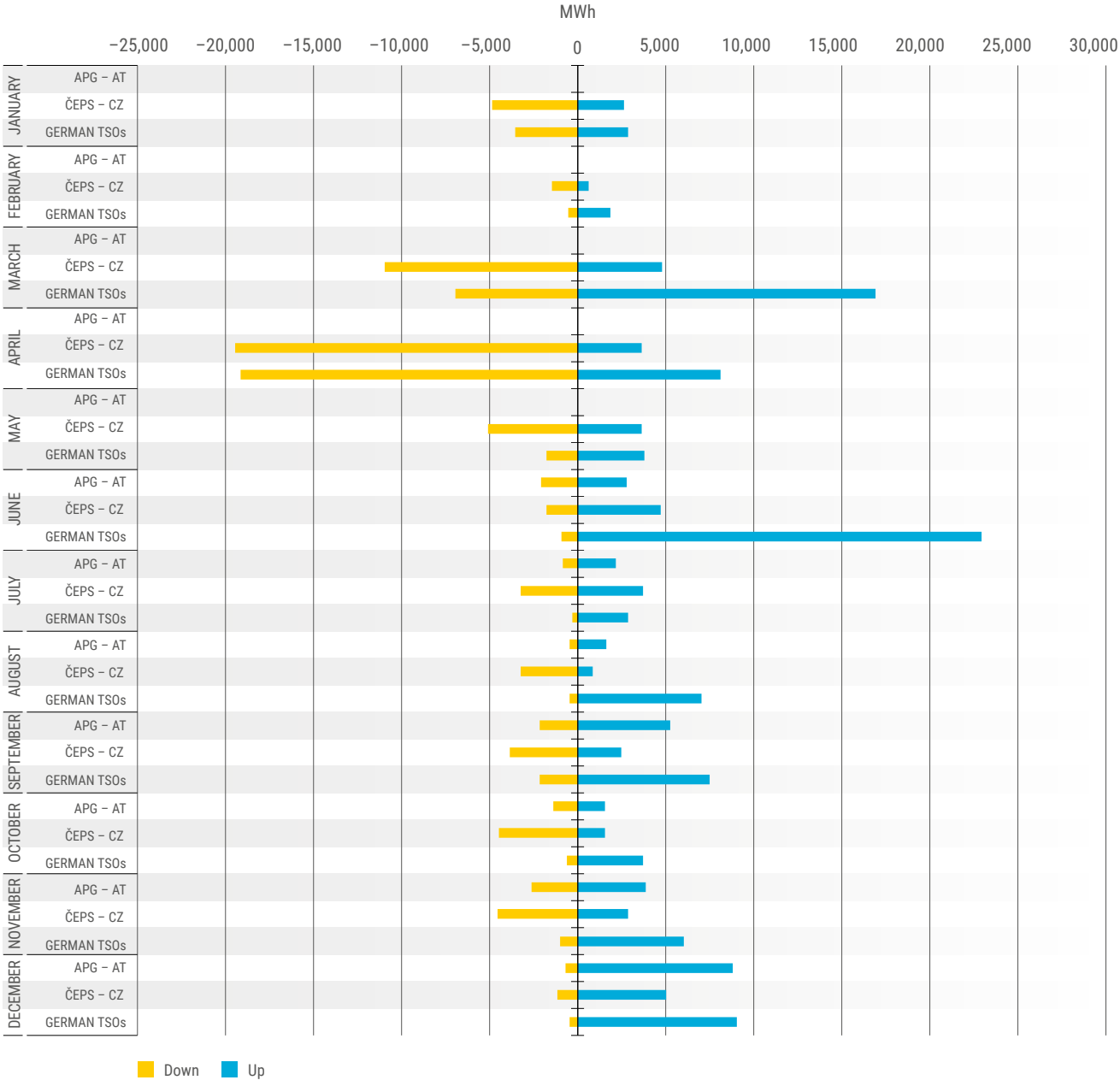
KPI 4.4.2: RR Platform: Monthly volume of demand per direction and per TSO



KPI 4.4.3: aFRR Platform: Monthly volume of selected bids per direction and per TSO



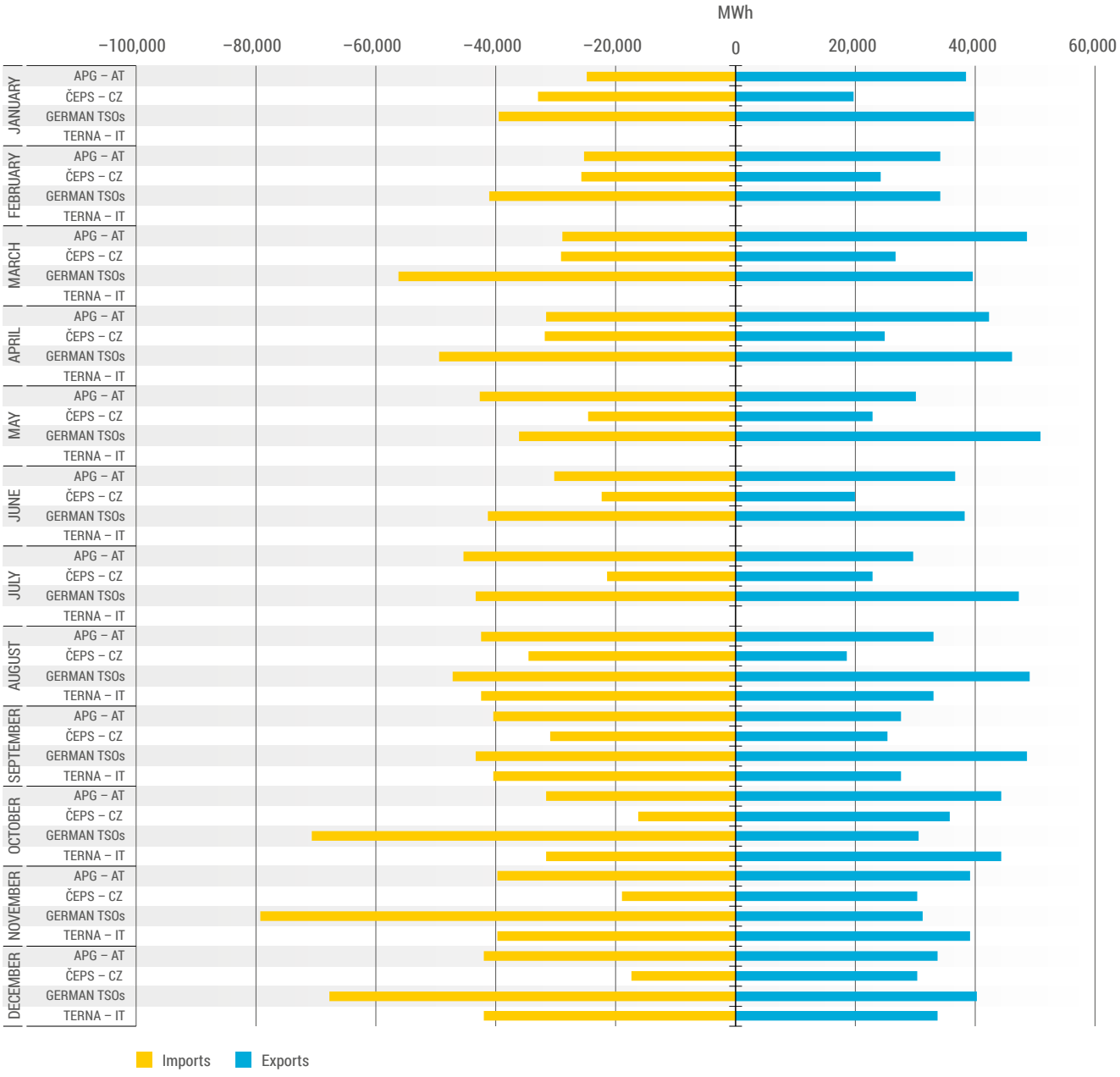
KPI 4.4.3: mFRR Platform: Monthly volume of selected bids per direction and per TSO



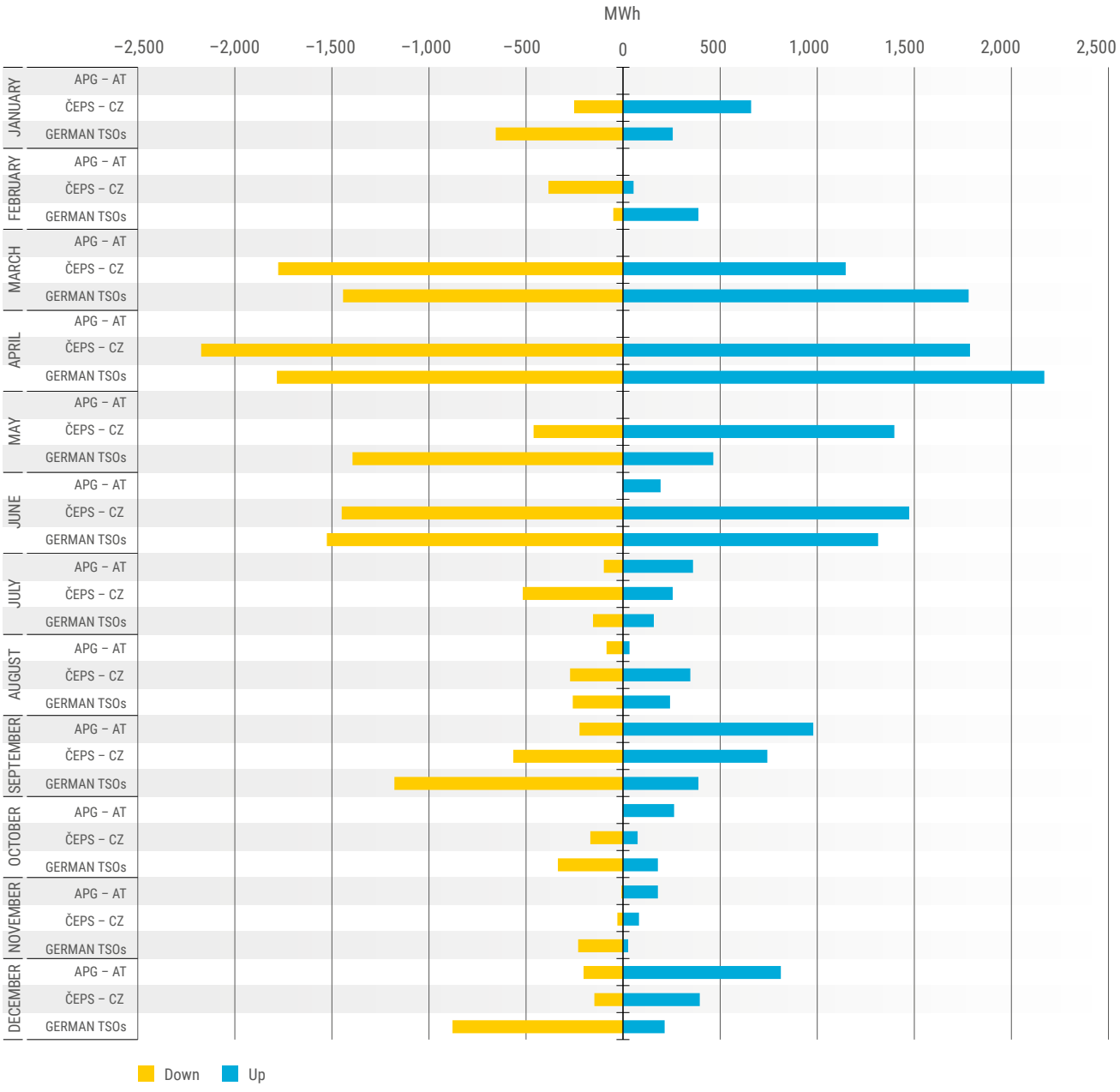
KPI 4.4.3: RR Platform: Monthly volume of selected bids per direction and per TSO

Included in the balancing section 2.1 RR Platform

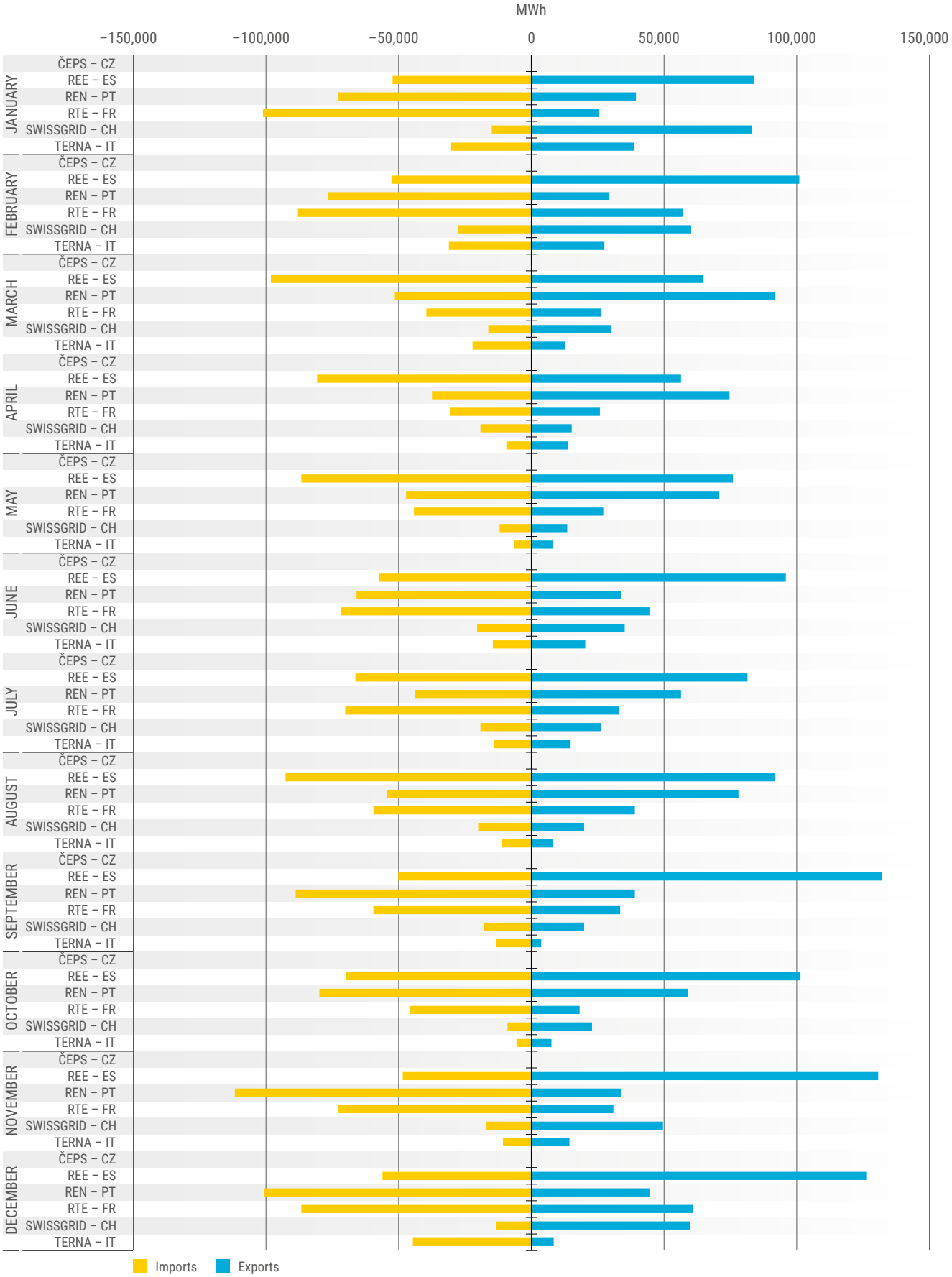
KPI 4.4.4/4.4.5: aFRR Platform: Monthly volumes of imports/exports per TSO



KPI 4.4.4/4.4.5: mFRR Platform: Monthly volumes of imports/exports per TSO (MWh)



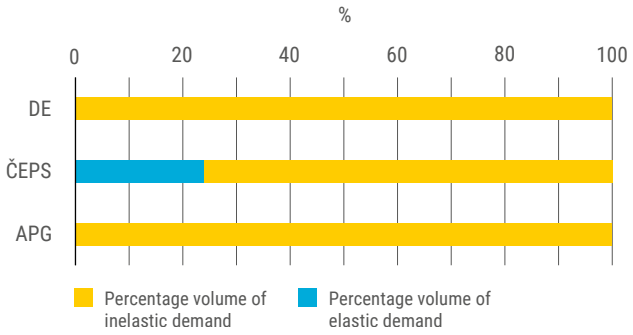
KPI 4.4.4/4.4.5: RR Platform: Monthly volumes of imports/exports per TSO



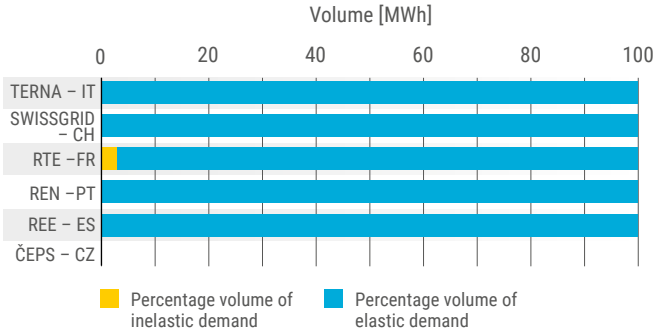
KPI 4.4.6: aFRR Platform: Repartition of the use of inelastic and elastic need per TSO (% of share of total demand that is being covered by elastic and inelastic demand)

Only inelastic needs used.

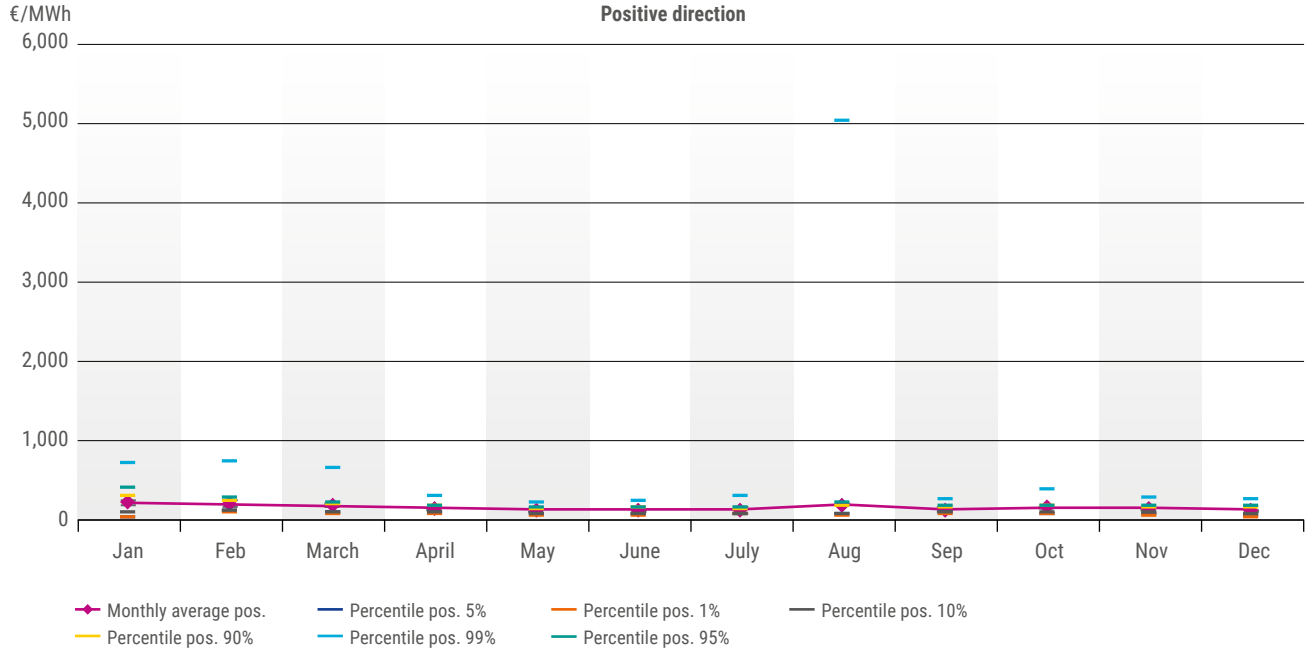
KPI 4.4.6: mFRR Platform: Repartition of the use of inelastic and elastic need per TSO (% of share of total demand that is being covered by elastic and inelastic demand)

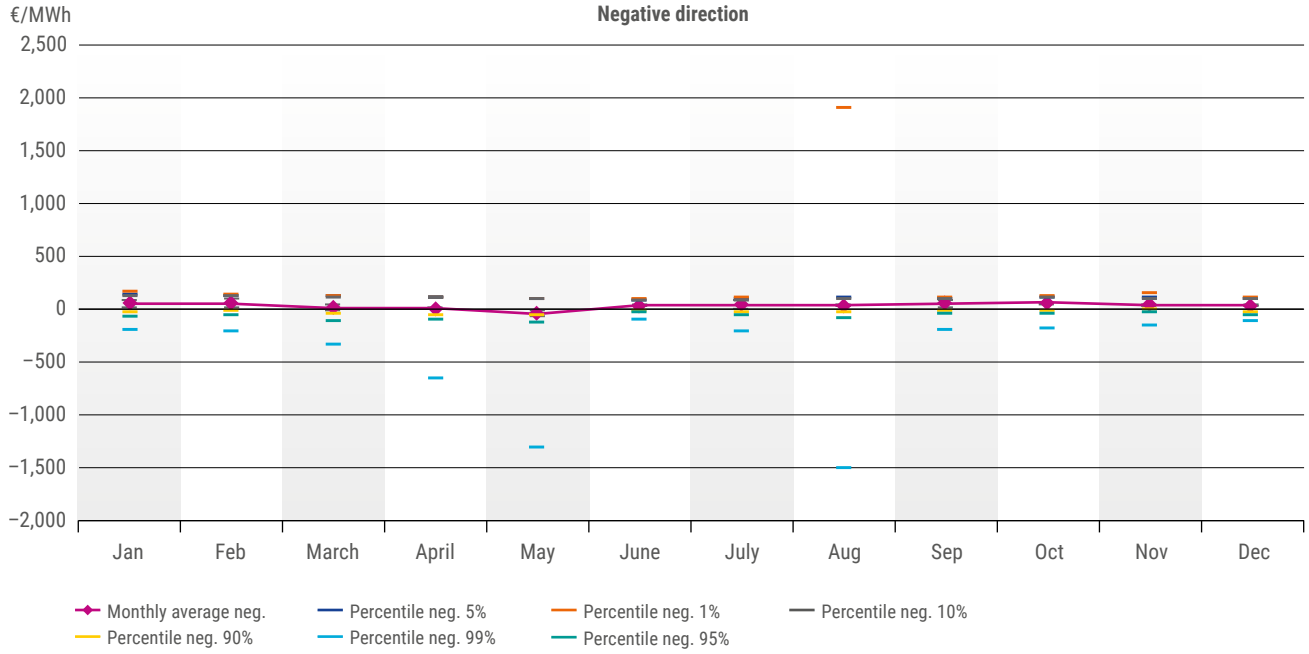


KPI 4.4.6: RR Platform: Repartition of the use of inelastic and elastic need per TSO (% of share of total demand that is being covered by elastic and inelastic demand)

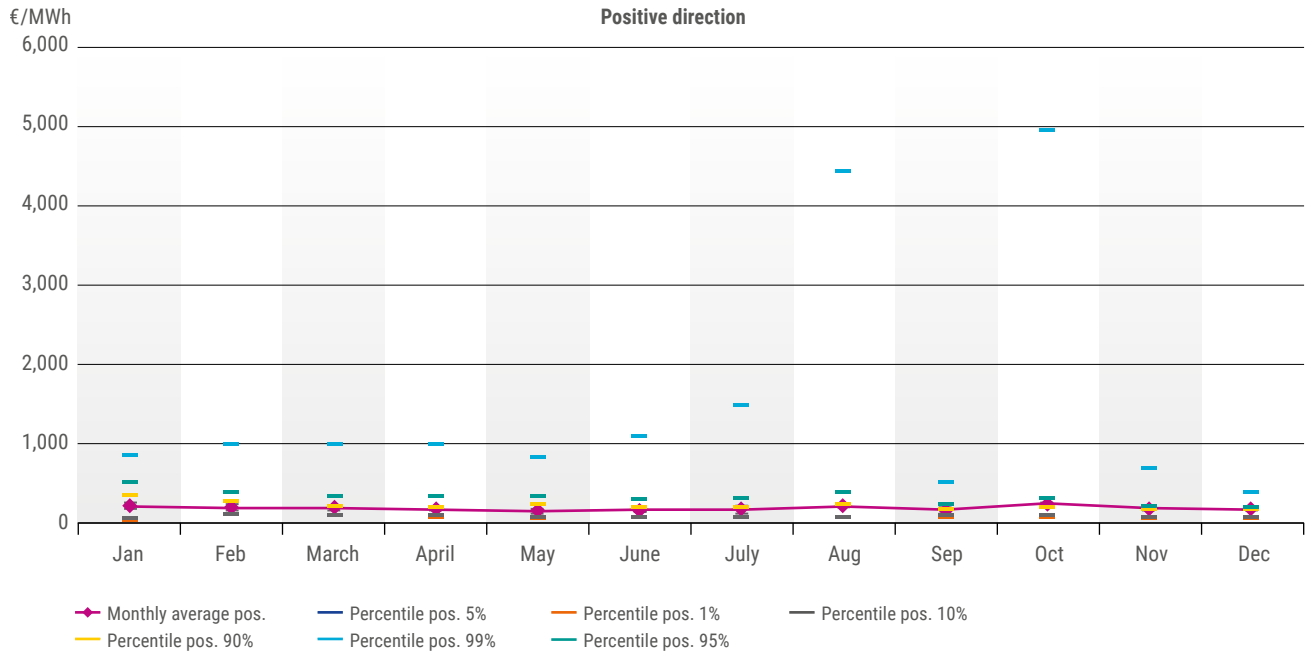


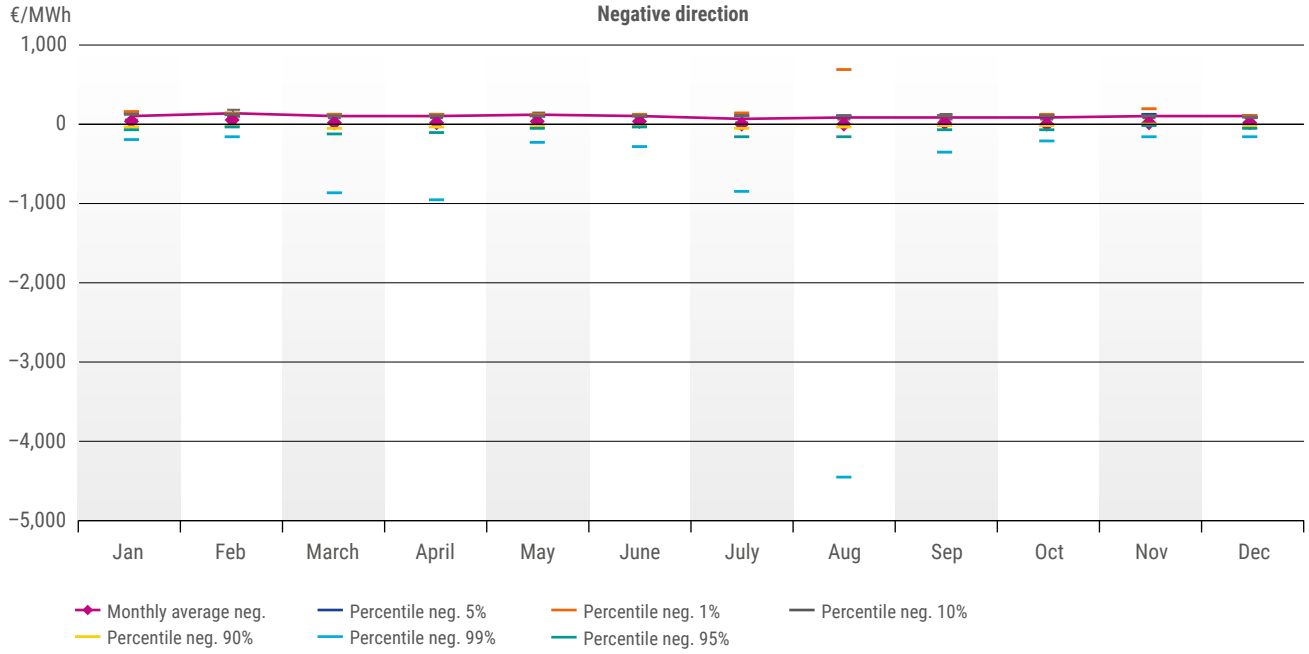
KPI 4.4.7: aFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – APG



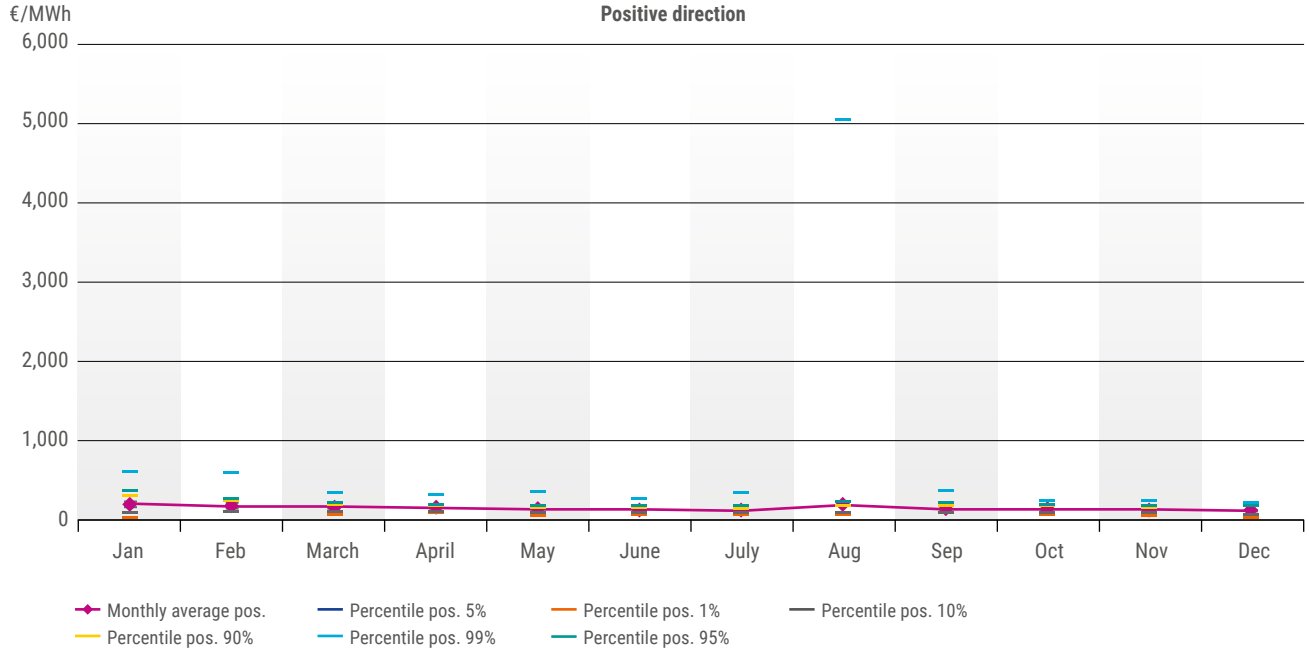


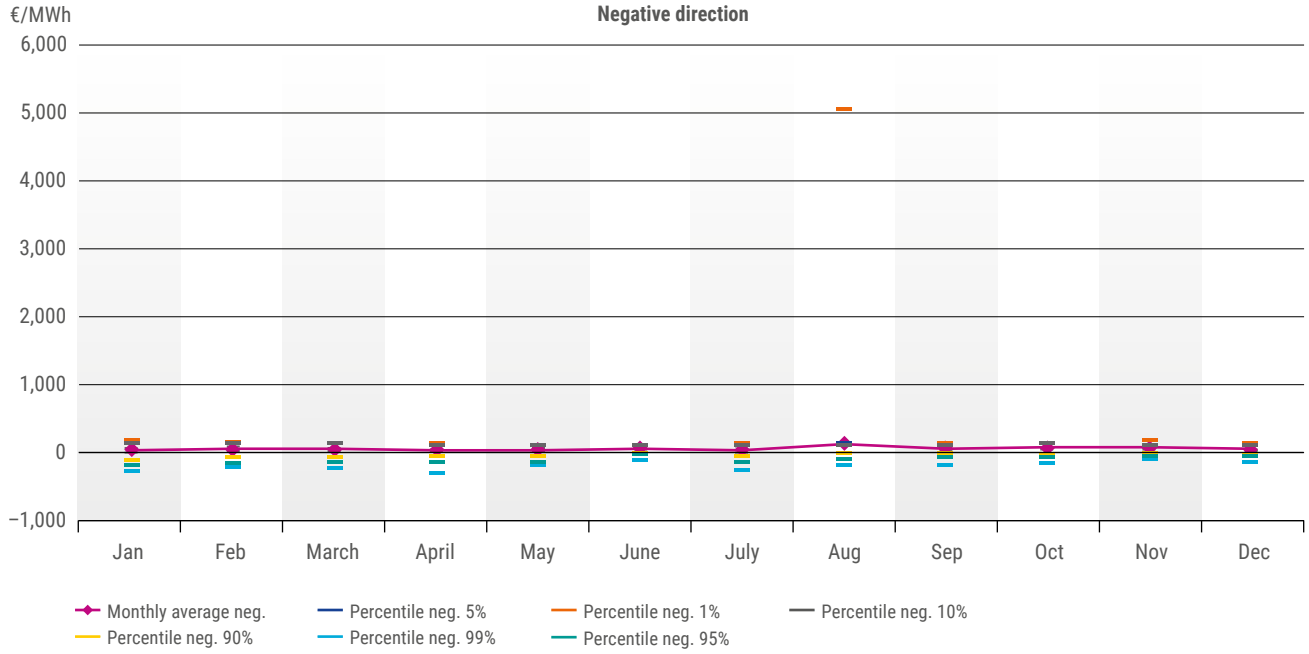
KPI 4.4.7: aFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – ČEPS



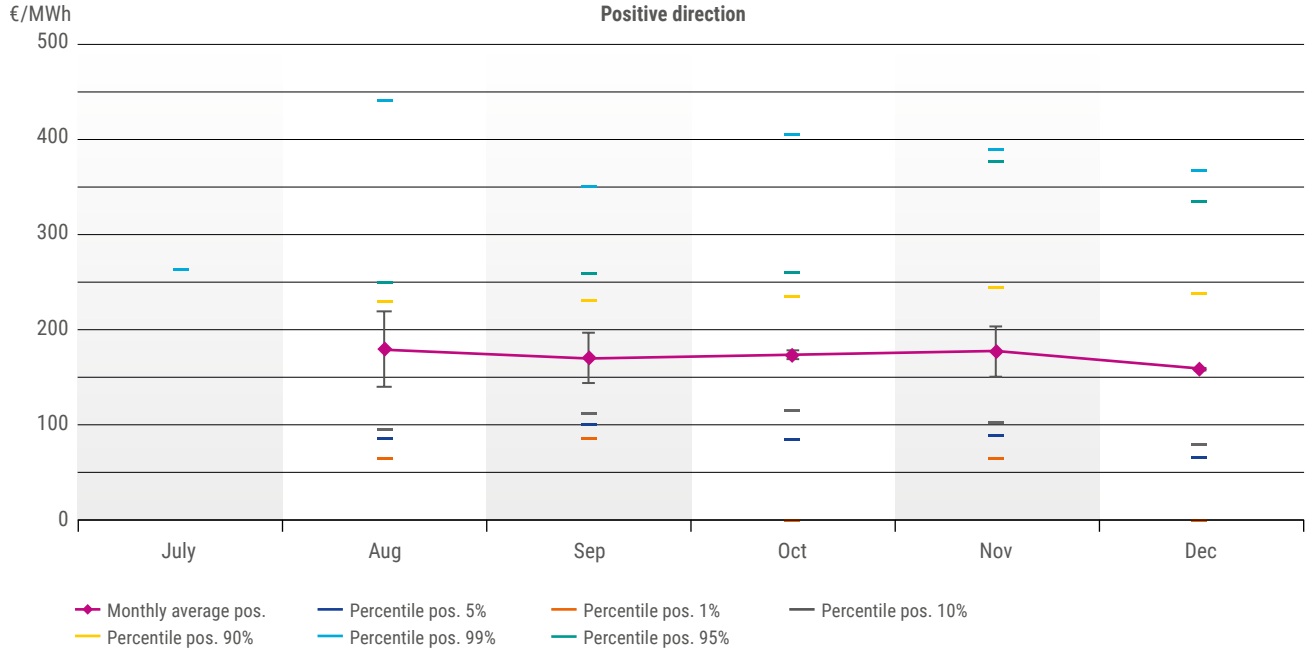


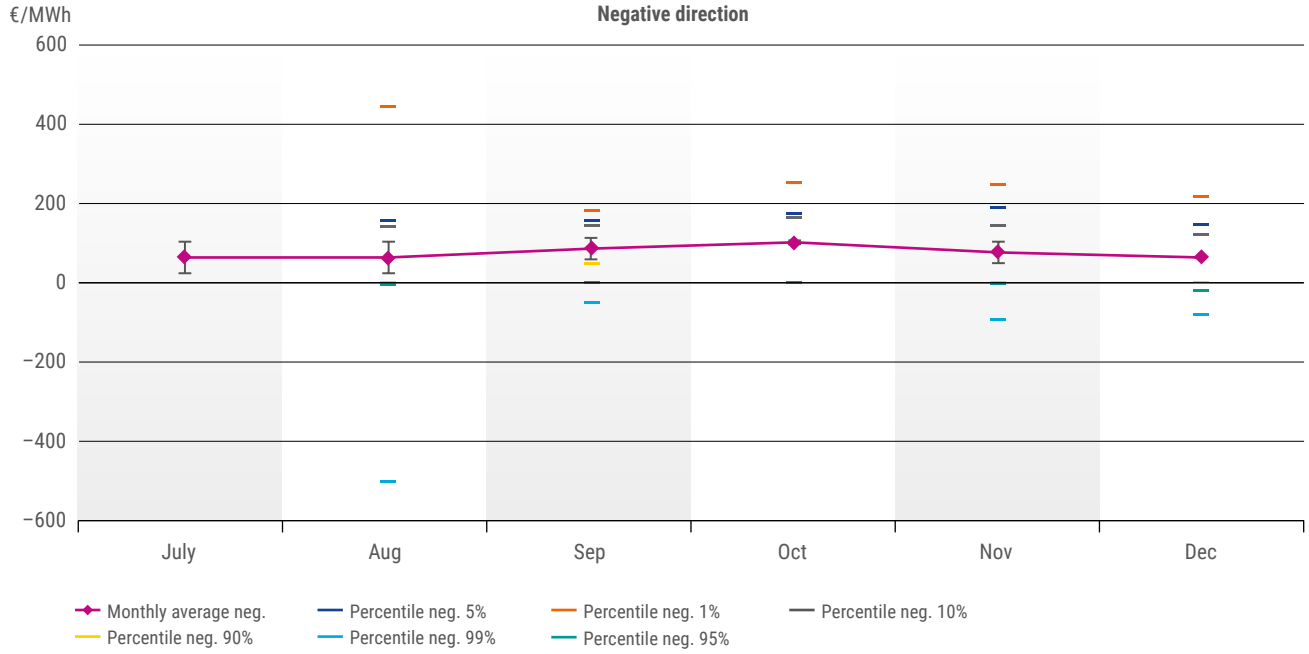
KPI 4.4.7: aFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – GERMAN TSOs



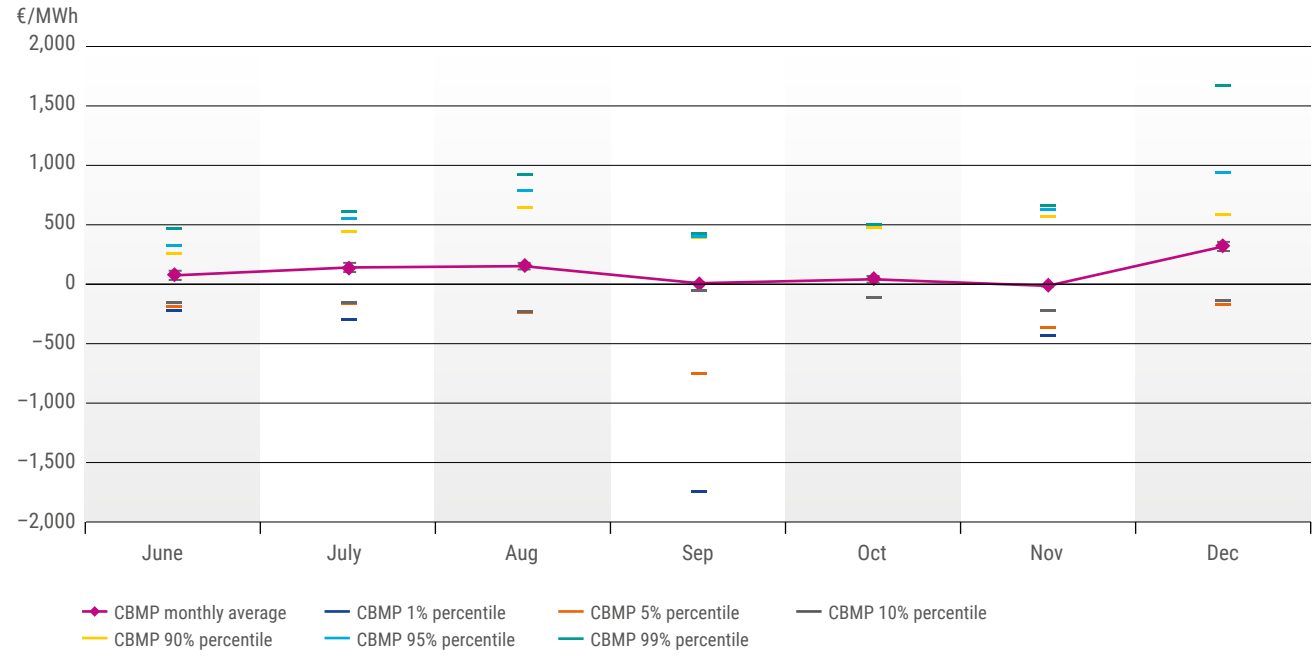


KPI 4.4.7: aFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – TERNA

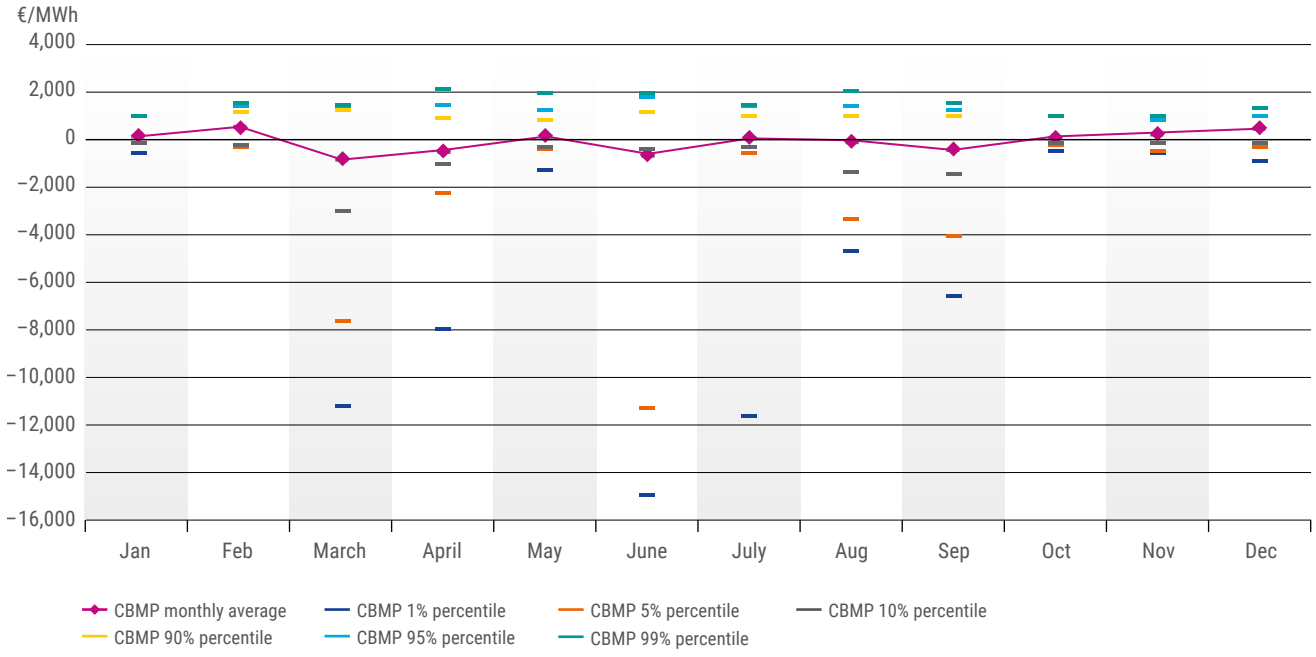




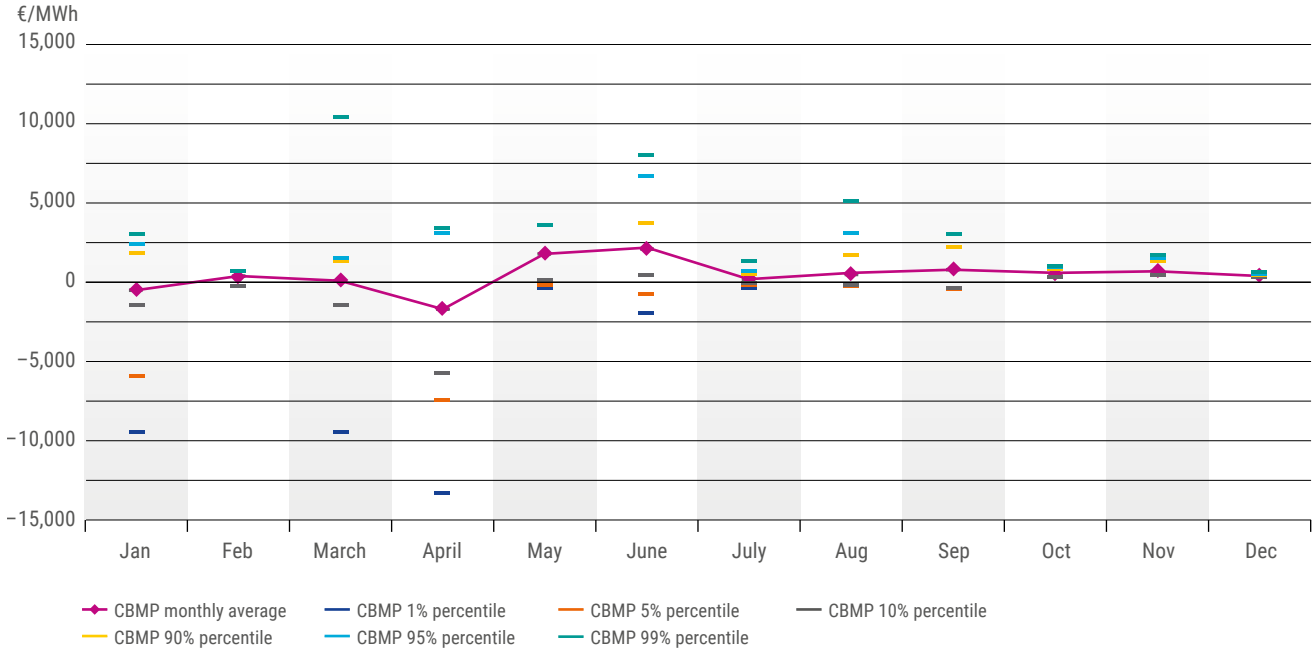
KPI 4.4.7: mFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – APG



KPI 4.4.7: mFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – ČEPS



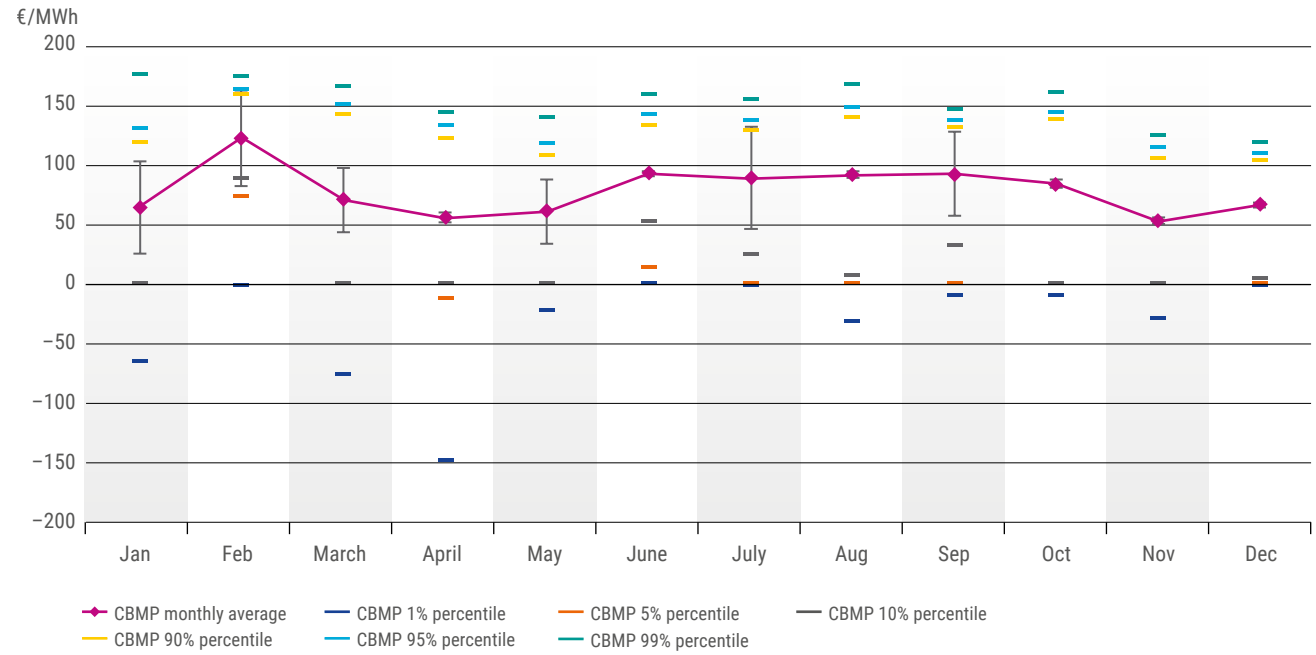
KPI 4.4.7: mFRR Platform: monthly average and standard deviation values and distribution of the CBMP per month – German TSOs



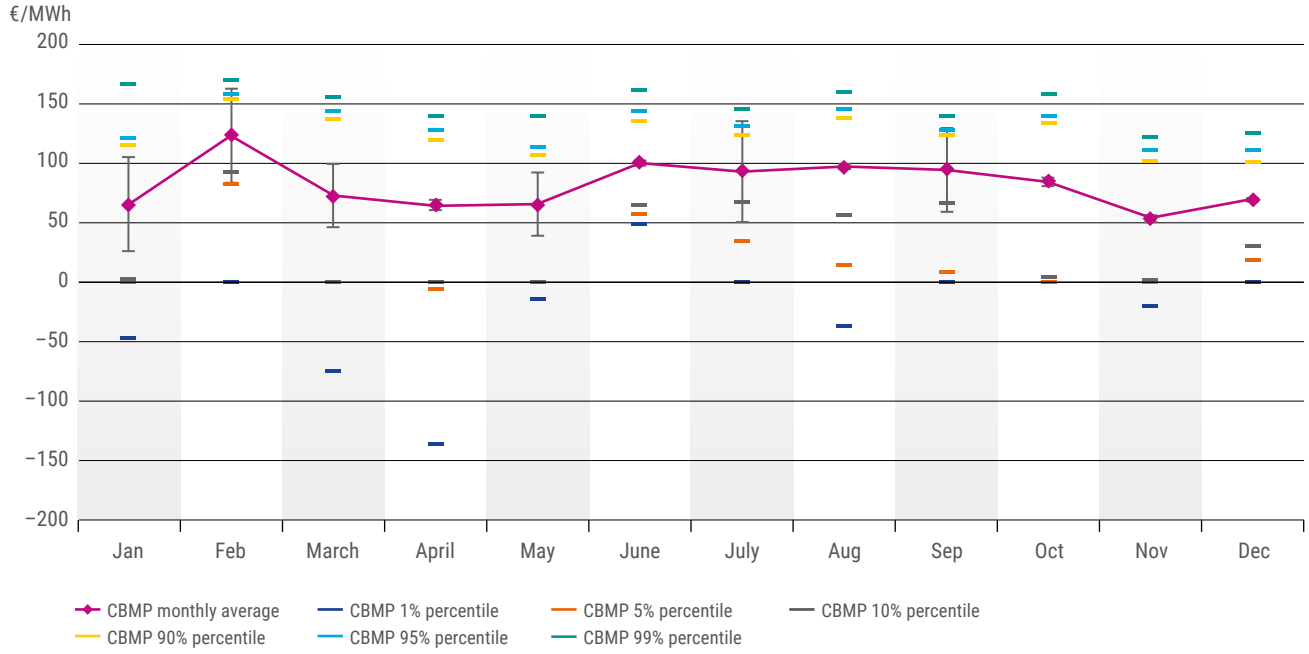
KPI 4.4.7: RR Platform: monthly average and standard deviation values and distribution of the CBMP per month – ČEPS

Disclaimer: CEPS did not receive bids from BSPs in RR product in 2023 nor had a demand on RR product.

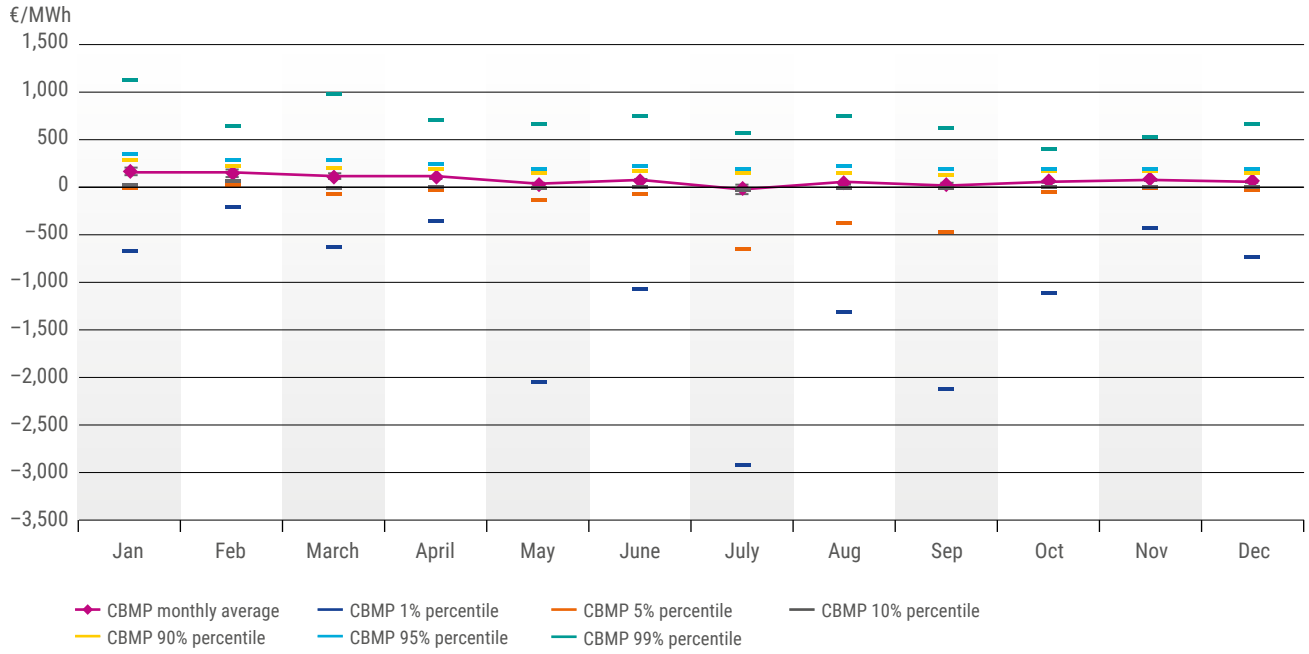
KPI 4.4.7: RR Platform: monthly average and standard deviation values and distribution of the CBMP per month – REE



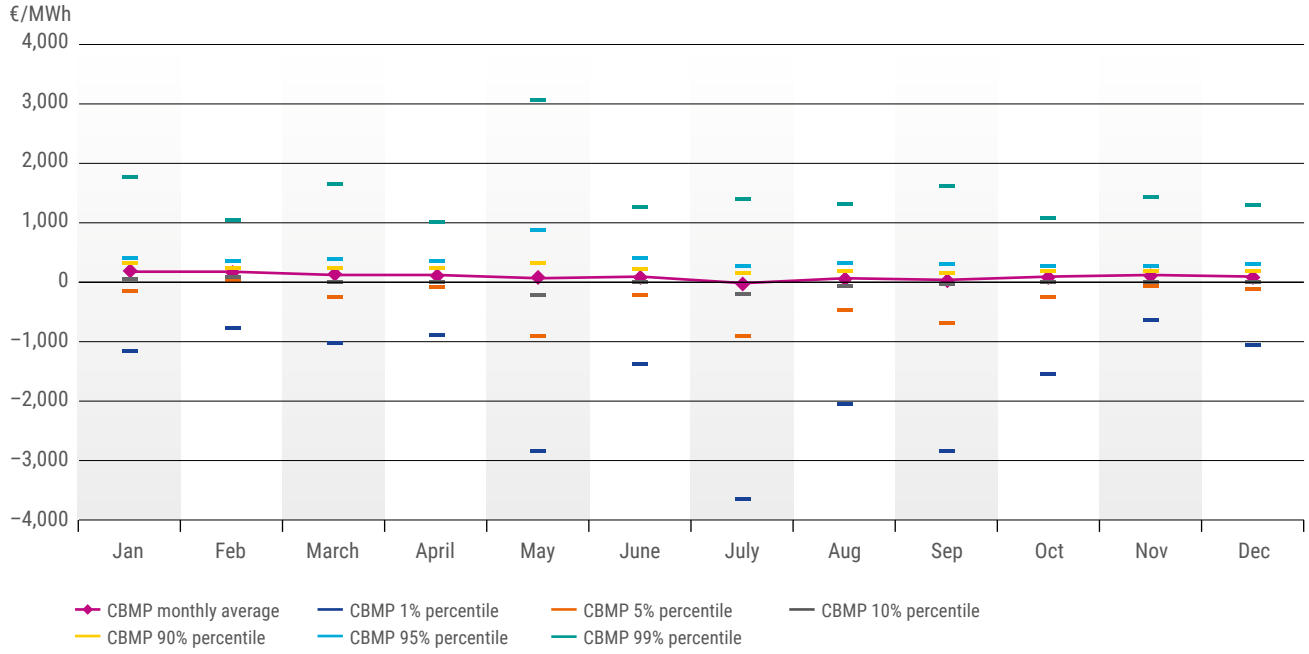
KPI 4.4.7: RR Platform: monthly average and standard deviation values and distribution of the CBMP per month – REN



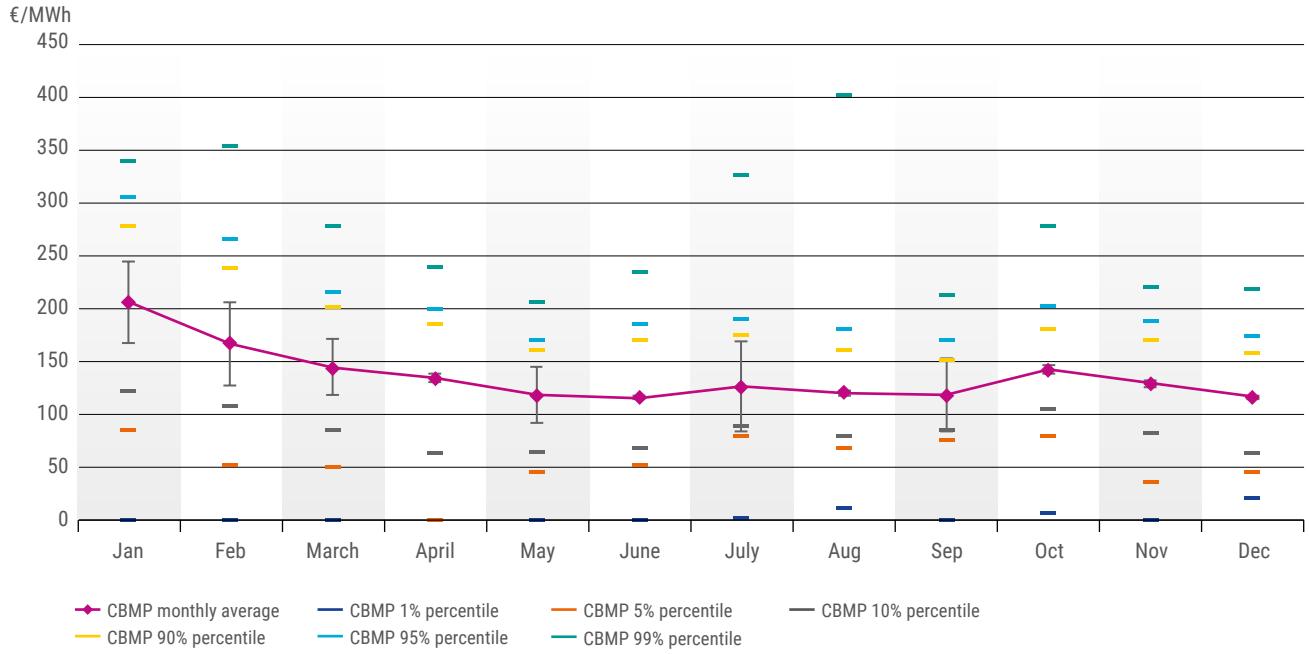
KPI 4.4.7: RR Platform: monthly average and standard deviation values and distribution of the CBMP per month – RTE



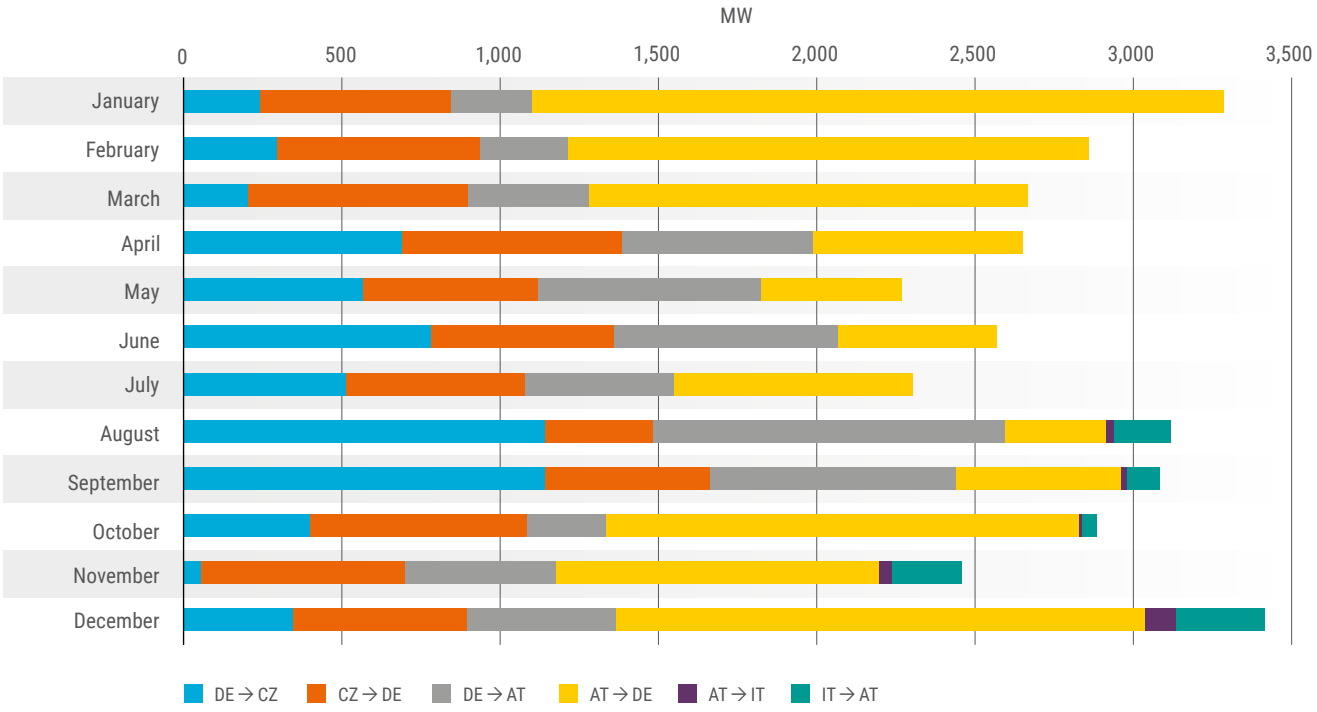
KPI 4.4.7: RR Platform: monthly average and standard deviation values and distribution of the CBMP per month – SWISSGRID



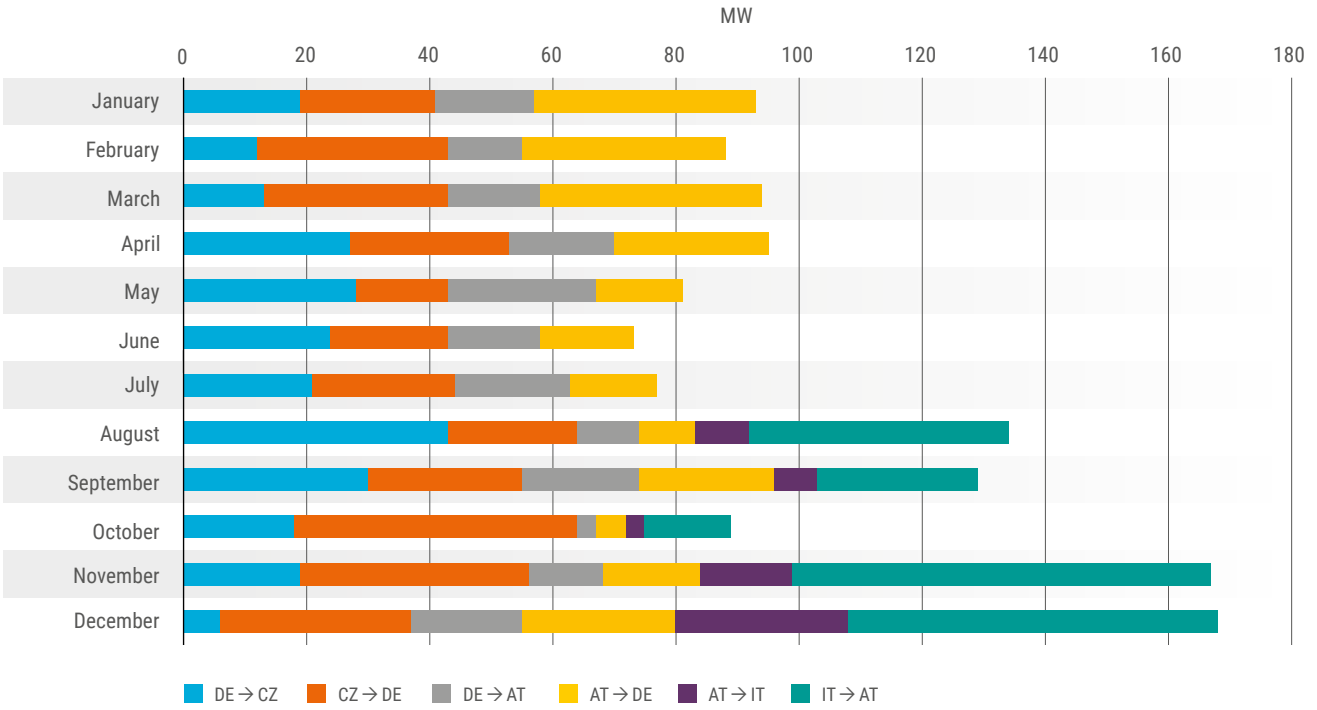
KPI 4.4.7: RR Platform: monthly average and standard deviation values and distribution of the CBMP per month – TERNA



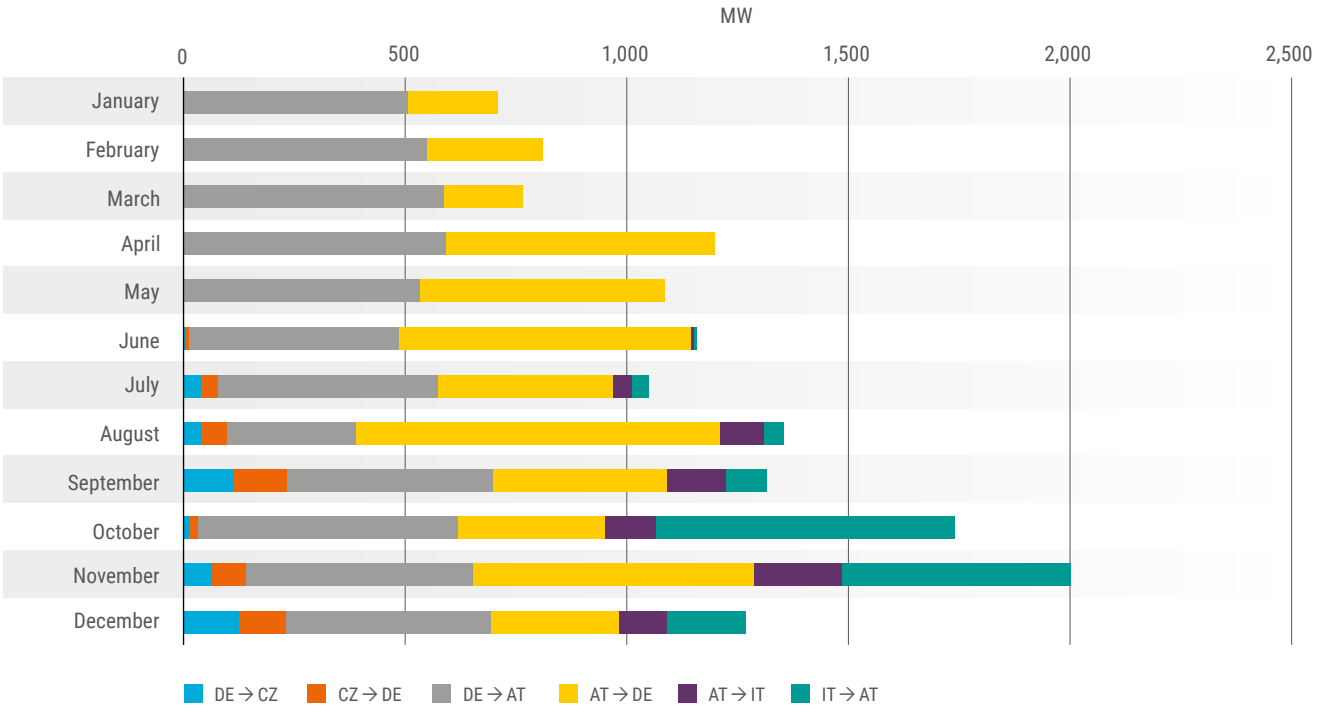
KPI 4.4.8: aFRR Platform: Monthly average value of the available CZC per BZB and per direction



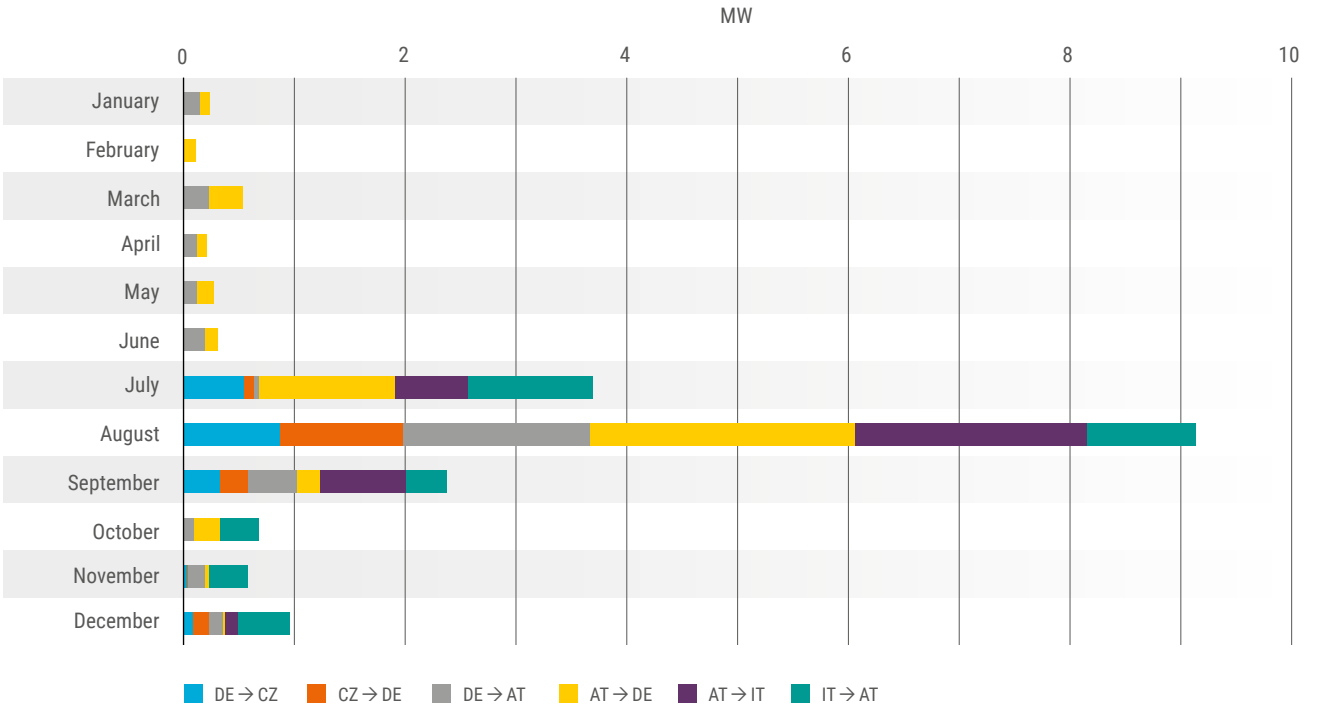
KPI 4.4.8: aFRR Platform: Monthly average value of the used CZC per BZB and per direction



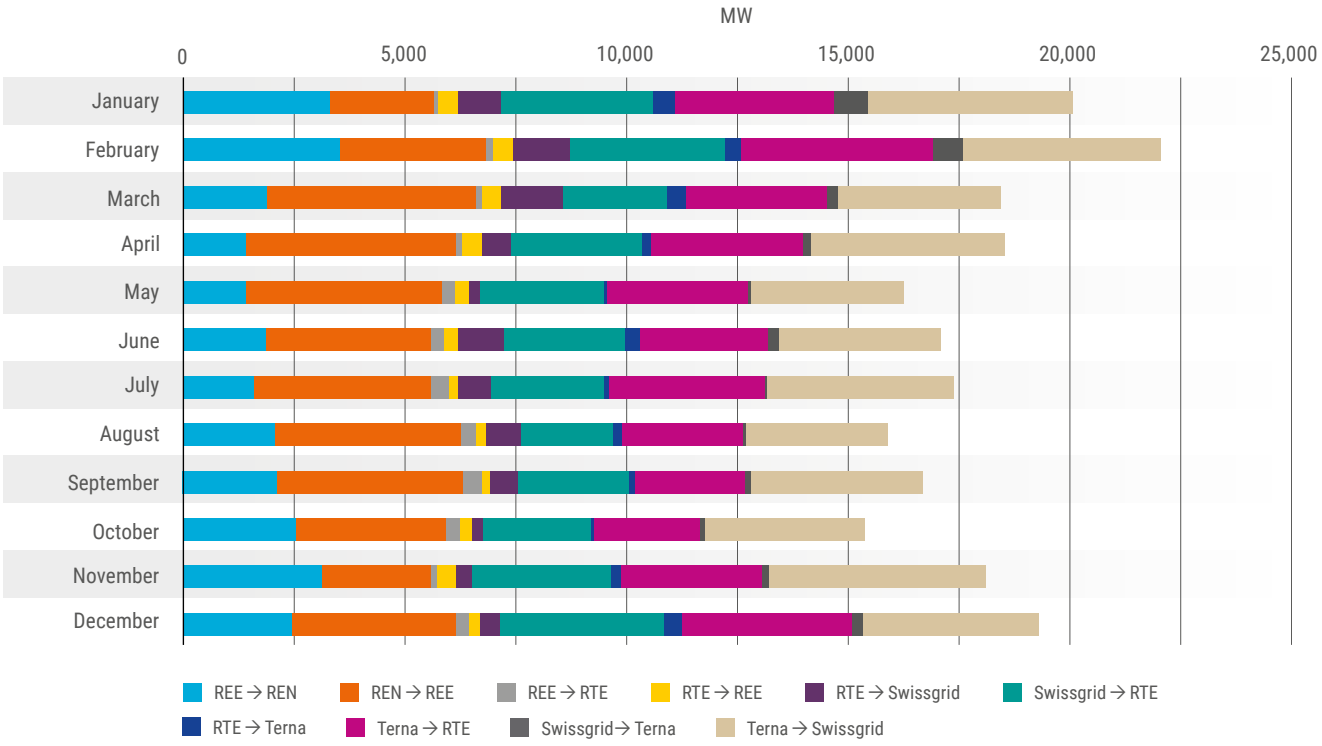
KPI 4.4.8: mFRR Platform: Monthly average value of the available CZC per BZB and per direction



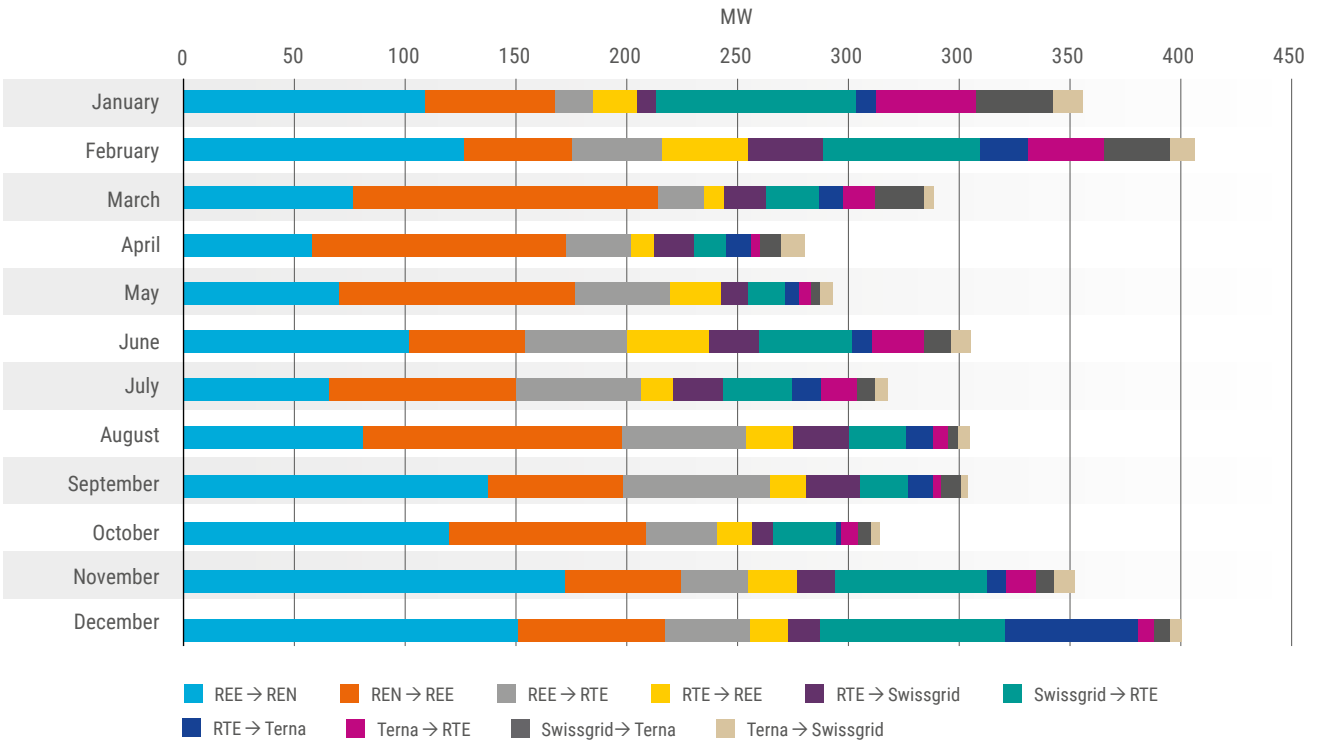
KPI 4.4.8: mFRR Platform: Monthly average value of the used CZC per BZB and per direction



KPI 4.4.8: RR Platform: Monthly average value of the available CZC per BZB and per direction[10]



KPI 4.4.8: RR Platform: Monthly average value of the used CZC per BZB and per direction[11]

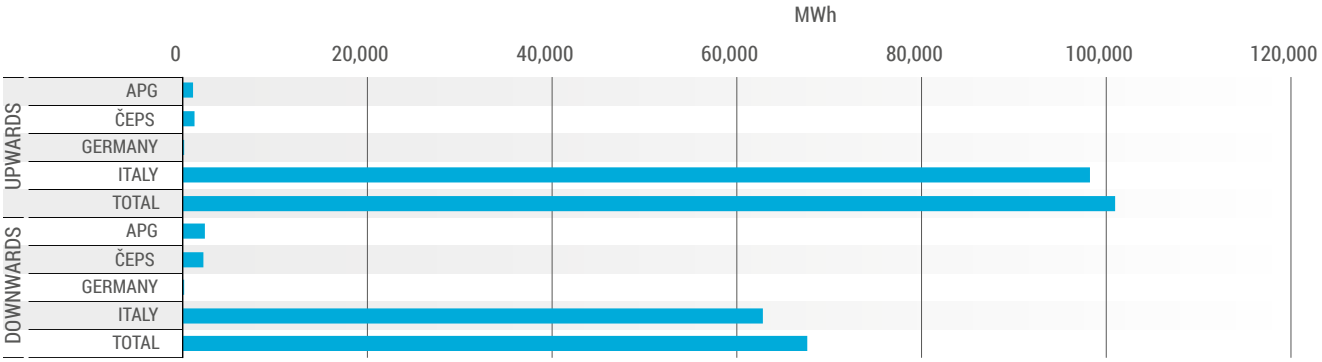


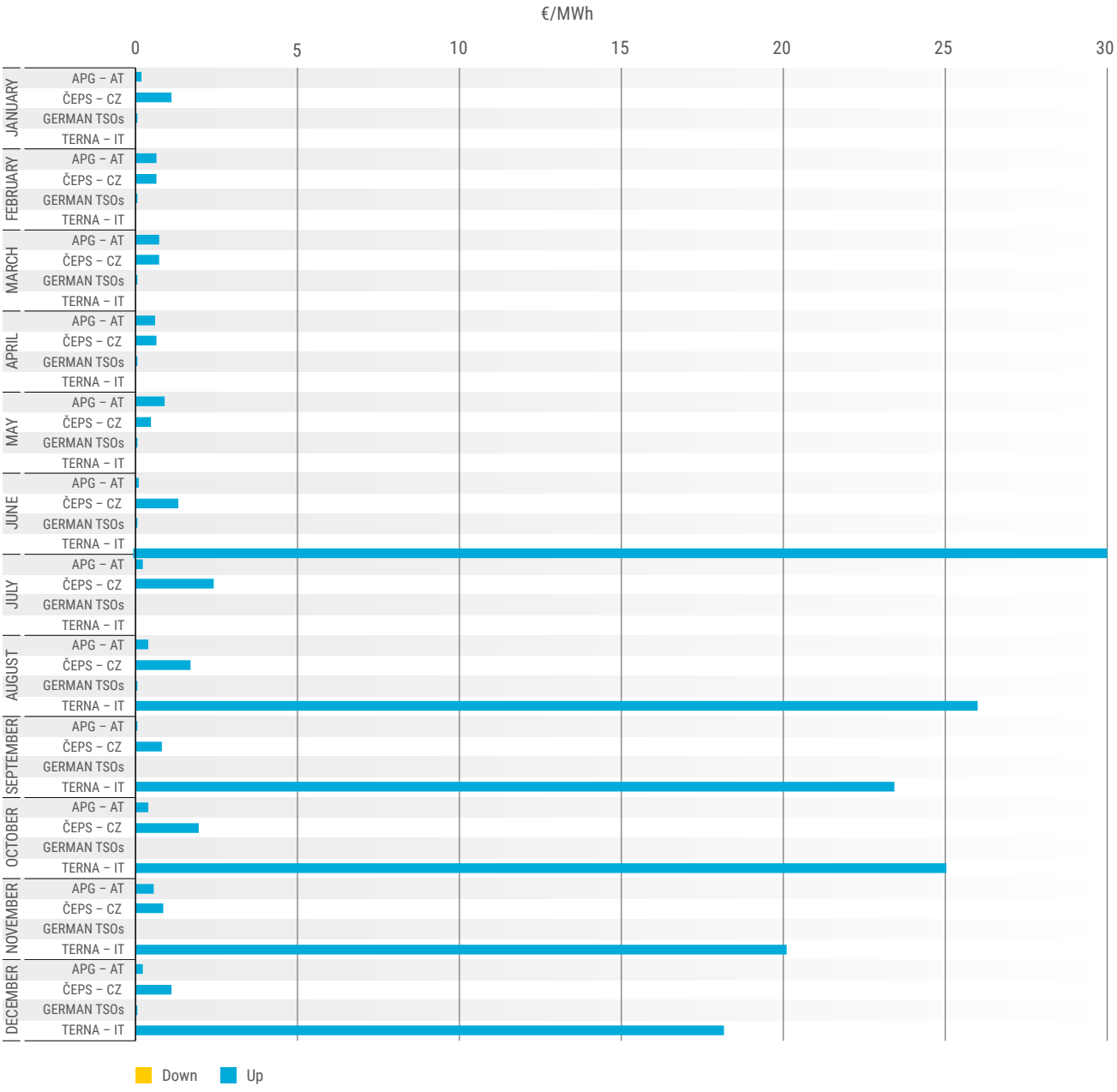
10+11 The maximum RR flow on the France–Spain border is limited by RTE to maintain Power System reliability. RR flows are limited to a maximum of 300MW in the direction of the scheduled flows and to a maximum of 500MW in the opposite direction of the scheduled flows.

KPI 4.4.9: Monthly average value of the number of uncongested areas per platform

Average value of uncongested LFC areas	TERRE (max 5)	PICASSO (max 4)	MARI (max 3)
January	4.56	1.55	1.03
February	4.84	1.54	1.20
March	4.26	1.49	1.12
April	4.10	1.55	1.06
May	4.21	1.56	1.03
June	4.33	1.55	1.33
July	4.40	1.89	1.56
August	4.66	2.39	1.23
September	4.11	2.33	1.41
October	3.96	2.58	1.37
November	4.26	2.26	1.89
December	4.35	2.25	1.93

KPI 4.4.10: aFRR Platform: Number of occurrences (% of MTU) of unsatisfied inelastic need / TSO and its volume





KPI 4.4.10: mFRR Platform: Number of occurrences (% of MTU) of unsatisfied inelastic need / TSO and its volume

No unsatisfied inelastic needs have been reported.

KPI 4.4.10: RR Platform: Number of occurrences (% of MTU) of unsatisfied inelastic need /TSO and its volume

TERRE		
	% of MTU of unsatisfied inelastic need	Volume of unsatisfied inelastic need (MWh)
RTE	5 %	1,775

KPI 4.4.11: Incident Overview – None.

PICASSO Platform: The operational experience with aFRR platform operation and the reports established in accordance with the first amendment of the Pricing Methodology show high activations costs and a significant number of aFRR price incidents (meaning that the aFRR CBMP exceeds the threshold of 7,500 €/MWh). The observed price incidents mostly occur only for a small time ≤ 1 min.

TERRE Platform: Only one price incident occurred in the platform due to an unlikely configuration of the market on 30 July and four critical incidents due to technical issues.

4.5 The possible inefficiencies and distortions on balancing markets

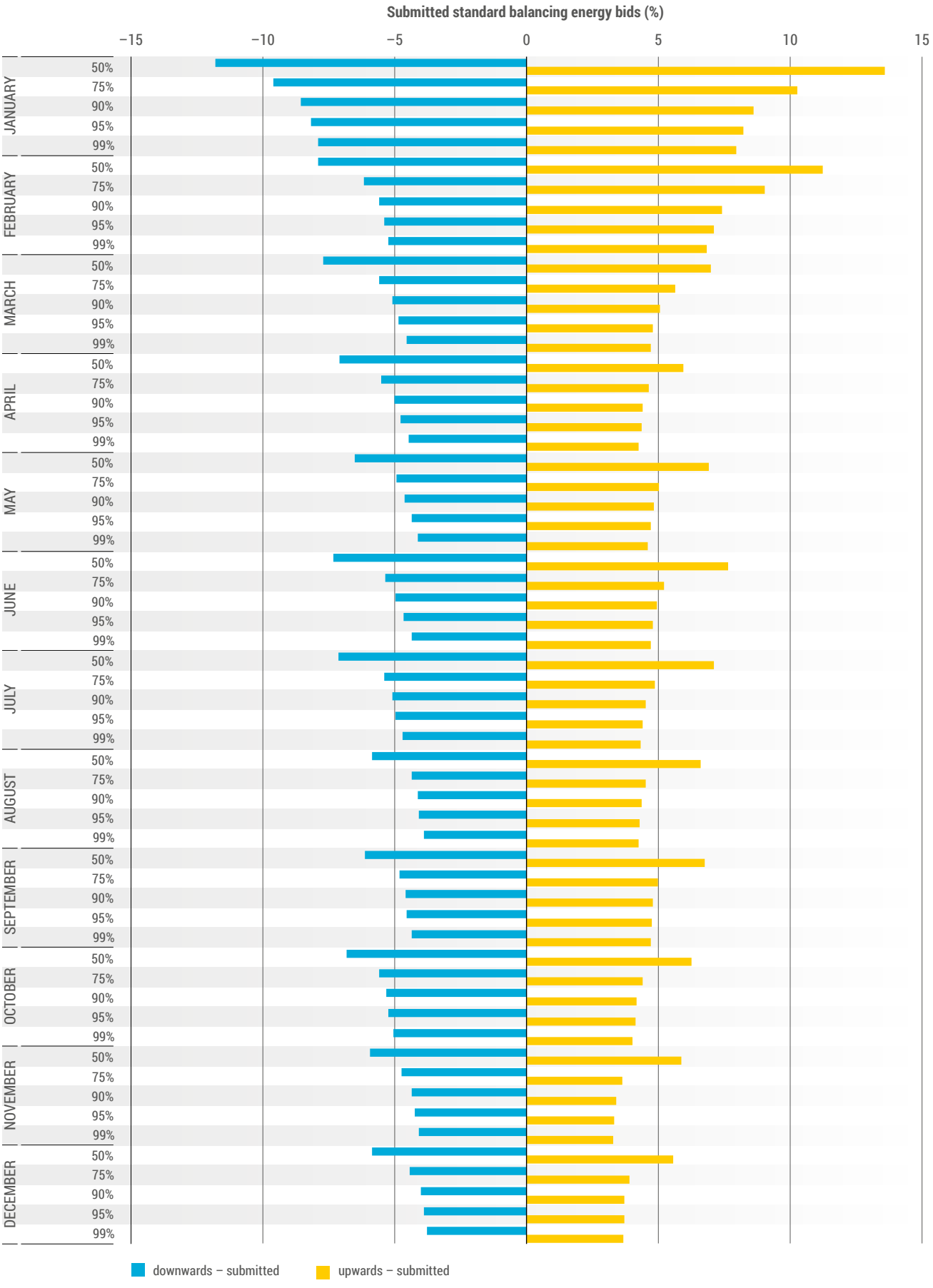
Definition	This indicator assesses the following data for each balancing platform and for each month: • CZC available and used by the balancing energy platform. Each balancing energy platform needs to report four values per BZB: the initially available CZC per border and direction, factoring in remaining capacity after consecutive preceding processes affecting each border (such as the last Intra-Day (ID) market, TERRE/RR market, and MARI market), as well as the CZC utilised per border and direction. The monthly average values per MTU are to be calculated for each balancing energy platform per each BZB in both directions • The average percentage of both submitted and activated standard balancing energy bids per product and per direction with prices higher than 50 %, 75 %, 90 %, 95 % and 99 % of the upper or lower transitory price limit • The volume-weighted average price (€/MWh) of the 5 % most expensive submitted standard energy bids for each European balancing platform per direction and per participating TSO
Legal reference	Article 59(4)(f) of the EB Regulation After the going operational of the approved IFs for the European platforms pursuant to Articles 19(5), 20(6), 21(6) and 22(5) of the EB Regulation. Further changes shall be done in accordance with Article 59(9) of the EB Regulation.
Time reference	Yearly with monthly granularity

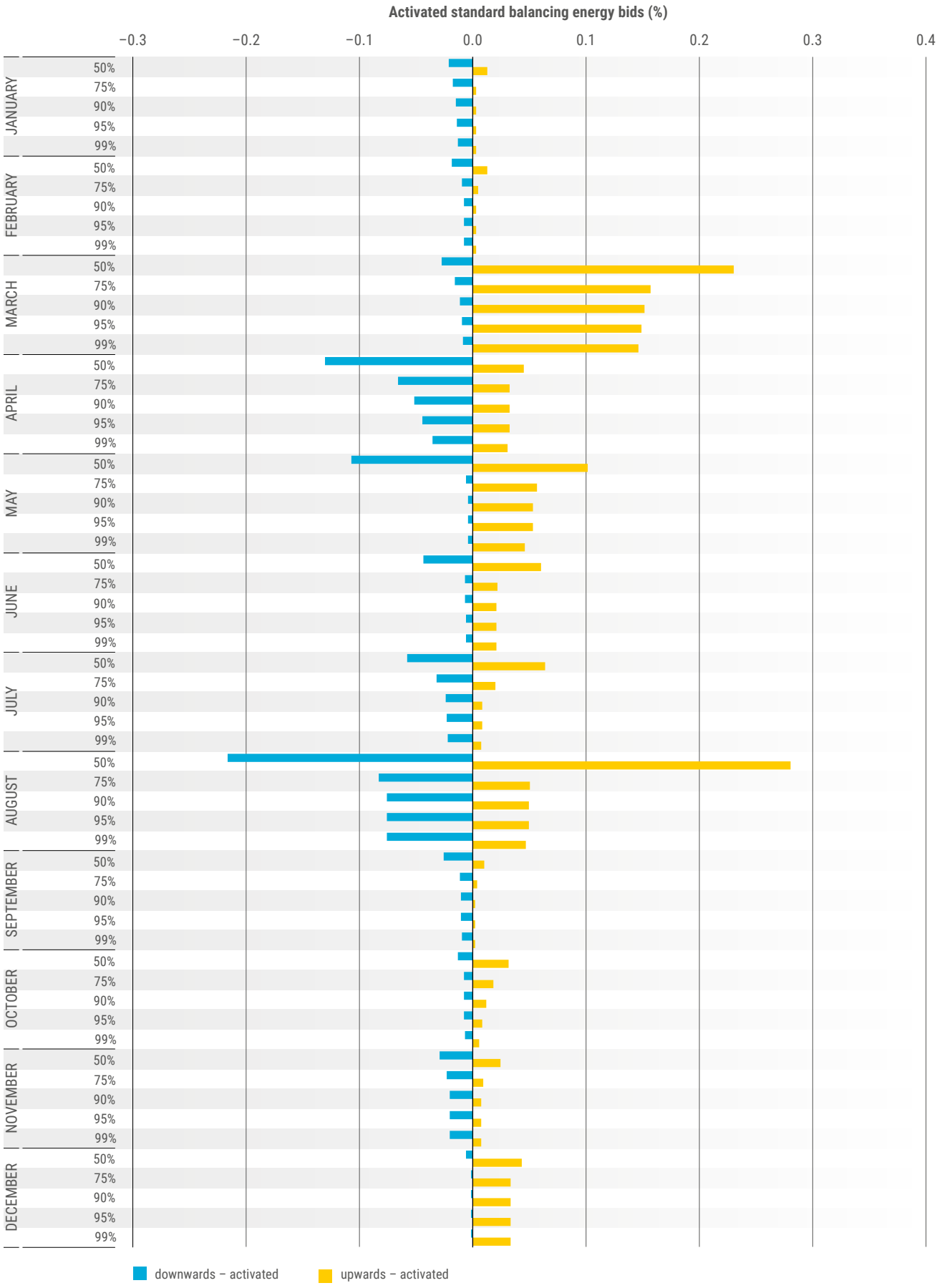
Table 9 – Indicator 4.5 on the possible inefficiencies and distortions on balancing markets

KPI 4.5.1: Cross-zonal capacity available and used

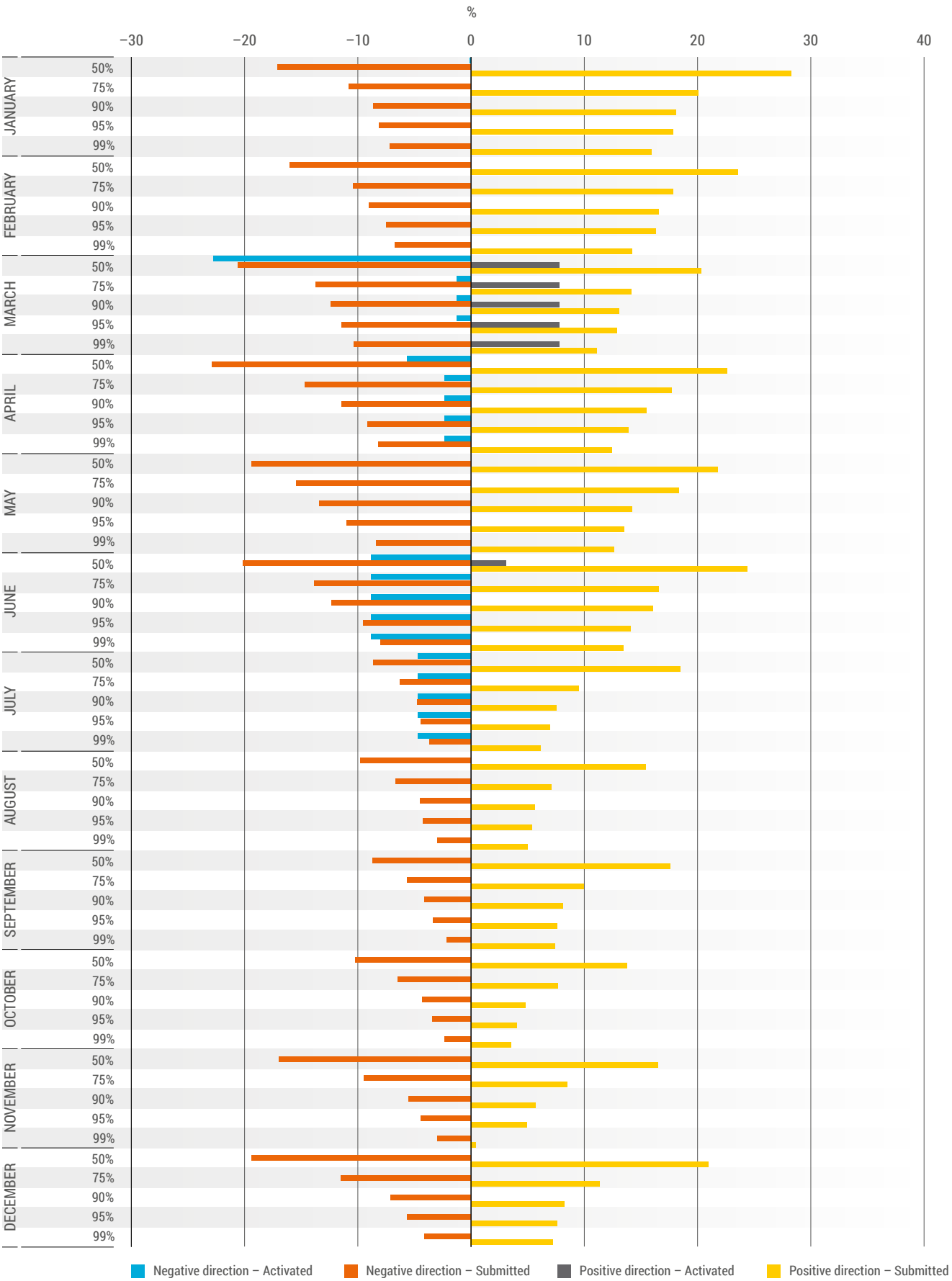
This information is already provided under KPI 4.4.8

KPI 4.5.2: aFRR platform: the average percentage of both submitted and activated standard balancing energy bids per product and per direction with prices higher than 50%, 75%, 90%, 95% and 99% of the upper or lower transitory price limit

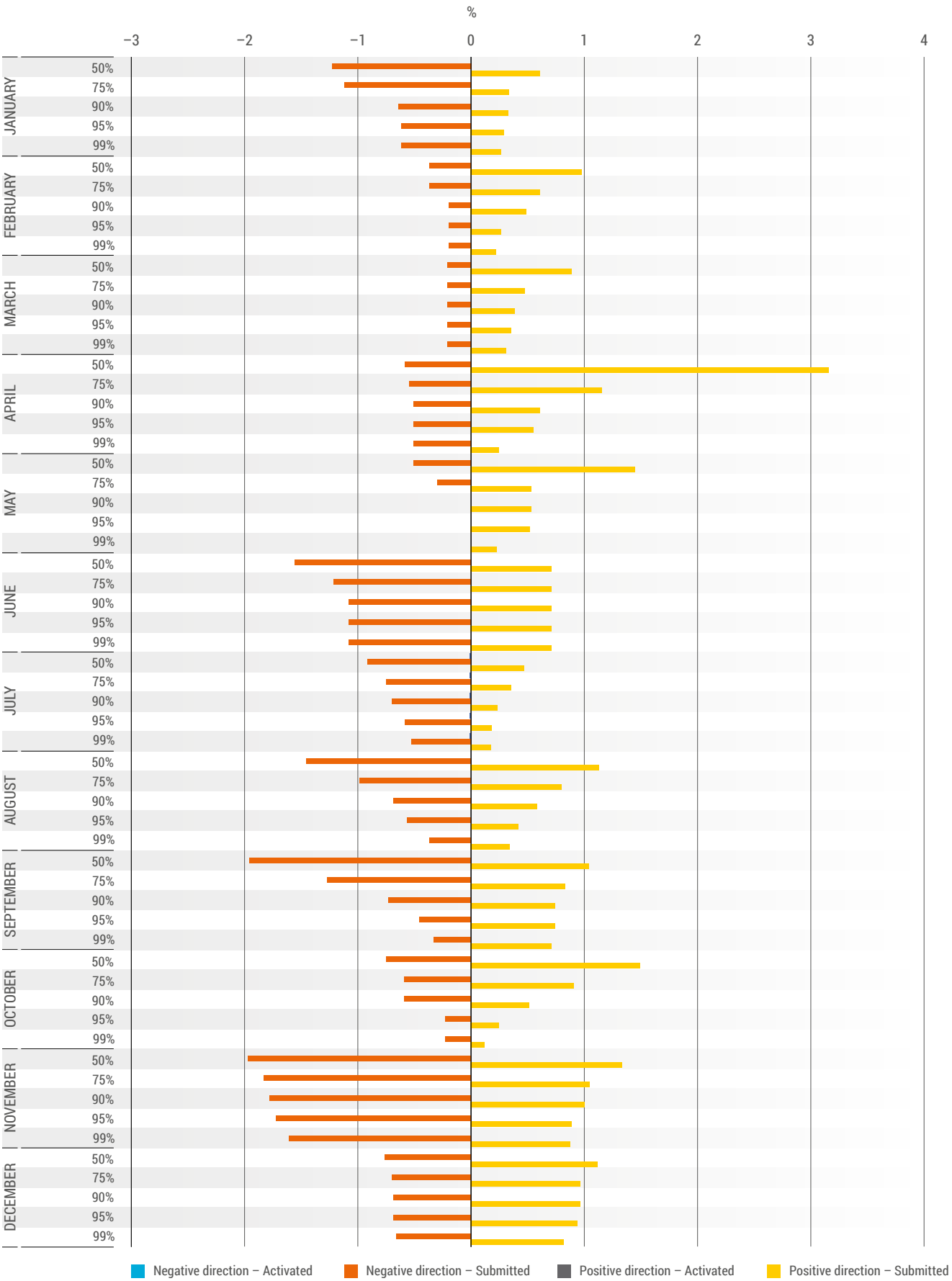



Activated standard balancing energy bids (%)
−0.3
−0.2
−0.1
0.0
0.1
0.2
0.3
0.4
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
50%
75%
90%
95%
99%
downwards – activated
upwards – activated

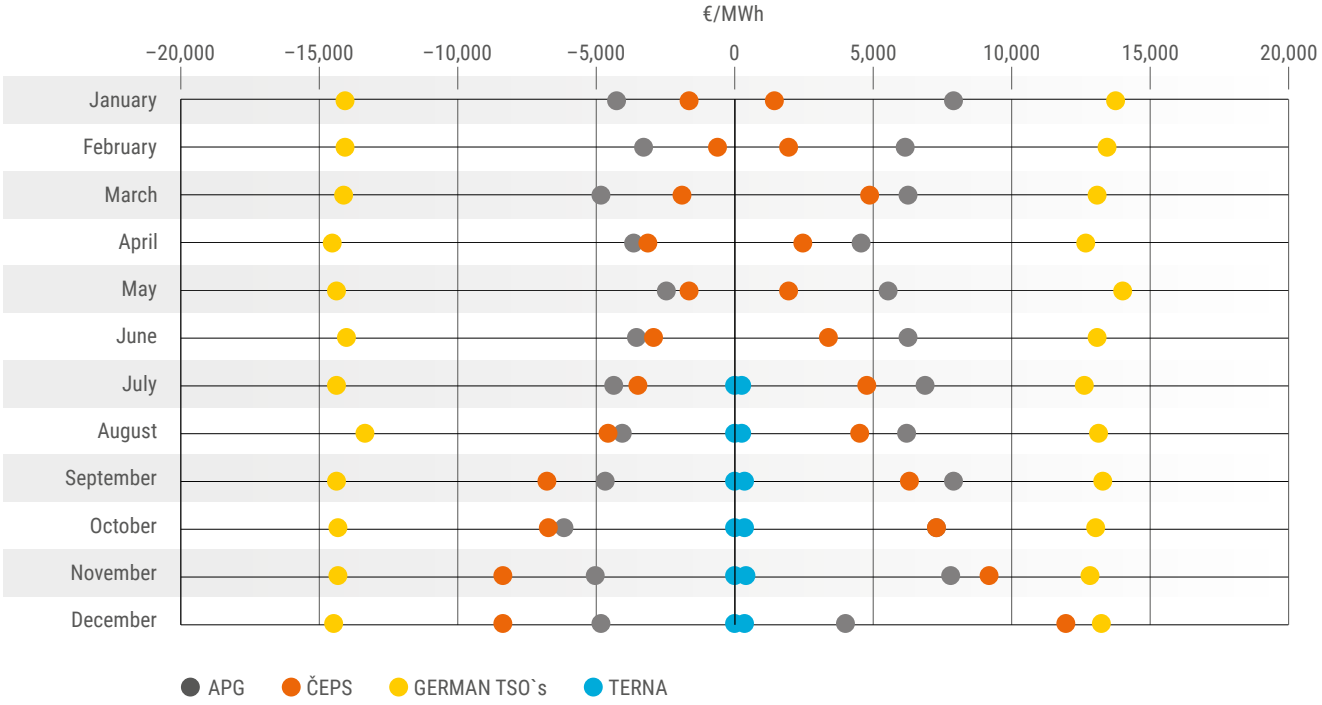
KPI 4.5.2: mFRR platform: the average percentage of both submitted and activated standard balancing energy bids per product and per direction with prices higher than 50%, 75%, 90%, 95% and 99% of the upper or lower transitory price limit



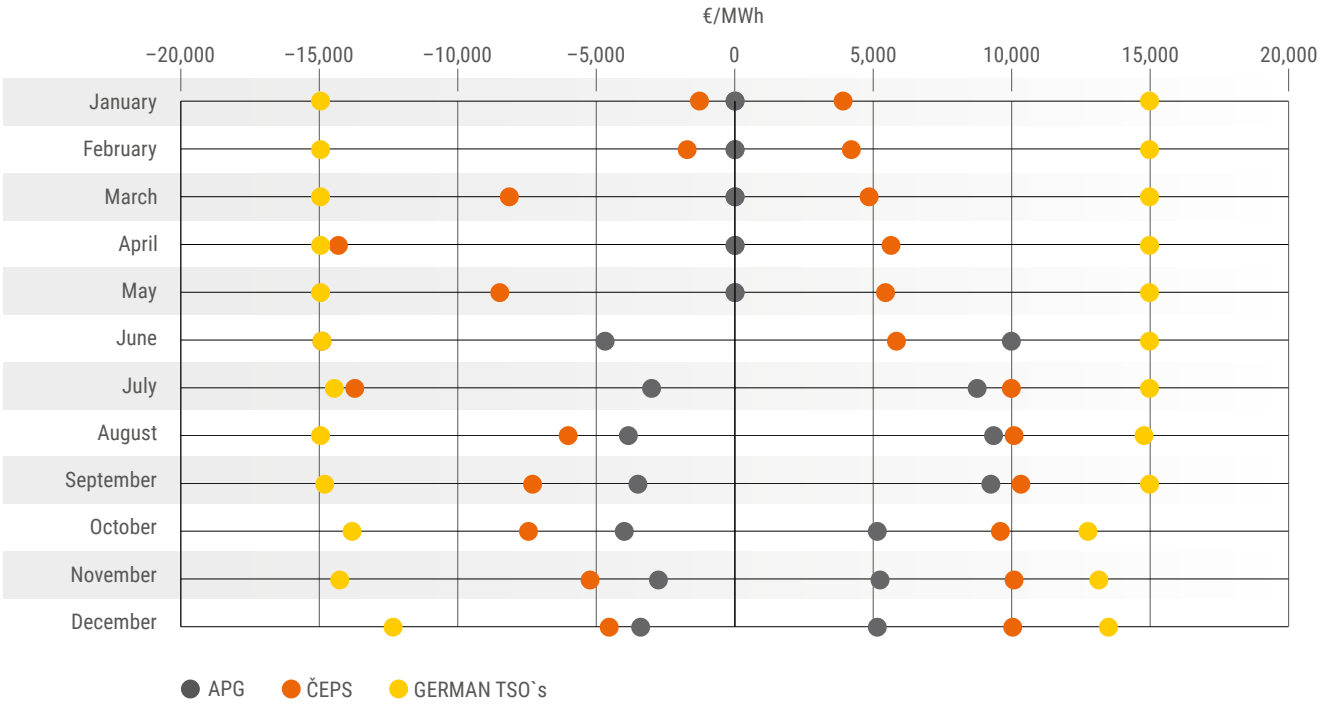
KPI 4.5.2: RR platform: the average percentage of both submitted and activated standard balancing energy bids per product and per direction with prices higher than 50%, 75%, 90%, 95% and 99% of the upper or lower transitory price limit



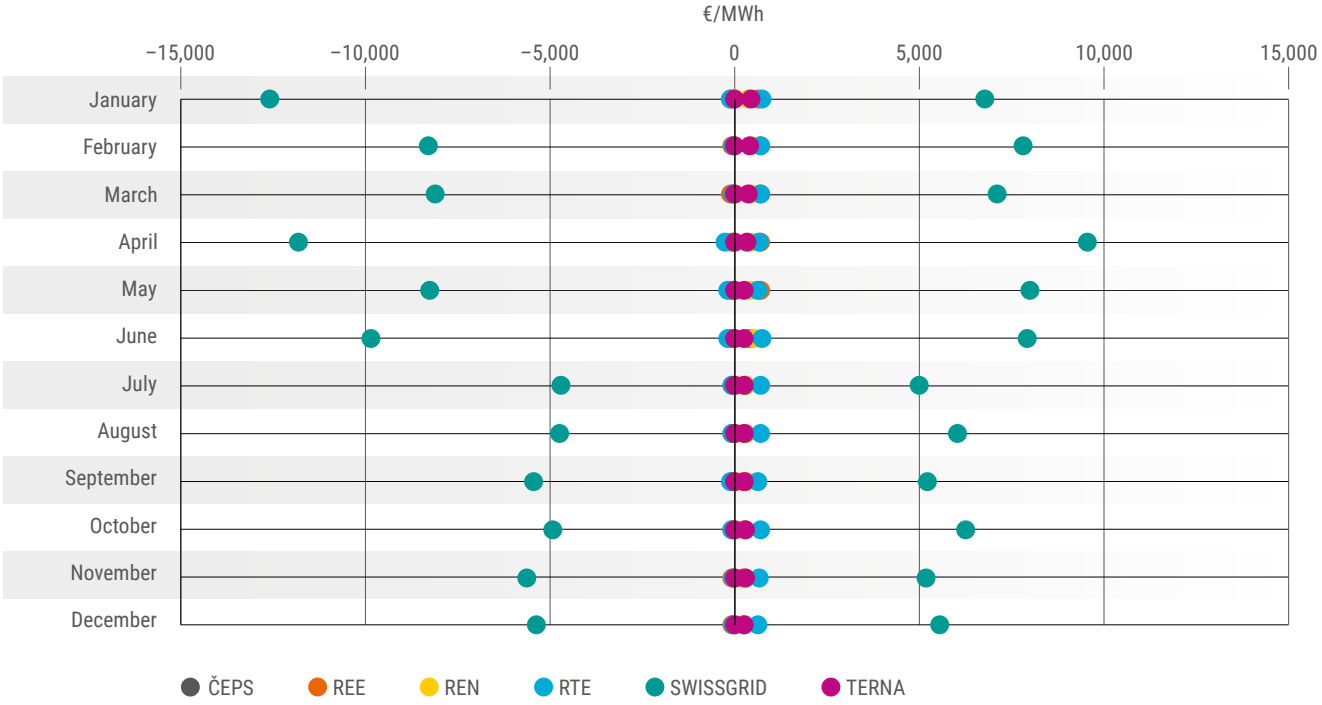
KPI 4.5.3: aFRR platform: Monthly volume weighted average price of the last (most expensive) 5% of the volume of submitted standard balancing energy bids per direction and per participating TSO: downward direction to the left side, upward direction to the right side



KPI 4.5.3: mFRR platform: monthly volume weighted average price of the last (most expensive) 5% of the volume of submitted standard balancing energy bids per direction and per participating TSO: downward direction to the left side, upward direction to the right side



KPI 4.5.3: RR platform: monthly volume weighted average price of the last (most expensive) 5% of the volume of submitted standard balancing energy bids per direction and per participating TSO: downward direction to the left side, upward direction to the right side



4.6 The efficiency losses due to specific products

Definition	Not reported
Legal reference	Article 59(4)(g) of the EB Regulation
Time reference	Not applicable

Table 10 – Indicator 4.6 on the efficiency losses due to specific products

TSOs consider that specific products can be used locally only when approved by its NRA according to the conditions specified by Art. 26(1)(f) of the EB Regulation, hence there is no significant loss to be reported on.

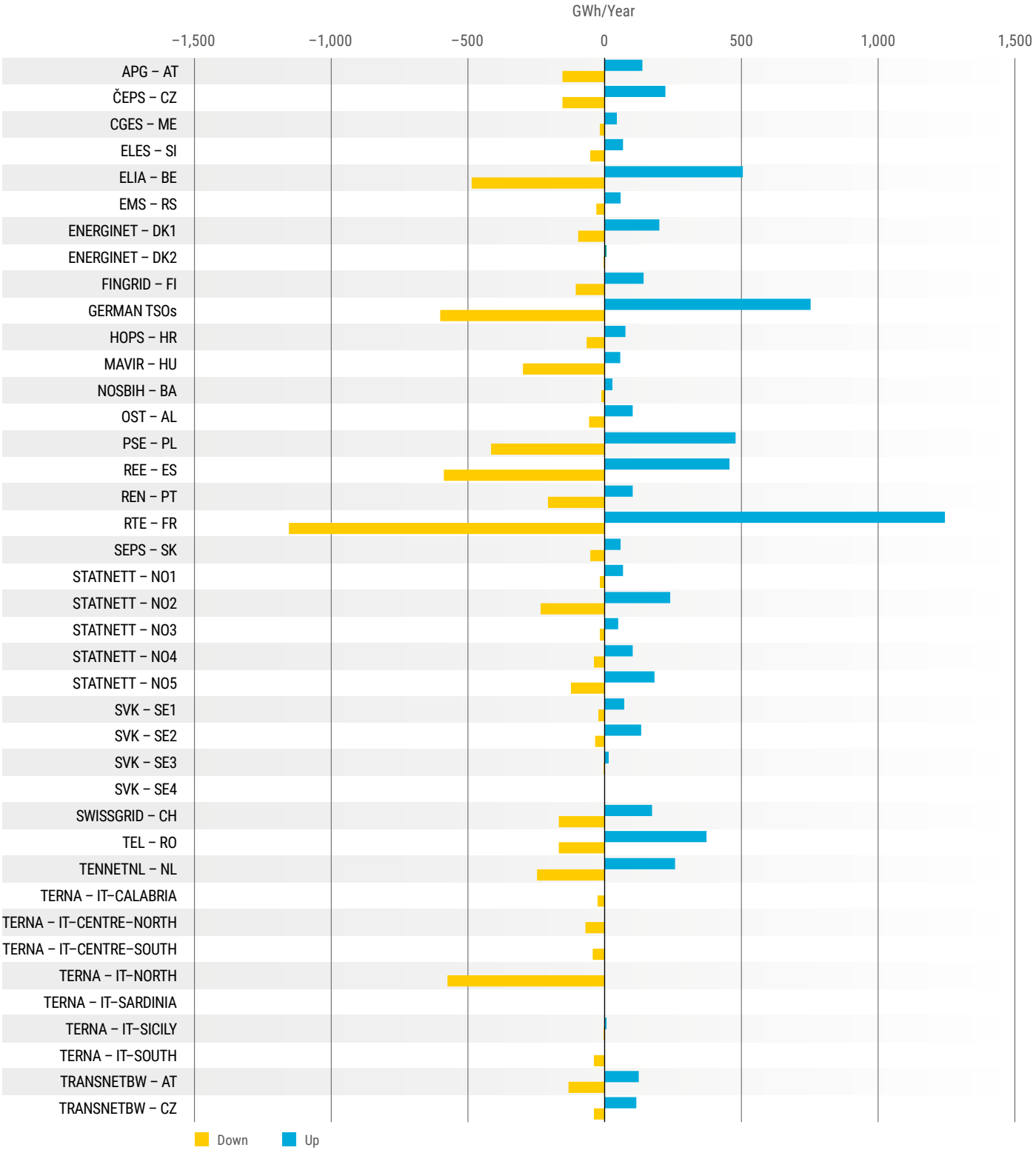
4.7 The volume and price of balancing energy used for balancing purposes, both available and activated, from standard products and from specific products

Definition	This indicator* displays: • The annual volume of activated balancing energy is calculated per TSO and, where data are available, per imbalance price area per direction (upward/downward), per type of product (standard/specific), and per type of process (FCR/aFRR/mFRR/RR) (GWh/year) • The yearly time-average price of activated balancing energy is calculated per TSO and, where data are available, per imbalance price area, per direction (upward/downward), per type of product (standard/specific), and per type of process (FCR/aFRR/mFRR/RR) (€/MWh)
Legal reference	Article 59(4)(h) of the EB Regulation
Time reference	Yearly

* These parameters reflect the perspective of the connected BSPs that supply TSO (in the case of TSO–TSO exchanges it does not reflect fulfilling the TSO demand).

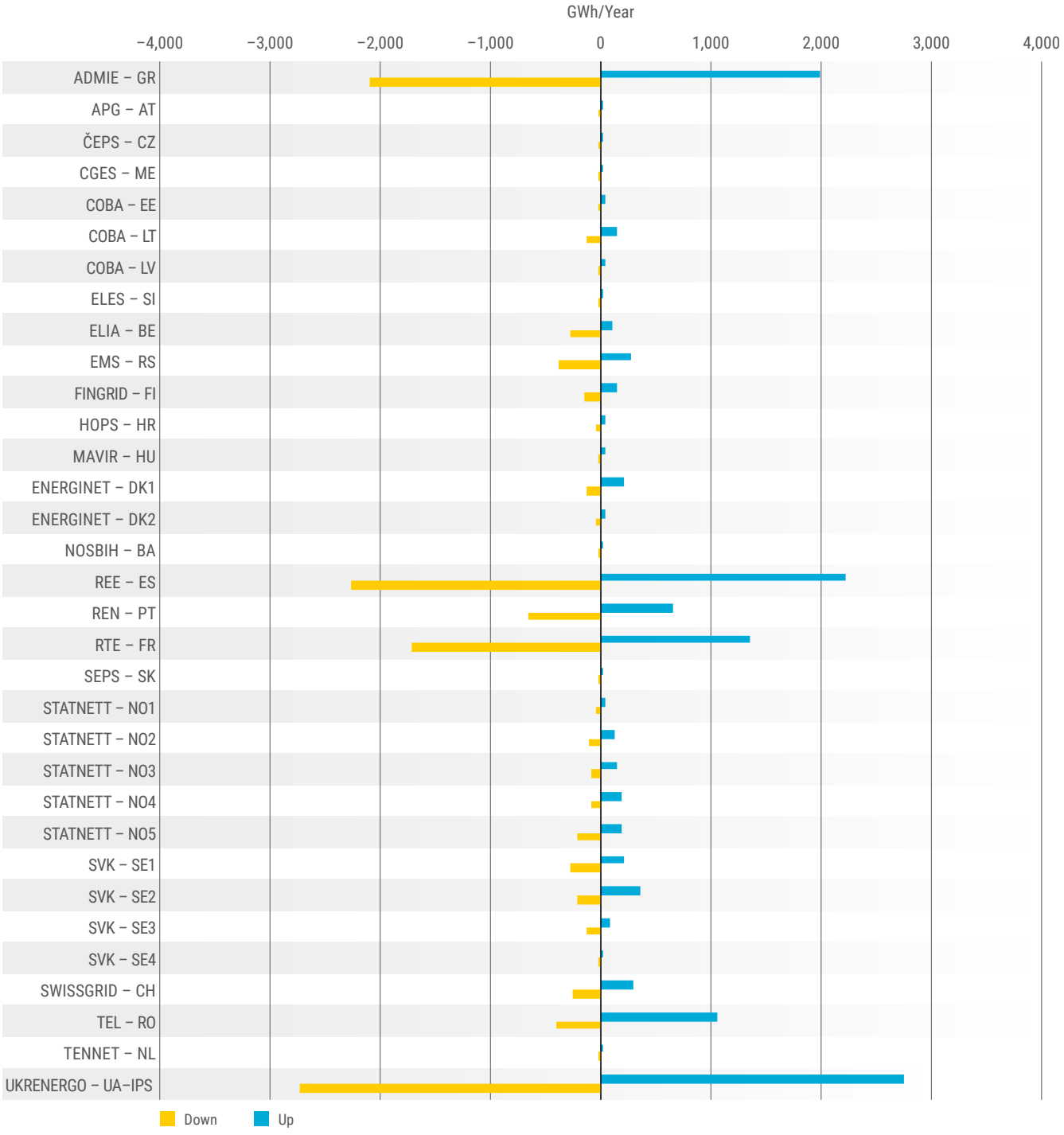
Table 11 – Indicator 4.7 on the volume and price of balancing energy used for balancing purposes

KPI 4.7.1: Yearly activated volume of balancing energy which is used for balancing purposes: aFRR



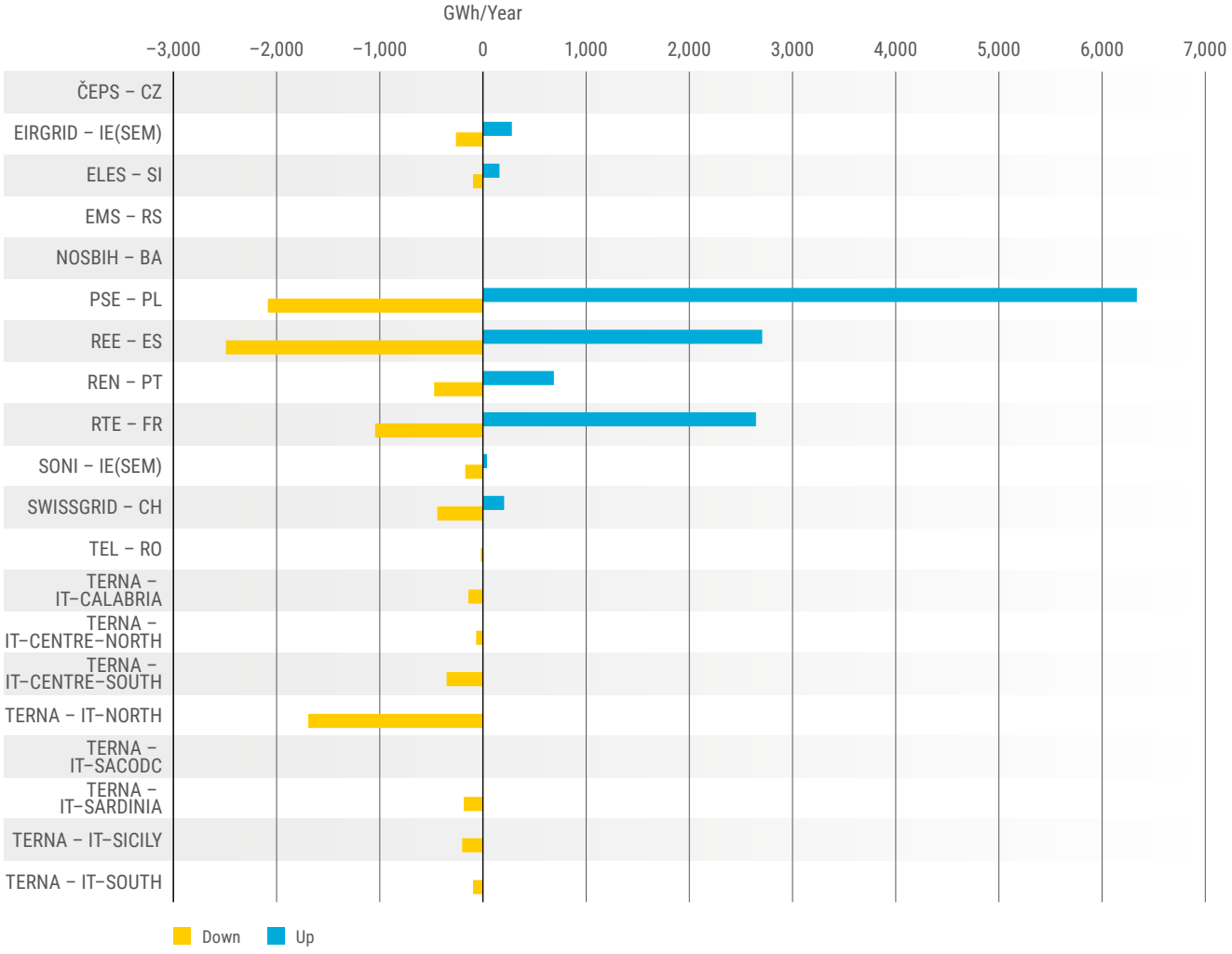
KPI 4.7.1: Yearly activated volume of balancing energy which is used for balancing purposes: mFRR[12]

Disclaimer: The values reported for Eirgrid and SONI are SEM (Standard Error of the Mean) values – it is not possible to breakdown volumes between mFRR and RR as they are using an integrated scheduling process. The values reported for Eirgrid/SONI are 426 GWh/Year in the upward direction and 328 GWh/Year in the downward direction.

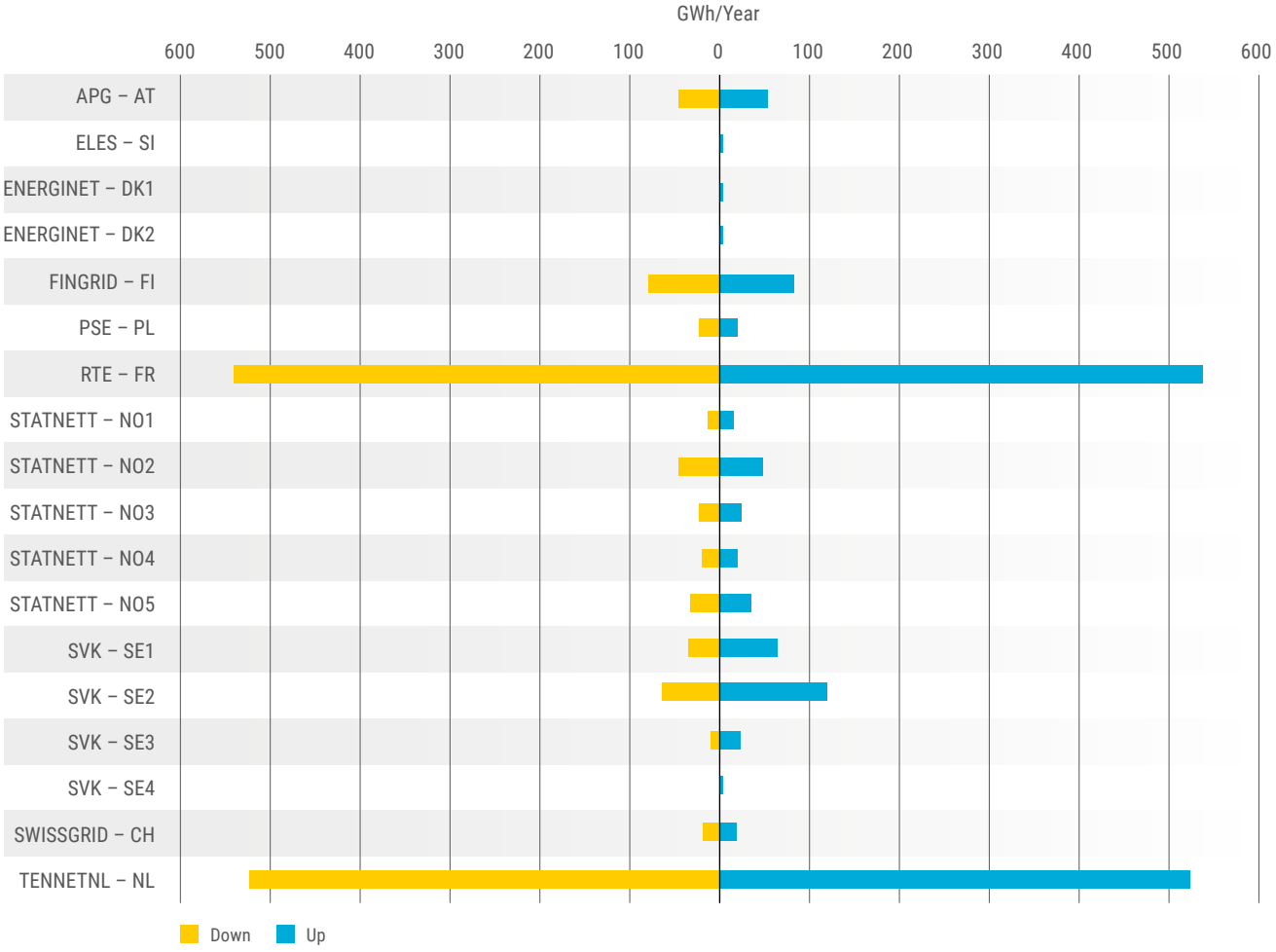


12 IPTO – GR: Quantities presented include also redispatch activations

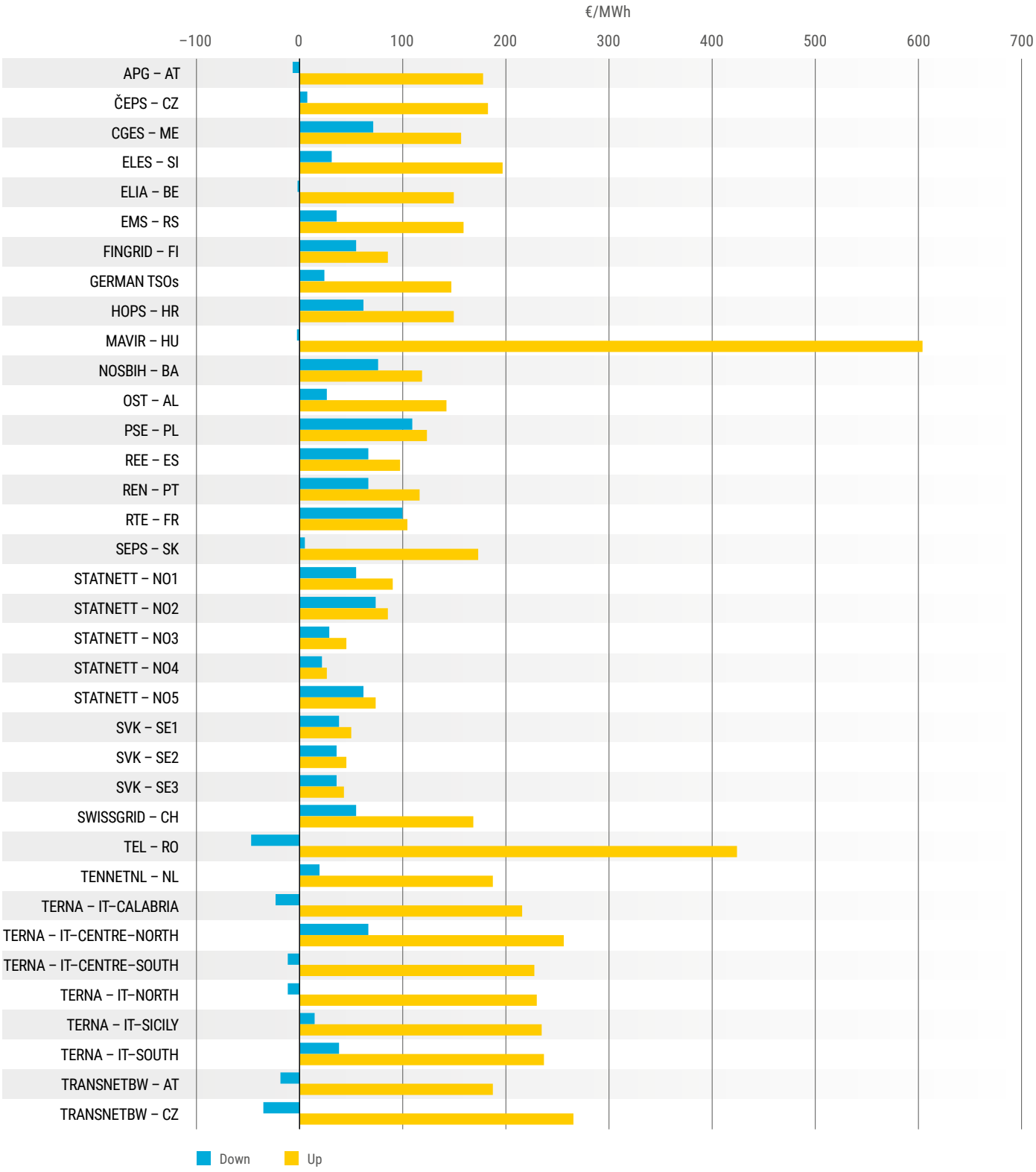
KPI 4.7.1: Yearly activated volume of balancing energy which is used for balancing purposes: RR



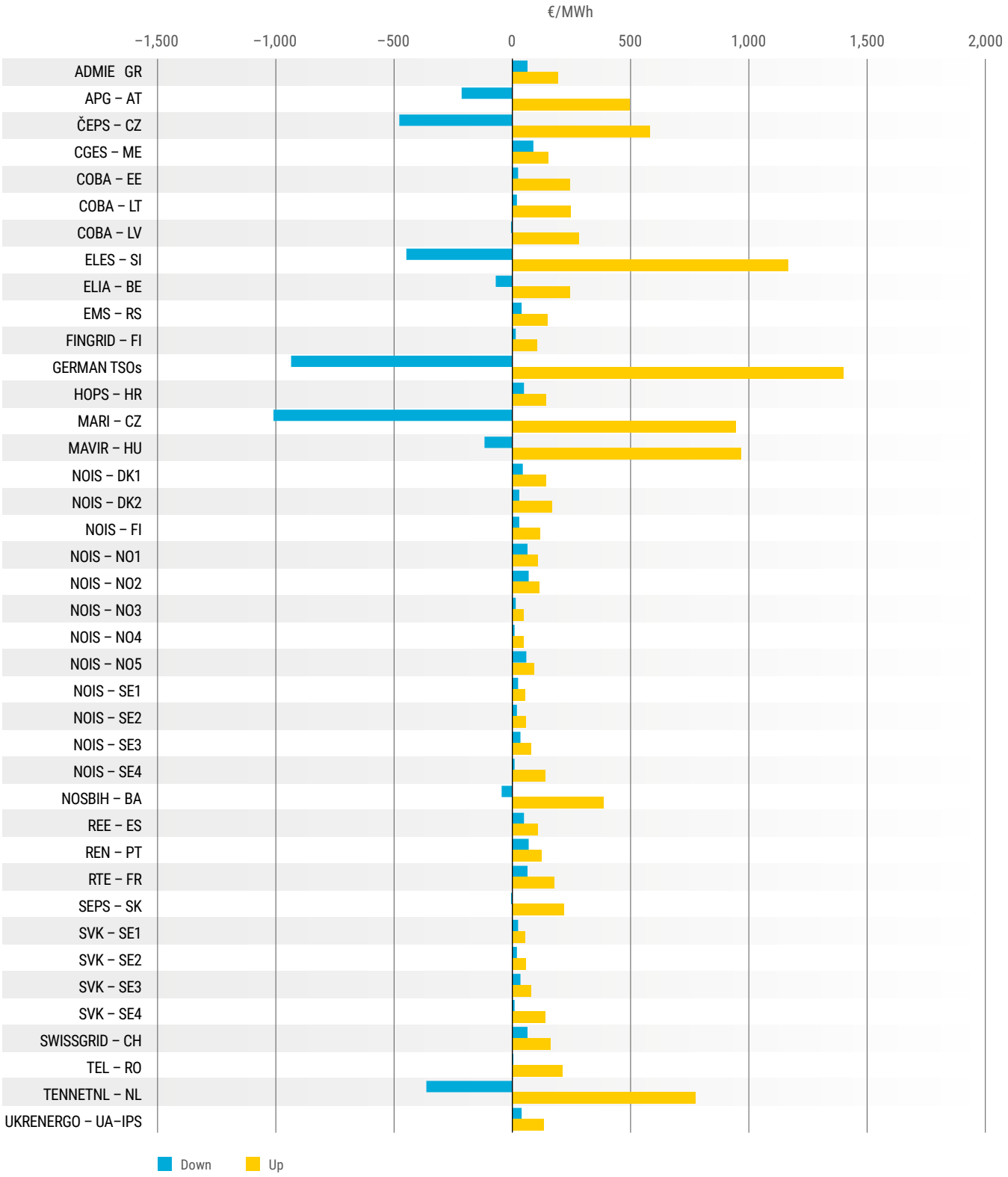
KPI 4.7.1: Yearly activated volume of balancing energy which is used for balancing purposes: FCR



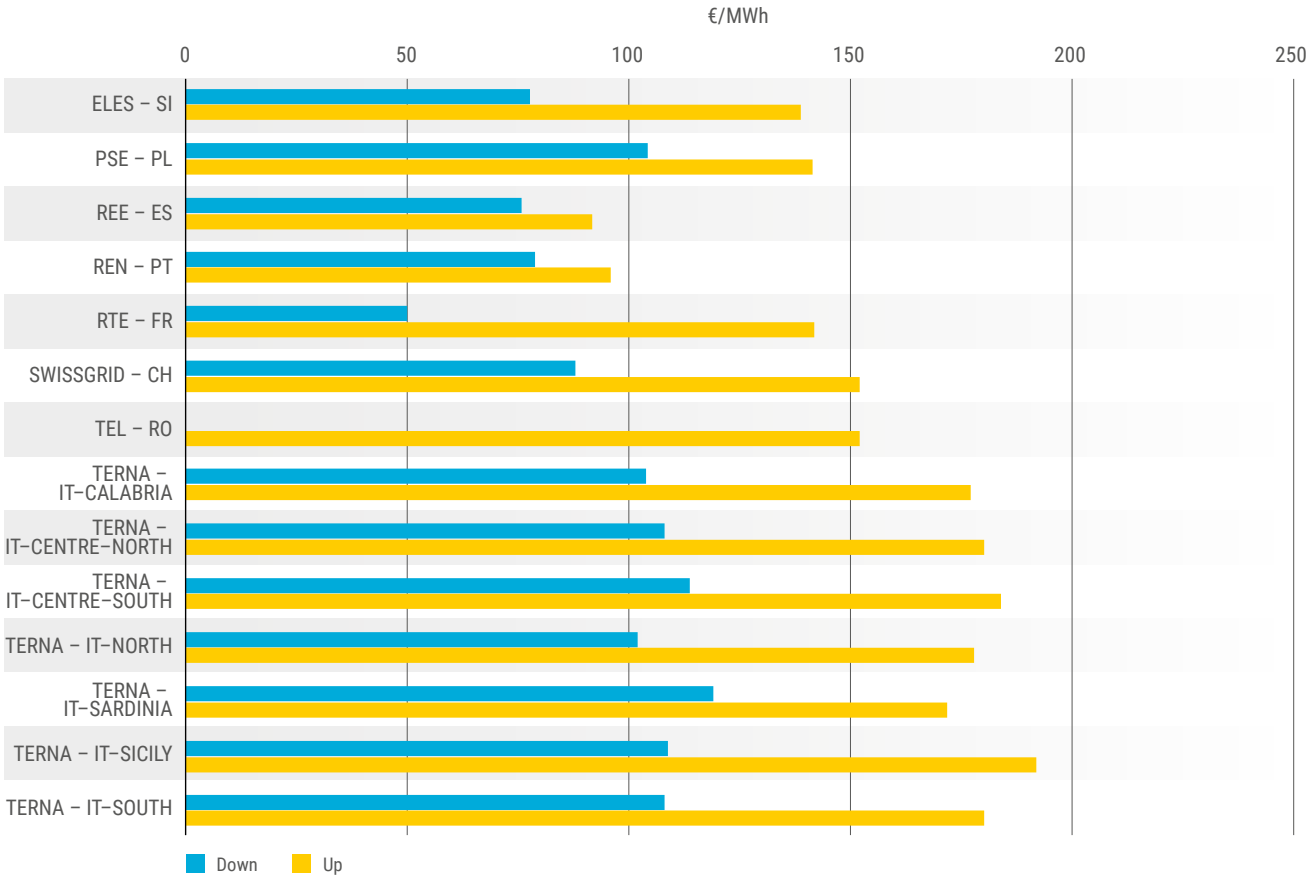
KPI 4.7.2: Time-average price of activated balancing energy: aFRR



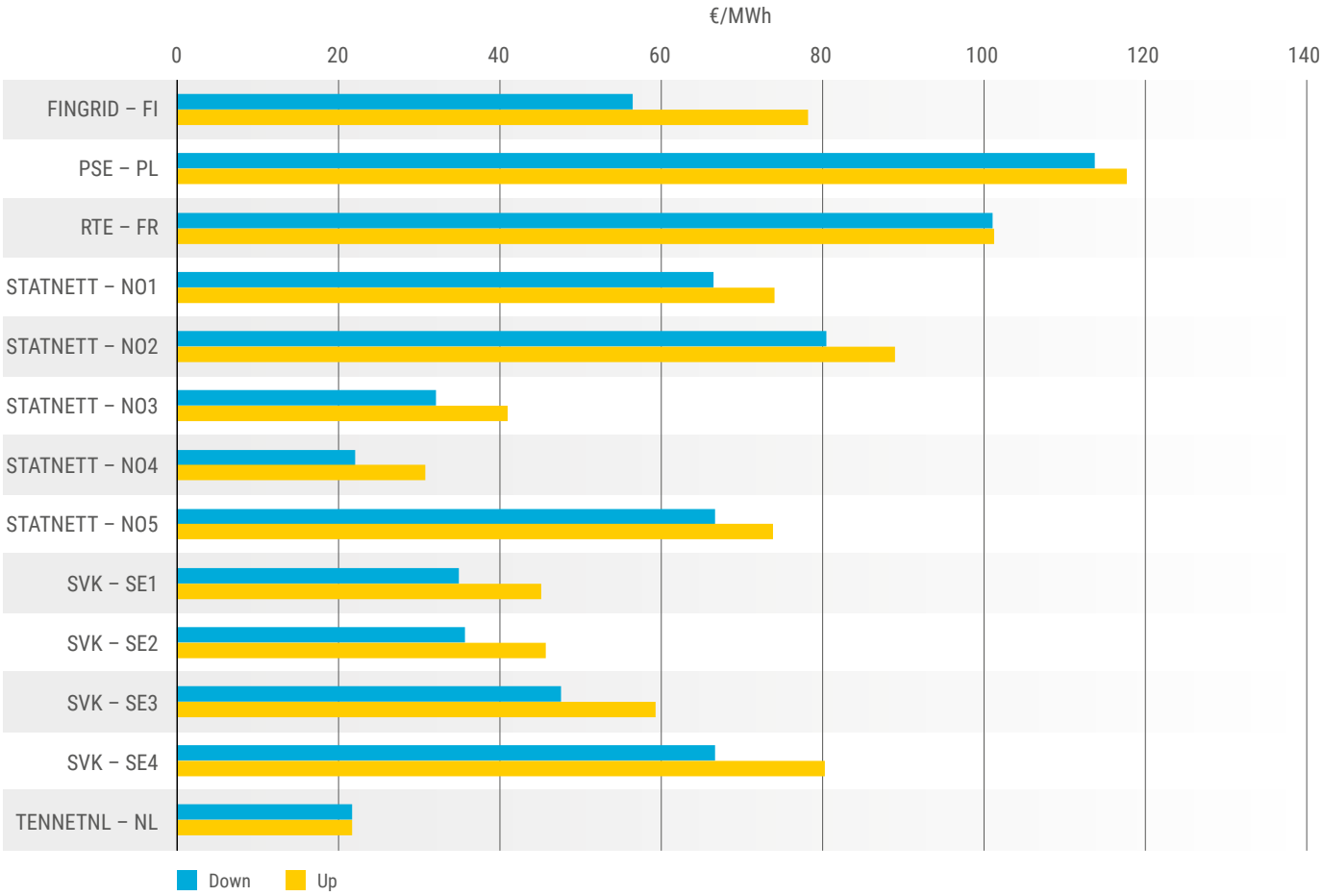
KPI 4.7.2: Time-average price of activated balancing energy: mFRR



KPI 4.7.2: Time-average price of activated balancing energy: RR



KPI 4.7.2: Time-average price of activated balancing energy: FCR

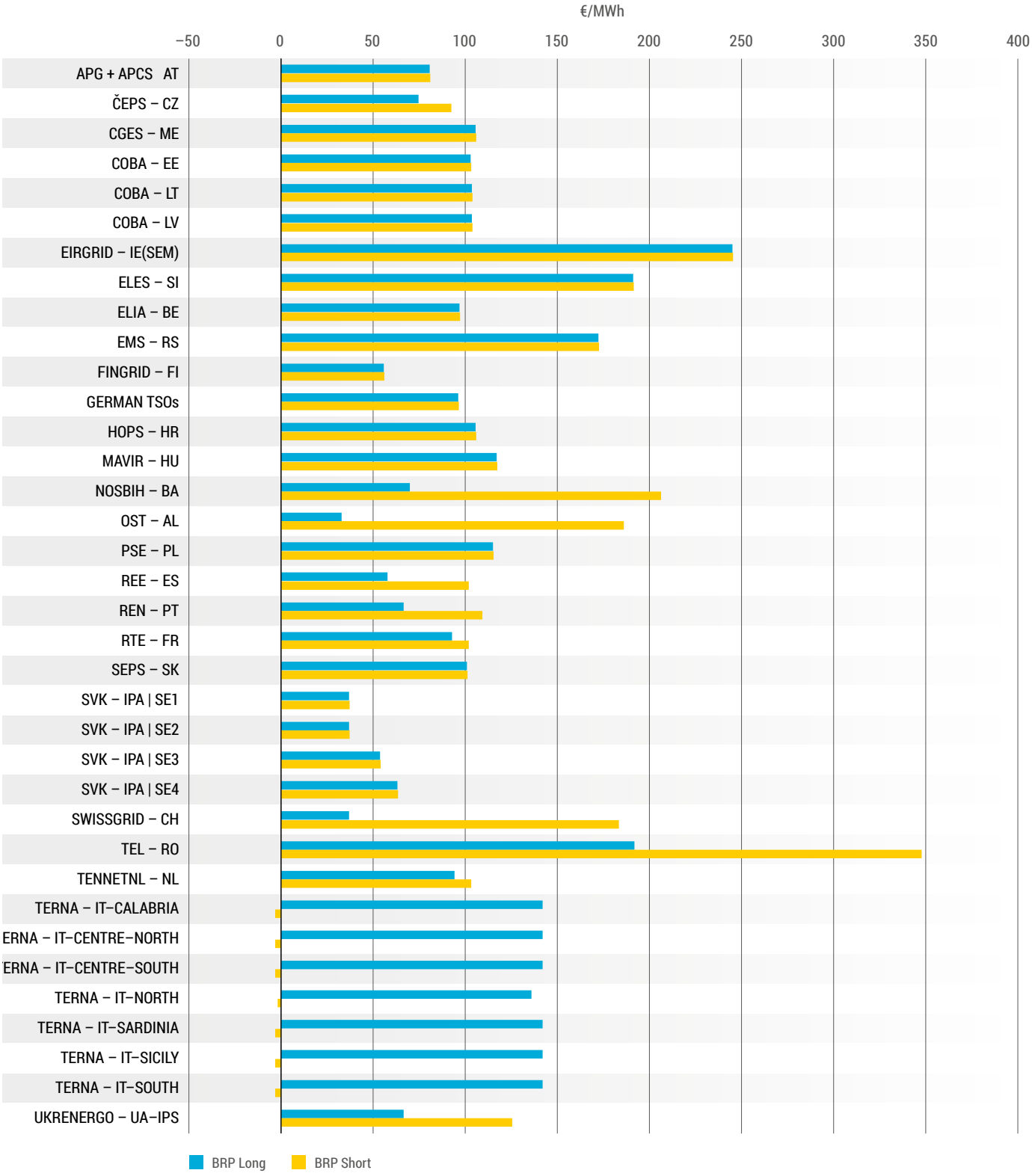


4.8 The imbalance prices and the system imbalances

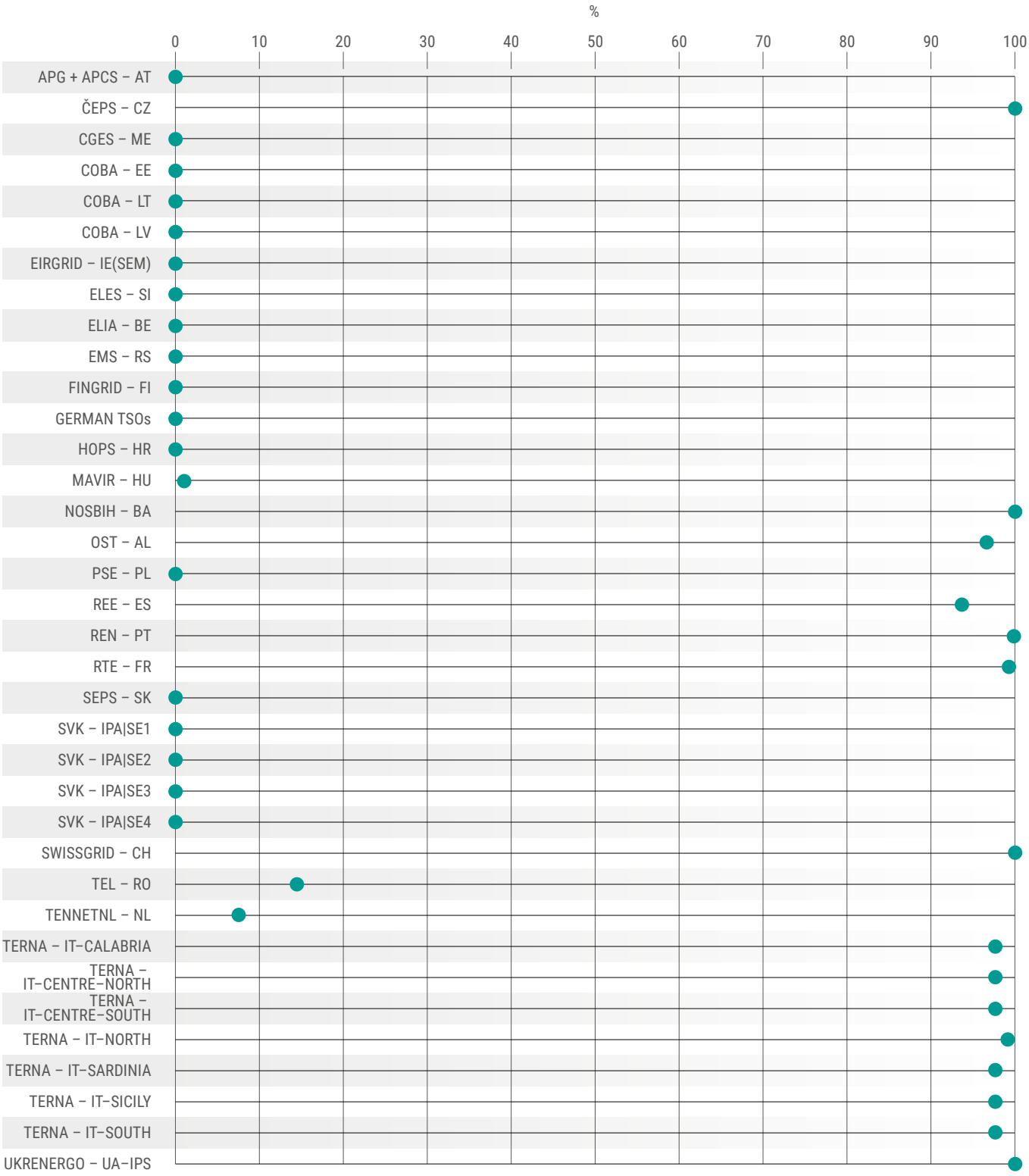
Definition	This indicator is based on the imbalance prices and the system imbalances. It indicates whether or not dual pricing has been applied by reflecting the average imbalance prices per BRP imbalance direction (shortage/surplus). This PI includes the following sub-PI's: 1. Average price for BRP shortage over all ISP; 2. Average price for BRP surplus over all ISP; 3. Percentage of ISPs where price shortage and surplus are unequal (incidence of dual prices); 4. Average prices for BRP shortage over ISPs when system imbalance indicates short; 5. Average prices for BRP surpluses over ISPs when system imbalance indicates long; and 6. Percentage of ISPs with positive respectively negative system imbalance. Some points to consider for this indicator: • In the event there are no ISPs with dual pricing, the average imbalance prices over all ISPs for shortage and surplus are equal. • The percentage of ISPs with dual pricing is given as a separate sub-indicator. • The average price (or prices) over all ISPs is (are) indicative of the value of imbalance for a BRP. • The spread of the average imbalance prices over those ISPs where the system imbalance is short (sub-PI 4) or long (sub-PI 5) indicates: • the volatility of the imbalance prices; • the incentive for BRPs to avoid imbalances that aggravate system imbalance, in order to support system balance. • The percentage of ISPs with negative (respectively positive) system imbalances is given as a separate sub-indicator and reflects whether the system was predominantly short or long. A positive or negative system imbalance parameter should reflect the BZ.
Legal reference	Article 59(4)(i) of the EB Regulation
Time reference	Yearly

Table 12 – Indicator 4.8 on the imbalance prices and the system imbalances

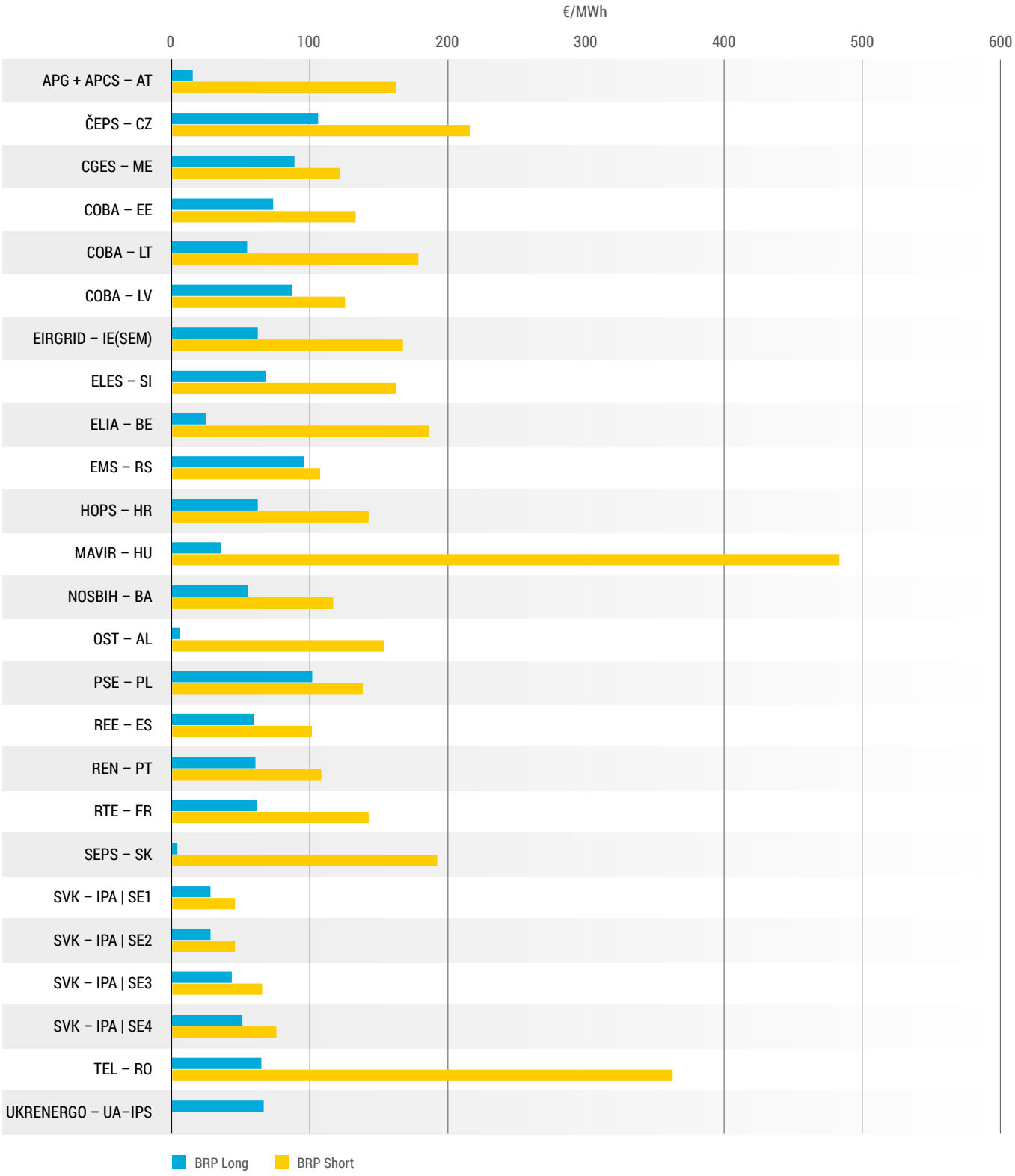
KPI 4.8.1/4.8.2: Average price for BRP shortage and surplus over all ISPs



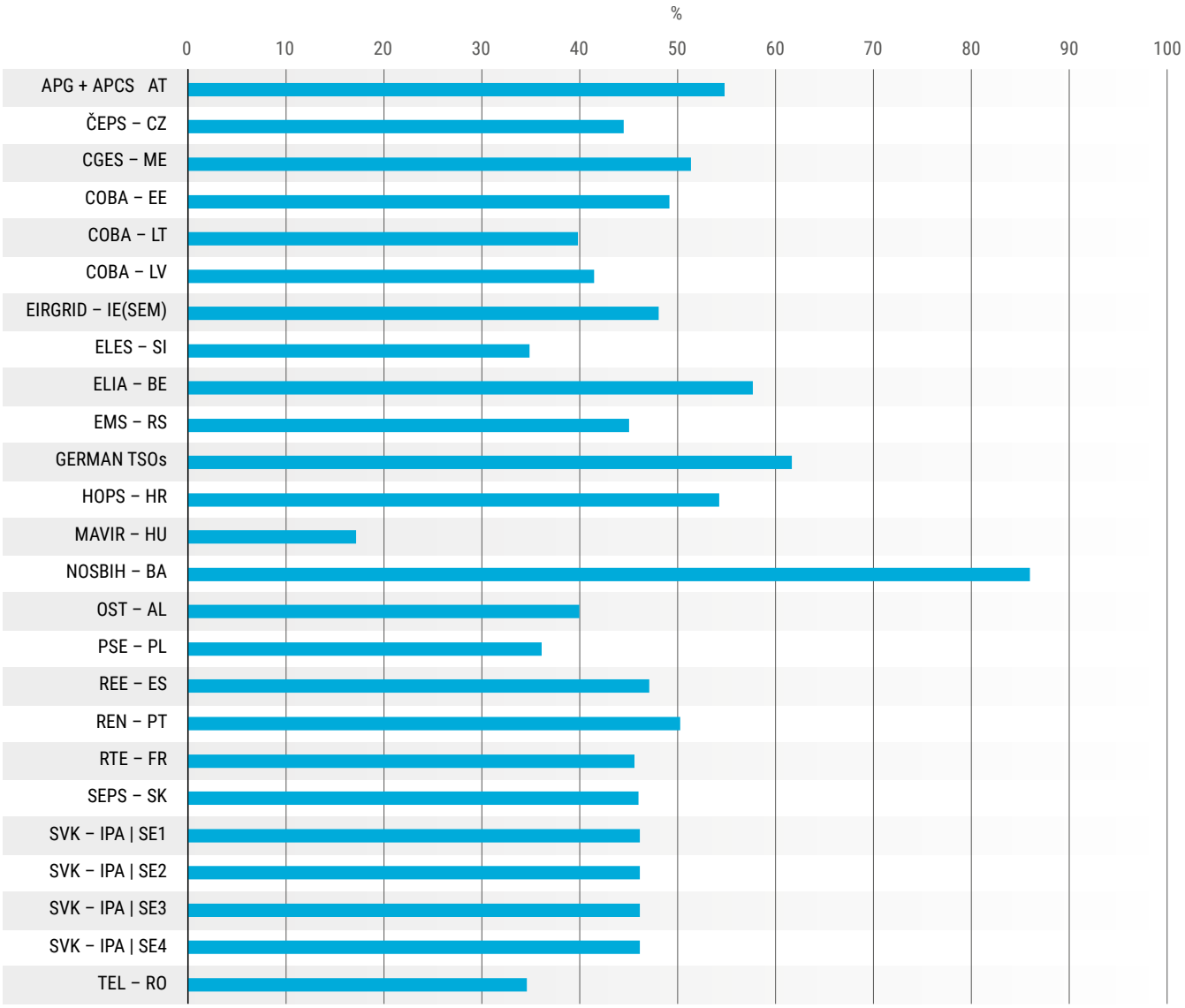
KPI 4.8.3: Percentage of ISPs where price shortage and surplus are unequal (incidence of dual pricing)



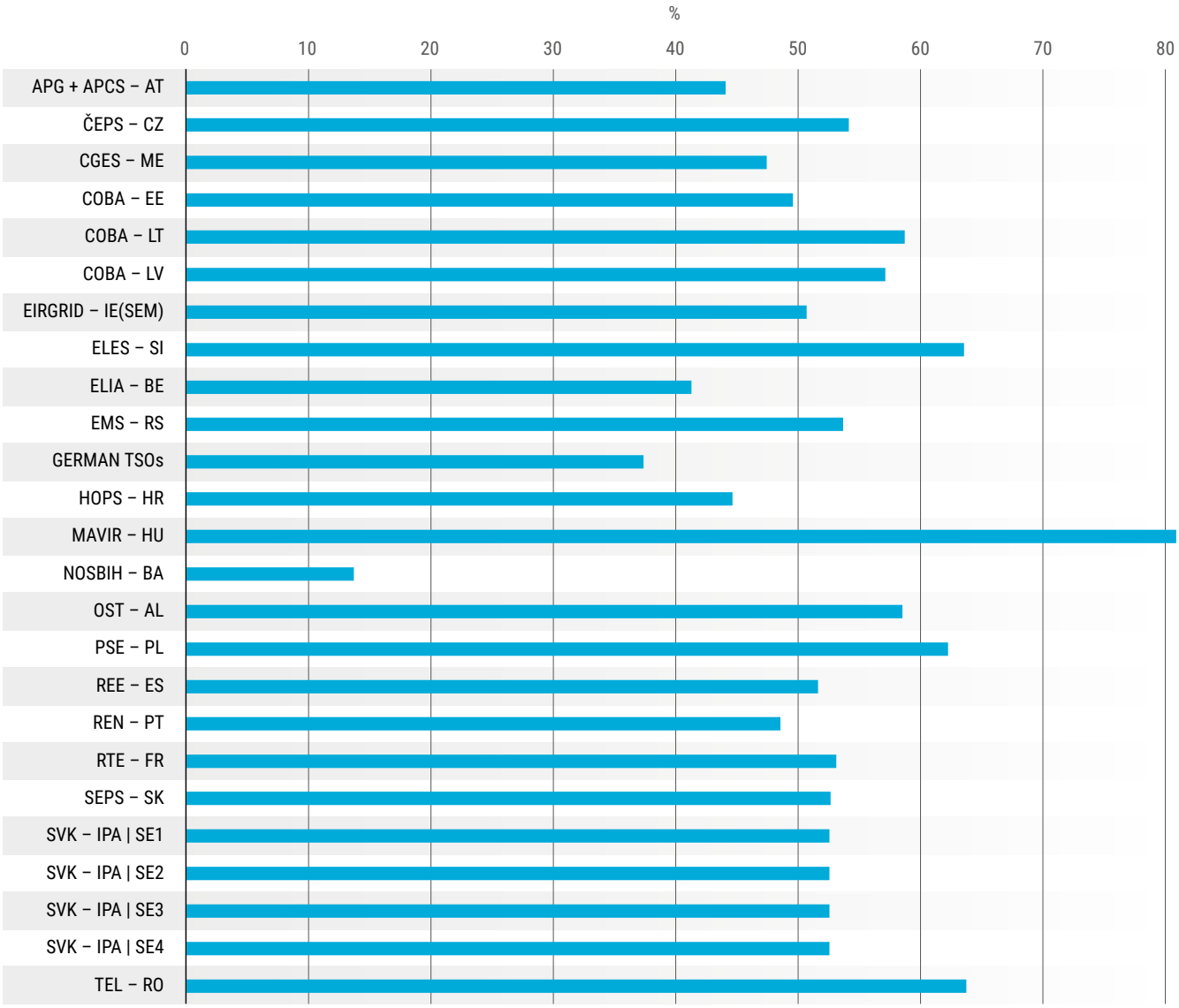
KPI 4.8.4/4.8.5: Average price for BRP shortage over all ISPs when system imbalance indicates short, and average prices for BRP surplus over all ISPs when system imbalance indicates long (€/MWh ISP all)



KPI 4.8.6: Percentage of ISPs with negative system imbalance (deficit)



KPI 4.8.6: Percentage of ISPs with positive system imbalance (surplus)

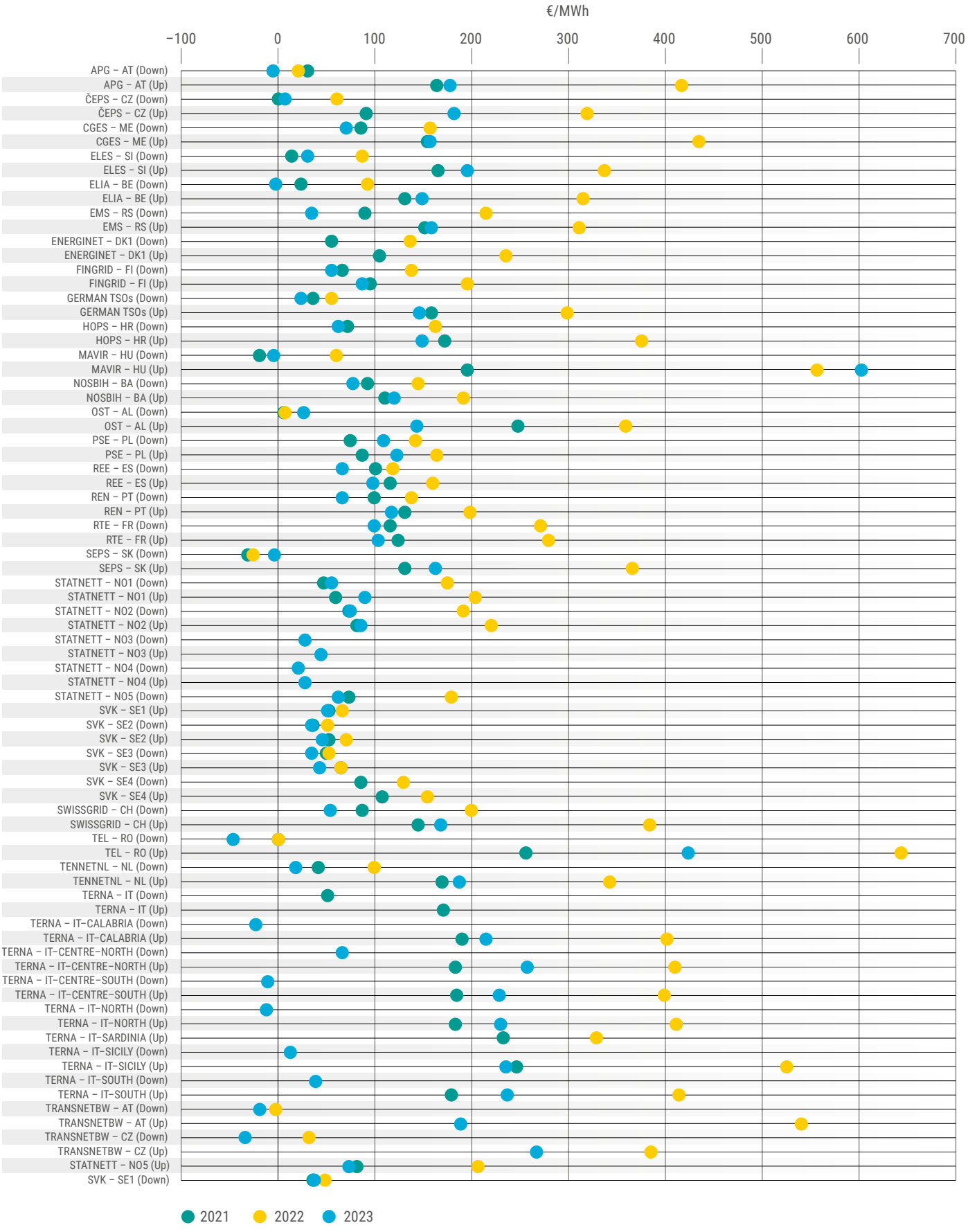


4.9 Evolution of balancing service prices of the previous years

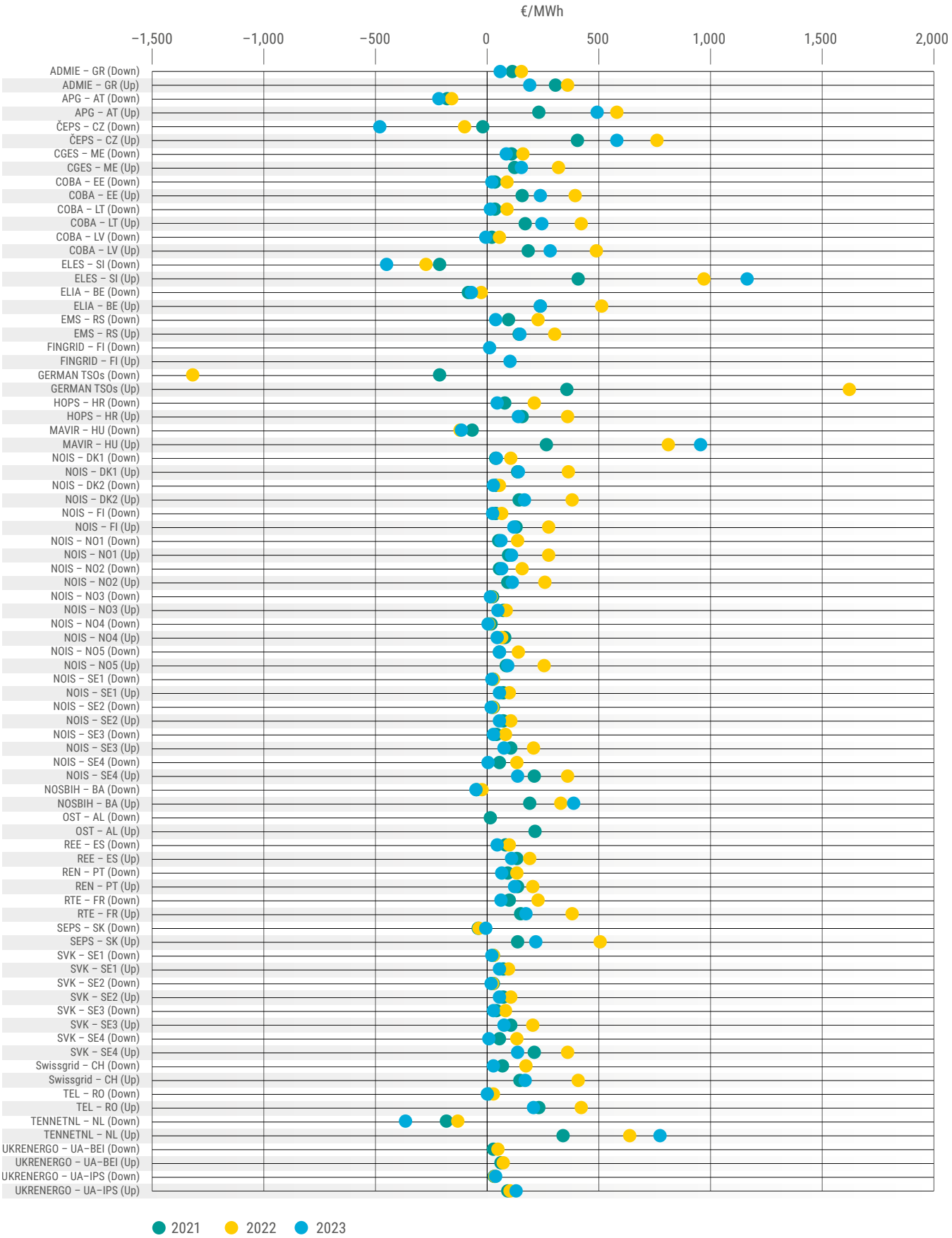
Definition	This indicator displays the evolution of the annual average prices for the balancing services over the past 3 years (whenever data are available). This PI includes the following: 1. Evolution of balancing energy prices at each TSO and where available, per BZ (including specific products); and 2. Evolution of balancing capacity procurement prices aligning these prices with a capacity procurement time of one hour.
Legal reference	Article 59(4)(j) of the EB Regulation
Time reference	Yearly

Table 13 – Indicator 4.9 on the evolution of balancing service prices of the previous years

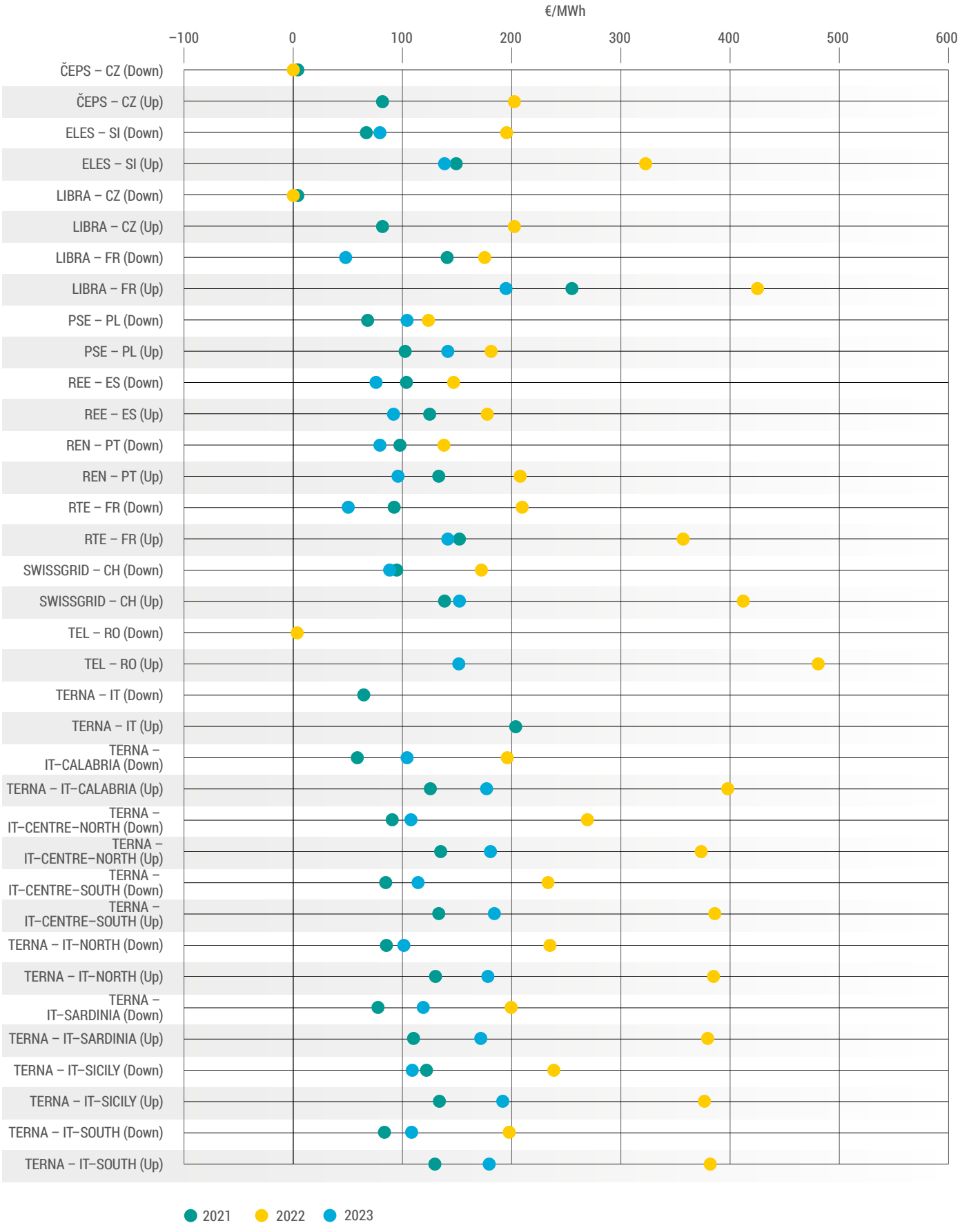
KPI 4.9.1: Evolution of balancing energy prices at each TSO and where available, per BZ (including specific products) – aFRR



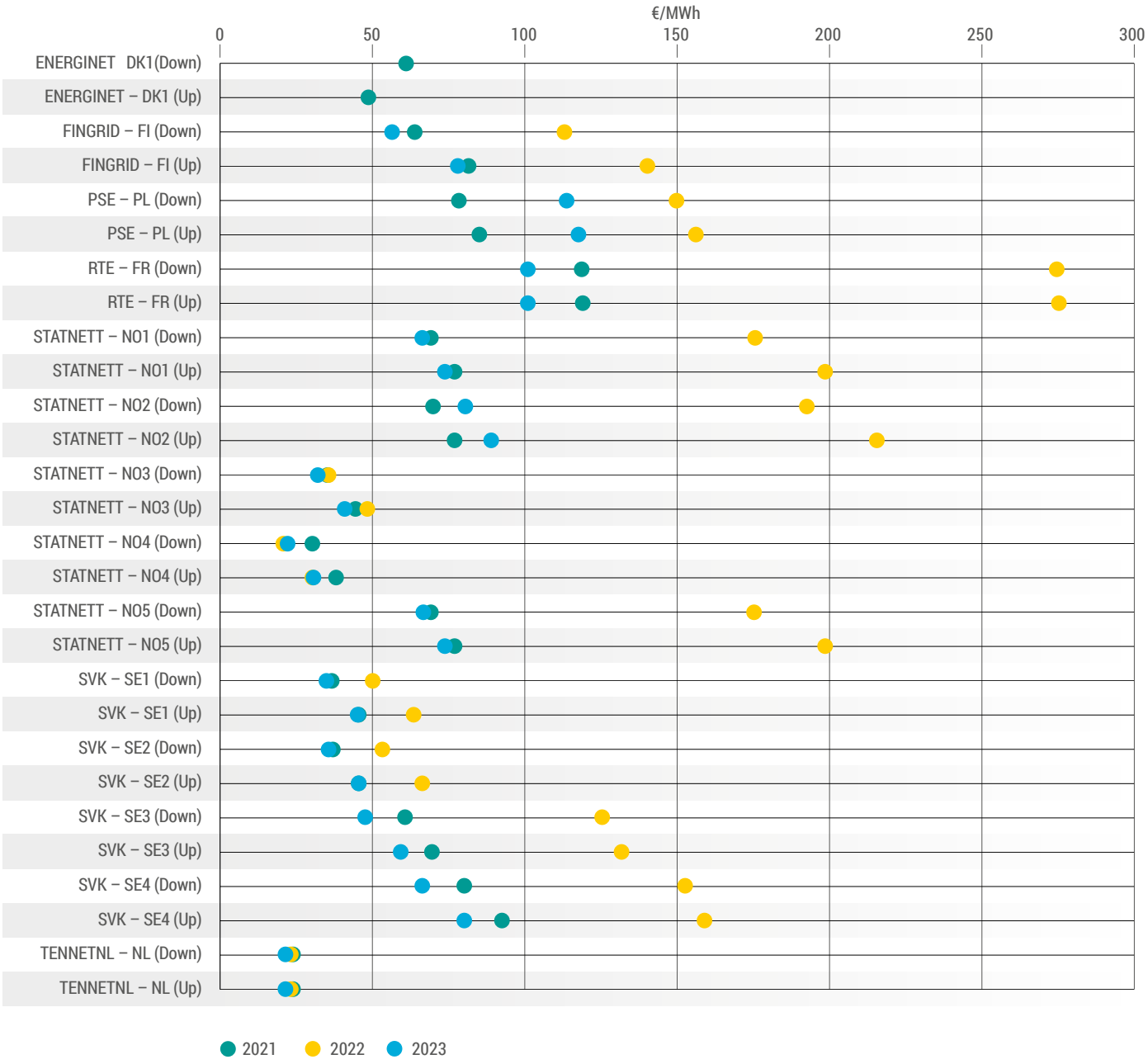
KPI 4.9.1: Evolution of balancing energy prices at each TSO and where available, per BZ (including specific products) – mFRR



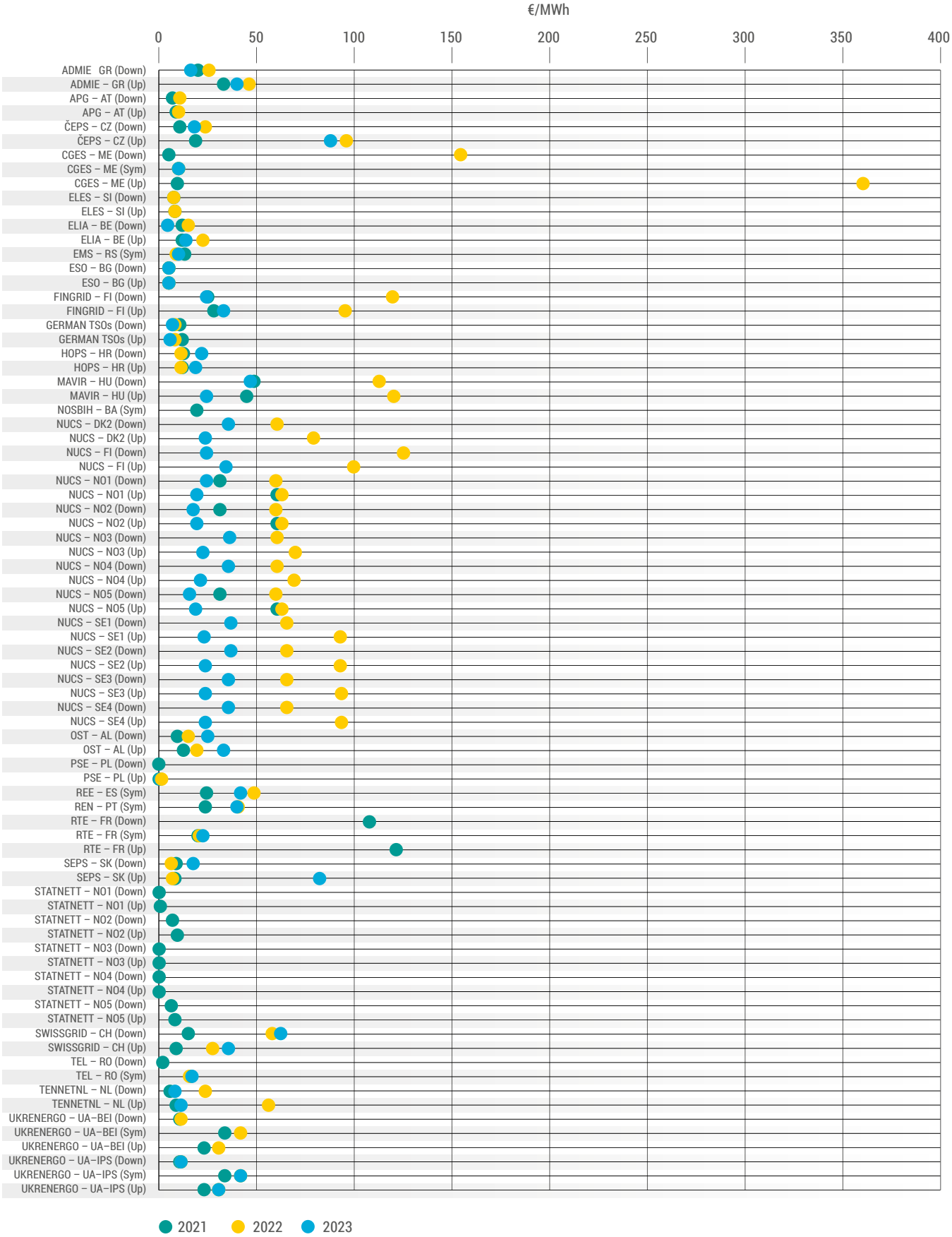
KPI 4.9.1: Evolution of balancing energy prices at each TSO and where available, per BZ (including specific products) – RR



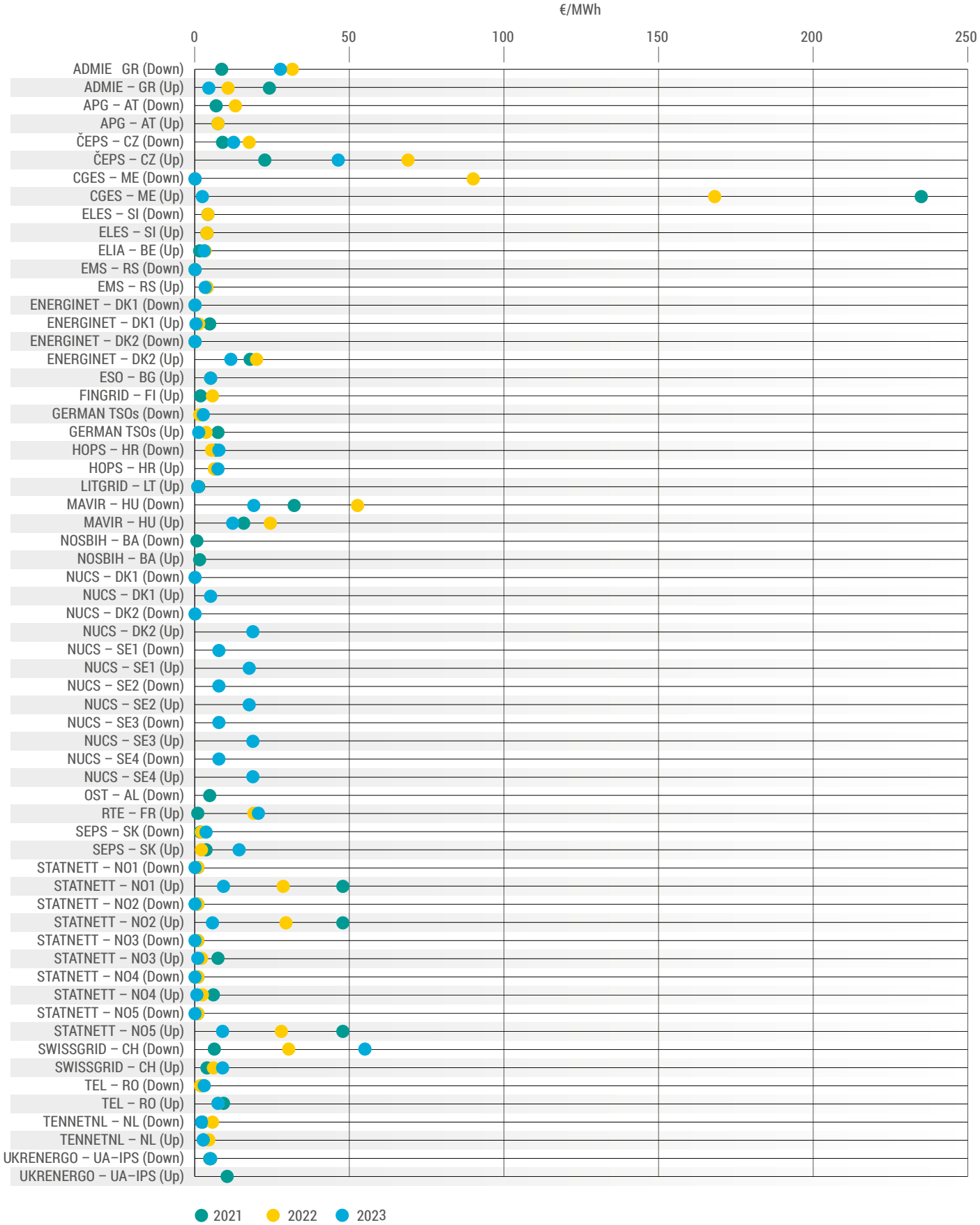
KPI 4.9.1: Evolution of balancing energy prices at each TSO and where available, per BZ (including specific products) – FCR



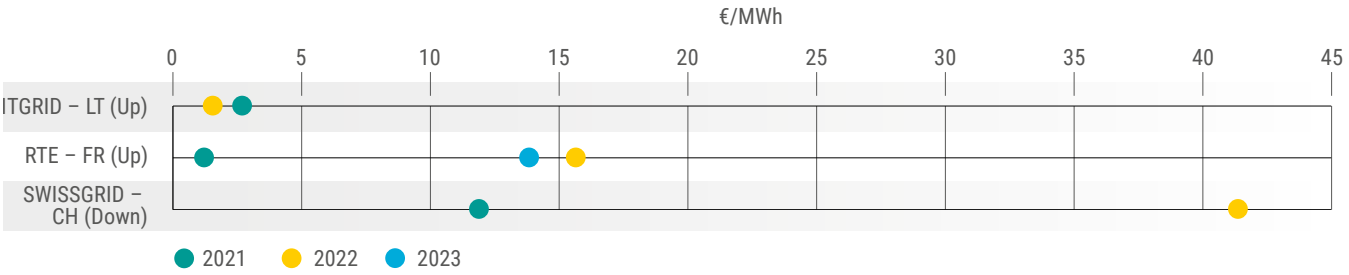
KPI 4.9.2: Evolution of balancing capacity procurement prices aligning these prices with a capacity procurement time of one hour – aFRR



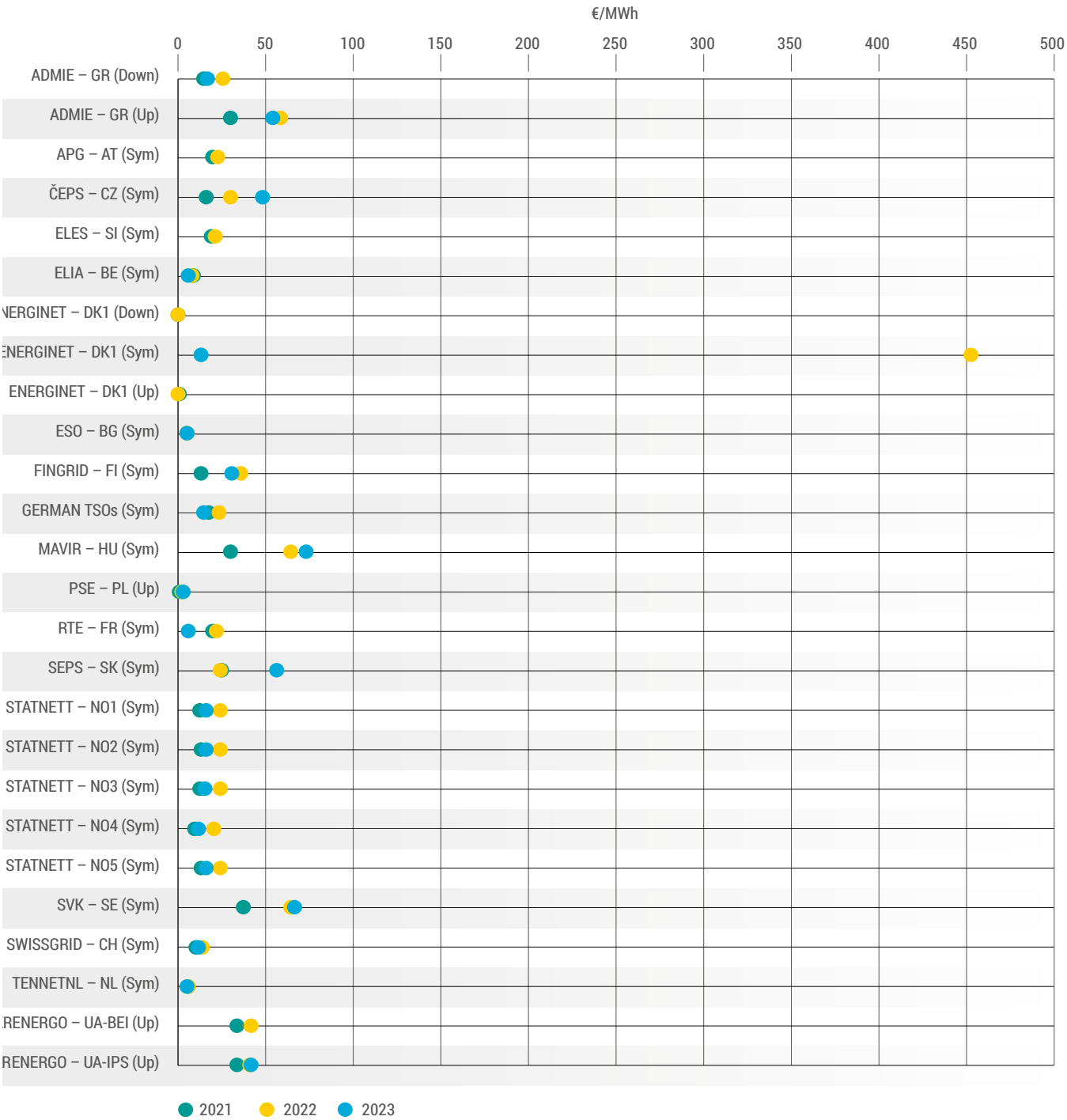
KPI 4.9.2: Evolution of balancing capacity procurement prices aligning these prices with a capacity procurement time of one hour – mFRR



KPI 4.9.2: Evolution of balancing capacity procurement prices aligning these prices with a capacity procurement time of one hour – RR[13]



KPI 4.9.2: Evolution of balancing capacity procurement prices aligning these prices with a capacity procurement time of one hour – FCR



13 PSE: Since 1 January 2021 the service reflected in this position (Operational Capacity Reserve) has been terminated, hence there are no data for 2021, 2022 and 2023

4.10 Comparison of expected and realised costs and benefits from all allocation of balancing capacity for balancing purposes

Definition	This indicator compares the expected benefits with the realised benefits (or losses) for each application of a CZC allocation methodology, based on forecast values (whether for balancing capacity bids or day-ahead energy market bids).[14] This PI includes: 1. For market-based application (Art. 41(1) of EB Regulation), compute the social welfare by considering the forecasted day-ahead energy bids and real reserve capacity bids. 2.For inverted market-based application (Art. 41(1) of EB Regulation), compute the social welfare by considering the real day-ahead energy bids and forecasted reserve capacity bids.
Legal reference	Article 59(4)(k) of the EB Regulation
Time reference	Yearly

Table 14 - Indicator 4.10 on the comparison of expected and realised costs and benefits from all allocations of cross-zonal capacity for balancing

KPI 4.10: Comparison of expected and realised costs and benefits from all allocation of balancing capacity for balancing purposes – Nordic aFRR)

	SDAC surplus	aFRR surplus	Total surplus	Avg. daily surplus
Realised Benefits excl.SE4	−18,153,469 €	46,895,664 €	28,742,195 €	78,746 €
Expected Benefits excl. SE4	−16,464,058 €	46,861,185 €	30,397,127 €	83,278 €
Total			**−1,654,932 €**	

14 Once CZC allocation methodology and RCC procurement methodology will entry into force, PI 4.10 will be provided by RCCs

5 Executive Summaries of TSOs

5.1 Austria (Austrian Power Grid AG)

Austrian Power Grid AG (hereinafter referred to as 'APG') is one of two TSOs in Austria. The other TSO is Vorarlberger Übertragungsnetz GmbH (hereinafter referred to as 'VUEN'), which is responsible for the westernmost federal state of Austria only.

APG is the LFC Block Operator of the LFC Block APG, which covers the geographical area of Austria as part of the SA CE. Since VUEN assigned the obligation of organising its LFC area to APG and both LFC areas were merged to one based on the Austrian Electricity Act, the LFC block APG is equal to the LFC area, scheduling area and monitoring area covering the entire country. For the sake of simplicity, APG reports on behalf of both Austrian TSOs.

All relevant documents, including the national balancing report and all Terms and Conditions of APG, are published at the **APG website**. The rules and requirements to become a BSP acc. to Articles 18(5–7) EBGL are defined within the T&Cs for BSPs (German: 'Modalitäten für Regelreserveanbieter').

APG is not a central-dispatching TSO.

Dimensioning of FRR is based on 15 min average values of the LFC block imbalance (according to Article 3 of the System Operations Guideline National Implementation (SOGL)), over a period of 12 months and applies the 99 %-criteria as well as the FRCE ranges in accordance with Article 128 SOGL. In the event of substantial changes in the general boundary conditions, the dimensioning of the FRR will be adjusted accordingly.

In addition to the statistical approach, the tripping of the largest power plant and load within the LFC block APG are considered as reference incident. The chosen approach resulted in the following optimal dimensioning:

- aFRR: +200/-200 MW
- mFRR: +280/-195 MW

whereby separation of FRR in aFRR and mFRR at APG is based on the recommended empiric approach in the Synchronous Area Framework Agreement (SAFA). Applying the ENTSOE quality criteria, the described dimensioning has proven to be sufficient. FCR capacity and aFRR energy are exchanged within security limits and with reference to the defined minimum amount of reserves, which has to be kept within the LFC-block.

A common market for procurement and exchange of FCR is operated together with the TSOs from Germany, Belgium, Denmark, Netherlands, France, Switzerland, Slovakia and Czechia. It is organised as a TSO–TSO-model.

APG is an operational member of the IGCC. In 2016, APG and German TSOs established a joint activation of aFRR, which is the early adoption of the requirements of the EBGL regulation concerning the exchange of balancing energy. In December 2019, this cooperation was extended to mFRR. Thus, APG and the German TSOs already activated all FRR energy based on a common merit order, provided that sufficient cross-border capacity is available.

In February 2020, the APG and the German TSOs extended their cooperation and established a common procurement of aFRR balancing capacity. Pursuant to Article 21 EBGL, APG takes part in PICASSO, which represents the implementation project establishing the European aFRR balancing energy platform. In June 2022, the accession to the operative PICASSO platform took place. APG also participates in MARI, which is the European implementation project for establishing the European mFRR platform. The operative start of the platform for the APG was in June 2023.

Since in Austria no specific products are defined, no respective cost-benefit analysis is applied.

The settlement process considers the general principles of Article 44 EBGL. Imbalance settlement is designed to be reflective of the real time value of energy as both balancing and wholesale market prices are considered in imbalance settlement prices. BSPs are provided incentives to be in balance generally or support the system, especially in more extensive situations; therefore, the imbalance situation is reflected in the imbalance prices. Financial neutrality is assured based on national legislation and complimented with the installation of an additional settlement mechanism.

An additional settlement mechanism, separate from the imbalance settlement, is in place to settle the procurement costs of balancing capacity (e.g. administrative costs and other costs related to balancing), in accordance with Article 44(3) EBGL. In Austrian National legislation, procurement costs of balancing capacity for FCR, aFRR and positive mFRR are regulated and costs are settled accordingly. An additional settlement mechanism was introduced to settle the costs of negative manual FRR as the regulation of these costs in the Austrian National legislation was no longer consistent with EBGL.

5.2 Baltic: Lithuania, Latvia, and Estonia (Litgrid AB, AS Augstsprieguma tikls and Elering AS)

Introduction

The TSOs of Baltic countries have prepared a common Report.

Litgrid AB (hereafter Litgrid) is the Lithuanian TSO, AS Augstsprieguma tikls (hereafter AST) is the Latvian TSO and Elering AS (hereafter Elering) is the Estonian TSO. All three are part of an SA with separate scheduling areas (EE, LV and LT), monitoring areas (EE, LV and LT) and BZs (EE, LV and LT). Pursuant to Article 2(4) of SO GL, the Baltic TSOs are exempted from defining their LFC blocks. After they are fully synchronised with the Continental European SA, they will start to implement such agreements. Each controls a scheduling area and monitoring area covering the entire country.

Starting from 1 January 2018, Litgrid, AST, and Elering (hereinafter commonly referred to as the Baltic TSOs) have operated common balance control with the aim of minimising the Baltic Area Control Error (ACE) towards zero. To support this, the Baltic TSOs established a common balancing energy market, based on Baltic mFRR energy products, and harmonised imbalance settlement rules incl. common imbalance pricing methodology.

Each Baltic TSO employs a self-dispatch model. For balancing purposes, only mFRR energy products are used.

The report on balancing could be found in all three TSO's website:

- **Link** to Litgrid's website
- **Link** to AST's website
- **Link** to Elering's website

During the report period, in Lithuania there were a total of 6 active BSPs. Litgrid's standard T&Cs for BSPs can be found **here**. During the report period, there were no more than 24 BRPs. Litgrid's standard terms and conditions for BRPs can be found **here**.

During the report period in Latvia there was a total of one active BSP. AST's standard terms and conditions for BSPs can be found **here**. During the report period, there were a total of thirteen BRPs. AST's standard terms and conditions for BRPs can be found **here**.

During the report period in Estonia there were a total of three BSPs, two of which offer the service based on Demand Side Response (DSR). Elering's standard T&Cs for BSPs can be found **here**. During the report period, there were a total of nine BRPs. Elering's standard T&Cs for BRPs can be found **here**.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	NAP	NAP
aFRR Platform	Litgrid AB:2024 December AST: 2025 January Elering: 2025 January	NAP
mFRR Platform	2024 October	Derogation granted by Baltic NRAs in order to join MARI together with Nordic TSOs. However, due to Nordic TSOs delay to join MARI, the decision was made to join the MARI platform on 2024 October.
IN Platform	Litgrid AB:2024 December AST: 2025 January Elering: 2025 January	NAP

Balancing capacity cooperations	Status	Reasoning for derogation and status of the derogation (granted or not)
Common Baltic balancing capacity market	Project ongoing. Relevant mandatory methodologies prepared by the Baltic TSOs were submitted to the Baltic NRAs for approval during 2023. All of the submitted methodologies were approved as of 2024 Q1. Current phase is IT development.	2025 Q1

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Litgrid AB: yes AST: yes Elering: no
1.1. If response to Q1 is 'no', why?	Litgrid AB: – AST:- – Elering: Since May 2019, Elering has allowed demand, RES and storage facilities to participate in the regional balancing market. Preparations in relation to joining the EU balancing energy platforms shall be carried out during 2022 and 2023.
1.2. If response to Q1 is 'yes', what were the main results'?	Litgrid AB: During report period, starting 2023 March, the first Demand aggregator started providing balancing energy services in Baltic balancing market. AST: Work was done to accommodate Demand response, aggregation in balancing market by developing IT exchange rules and system and T&Cs.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Litgrid AB: yes AST: yes Elering: yes
2.1. If response to Q2 is 'no', why?	Litgrid AB: – AST: – Elering: –
2.2. If response to Q2 is 'yes', what were the main results?	Litgrid AB: During 2023 December, the new version of the standard T&Cs for BSPs were submitted to the local NRA for approval. This document includes the balancing energy and balancing capacity market rules for FCR, aFRR and mFRR compatible with standard balancing energy products. AST: Updated T&C were developed to include mFRR standard energy products and IT development was done to enable prequalification of the first reserve units. Elering: Update in the IT system to manage the FCR, aFRR and mFRR products. In addition, the implementation of ECP/EDX tool for data exchange. The national T&C conditions were in the process of being updated in the Report Period.
Q3: Do you procure a standard product for balancing capacity?	Litgrid AB: yes AST: no Elering: no
Q4: What are the main characteristics?	Litgrid AB: Standard hourly mFRR capacity product is procured daily for the following day. AST: AST did not procure balancing capacity during this timeframe. Elering: Elering did not procure balancing capacity during this timeframe.
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	Common Baltic capacity market is being developed and shall be introduced in 2025 Q1
5.2. If response to Q6 is 'yes', what were the main results?	–
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the Future

Evolution of the terms and conditions for BSP
Litgrid AB: During 2023 August a new version of standard T&Cs for BSPs were submitted to the local NRA for approval. This document includes the balancing energy and balancing capacity market rules for FCR, aFRR and mFRR compatible with standard balancing energy products. AST: Updated T&Cs include rules for mFRR standard energy product. Elering: NAP
Evolution of the T&Cs for BRP
Litgrid AB: During Report period, a new version of the standard T&Cs for BRPs was being prepared and it was submitted to the local NRA for approval in 2024 February. This document includes the necessary changes to cover the upcoming 15 min ISP. AST: Changes in national grid code were done to update BRP imbalance settlement rules, enabling 15 minute ISP starting from 01 January 2025, imbalance price formation by using new balancing prices created, including prices from European platforms and neutrality component calculation updating the unintended exchange costs calculation with FSKAR costs that will be present from synchronisation with CE. Proposal is yet to be approved by the NRA. Elering: standard T&Cs for BRPs were updated to comply with the Imbalance settlement harmonisation methodology, which was approved by ACER on 15 July 2020.

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	31 December 2024
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Implemented
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f):

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Pursuant to Article 2(4) of SO GL, the Baltic TSOs are exempted from the provisions of SOGL that are related to the dimensioning of FCR, FRR and RR. Baltic power systems operate in the IPS/UPS synchronous area, therefore dimensioning principles for active power reserves are defined in mutual agreements within the IPS/UPS SA and national legislation.

Baltic TSOs according to agreements with TSOs and network owners of the common SA (Belarus, Russia, Estonia, Latvia and Lithuania) (hereinafter – BRELL) are mutually responsible for maintaining 100 MW of normative emergency reserve capacity.

Depending on national legislation, each Baltic TSO separately applies national requirements for the dimensioning of active power reserves.

Currently, a project is ongoing to introduce the common Baltic balancing capacity market for the needs of the Baltic LFC block. It is foreseen to go live in 2025 Q1. The common procurement of balancing capacity shall allow Baltic TSOs to exchange and share balancing capacity reserves within the Baltic LFC block.

Litgrid AB case:

Standard upward mFRR balancing capacity product was implemented, procured with the first delivery date on 1 January 2022. The dimensioning for this capacity considers the biggest dimensioning incident, forecasted availability in upward mFRR balancing energy market, emergency reduction of RES generation, overloads of Cross-border tie lines and the amounts of procured tertiary reserve.

AST case:

AST has not introduced or procured balancing capacity in the Report period.

Elering case:

Elering has not introduced or procured balancing capacity in the Report period.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

Considering that no standard or specific balancing energy was implemented during the Report Period, no cost and benefit analysis and analysis on volumes, availability, procurement, usage and justification of usage of specific products were made for the Report period.

During the Report Period, Baltic TSOs have been operating in the common Baltic balancing market (Baltic CoBA). Baltic CoBA has two defined balancing energy products:

1. Baltic standard manual Frequency Restoration Reserve (Baltic mFRR) product for balancing;

2. Specific Emergency manual Frequency Restoration Reserve (Baltic ER mFRR) products:

a. Normative Emergency Capacity Reserve (NERC);

b. Emergency Capacity Reserve (ERC).

NERC is introduced as a mandatory reserve capacity to cover Baltic TSOs obligations over BRELL agreement. ERC is introduced separately by each Baltic TSO to ensure the operational security of their respective power system. All Baltic balancing energy products are not compatible with standard energy products as defined in EBGL articles 25 and 2(36).

5.3 Belgium (Elia Transmission Belgium SA/NV)

Introduction

a. Link to the National TSO report on Balancing

b. Link to current version of National T&Cs

c. Geographical scope: SA(s), LFC block(s), LFC area(s), scheduling area(s) = imbalance area(s), BZ(s) = imbalance price area(s), TSO(s).

- SA CE
- LFC block: Control block Belgium / Elia
- LFC Area: Control block Belgium / Elia
- Scheduling area / imbalance area : Belgium
- BZ / imbalance price area : Belgium
- TSO: Elia Transmission Belgium

d. General information about market design and reserve dimensioning: central / self-dispatch model, types of reserve used to balance the system and dimensioning, specific requirements defined in the T&Cs for BSP/BRP1 according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.).

- The Belgian system is based on a self-dispatch model;
- The types of reserves used to balance the system are FCR and FRR (aFRR and mFRR)
- BSPs have the obligation, for units of more than 25 MW, to offer to the TSO the available upward and downward power as balancing energy bids.

e. General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.

- Number of BSPs active in Belgium: 9 (December 2023), 9 (December 2022)
- Number BRPs active in Belgium: 128 (December 2023), 113 (December 2022)
- Historical / new market players: the increasing number of BRPs is mainly explained by the increasing amount of BRP traders (no substantial increase in number of BRPs with physical positions).
- DSR / RES / Batteries participation: Elia opened all capacity and energy products for all technologies. These technologies are known to participate in several products, for example: batteries are observed to participate in providing FCR and aFRR balancing capacity; wind power is observed to provide non-contracted balancing energy bids mFRR, and DSR is observed to participate in mFRR balancing capacity.

[MW]	FCR	aFRR	mFRR
DSR	0	0	340
Batteries	103	103	0
Other	239	3,284	4,377

Table 15 – Pre-qualified volumes in MW for participation in FCR, aFRR and mFRR balancing capacity in December 2023 (Delivery Point Single Unit & Delivery Point Providing Group).

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide the most recent information closest to the report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Not applicable	Not applicable
aFRR Platform	Connection to the platform foreseen for October 2024	A derogation was granted on 14 July 2022 to allow for more time to implement mitigation measures against high aFRR activation prices, at national and European levels. The aim of these measures is to limit the risk of extreme aFRR activation costs and imbalance prices.
mFRR Platform	Connection to the platform foreseen for June 2024	A derogation was granted on 2 June 2022 to allow for more time to Elia and market parties to adapt to the European market design
IN Platform	ELIA is an active participating TSO	Not applicable

Balancing capacity cooperations	Status	Accession timeline
FCR Cooperation	Participating TSO	Not applicable

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
T&C BSP FCR have not been amended during the years 2022 and 2023.	Approved
Next modification will relate to the implementation of the harmonised T-min LER requirements, the implementation of continuous monitoring and the implementation of the Additional Properties for FCR as introduced in the SAFA.	Not submitted, Submission foreseen in 2024–2025
T&C BSP aFRR were amended in March 2022 with modifications to the aFRR capacity auction design.	Approved
Next modifications currently planned for Q3 2024 include modifications necessary to access the PICASSO platform, modifications to facilitate the participation of Low Voltage assets, and shortening of the Full Activation Time to 5 minutes.	Not submitted, Submission foreseen in Q3 2024
Modifications were approved in March 2024 to prepare the accession to the MARI platform. They relate in particular to the suppression of implicit bidding (all bids will have to be introduced by BSPs), the cross-border activation of mFRR energy and fallback processes, the suppression of a 4-hour balancing capacity products with neutralisation time (ensuring compliance with the European methodology for standard products for balancing capacity) and a shortening of the full activation time from 15' to 12.5' in accordance with the mFRR IF.	Approved
Evolution of the terms and conditions for BRP	
T&C BRP were amended in 2023 to prepare the accession to the MARI & PICASSO platforms (as per article 52(2) and 55 of the EB Regulation.	Not Submitted
Next modifications planned will relate to the context of a Consumer Centric Market Design (faster settlement, evolution of imbalance adjustments in case of Transfer of Energy, multiple BRPs behind one meter, …) (a.o. as per article 54 of EBB Regulation)	Submission foreseen in 2024–2025

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Not Applicable
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f)

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Summary analysis of the dimensioning of reserve capacity, including the justification and explanation for the calculated reserve capacity requirements

FCR is dimensioned according to Article 153 of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as 'SOGL') and as specified in the Synchronous Area Operational Agreement.

Until 21 July 2022, the dimensioning methodology for the reserve capacity needs was specified according to Elia's LFC block Operational Agreement, hereafter referred to as LFCBOA, approved by CREG on 6 December 2019 (B)2025. As from 18 July 2022, the method of determination of the aFRR needs changed as described in Elia's LFCBOA, approved by CREG on 14 July 2022 (B)2434.

Elia dimensions the required reserve capacity on FRR on a daily basis in accordance with the minimum criteria set out in Article 157(2) SOGL on the basis of the maximum value resulting from:

1. a dynamic **probabilistic methodology** in line with Article 157(2)b of the SOGL. It is based on a convolution of two distribution curves, one representing the prediction risk and another representing the forced outage risk. This methodology has been designed to cover 99.0 % of the LFC block imbalance risk. After the convolution, the new distribution is decomposed in a distribution of potential positive LFC block imbalances, and a distribution of potential negative LFC block imbalances. This calculation is conducted for each-quarter hour of the next day, and the 99.0 % percentile of each probability distribution curve determines the minimum positive and negative required reserve capacity.

2. a dynamic **deterministic methodology** based on the dimensioning incident in line with Article 157(2)e and 157(2)f of the SOGL. For each-quarter hour of the next day Elia determines the required positive and negative reserve capacity on FRR in order that it is never less than the positive and negative dimensioning incident of the LFC block, as specified in Article 3 and Article 157(2)d of the SOGL.

3. a **minimum threshold** based on the historic LFC block imbalances in line with Articles 157(2)h and 157(2)i of the SOGL. For each-quarter hour of the next day, ELIA determines the required positive and negative reserve capacity on FRR in order that it is sufficient to cover at least the positive and negative historic LFC block imbalances for 99.0 % of the time in line with Articles 157(2)h and 157(2) i of the SOGL.

Elia determines the required positive and negative reserve capacity on mFRR each day before 7 AM for every period of 4 hours of the next day as the difference between the required positive and negative reserve capacity on FRR (dynamic) and aFRR (static).

ELIA uses a 'static' probabilistic method to determine the aFRR needs symmetrically (positive and negative), based on a time series of two years of expected variations between quarter-hours of LFC block imbalances. As from July 21, 2022, the aFRR capacity needs are determined as the capacity that can cover 79 % of the absolute variations of LFC block imbalances after imbalance netting. It is determined at 117 MW. Before that, Elia limited the symmetric aFRR needs at the same value as in 2021, i.e. 145MW. Elia plans to present in a next version of the LFCBOA a new methodology to assess the aFRR needs.

Reserve capacity requirements	2022		2023	
	positive	negative	positive	negative
FCR (symmetric)	86 MW		88 MW	
FRR	1041 MW	831 MW	1041 MW	983 MW
aFRR (symmetric)	132 MW		117 MW	
mFRR	909 MW	699 MW	924 MW	866 MW

Summary analysis of the optimal provision of reserve capacity including the justification of the volume of balancing capacity

As from 7 January, 2021, the dimensioning methodology for the required balancing capacity was specified in ELIA's LFC Means approved by CREG on 17 December, 2020 (B)2159 in which the balancing capacity requirements are determined (complementary to the LFCBOA in which the reserve capacity needs are determined).

For positive mFRR, taking into account the guaranteed availability of the mFRR balancing capacity products in combination with the sharing of reserves with other TSOs, balancing capacity is determined dynamically based on the mFRR reserve capacity needs. This balancing capacity is covered with a minimum of 640 MW of 'mFRR standard'.

1. As shared mFRR reserve capacity with neighbouring TSOs can only be activated in exceptional circumstances, taking into account service availability and remaining cross-border capacity, ELIA can take into account 250 MW of FRR sharing to cover positive mFRR requirements.

2. As non-contracted balancing energy bids have a limited availability, no capacity can be guaranteed with acceptable availability on an annual basis. For this reason, ELIA cannot cover, even partially, its positive mFRR needs with non-contracted balancing energy offers.

The negative mFRR requirements are covered with non-contracted balancing energy bids and mFRR reserve sharing. On the basis of an analysis of the availability of non-contracted balancing energy bids and the availability of mFRR sharing (based on the availability of the service and the available cross-border capacity on continental borders) no need to procure balancing capacity could be demonstrated. The coverage of the needs with available means is subject to a yearly analysis.

Following the latest version of the LFC Means approved on 22 December, 2022 (B)2484, Elia may, from 1 November 2022 until 31 March 2023, temporarily reduce the contribution of the positive shared capacity to 0 MW when receiving from the relevant RCC a communication on a 'Critical Grid Situation' concerning an adequacy issue in one or more countries with which Elia has a sharing agreement.

Analysis of the opportunities for the exchange of balancing capacity and sharing of reserves

ELIA joined the FCR Cooperation in 2016. FCR Cooperation has developed a common process for the procurement of FCR with other TSOs, thus increasing the competition between BSPs and reducing the overall cost of procurement. ELIA has procured since then a significant part of its FCR needs abroad.

In line with Article 32(1) of the EBGL, ELIA takes into account the sharing of reserve capacity with neighbouring TSOs in the dimensioning of its balancing capacity.

Taking into account the constraints of service availability and that availability of cross-border capacity is not ensured, the reliability rate of 99 % for covering the expected LFC block imbalances (as specified in Article 8 of the LFCBOA), and the result of an analysis of historic observations on available interconnection capacity at borders after the intra-day time frame, ELIA determined, following the latest version of the LFC Means approved on 22 December 2022 (B)2484 :

- the positive sharing capacity included in the dimensioning to 250 MW.
- the negative sharing capacity included in the dimensioning to 350 MW.

Explanation and a justification for the procurement of balancing capacity without the exchange of balancing capacity or sharing of reserves;

As the previous section has already discussed the opportunities of exchange of balancing capacity for FCR, and sharing of mFRR, this section focuses on the exchange of balancing capacity and sharing of reserves which are currently not implemented.

- As FCR is dimensioned on regional basis by ENTSO-E, i.e. for CE, the sharing of FCR reserve capacity for ELIA's LFC block is not applicable.
- Considering the automatic, local character of the activation of aFRR, it has been considered very complex to share aFRR reserve capacity or exchange aFRR balancing capacity before the European balancing platform for aFRR is established. In addition, the existing gaps between the local market designs would likely hinder such an exchange.
- In ELIA's view, the exchange of mFRR balancing capacity would have required the reservation of CZC for this purpose. This was not expected to be beneficial to the market as it would have reduced trading opportunities in day-ahead and intraday. It would also have required to establish with neighbouring TSOs complex processes to be able to activate the reserve contracted abroad frequently.

Assessment of sharing/exchange of reserves

The table below represents the volume of FCR provided by Belgian BSPs and the volumes of FCR that Elia contracted abroad, through the FCR Cooperation. From 1 July 2020, the FCR Cooperation introduced a daily auction with 4h granularity product and Elia has procured its total FCR demand in the FCR Cooperation, ending the FCR/aFRR auction. The FCR Cooperation procurement rules nevertheless ensure that the Core Share is satisfied locally. Since the beginning of 2021, the volumes procured locally in excess of the Core Share have been extremely limited. Specific information on the prices and volumes of the FCR cooperation can be found on the website of the FCR Cooperation.

Month	2022		2023	
	Volume of FCR provided by Belgian BSPs [MW]	Imported volumes of FCR [MW]	Volume of FCR provided by Belgian BSPs [MW]	Imported volumes of FCR [MW]
January	27	59	32	56
February	27	59	30	58
March	28	58	32	56
April	28	58	30	58
May	28	58	28	60
June	27	59	30	58
July	27	59	29	59
August	27	59	28	60
September	30	56	29	59
October	30	56	28	60
November	28	58	28	60
December	32	54	28	60

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

No specific products were introduced by Elia.

5.4 Bulgaria (Electroenergien Sistemen Operator EAD)

Introduction

For the national TSO report on balancing, see here. The balancing market in Bulgaria was introduced in 2014 with a self-dispatch model and equal principles for the balancing of all transactions and all market participants.

Under Article 6, paragraph 9 of Regulation EU 2019/943 of the European Parliament and the Council of 5 June 2019 on the internal market of electricity, in 2021 ESO Bulgaria started to conduct a daily balancing reserve auction procedures, for the entire range of FCR, aFRR and mFRR – 100 % of legally required balancing capacity. The BSPs that can apply to the prequalification procedure for providing services for FCR, aFRR and mFRR reserves can be generators, consumers, prosumers, storage facilities (including batteries) or aggregators. The auction rules and the register of BSPs participating in the balancing reserve auctions for FCR, aFRR and mFRR, are published on the website of ESO.

As of 23 June 2021, daily balancing energy auctions were also started for collecting balancing energy offers from BSPs and creating a local merit order lists for the different types of reserves. The start of the daily auctions for balancing capacity and balancing energy are the prerequisite for the further fulfilment of requirements, introduced in the EB Regulation and the successful participation of Bulgaria in the common EU balancing energy platforms under the PICASSO and MARI projects. The integration of balancing markets is the last task before the completion of the integration of markets on the day-ahead and intraday time frames. In 2023, the preparations of ESO to join the IGCC project was completed. Since 1 March 2023, ESO has been an operating member of this cooperation and as a result, a significant part of the energy required for regulation in the Bulgarian control area from aFRR was covered by the imbalance netting mechanism and this was a prerequisite for the reduction of balancing costs for ESO and respectfully for all market participants in the electricity market.

In fulfilment of Article 53, paragraph 1 of Regulation EU 2017/2195 as of October 2022, ESO and the Independent Bulgarian Energy Exchange respectively implemented the 15-minute ISP and the 15-minute MTU on the intraday market.

The registers of BRPs are public, and according to the Market Rules the balancing groups are split in standard balancing groups (55 active), special balancing groups (20 active) and combined balancing groups (7 active), but they pay the same balancing prices for deficit and surplus that are calculated by ESO. The Energy Law has been amended to provide possibilities for storage/batteries to participate in the balancing market.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide the most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	ESO is an observer in this project
aFRR Platform	Q4 2024	Market development and replacement of current EMS/supervisory control and data acquisition (SCADA) is a prerequisite for implementing adaptations to connect to European platform for aFRR.
mFRR Platform	Q4 2024	Market development and replacement of current EMS/supervisory control and data acquisition (SCADA) is a prerequisite for implementing adaptations to connect to European platform for mFRR.
IN Platform	In operation since March 2023	

Balancing capacity cooperations	Status	Accession timeline
	ESO is not involved.	

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
A new methodology for determining the imbalance clearing prices was introduced and expected to be in force in May 2024 taking into account the specifics of the common balancing energy platforms and the content in the EB Regulation.	Submitted – expect to be in force from May 2024

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Date
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes
3.1. Condition (a)	Implemented
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

5.5 Croatia (Croatian TSO Ltd.)

Introduction

The Croatian TSO Plc. (HOPS) is the sole TSO in the Republic of Croatia and the owner of the entire Croatian transmission network.

HOPS is responsible for the organisation of the Croatian balancing market and is solely responsible for the Croatian LFC area, scheduling area and monitoring area that covers the entire country. Together with two neighbouring TSOs, the Slovenian TSO (ELES Ltd.) and Bosnian and Herzegovinian TSO (Nezavisni operator sistema u BiH – NOSBiH Ltd.), HOPS forms the Load-Frequency Control Block Slovenia-Croatia-BiH (LFC block SHB) where joint FRR dimensioning is performed. The Croatian LFC area is a part of the CE SA:

a) Link to the National TSO report on Balancing

b) Link to current version of National T&Cs

c) Geographical scope: SA(s), LFC block(s), LFC area(s), scheduling area(s) = imbalance area(s), BZ(s) = imbalance price area(s), TSO(s):

- CE SA
- Load-Frequency Control Block Slovenia-Croatia-BiH (LFC block SHB)
- Croatian LFC area (CTA/HR)
- Croatian scheduling area (SCA HR) = Croatian imbalance area (MBA HR)
- Croatian BZ (BZN HR) = imbalance price area HR,
- TSO: Croatian TSO Plc. (HOPS).

d) General information about market design and reserve dimensioning: central / self-dispatch model, types of reserve used to balance the system and dimensioning, specific requirements defined in the T&Cs for BSP/BRP1 according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.).

e) For balancing of the power system in 2022 and 2023, HOPS used a self-dispatch model for the following reserves: FCR, aFRR, mFRR.

The total amount of FCR reserves within the CE SA agreed in the amount of the largest reference imbalance phenomenon in the power system (3,000 MW) and required values of FCR reserve in 2022 for the Croatian LFC area was 15 MW and 2023 17 MW. In accordance with the Croatian Grid Code (Mrežna Pravila prijenosnog sustava NN 67/2017, 128/2020), the provision of FCR power reserve is mandatory for all electricity producers connected to the transmission network. The procedure for dimensioning the aFRR and mFRR for the Croatian LFC area is performed in accordance with the provisions of the System Operation Guideline, the Croatian Grid Code, the pricing methodology the for provision of ancillary services (Metodologija za određivanje cijena pomoćnih usluga, HOPS 9/2020), methodologies for determining the amount of tariff items for transmission of electricity (Metodologija za određivanje iznosa tarifnih stavki za prijenos električne energije, OG 104/2015, 84/2016 84/2022) and the Operational Agreement of the SHB LFC block.

Under Article 18 of the EB Regulation, with prior approval from the NRA the Croatian Energy Regulatory Agency (HERA), HOPS adopted Rules for balancing the power system (Pravila o uravnoteženju elektroenergetskog sustava, POUEES), effective from 7 December 2019 until 31 December 2023.

T&Cs for BSPs, under Articles 18.5. of EB Regulation, POUEES defines the Market Rules for the BSPs, and ensures the legal possibility for HOPS to participate in common European balancing energy exchange platforms in accordance with Articles 19–22 of the EB Regulation. According to POUEES, balancing services (aFRR, mFRR and respective balancing energy) are defined, procured and activated in positive and negative directions separately.

T&Cs for BRPs, under Articles 18(6)(e), (i) and (j) of the EB Regulation, are defined in the local electricity market code (Pravila organiziranja tržišta električne energije (NN 107/2019; NN 36/2020)), issued by the Croatian Market Operator (HROTE). BRPs are required to sign a balance responsibility agreement with HOPS.

In accordance with the provisions of POUEES, ISP is delegated to HROTE. POUEES sets imbalance settlement rules with single imbalance pricing for all BRPs, reflecting the cost of activated balancing energy in the respective settlement period.

f) General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.

Balancing services are procured in a transparent and non-discriminatory manner by conducting a procurement procedure through a public tender that is conducted on a periodic basis (monthly, weekly, daily and/or intraday). BSPs can be any individual network users and aggregators which have successfully completed a prequalification process, demonstrated a technical ability to provide a balancing

service, and have signed balancing service agreements with HOPS (separately for each service). HOPS conducts a procurement mFRR process through public tenders in accordance with the rules published on **HOPS's website**.

For most balancing services, during 2022 and 2023 only one prequalified BSP was present inside the vertically integrated company (HEP DD), which is the dominant service provider in the provision of balancing services in the Croatian power system. In such cases, a respective balancing service is then procured via direct contracting with the dominant service provider, with prior NRA approval, in accordance with:

- Methodology for Determining Balancing Capacity Prices (HOPS 7/2016)
- Rules for Determining the Balancing Energy Price Caps (Annex 1 of POUEES).

By 31 December 2023, there were in the Croatian balancing market:

- only 1 dominant BSP offering aFRR;
- 10 BSPs offering mFRR (manly DSR units and RES, 2 independent aggregators) besides the dominant BSP.

By December 2023, there were 34 BRPs present in the electricity market.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps, with further remarks by each TSO if needed (to provide the most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	HOPS is not performing the reserve replacement process, thus it is not a member of the TERRE project.
aFRR Platform	After legal deadline (23 July 2024)	Under Art. 62 of the EB Regulation, the 15th session of the HERA management board on 23 July 2021 adopted a decision on granting approval to HOPS for derogation from the obligations laid down in Art. 21 of the EB Regulation for the period from 24 July 2022 to 24 July 2024.
mFRR Platform	After legal deadline (23 July 2024.)	Market development and replacement of current EMS/supervisory control and data acquisition (SCADA) is a prerequisite for implementing adaptations to connect to European platform for mFRR.
IN Platform	In full operation from 1 February 2019.	

Balancing capacity cooperations	Status	Accession timeline
Joint dimensioning FRR process in LFC block SHB	Member	In full operation from 2014, with adaptations in accordance with the Operational Agreement of the Slovenia, Croatia, and Bosnia and Herzegovina (SHB) LFC block.

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	N/A
1.2. If response to Q1 is 'yes', what were the main results'?	Allowing Demand, RES and Storage to participate increased the liquidity in our local balancing market. Allowing such units to participate in the European balancing energy market potentially lower prices of balancing the platforms and increases the security of the power system and the supply of end consumers.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	N/A
2.2. If response to Q2 is 'yes', what were the main results?	HOPS prequalifies, procures and uses only standard balancing energy products in the Croatian LFC area
Q3: Do you procure a standard product for balancing capacity?	Yes
Q4: What are the main characteristics?	The main characteristics for aFRR standard balancing product in positive and negative directions is: • 1 hour validity period • unlimited activation time and no neutralisation time. For mFRR, HOPS procures the following balancing products: • the first one is characterised by 1 hour validity period, unlimited activation time and no neutralisation time • the second one is characterised by a 1 hour validity period, limited activation time of >2 hours and a neutralisation time in time interval from 0 to 8 hours.
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	N/A
5.2. If response to Q6 is 'yes', what were the main results?	HOPS has implemented joint FRR dimensioning inside LFC block SHB operational from 2015, in accordance with Agreement of the LFC block SHB. The main results are reduced costs of aFRR and mFRR balancing capacity on LFC block SHB level.
Q6: Are you already involved in a BCC as a member or as an observer?	Observer in German-Austrian aFRR balancing capacity cooperation (BCC)

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
The Croatian government adopted the Electricity Market Law (Zakon o tržištu električne energije, NN 111/2021, 83/2023 (ZOTEE)), which incorporates all provisions related to balancing defined by Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast), and Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity, and amending Directive 2012/27/EU in national legislation. New T&C for BSP (Pravila o uravnoteženju elektroenergetskog sustava, POUEES 12/2023) in accordance with ZoTEE have been approved by HERA on 7 December 2023 and are effective from 1 January 2024.
Evolution of the T&Cs for BRP
POUEES 12/2023 partly covers T&C for BRPs (sets imbalance settlement rules with single imbalance pricing for all BRPs, reflecting the cost of activated balancing energy in the respective settlement period) but T&Cs for BRPs, under Articles 18(6)(e), (i) and (j) of the EB Regulation, are defined in the local electricity market code (Pravila organiziranja tržišta električne energije (NN 107/2019; NN 36/2020)), issued by the Croatian Market Operator (HROTE). A new Market code is currently in development, expected to be approved until the end of Q1 2024.

Summaries and main results of the analysis of Articles 60(2)(a–f):

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f):

For the dimensioning of the aFRR balancing capacity, an empirical approach has been used to calculate the minimum amount of reserved capacity using empirical factors (a = 10, b = 150) and maximum load in the system in MW. The value of the required balancing capacity is extrapolated to hourly and monthly values depending on the expected load within a calendar month. Minimum and maximum amounts of aFRR have been set at ± 35 MW and ± 75 MW.

To calculate the required amount of mFRR balancing capacity, two generally accepted approaches have been used, probabilistic and deterministic.

The deterministic approach takes into account the largest single outage in the Croatian LFC area. The probabilistic approach defines the need for balancing energy based on historical needs for balancing, considering the ACE open loop.

These two approaches have been combined together with other impact factors (for example joint dimensioning in the SHB LFC block, the national legislative framework, the 10-year network development plan); mFRR capacity for 2022 & 2023 has been calculated as 250 MW for the up direction and 100 MW for the down direction.

The aim of cooperation within the SHB LFC block is to establish an adequate mechanism that would enable the efficient operation of the LFC control areas of Slovenia, Croatia, and Bosnia and Herzegovina, and consequently of the SHB LFC block.

All parties have determined the mFRR balancing capacity of the SHB LFC block based on a probabilistic methodology.

The defined values for 2022 and 2023 for mFRR balancing capacity are:

- upwards direction: 250MW (ELES), 250 MW (HOPS) and 196 MW (NOSBiH);
- downwards direction: 71 MW (ELES), 46 MW (HOPS) and 68 MW (NOSBiH).

Assessment of sharing/exchange of reserves:

Procurement of the reserve capacity was local; no exchange of balancing capacity or common procurement has been applied since HOPS does not participate in any BCC.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d):

There were no specific products in the year 2022 and 2023.

5.6 Czech Republic (ČEPS a.s.)

Introduction

In line with COMMISSION REGULATION (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing, Article 60 TSO report on balancing: The original report on balancing is available **here**.

ČEPS, a. s. (hereinafter referred to as 'ČEPS') is the Czech Republic TSO. It is within the CE SA. As a part of it, ČEPS oversees the LFC block, which is equal to the LFC area, scheduling area, and monitoring area covering the entire country. ČEPS is not a central dispatch TSO.

The rules for pricing and evaluation of balancing capacity bids and the subsequent evaluation of balancing services are set up in the T&Cs for BSPs. Settlement and invoicing occur after the balancing service evaluation period, followed by an appeal period. The actual version is **here**, file: Kodex_PS_Část_II_od_1_1_24.pdf.

The rules for balancing energy evaluation are described in the T&Cs for BSPs. The volume and price of the positive and negative balancing energy are transmitted to the Nominated Electricity Market Operator (OTE) by ČEPS within the terms defined in the **Czech Market Rules**.

ČEPS has adopted standard balancing capacity and energy products since 1 April 2024. ČEPS procures standard products of balancing capacity and one specific product of balancing capacity. Standard products of balancing capacity are aFRR and mFRR. The specific product of balancing capacity is mFRR5. mFRR5 has a shorter full activation time (FAT = 5 minutes) compared to the standard product of mFRR. It has a minimum daily activation duration of 4 hours.

ČEPS establishes the volume of balancing capacity based on the requirements outlined in Commission Regulation (EU) 2017/1485 dated 2 August 2017, providing a framework guideline for the operation of electricity transmission systems. ČEPS determines its dimensioning needs every year. Dimensioning is performed six months before the start of procurement. Since 2021, ČEPS has employed a probabilistic

determination of balancing capacity, resulting in varying needs throughout individual months and hours.

The volume of balancing capacity in the positive direction is determined by the size of the positive dimensioning incident, representing the largest imbalance that may result from an instantaneous change of active power of a single-generation module. The volume thus determined is covered by standard and specific products of balancing capacity. ČEPS also procures the minimum required volume of standard products of balancing capacity regarding the volume of balancing capacity in the positive direction to cover the historical record of LFC block imbalance 99 % of the time. The volume of balancing capacity in the negative direction covers the historical records of LFC block imbalances 99 % of the time. ČEPS also determines the minimum size of the procured aFRR in both directions, considering additional recommendations outlined in the SAFA Policy on Load-Frequency Control and Reserves, explicitly referring to section B-6-2-2-1-5. The determined minimum volume of aFRR is larger than the difference between the 1-minute average ACEol and the 15-minute average ACEol of the LFC block.

All new or existing BSPs in the Czech Republic (CZ LFC block) shall have:

- Valid Agreement on the Terms of Procurement and Provision of Balancing Services (including T&Cs for BSPs);
- Valid certificate for provision of Balancing Services – an independent certification authority performs prequalification according to the procedures defined in the T&Cs for BSPs; and
- Connection to ČEPS control system and the 'Protocol of successfully completing point-to-point and functional tests.'

The technical requirements for balancing services are defined in the T&Cs for BSPs. Possibilities and conditions of aggregation are described in the T&Cs for BSPs. The consequences of non-compliance are described in the ČEPS T&Cs for BSPs. If the BSP fails to provide the balancing energy, the BSP will not get the payment for the balancing capacity in the relevant business period. If the activated reserves' aFRR, mFRR, or RR quality parameters are not respected, the activation is settled as unsuccessful or partially unsuccessful. In the case of mFRR or RR, the total monthly payment for balancing capacity is reduced by 10 % for each failed activation. In the case of mFRR or RR, the total monthly payment for balancing capacity is reduced by 5 % for each partially failed activation. Suppose the BSP does not provide the balancing capacity in more than 10 % of the business hours; in that case, the BSP might be suspended from providing any balancing services, and the delivery issue must be fixed as soon as possible.

ČEPS performs weekly, daily and intraday operational planning. The BSPs must provide the data for operational planning according to the procedure set by the T&Cs for BSPs. BSPs must also update the data without undue delay according to the T&Cs for BSPs.

OTE determines the time frame for the settlement of balancing energy with the BSP. Evaluation and settlement of the balancing energy market is described in the Business T&Cs for Electricity issued by OTE.

BRPs are responsible for their imbalance and may transfer the imbalance responsibility to another BRP under contract. The Czech Market Rules further define responsibility for imbalance, applied to each customer's connection/supply point, individual electricity point of delivery or summary of delivery points, and the obligation for the TSO or the distribution system operator to cover the losses of their system, which is itself a BRP or has transferred imbalance responsibility to another BRP.

The requirement that all BRPs bear financial responsibility for their imbalances and such imbalances are subject to clearing with the Market Operator are prescribed by the Energy Act in Section 22 (2) – Electricity Market Participants and PT in Section 18 – Liability for Imbalance.

The rules according to which BRPs may change their plans before and after the closure of intra-day electricity trading capacity (as required by Article 17(3) and 17(4) of EB regulation are described in the Czech Market Rules: §7 - Intraday market and §11 – Settlement of the balancing energy market.

System imbalances are provided by OTE, which monitors the measured power values and compares them with the contracted power. In the case of differential, OTE calculates the system imbalance.

Information about unused generation capacity is used to prepare corrective measures for regional operation planning. Rules about providing this information are described in the ČEPS Business Portal. Offers of unused generation capacity are not required for BSP to share with ČEPS – it is only voluntary. ČEPS has no specific requirements for BSPs beyond EB regulation. An exemption from publishing information on offered prices of balancing energy or balancing capacity bids due to market abuse concerns, according to Article 12(4), is not used. The dual pricing method of imbalance settlement is defined by the Market Rules in Annex 8.

The Czech balancing capacity market initially comprised 27 BSPs in 2022, which increased to 35 in 2023. ČEPS anticipates further growth in the BSP numbers in the coming years. Currently, there are 142 BRPs. The historical marker players have slightly reduced their portfolios of balancing capacity, attributed to the implementation of standard products with shorter FAT. On the other hand, Aggregators have emerged as significant roles among the new participants. DSR/RES/Batteries can provide balancing capacity if they meet the conditions set out in the T&Cs for BSPs.

5.7 Denmark (Energinet Elsystemansvar A/S)

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available **here**. **Link** to the current version of National Terms & Conditions.

Energinet is the Danish TSO. The Danish power transmission system is geographically located in Northern Europe and connects the Nordic SA with the Continental European SA.

Denmark has two monitoring-, bidding-, and scheduling areas: DK1 (west) and DK2 (east).

DK1 is part of the German–Danish–Luxembourgish LFC block and thus a part of the Continental European SA. DK2 is part of the Nordic SA and the Nordic LFC block (together with Finland, Norway and Sweden).

Market size and market players

There are around 80 approved market players in the DK area, of which 48 are pure traders performing non-asset-based trading. During the last two years, 40 new market players have been approved including five new BSPs (suppliers of balancing services without energy).

The BSPs are mainly focused on the delivery of FCR from batteries and electrical vehicles whereas the participation of RES (wind and solar) is served by BRPs.

Energinet has prequalified roughly 25 MW of batteries, 400 MW of renewables and 30 MW of flexible consumption (excluding electric boilers). In addition, multiple GW of renewables and close to 2 GW of electric boilers participate on voluntary basis with mFRR energy bids, which are not included in the above numbers.

In 2022 Energinet started publishing an annual report called **'Outlook for ancillary services'**, which gives a thorough insight into the expected future of the markets for ancillary services in Denmark +10 years ahead.

Dimensioning of reserves

The Nordic TSOs have agreed upon common principles for the dimensioning of FRR-reserves for all the Nordic areas (DK1 included). In general, the principles follow the regulation from SOGL §157. However, rather than finding the maximum of the P99 of Block imbalances and the reference incident within the block, each TSO is to ensure reserves for the netted area imbalances, special regulation and reserves to cover each LFC area reference incident.

This approach yields higher FRR needs compared to the SOGL compliance. However, the Nordic TSOs have developed an optimisation algorithm that seeks to minimise the procurement of FRR reserves by utilising sharing possibilities. This ensures a high security level to the lowest costs possible.

Denmark will by the end of 2024 procure dynamically, which entails that Energinet will predict needs for the coming day on an hourly resolution based on forecasts of e.g. weather, consumption, local RI, etc.

The FRR procurement process itself is done via the common Nordic capacity markets for both aFRR and mFRR detailed below.

Specific requirements for BSP/BRP

Specific requirements and other aspects of Articles 18(5–7) are summarised in **Ancillary Services to be delivered in Denmark – Tender conditions**. Energinet does not require suppliers of balancing services to continuously present information about unused capacity or requirements for suppliers to offer unused capacity in the form of balancing resources or otherwise.

Characteristics of DK1

In DK1, a self-dispatch model is applied. The types of reserves used to balance the system are FCR, aFRR and mFRR. DK1 participates in the European FCR cooperation. Thus, FCR is dimensioned and activated across CE. The DK1 contribution is calculated based on DK1's share of the total generation and consumption.

aFRR in DK1 is dimensioned in accordance with the SAFA and dimensioned to deliver System Operation Guideline-compliant FRCE values. Furthermore, it is part of the N-1 response detailed below. The amount of aFRR needed in DK1 for 2024 is determined as ± 100 MW. The FRCE is defined as the unintended flow on DK1's only alternating current (AC) border connecting DK1 and TenneT DE, hence the ACE CL for DK1.

The amount of mFRR bought in DK1 is dimensioned to handle the worst-case N-1 incident. For DK1, this is a trip of the Viking Link cable at 1400 MW. Due to a mutual agreement on sharing of up to 700 MW emergency incident reserve with TenneT, the demand is reduced to 700 MW. This must be covered by both mFRR and aFRR, and thus the mFRR demand in DK1 is 600 MW. Energinet uses a sharing agreement between DK1 and DK2, enabling a reduction of the mFRR bought in DK1 by 300 MW. This brings the total demand for mFRR in DK1 to 300 MW.

Reserve product	Demand	Bought in LFC area
FCR	25	25
aFRR	100	100
mFRR	600	300

Table 16 – Reserve volumes in DK1

Characteristics of DK2

The market design in the Nordic LFC block and thus DK2 is based on the self-dispatch model. The type of reserves used in the Nordic SA to balance the system are FCR, FRR and FFR.

The FCR reserves are used for the containment of frequency. FCR is divided into two reserve products, with FCR-D being asymmetrical and split in separate up/down products, FCR for normal operation (FCR-N), FCR for disturbance upwards (FCR-D Up) and FCR for disturbance downwards (FCR-D Down). FCR-D Down is the newest reserve product used in the Nordic SA. Energinet started its procurement of FCR-D Down on 30 December 2021.

FRR reserves are used to restore the frequency to the target value of 50.0 Hz, manage unintended flows, and relieve the activated FCRs. The FRRs are divided into two reserve products: aFFR and mFFR.

aFRR was implemented in Q4 2022 simultaneously with the connection to the common Nordic aFRR capacity market. Energinet has forecasted the aFRR need in 2025 for DK2 to approximately 0–52 MW dependent on the hour of the day, with nothing procured at night, 38 MW procured during most daytime hours, and 52 MW procured at peak hours in the morning and the afternoon. mFRR is dimensioned by a trip of the largest unit in operation (N-1), which is Storebælt HVDC at 600 MW.

Furthermore, a FRR is procured in the Nordic countries. The FFR is supporting in case of large disturbances, needed in periods with low inertia in the system (below ~150 GWs). The FFR need is forecasted on a continuous basis per hour for the coming day.

The market sizes for the different products can be seen in the table below. The dimensioning is determined on a Nordic level and distributed among the four Nordic TSOs according to the national share of the total need, except for mFRR, which is dimensioned on a national level.

Reserve product	Nordic volume	National share	National requirement
FCR-N	600	3 %	18
FCR-D Up	1450	3 %	44
FCR-D Down	1400	3 %	44
aFRR	0/300/400		0/38/52
mFRR	N/A	N/A	600
FFR	Forecasted need	8 %	Depending on forecast, typically in the range of 0–20 MW

Table 17 – Reserve volumes in DK2

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps, with further remarks by each TSO if needed (to provide the most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	N/A
aFRR Platform	October 2024	
mFRR Platform	2026	
IN Platform	2011 (DK1)	

Balancing capacity cooperations	Status	Accession timeline
Nordic aFRR capacity market	Project implemented	December 2022
Nordic mFRR capacity market	Project ongoing	November 2024

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
Balancing Main Agreement	Approved, valid as of December 2022
Balancing Agreement for Balancing Services without Energy supplies	Approved, valid as of December 2022
T&Cs for Ancillary Service providers	Approved, valid as of February 2024
T&Cs for Prequalification – Ancillary Services	Approved, valid as of September 2023

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	No
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered/Implemented/Proposed
3.2. Condition (b)	Not considered/Implemented/Proposed
3.3. Condition (c)	Not considered/Implemented/Proposed
3.4. Condition (d)	Not considered/Implemented/Proposed
3.4. Condition (e)	Not considered/Implemented/Proposed

Summaries and main results of the analysis of Articles 60(2)(a–f):

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Dimensioning – DK1

Energinet participate in the FCR-cooperation, i.e. the common market for the procurement and exchange of FCR. This cooperation represents a voluntary European cooperation according to Article 33(1) of the EB Regulation. The contribution is calculated based on DK1's share of the total generation and consumption.

aFRR in DK1 is dimensioned in accordance with the SAFA and dimensioned to deliver System Operation Guideline-compliant FRCE values.

mFRR in DK1 is dimensioned to handle the worst-case N-1 incident (aFRR also part of the N-1 dimensioning need). Energinet uses a sharing agreement between DK1 and DK2, enabling a reduction of the mFRR bought in DK1 by 300 MW. Furthermore, Energinet has an emergency incident sharing agreement with TenneT DE.

Dimensioning – DK2

In the Nordic Region, two types of FCR products are used: FCR-N and FCR-D. The dimensioned need for FCR-N is 600 MW, while the dimensioned need for FCR-D is 1400/1450 MW. The FCR-D product is asymmetrical and for FCR-D up the dimensioned need is 1450 MW while for FCR-D down it is 1400 MW. Each Nordic TSO is responsible for securing their national share (3 % for DK2).

aFRR was introduced in DK2 in Q4 2022, simultaneously with the connection to the common Nordic aFRR capacity market. Energinet has forecasted the aFRR need in 2025 to approximately 0–52 MW depending on the hour of the day, with nothing procured at night, 38 MW procured at most hours of the day, and 52 MW procured at peak hours in the morning and the afternoon.

mFRR is dimensioned by a trip of the largest unit in operation (N-1), which is Storebælt at 600 MW.

Assessment of sharing/exchange of reserves

Energinet utilises exchange of balancing capacity between the two bidding zones DK1 and DK2 in a national mFRR market. This market will later be developed into a Nordic mFRR market, expected to be launched in Q4 2024 (Denmark, Sweden, Finland). Furthermore, DK2 is exchanging aFRR balancing capacity as a member of the Nordic aFRR capacity market counting all four Nordic TSOs, which was implemented in December 2022.

Sharing of reserves is utilised for mFRR between DK1 and DK2, as also described in the dimensioning part. A sharing agreement is also agreed between TenneT DE and Energinet in DK1.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

Energinet did not use any specific products in the reporting period.

5.8 Finland (Fingrid Oyj)

Introduction

The Finnish power transmission system locates geographically in Northern Europe and is a part of the Nordic SA which consists of the transmission systems of Finland, Sweden, Norway, and Eastern Denmark. This comprises the Nordic LFC block. There is only one scheduling area and one BZ in Fingrid's control area.

The market design is based on the self-dispatch model. The types of reserve used in the Nordic synchronous area to balance the system are FCR and FRR. The FCRs are reserves used for the containment of frequency. The FCRs are divided into three reserve products: Frequency Containment Reserve for Normal Operation (FCR N), Frequency Containment Reserve for Disturbances Upwards (FCR D Up), and Frequency Containment Reserve for Disturbances Downwards (FCR D Down). The FCR D Down is the newest reserve product used in the Nordic synchronous area, and Fingrid started its procurement on 1 January 2022. FRRs are reserves whose purpose is to restore the frequency to the nominal value of 50.0 Hz and release the activated FCRs. The FRRs are divided into two reserve products: aFRR and mFRR. RR are not used in the Nordic SA.

The size of the reserve markets varies between these five reserve products as demonstrated in the table below, which presents the number of BSPs by reserve product. Technology-neutrality is one of the main principles when designing the reserve markets in Finland. Thus, the resources are treated in an equal manner and all types of technologies can participate in the reserve markets as long as the requirements are met. Currently, DSR and batteries participate widely in Finnish FCR markets. The FCR-D Up market has proven to be potential especially for DSR, whereas all the FCR markets are well fitted for batteries. For instance, over 40 % of the prequalified capacity of FCR-D Up is from DSR and 17 % of FCR-N is from batteries. Balancing energy bids from RES, especially from wind production, increased significantly during 2023. On windy days, the majority of mFRR down regulation bids were submitted from wind assets, up to almost 900 MW. An ongoing pilot project Wind power for the Reserve Markets is expected to bring wind assets to FCR and aFRR markets soon. Solar power joined automatic reserves for the first time in 2023.

Reserve product	Nordic volume	National share	National requirement	Number of BSPs
FCR-N	600 MW	20 %	122 MW	20
FCR-D Up	Up to 1450 MW	20 %	Up to 295 MW	20
FCR-D Down	Up to 1400 MW	20 %	Up to 240 MW	14
aFRR	300–400 MW	15.5 %	46–62 MW	11
mFRR	N/A	N/A	N/A	43

Table 18 – The reserve volumes and number of BSPs at the beginning of 2022.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	N/A
aFRR Platform	Accession planned 10/2024	Derogation granted until 24 July 2024 due to simultaneous joining of the Nordic SA.
mFRR Platform	2026	Derogation granted until 24 July 2024 due to simultaneous joining of the Nordic SA.
IN Platform	N/A	N/A

Balancing capacity cooperations	Status	Accession timeline
Nordic aFRR CM	member	In operation
Trilateral mFRR capacity market between Denmark, Finland and Sweden	member	Planned to be implemented in November 2024

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	–
1.2. If response to Q1 is 'yes', what were the main results'?	The T&Cs for the BSPs are technology-neutral and allow full participation from DSR, RES and batteries.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	–
2.2. If response to Q2 is 'yes', what were the main results?	The market management system has been developed to enable adopting standard energy products.
Q3: Do you procure a standard product for balancing capacity?	Yes (aFRR) & No (mFRR)
Q4: What are the main characteristics?	aFRR balancing capacity product fulfils the characteristics of a standard product. mFRR balancing capacity has longer Full Activation Time (15 min.).
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes, Nordic aFRR capacity markets are in place and Nordic mFRR capacity markets will be launched in November 2024
5.1. If response to Q6 is 'no', why?	–
5.2. If response to Q6 is 'yes', what were the main results?	The exchange of balancing capacities creates socioeconomic benefits.
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
T&Cs for providers of aFRR	Approved and valid from 17 February 2024, **Link**
T&Cs for providers of aFRR	Approved and valid from 29 May 2024, **Link**
T&Cs for providers of FCR	Approved and valid from 22 May 2023, **Link**
T&Cs for providers of FCR	Approved and valid from 29 May 2024, **Link**
T&Cs for providers of mFRR	Approved and valid from 23 May 2023, **Link**
Evolution of the T&Cs for BRP	
Appendix 1 part 1: Fingrid Oyj's general terms and conditions concerning balance management	Approved 17 February 2023, **Appendix 1 part 1**
Appendix 1 part 2: Fingrid Oyj's general terms and conditions concerning imbalance settlement	Approved 17 February 2023, **Appendix 1 part 2**
Appendix 2: Fee components and determination of fees	Approved 30 November 2023, **Appendix 2**

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	–
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f):

During the reporting period, the Nordic TSOs maintained three types of FCR products for the Nordic SA: FCR-N, FCR-D Up and FCR-D Down. The Nordic TSOs have agreed that currently the FCR-N volume for the entire synchronous system is 600 MW. The total capacity is distributed among the Nordic TSOs based on the shares, which are updated yearly. The share of a TSO is calculated based on the sums of annual electrical energy consumption and generation in the TSO's control area and in the SA. The required Nordic volume of FCR-D is 1450 MW for up-regulation and 1400 MW for down-regulation, corresponding to the reference incidents in the Nordic SA. The distribution of the FCR D Up and FCR-D Down capacities between the Nordic TSOs are calculated similarly to the FCR-N.

The national requirements for mFRR up-regulation and down-regulation volumes are currently determined by the dimensioning incidents of the control area in question. In other words, the Nordic TSOs dimension the mFRR volumes for their own control area and determine the required distribution within their control area individually. aFRR is seen as an automatic complement to mFRR in the frequency restoration process. Thus, the Nordic TSOs determine the hours for which aFRR shall be procured and dimensioned on a quarterly basis for the next three months. The procurement hours have been 20 hours per day during the reporting period.

During the reporting period, the dimensioning rules as referred in Articles 127, 157 and 160 of the SOGL were not in use in the Nordic LFC block. Therefore, Fingrid has not performed analyses on optimal provision of reserve capacity following the procedure required by Article 32(1) of the EBGL.

Fingrid utilises the exchange of balancing capacity and the sharing of reserves whenever needed and cost-effective. During the reporting period, Fingrid has purchased FCR-N and FCR-D (for up-regulation) from the domestic yearly and hourly markets as well as from the Estonian and Russian HVDC links (until May 2022) and from other Nordic countries by inter-TSO trades. Furthermore, Fingrid has purchased mFRR from the domestic markets and has a contract for sharing and exchange of mFRR with the Estonian TSO Elering. Nordic TSOs launched the Nordic aFRR capacity markets, including the possibility to allocate transmission capacity for the exchange of the aFRR-capacity in December 2022. During the reporting period, transmission capacity is reserved only in the transmission direction from Finland to Sweden. The allocation of transmission capacity has been possible in the direction from Sweden to Finland since 18 February 2024.

5.9 France (Réseau de Transport d'Electricité)

Introduction

Réseau de Transport d'Electricité (hereinafter referred to as 'RTE') is the French TSO. It is part of the CE SA, and manages its LFC block, which is equal to its LFC area, scheduling area and monitoring area.

Pursuant Art. 60(1) of the Electricty Balancing Regulation, RTE publishes a report on balancing covering the calendar years 2022 and 2023 available **here**.

The French market is underpinned by the concept of a BRP. The BRPs are financially responsible for their imbalances. The French balancing model is based on a decentralised dispatch of power generating units or demand response facilities.

Closer to real-time, the power system is managed in a centralised and proactive manner by RTE. The French balancing market relies on a unit-based scheduling process which gives the TSO very detailed forecast information about the status of the power system. To balance the French power system, RTE uses a dynamic system for sizing the balancing capacity required during the course of the day.

Supply-demand balance and network constraints are jointly managed. This results in integrated processes: an action performed for balancing purposes within the balancing market is also analysed against the impact that it has on the grid.

Convinced of the benefits of establishing a European balancing market, RTE has been involved since the early phase in almost all the European projects. RTE joined the TERRE platform in December 2020.

RTE is also preparing its connection to the European platforms:

- for the exchange of balancing energy from FRR with automatic activation (PICASSO platform) by the end of 2024. As a first step towards its connection to PICASSO, RTE has launched a local call for tenders for aFRR activation in November 2023, switching from a pro-rata mode for activation and a settlement based on the Spot price, to a merit-order mode for activation and a settlement based on the French Local Marginal Price;
- for the exchange of balancing energy from FRR with manual activation (MARI platform) by the end of 2025. As a first step towards its connection to MARI, RTE will be sharing its Available Transfer Capacities (ATC) on the platform from July 2024.

As of 1 March 2024, 241 BRPs are active on the French balancing market. In 2023, the average system imbalance is 370.9 MWh for an ISP with a positive imbalance and −324.2 MWh for a negative imbalance. On average, the system has a positive imbalance 54.4 % of the ISPs and a negative imbalance 45.5 % of the ISPs.

As for the BSPs, 75 are active as of 1 March 2024, including: producers connected to the transmission grid with a legal obligation to offer their available power on the balancing market, renewable energy producers, storage facility providers, aggregators providing demand side flexibility.

The French balancing market keeps evolving to include the specificities of technologies such as storage, renewables and demand-side management and will pursue its evolution towards an efficient integration of flexibility sources.

Demand-side response is able to participate to all French balancing markets for the different timeframes and in 2023, demand-side management contributed to respectively 10 % of FCR, 1 % of aFRR and 36 % of mFRR/RR procured volumes.

The participation of storage facilities in FCR has significantly increased in 2022 and 2023: by the end of 2023, 500 MW of batteries were certified for FCR. Due to the upcoming change in the procurement of aFRR (switch from prescription with a secondary market to a primary market with a call for tender for aFRR), the certified aFRR volume of storage facilities has also increased in 2023: by the end of 2023, 28 MW of batteries were certified for aFRR.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Connected since December 2020	–
aFRR Platform	Q4 2024	Delay in implementation + connection conditioned to high prices mitigation measures submitted to ACER's approval - granted
mFRR Platform	Q4 2025	Delay in implementation - granted
IN Platform	Connected since February 2016	–

Balancing capacity cooperations	Status	Accession timeline
FCR cooperation	Member	Connected since January 2017

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	Non applicable.
1.2. If response to Q1 is 'yes', what were the main results'?	Storage facility providers currently participate in the TERRE platform. Demand-side management and storage facilities participate to the local tender for aFRR activation, and will participate to the aFRR standard platform once RTE is connected.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	Non applicable.
2.2. If response to Q2 is 'yes', what were the main results?	• Connection to TERRE platform in December 2020 • Connection to PICASSO platform expected in Q4 2024: all regulatory and IT developments have been carried out except for the upcoming high prices mitigation measures. RTE has reached the first step towards the connection to PICASSO by launching the national tender for aFRR activation. • Connection to MARI platform expected on Q4 2025: regulatory and IT developments are currently being carried out.
Q3: Do you procure a standard product for balancing capacity?	RTE will procure a standard product for aFRR capacity once the call for tender for aFRR procurement is launched in June 2024.
Q4: What are the main characteristics?	Non-applicable.
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	Non applicable
5.2. If response to Q6 is 'yes', what were the main results?	RTE's Research & Development is currently leading studies to assess this potential.
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
Frequency ancillary services T&Cs (FCR and aFRR):
• Evolution of the T&Cs related to the participation of storage facilities and decentralised demand response to FCR and aFRR (approved, version applicable as of 1 September 2022)
• Evolutions required for the resumption of the national call for tender for aFRR capacity in June 2024 (approved, version applicable as of 1 April 2024)
• Introduction of elastic demand for aFRR energy (Not submitted, application in Q4 2024)
• Evolution of the T&Cs related to the participation of RES to FCR and aFRR (under discussion)
Rules relating to Scheduling, the Balancing Mechanism and Recovery of Balancing Charges section 1 (mFRR and RR)
• Introduction of the standard energy bids for mFRR (approved, version applicable as of 1 April 2024)
• Introduction of an additional day-ahead scheduling gate after the first intra-day auction (approved, version applicable as of 1 April 2024)
• Switch to 96 gates for scheduling (approved, version applicable as of 1 April 2024)
mFRR-RR T&Cs
• Evolutions regarding mFRR/RR dimensioning and the mFRR product (under discussion)
Evolution of the T&Cs for BRP
Implementation of the European methodology defining the new imbalance settlement at synchronous borders in accordance with Articles 50(3) and 51(1) of the Electricity Balancing Guideline (approved and version applicable as of 1 September 2021)

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	January 2025
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented (with a dedicated coefficient)
2.3. Component related to financial neutrality of the TSO?	Implemented (with a dedicated coefficient)
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f):

Procurement of reserves capacities

› RTE has procured on average 502 MW of FCR through a European tender, the FCR cooperation, performed daily:

	2022	2023
TSO need (MW)	489	514
Total procurement cost (M€)	88	25
Average annual capacity price (k€/MW/y)	180	48.6

› RTE has prescribed daily an average of 709 MW of aFRR to the French stakeholders:

	2022	2023
TSO need (MW)	720	698
Total procurement cost (M€)	104	136
Average annual capacity price (k€/MW/y)	144	194

› RTE has jointly procured mFRR and RR through an annual national tender and a daily tender:

	2022		2023	
mFRR/RR	Annual	Daily	Annual	Daily
TSO need (MW)	1,000	500	750	750
Total procurement cost	10	13	228	14.6
Average annual capacity price (k€/MW/y)	10	17.3	304	29.2

RTE contributes to the European discussions about the opportunities for the exchange of balancing capacity and sharing of reserves but considers that certain pre-requisites have to be met before joining such a cooperation for the procurement of balancing capacity:

› resumption of the national tender for aFRR capacities (by the end of June 2024);

› connection to the PICASSO and MARI platforms (by the end of 2024 and 2025 respectively);

› harmonisation of standard balancing capacity products within potential balancing capacity cooperations; and

the approval of the different methodologies to build any cooperation on a stable and comprehensive regulatory framework.

Balancing the French system in real-time

In December 2020, RTE joined the TERRE platform. After a period of operation of under control, RTE started a 24/7 operation of TERRE in March 2022. In 2022 and 2023, the liquidity on TERRE has been consistently increasing. However, the use of specific products is still necessary to cover all the imbalance.

In 2022 and 2023, there were on average 20.5 GW of upward submitted bids and 18.9 GW of downward submitted bids per ISP.

In 2022:

› 644 GWh of upwards needs were satisfied by the TERRE platform, representing 17 % of the upward mFRR/RR energy activated to balance the system;

› 562 GWh of downward needs were satisfied by the TERRE platform, representing 12 % of the downward mFRR/RR energy activated to balance the system.

In 2023:

› 594 GWh of upwards needs were satisfied by the TERRE platform, representing 14 % of the upward mFRR/RR energy activated to balance the system;

› 243 GWh of downward needs were satisfied by the TERRE platform, representing 5 % of the downward mFRR/RR energy activated to balance the system.

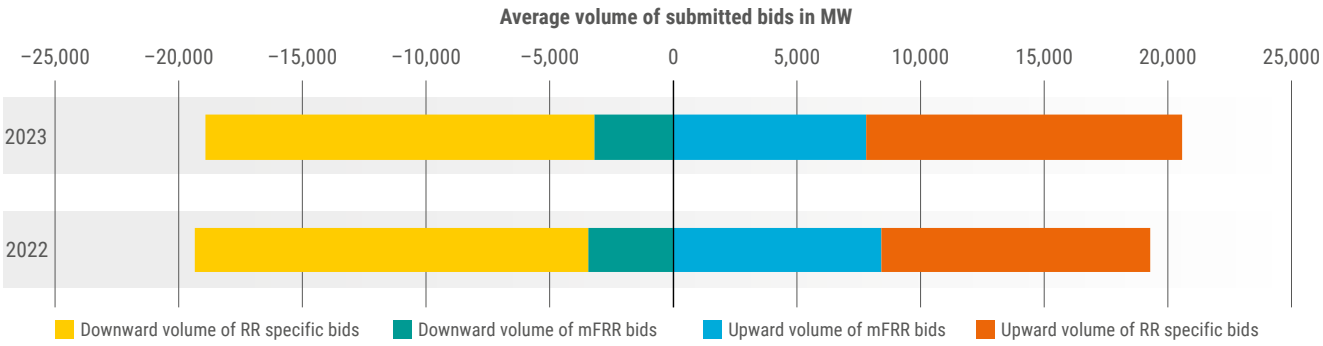


Figure 27 – Volume of submitted specific bids in MW for 2022 and 2023

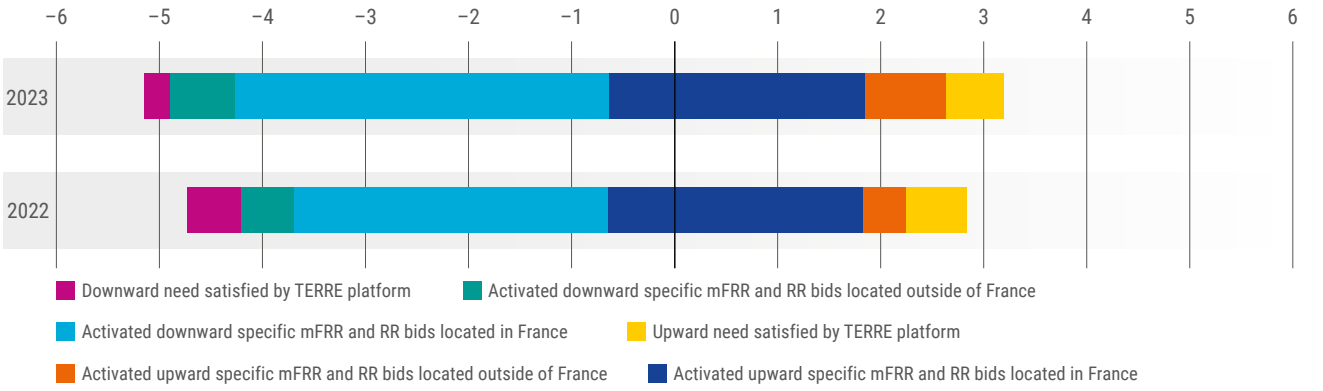


Figure 28 – Volume of activated bids in TWh for 2022 and 2023

Justification for using specific mFRR and RR energy products

Specific products activated locally will remain necessary to balance the system as the standard products do not allow for all imbalance to be reabsorbed. Although the liquidity on TERRE has been increasing in 2022 and 2023, it is not sufficient to cover all the imbalance. Therefore, as RTE cannot request more than what is submitted by French BSPs on the platform, the use of specific products to balance the system in energy is still required.

These specific products are also necessary for the coordinated management of supply-demand balance and network constraints.

Furthermore, activating only standard balancing energy bids from mFRR and RR could have foreclosure effects on certain capacities currently participating in these markets.

Lastly, specific products remain necessary to continuously monitor available adequacy margins and risks at various relevant times, and where necessary restore the required level of margins by activating means with a longer activation time. Standard products, available close to real time, are shared by definition (they can be activated to satisfy another TSOs' need) and consequently they cannot meet this purpose.

5.10 Germany and Luxembourg 50Hertz Transmission GmbH, Amprion GmbH – CREOS Luxembourg S.A, TenneT TSO GmbH and TransnetBW GmbH

Introduction

› Link to the National TSO report on Balancing

› Link to current version of National T&Cs

Geographical scope: synchronous area(s), LFC block(s), LFC area(s), scheduling area(s) = imbalance area(s), bidding zone(s) = imbalance price area(s), TSO(s).

Germany, Luxembourg[15] and Denmark West are forming one LFC block (DE–DKW–LU) which is part of the CE SA. According to the National Energy Act, the German TSOs 50Hertz, Amprion, TenneT DE and TransnetBW are each responsible for the system operation in their LFC area. Creos is part of the LFC area of Amprion. Denmark West has been part of the LFC area of TenneT DE and became an independent LFC area in June 2022[16]. Within the LFC block DE-DKW-LU, the exchange capacities are treated as unlimited. Moreover, a common balancing market was established in which all BSPs can offer their available generation capacities to all TSOs on a common market-based principle.

Each German TSO is responsible for its scheduling area, which covers the respective LFC area. Together with the scheduling area from Creos, those five scheduling areas form a BZ, which also corresponds to an imbalance price area.

General information about market design and reserve dimensioning: central / self-dispatch model, types of reserve used to balance the system and dimensioning, specific requirements defined in the terms and conditions for BSP/BRP [17]according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.).

In Germany, a self-dispatch model is applied. The types of reserves used to balance the system are FCR, aFFR and mFRR. While FCR is dimensioned and activated across CE, aFRR and mFRR are dimensioned and activated within the German LFC block. For FCR, the TSOs hold a share[18] of the overall FCR requirement within CE, equal to the share of the overall electricity generation and withdrawal in the SA. Since December 2019, German TSOs have applied a dynamic dimensioning approach for aFRR and mFRR, to adapt the demands to the relevant situation on shorter notice[19] (see Figure 1). The dimensioning procedure complies with the requirements of the System Operation Guideline, to apply a probabilistic approach and ensure the quality criteria. In compliance with the System Operation Guideline, the data used when dimensioning contains at least 1 full year and does not end earlier than 6 months before the calculation date.

German TSOs drafted T&Cs for the BSPs according to all paragraphs of Article 18(5) of the EB Regulation and submitted them for approval to the German NRA. The T&Cs for BSPs have been approved by the NRA in a stepwise approach until October 2022. In Germany, there is no requirement for BSPs to provide information on or offer unused generation capacity. Within the LFC areas, electricity suppliers and traders form balancing groups that pool their feed-ins, trades and consumers' demands.

Each balancing group is managed by a BRP. According to the provisions of Article 18(6) of the EB Regulation, the T&Cs for BRPs were revised by the TSOs and accordingly submitted to the NRA for approval, which took place in November 2023. The approved T&Cs for BRPs resulted in a new standard balancing group contract.

General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.

According to latest published information, there are 28 BSPs prequalified in Germany for offering FCR, 30 for aFRR and 27 for offering mFRR[20]. Compared with the number of BSPs at the end of 2021, the number of BSPs for FCR decreased by 2, for aFRR by 4 and for mFRR by 7. However, the respective prequalified balancing capacity remained almost the same and amounts to roughly 118 GWh. Not all prequalified BSPs,

15 Luxembourg is part of the Amprion/Creos LFC area. However, it also forms its own scheduling area. Creos adopts all balancing regulations implemented by Amprion, therefore the German TSO report on balancing summarised in this document covers Luxembourg as well.

16 Denmark West will become a separate LFC area in 2022.

17 Including the rules for suspension and restoration of market activities, in accordance with Article 36 of the EB Regulation, and the rules for settlement in case of market suspension pursuant to Article 39 of Regulation (EU) 2017/2196 once approved, in accordance with Article 4 of the EB Regulation.

18 See Announcement of FCR demand and core shares of each LFC block.

19 For a comprehensive description of the new dimensioning procedure, see Method for Dimensioning of the Demand for Automatic and Manuell Frequency Restoration Reserve (aFRR and mFRR)

20 See List of prequalified BSPs

and thus not necessarily the total prequalified reserve capacities, are continuously active in the respective market. BSPs may include technical units based in Luxembourg in their pool to participate in the German market for FCR. For this purpose, Creos and Amprion have developed a cooperation model. The access to the German FRR market, for BSPs having units in Luxembourg, is under development.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide the most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Not planned as no RR product used in Germany	N/A
aFRR Platform	Participating TSOs since June 2022	N/A
mFRR Platform	Participating TSOs since October 2022	N/A
IN Platform	Participating TSOs since May 2010	N/A

Balancing capacity cooperations	Status	Accession timeline
FCR cooperation – a common market for procurement and exchange of FCR	Participating TSOs, project member	March 2012
German–Austrian aFRR capacity cooperation for a common procurement of aFRR balancing capacity and resulting activation of aFRR balancing energy	Participating TSOs in bilateral cooperation	February 2020
ALPACA cooperation – application of the probabilistic approach for the exchange of aFRR capacity at the DE–CZ border	Project member	Planned go-live in the first half of 2025

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes. Demand, RES and storages already participate in the German balancing market and respective balancing energy bids are submitted to the platforms by German TSOs. Essentially, the PQ criteria are open to any kind of technology. Where a setpoint is missing, e.g. for PV and Wind, requirements for alternative methods apply. Requirements for units with limited energy reservoir apply for batteries and others such as pump storage as well.
1.1. If response to Q1 is 'no', why?	N/A
1.2. If response to Q1 is 'yes', what were the main results'?	FCR is dominated by batteries. Wind takes part in mFRR, but not yet with huge volumes. Prequalification of wind for aFRR and PV are ongoing, also first steps with EVs were taken.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	N/A
2.2. If response to Q2 is 'yes', what were the main results?	Introduction of 1 MW minimum bid size in 2021 and 15 min products for aFRR and mFRR in 2022. Additional IT changes required to connect to the MARI and PICASSO platforms in 2022.
Q3: Do you procure a standard product for balancing capacity?	Yes
Q4: What are the main characteristics?	D-1 procurement, 1 MW bid size and granularity, 4h product, fully divisible bids for aFRR and option between divisible and indivisible (up to 25MW) bids for mFRR
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	N/A
5.2. If response to Q6 is 'yes', what were the main results?	Germany is part of several initiatives with its neighboring countries for the exchange of balancing capacity and sharing of reserves
Q6: Are you already involved in a BCC as a member or as an observer?	Operational member in DE–AT aFRR BC cooperation and member in ALPACA cooperation

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
Submitted in 2018, the proposed T&Cs necessary to implement the EB Regulation's balancing market design and related processes have been approved stepwise by the German NRA (Bundesnetzagentur) until October 2022 (reference: BK6-22-162).
Evolution of the T&Cs for BRP
Submitted in 2018, approved and entered into force in 2020. Latest update approved by Bundesnetzagentur in November 2023 (reference: BK6-23-102).

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Implemented
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	No
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	N/A
3.2. Condition (b)	N/A
3.3. Condition (c)	N/A
3.4. Condition (d)	N/A
3.4. Condition (e)	N/A

Summaries and main results of the analysis of Articles 60(2)(a–f)

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

The dimensioning of FRR capacity in Germany follows the requirements of the System Operation Guideline by applying a probabilistic approach that considers recent historical records of imbalances and ensures that reserve capacity is sufficient for imbalances at least 99.975 % of the time (see Figure 1). The sharing of reserves with other LFC blocks to reduce the procured capacity is currently not considered, as it is mostly used in LFC blocks where the procured capacity is determined by the reference incident.

Among the German LFC areas, full exchange of balancing reserves is implemented for all balancing services. The German TSOs already participate in FCR cooperation, the common market for the procurement and exchange of FCR. This cooperation represents a voluntary European cooperation according to Article 33(1) of the EB Regulation. Furthermore, a common procurement of aFRR balancing capacity with the Austrian TSO is implemented by the German–Austrian aFRR capacity cooperation. In the first half of 2025, the aFRR balancing capacity cooperation with Austria and Czechia, namely ALPACA, is planned to go live in addition to the existing German–Austrian cooperation. The possibilities for further TSOs to join the ALPACA cooperation will be considered after the go-live. Germany participates with the DE–CZ in the cooperation using a probabilistic approach pursuant to EB Regulation Article 33(6).

The evaluation of the demands and bid surpluses on the balancing capacity market shows that, for all types of procured reserves, supply has always been greater than demand. On average, the offered balancing capacity for negative aFRR was approximately 1.9 times the demand, for aFRR positive 2.2 times and for mFRR negative and positive even 5.6 and 4.3 times, respectively. The German market for aFRR and mFRR balancing capacity can therefore be considered to be sufficiently liquid.

The evaluation of the demands and bid surpluses on the balancing energy market shows that, in 2023, the energy bids for aFRR negative were on average around just 16 % above the demand for balancing energy and for aFRR positive around 11 %. For mFRR energy bids, the surpluses were on average 20 % above the demand for negative and 9 % above the demand for positive balancing energy.

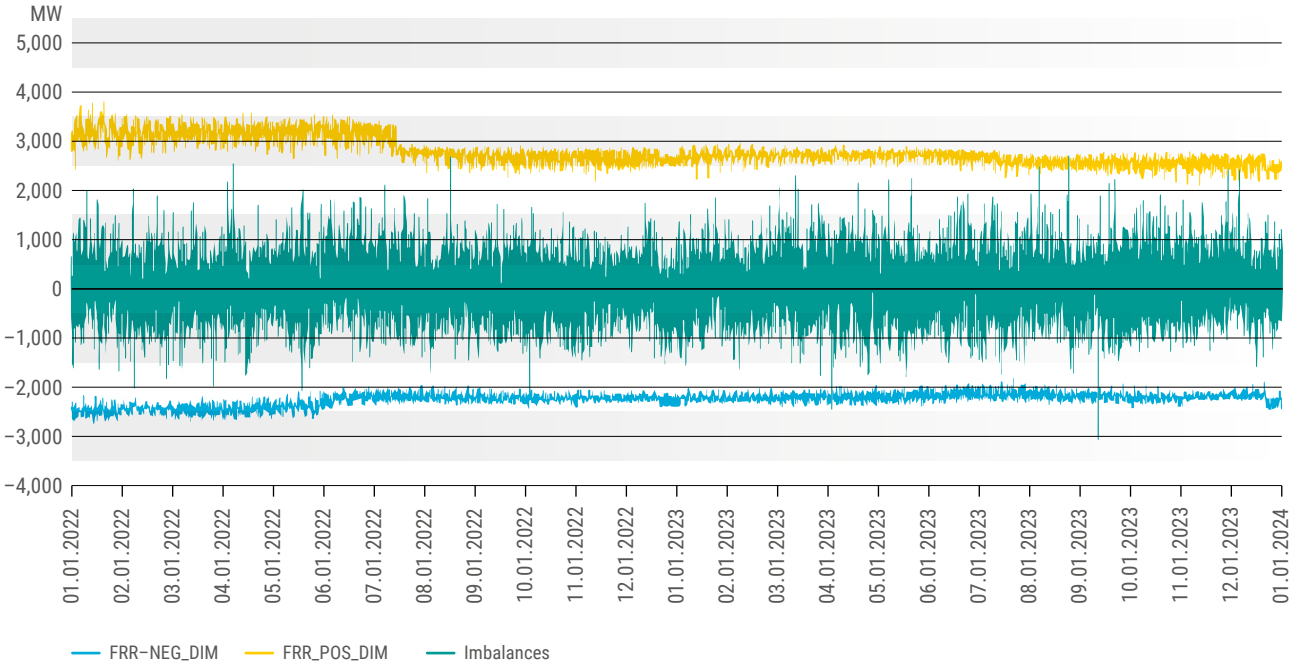


Figure 29 – Dimensioned FRR capacity and imbalances in Germany, 2022–2023

Assessment of sharing/exchange of reserves

German TSOs cannot be control capability receiving TSOs as part of an agreement for sharing of reserves following provisions of SO Regulation as the size of the positive dimensioning incident is below the reserve capacity on FRR required to cover the positive LFC block imbalances during 99 % of the time. German TSOs are control capability providing TSOs in an agreement for sharing of reserves with Belgium.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

Currently, German TSOs do not use specific products in the LFC process according to the EB Regulation.

5.11 Greece (Independent Power Transmission Operator S.A.)

Introduction

The extended version of the balancing report covering the calendar years 2022 and 2023 is published on the IPTO's website at the following **link**.

Greece is an LFC block and area, as part of the CE SA, and IPTO operates this LFC area by fulfilling the obligations of LFC. More details can be found in the table in the right column. IPTO uses a central dispatch model. The balancing market includes the Integrated Scheduling Process, the balancing energy market (mFRR and aFRR processes) and the balancing market Settlement Procedure.

TSO	IPTO
Scheduling Area/LFC area/LFC block	HETS (Hellenic transmission system)
No of BZs/scheduling areas/imbalance areas	1

Market Name	Execution/time resolution	Product
Day-ahead and intra-day Integrated Scheduling Process	3 sessions after the relevant IDM session and ad-hoc if necessary (ISP1, ISP2, ISP3)/30 minutes	Co-optimisation of balancing energy and capacity Balancing capacity procurement (FCR, aFRR, mFRR) Commitment schedule and indicative production schedule of Balancing Service Entities Insurance of operational security in the Transmission System, considering network constraints
Balancing energy market	Continually every 15 minutes/ 15 minutes	Activation of mFRR and aFRR balancing energy offers by issuing real-time Dispatch Instructions and AGC Instructions to the Balancing Service Entities Final schedules for Balancing Service Entities
Balancing market Settlement Procedure	Weekly/15 minutes	Calculation of energy supplied, imbalances, prices etc. Metering Settlement of energy and capacity

General provisions

To become a BSP, the interested entity must successfully complete the **pre-qualification process**, which includes control tests to certify that the minimum technical requirements for the supply of FCR and FRR are fulfilled. The entities that are entitled to become a BSP, as long as they have successfully completed the pre-qualification process, are Producers with a power generating unit of installed capacity of over 5 MW, Auto-producers, RES Producers, RES aggregators, Demand Response Aggregators, Consumers.

The entities that shall be registered as BRPs are Producers, Auto-producers, RES Producers, RES Aggregators, Demand Response Aggregators, Consumers, Self-Supplied customers, Suppliers, Traders.

In the event of a dispute between the IPTO and the BSPs or BRPs regarding the T&Cs, IPTO terminates the Balancing Service and the Balance Responsible Party Contract respectively. In the event of the default of BSPs or BRPs on their financial obligations, specific provisions apply. In the event that the operation of the Balancing Market is impossible, in particular due to an Emergency Situation, or failure of the Balancing Market System or of the other electronic systems, IPTO applies the rules set out in the 'Rules for Suspension and Restoration of market activities' and the 'Rules for settlement in case of market suspension'.

As of December 2023, in the Greek balancing market, the active BSPs were 7 and they represented 47 Balancing Service Entities. The active BRPs were 66.

Integrated Scheduling Process

After the DAM and IDM Gate Closure Time (GCT), the Power Exchange sends to the TSO for each MTU of each dispatch day the Market Schedules of all Balancing Service Entities. BSPs that represent generating units are obliged to submit balancing energy and capacity bids on Integrated Scheduling Process for each BSE they represent, whereas BSPs that represent RES or Load Portfolios participate on a voluntary basis. BSPs submit volume-price balancing energy offers and balancing capacity offers per balancing capacity product for each Dispatch Day between 14:00 and 16:45 EET of the day preceding the dispatch day.

The balancing capacity (reserve) requirements per BZ, namely upward and downward FCR, aFRR and mFRR, are contracted daily within the Integrated Scheduling Process based on IPTO dimensioning rules.

Balancing Energy Market

In the balancing energy market, two products are used: (1) upward and downward mFRR balancing energy, which is activated by executing the mFRR process per 15 minutes, and (2) upward and downward aFRR balancing energy, which is activated through the operation of the Automatic Generation Control. The BSPs submit balancing energy offers for mFRR and aFRR that correspond to the activation of the mFRR and aFRR, on T-15.

If there is no congestion between BZs, the upward (or downward) balancing energy price for mFRR for each ISP is equal to the maximum (or minimum) of the balancing energy offer prices for the mFRR bids that were activated to cover system imbalances (marginal pricing). If there is congestion between BZs, the upward (or downward) balancing energy price for mFRR for each ISP is equal to the maximum (or minimum) of the balancing energy offer prices for the mFRR bids that were activated to cover the deviation in the specific BZ. The debits or credits to the BSPs, per ISP, for activated balancing energy are determined for each direction according to the following table:

	Positive Balancing Energy Price	Negative Balancing Energy Price
Upward Balancing Energy	Payment from Billing Agent to BSP	Payment from BSP to Billing Agent
Downward Balancing Energy	Payment from BSP to Billing Agent	Payment from Billing Agent to BSP

The credits to BSPs per ISP for balancing capacity is determined taking into account the upward or downward balancing capacity contracted on the Integrated Scheduling Process, the availability of the asset and the price of the respective balancing capacity offer step (pay-as-bid).

Imbalance settlement

The Imbalance Area is the HETS and the imbalance settlement period is 15-min. IPTO uses single imbalance price for all imbalances. The Balancing Market Settlement is implemented weekly. The correction for settlement week W is possible up to 52 weeks after the first settlement.

Each BRP can have several final positions per imbalance area for an ISP equal to generation schedules of power generating facilities or consumption schedules of demand facilities. The Imbalance of a Balancing Service Entity is equal to the difference between the Entity's certified measurement energy data and the Entity's Market Schedule, taking into consideration any possible adjustment deriving from the Entity's Dispatch Instruction.

The imbalance price is the weighted average price of activated balancing energy in the predominant direction (upward or downward) for mFRR and aFRR. If there has been no activation of balancing energy, the imbalance price reflects the value of avoiding balancing energy activation. Any remaining balance after the calculation of the debits and credits calculated for the energy and imbalance Settlement is allocated to BRPs through an uplift account that ensures the TSO's financial neutrality.

The imbalance amount for an Imbalance Settlement Period and a BSE is calculated as the final imbalance, in MWh, multiplied by the imbalance price, in €/MWh. The debits or credits to the BSPs, per ISP, for their imbalances are determined for each direction according to the following table:

	Positive Imbalance Price	Negative Imbalance Price
Positive imbalance	Payment from Billing Agent to BSP	Payment from BSP to Billing Agent
Negative imbalance	Payment from BSP to Billing Agent	Payment from Billing Agent to BSP

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Regarding the European balancing platform for the activation of balancing energy:

- RR Platform: IPTO is not participating because the RR product is not used in Greece.
- aFRR and mFRR Platform: Pursuant to the provisions of article 62 of the EBGL, IPTO has requested a derogation from the provisions of articles 20(6) and 21(6) of EBGL concerning the implementation of the European platform for the exchange of balancing energy from frequency restoration reserves with manual and automatic activation, 'MARI' and 'PICASSO' platforms. The requested derogation period is two years, thus until 24 July 2024. Participation in the European platform PICASSO is targeted for July 2024. The participation in the European platform MARI is targeted for September 2026 as it is a far more challenging project that requires significant and extensive modifications and adaptations to systems, infrastructures and procedures related to the mFRR and the T&Cs of BSPs and BRPs, as well as other regulatory framework changes.
- IN Platform: IPTO is already participating as of June 2021. The productive operation of IPTO on the IN platform began end of March 2023, after the successful accession of Bulgaria.

The participation in European balancing energy platforms of all generating resources is envisaged, including Demand, RES and Storage Portfolios.

IPTO is not part of any cooperation for the exchange of balancing capacity or sharing of reserves.

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	N/A
1.2. If response to Q1 is 'yes', what were the main results'?	In April 2023 the first DR assets started participating in the mFRR process. Until December 2023: 4 qualified DR aggregators with 5 DR portfolios
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes, regarding the aFRR standard products No, regarding the mFRR standard products
2.1. If response to Q2 is 'no', why?	The participation in the European platform MARI is targeted for September 2026 as it is a far more challenging project that requires significant and extensive modifications and adaptations to systems, infrastructures and procedures related to the mFRR.
2.2. If response to Q2 is 'yes', what were the main results?	IT developments are ongoing regarding only the aFRR standard products for the upcoming accession to PICASSO platform (July 2024).
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	N/A
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	IPTO considers that the exchange of balancing capacity or sharing of reserves provides small opportunities for cooperation as the capacity of interconnections with other member states is not very large and most of the capacity usually has already been used in the previous markets (DAM and IDM).
5.2. If response to Q6 is 'yes', what were the main results?	N/A
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

The T&Cs for BSPs and BRPs are issued in accordance with articles 2 and 5 of the Balancing Market Rulebook, as well as article 18 of EBGL and apply on BSPs and BRPs within the control area of IPTO.

Significant changes were implemented in the year 2022 regarding the T&Cs for BRPs and BSPs mainly affecting Dispatchable Load Portfolios and Dispatchable Portfolios of RES Units.

Within 2022, the participation of Dispatchable Load Portfolios and Dispatchable Portfolios of RES Units as Balancing Services Entities in the Integrated Scheduling Process and in the mFRR, aFRR and FCR processes was launched. Likewise, as of October 2022, the aforementioned portfolios were able to participate in the aFRR processes. The first Dispatchable Load Portfolio registered with the HETS Operator Registry and began its participation in the mFRR process in April 2023.

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Yes
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered yet/Under investigation
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f)

IPTO does not use specific products subject to conditions pursuant to Article 26. Moreover, IPTO neither exchanges balancing capacity reserves nor shares reserves through national interconnections, as mentioned in section 2.

Information regarding Article 60 (2) (a) of the EB Regulation

Volumes of available reserves

The technical capability of a unit to provide FCR, aFRR, mFRR is a parameter registered among its technical operating characteristics for the provision of balancing services. The total volumes of available capacity for FCR, aFRR, mFRR can be seen in the table below and is calculated as the summation of the corresponding registered characteristics per unit.

Balancing Capacity	Total up [MW]	Total dn [MW]
FCR	963	963
aFRR	3,898	3,906
mFRR	4,836	4,885

Table 19 – Available Balancing Capacity (MW)

Volumes of procured reserves

The average volumes per 30min of procured FCR, aFRR and mFRR for the years 2022 and 2023 through the Integrated Scheduling Process can be seen in the table below.

Years	FCR_UP (MW)	FCR_DN (MW)	aFRR_UP (MW)	aFRR_DOWN (MW)	mFRR_UP (MW)	mFRR_DOWN (MW)
2022	46	43	455	112	479	130
2023	50	41	463	101	485	108

Table 20 – Average 30min volumes of procured reserves for years 2022–2023

Volumes of used balancing energy

IPTO uses local balancing energy products. The total annual volumes of used balancing energy (MWh) per product can be seen in the table below for the years 2022–2023. The volumes of the mFRR balancing energy correspond to the summation of the netted quantities per 15min ISP.

Years	BEup		BEdown	
	aFRRup	mFRRup	aFRRdown	mFRRdown
2022	1,048,700	887,031	781,131	955,280
2023	684,958	1,067,318	623,072	1,150,418

Table 21 – Annual values of used balancing energy

Information regarding Article 60 (2) (b) of the EB Regulation – Dimensioning of reserve capacity

IPTO determines the system needs for Balancing Capacity for FCR, aFRR and mFRR, as specified in the **'Methodology for Determination of Zonal/Systemic Balancing Capacity Needs'**, approved by RAEWW.

IPTO as a TSO of the CE SA follows the dimensioning rules for FCR described at the EU Regulation 2017/1485 (article 153). The reserve capacity for FCR required for the SA shall cover at least the reference incident (3000 MW in positive and negative direction). The shares of reserve capacity on FCR required for each TSO as initial FCR obligation shall be based on the sum of the net generation and consumption of its control area divided by the sum of net generation and consumption of the SA over a period of one year.

Regarding the FRR dimensioning, IPTO determines the required reserve capacity of FRR of its LFC block based on consecutive historical records, comprising at least the historical LFC block imbalance values. IPTO determines the size of the reference incident, which shall be the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, or single HVDC interconnector or from a tripping of an AC line within its LFC block. FRR is categorised according to the manner it is activated; automatic (aFRR) and manual (mFRR).

- aFRR upwards & downwards needs are calculated for each half hour of the day, taking into consideration the following: i) maximum System Load, ii) the largest possible imbalance deficit due to one outage, iii) the minimum stable generation of the largest unit that is currently starting up, iv) the need to cover operational imbalances due to interconnector schedules and v) the need to cover very fast load increases/decreases.
- mFRR upwards & downwards needs are calculated for each half hour of the day, taking into consideration the following: i) the aFRR need for the same period, ii) the RES generation, iii) the need to cover operational imbalance due to demand deficit, iv) the need to cover operational imbalances due to interconnector schedules and v) the need to cover extreme conditions.

5.12 Hungary (Magyar Villamosenergiaipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság/MAVIR Hungarian Independent Transmission Operator Ltd)

Introduction

The Hungarian electricity system consists of one scheduling area and LFC Area, of which the transmission system operator is MAVIR Hungarian Independent Transmission Operator Ltd. ('MAVIR'). The National TSO report on Balancing according to EBGL 60 will be available at the following **link** in Hungarian.

The T&Cs related to balancing pursuant to Article 18 of EBGL was submitted to Hungarian NRA by the 18 June 2018 and it was approved by 18 September 2018 with entry into force of 1 January 2019. It is part of the Hungarian International Network Code (Section 3.1, **link**) and defines the T&Cs for both BSPs and BRPs in Hungarian and an English version.

A BSP can participate in balancing services markets as long as it fulfils the qualification requirements, which consist of a successful prequalification and a valid Framework Contract for Balancing services. In the Hungarian LFC Area there are 3 types of reserves: FCR, aFRR and mFRR. The dimensioning of reserves is based on the requirements of SOGL. From 04 January 2023, MAVIR calculates the necessary reserves, applying a machine learning algorithm. The implemented methodology enables a much more accurate assessment and consideration of the real risks affecting system balance. The machine learning algorithm-based procedure enables dimensioning, with hourly resolution based on the weather and system load forecast data available on the previous day. The procurement of balancing capacity consists of a pre-selection process which concludes in a Framework Agreement, and there is a daily bidding based on the Agreement. BSPs during the daily bidding of balancing services have to provide their bids in hourly resolution, however there is a quarter-hourly settlement applied after all. The pre-selection process in 2023 was completed in monthly and daily tenders, but from Q4 2023, intraday tenders were also introduced. In cases when the already procured amount of balancing capacity is not available or a balancing capacity shortage occurred in the pre-selection process, the missing capacity quantities can be procured within the intraday capacity tenders. The rules and procedures related to the pre-selection process can be found in the Tender Documentation.

The intraday balancing energy market was introduced 1 January 2021. From November 1, 2023 BSPs allowed to submit their balancing energy bids closer to real time with 25 minutes GCT, in accordance with Article 6 (4) of Regulation (EU) 2019/943. In the balancing energy market, BSPs with procured balancing capacity and BSPs without procured balancing capacity have the same level playing field; the only evaluation criterion applied is the balancing energy price. The activation of balancing energy bids is based on a merit order list separately for balancing energy bids, from aFRR in a positive and negative direction and also for balancing energy bids, from mFRR in a positive and negative direction. The pricing of balancing services in both markets is pay as bid. MAVIR has participated in the common imbalance netting process called IGCC from 10 March 2020 with the purpose of avoiding the simultaneous activation of FRR in opposite directions. From 16 November 2023 the one volume-one price was replaced by multiple volume-multiple price method, so the control range can be covered by several price-volume pairs. The significant market power procedure is still in effect in the balancing energy market. As a result of this procedure, a market concentration based limit price is applied in the balancing energy market. The limit price for aFRR positive and mFRR positive suspended in the 2022 was reintroduced on 1 December 2023.

The T&Cs related to balancing include every requirement related to the BRPs, and they define every rule for scheduling and imbalance settlement. The ISP applied in the Hungarian scheduling area is 15 minutes.

The imbalance settlement methodology was changed by January 1 2022 as MAVIR has fully implemented the ISH Methodology according to the requirements stipulated by Article 52(2) of EB Regulation (Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing, an imbalance settlement harmonisation methodology). The new methodology fully conforms with the harmonisation requirements, implementing a single imbalance price calculation system for BRP (Balance Responsible Party) imbalances in Hungary. Currently, only a price incentive is applied (HUPX DAM market reference price), with no other components (scarcity component, financial neutrality component) to the imbalance price calculation methodology.

According to the guideline on electricity balancing ('EBGL'), all TSOs of a SA shall develop within 18 months after entry into force a proposal for common settlement rules applicable to intended exchanges of energy as a result of the frequency containment process and/or ramping periods according to Article 50(3) of the EBGL and a proposal for common settlement rules applicable to all unintended exchanges of energy according to Article 51(1) of the EBGL. The common settlement rules applicable to these exchanges of energy shall be known jointly as the Financial Settlement of KΔf, ACE

and ramping period (FSkar). The unintentional deviation was compensated in kind in the following compensation period. FSkar performs this settlement financially and replaces the compensation programme. The go-live of FSkar was 1 June 2021. A first review report performed by CE TSOs with regards to the review of the FSkar methodologies was finalised by end of June 2023. The report showed that at this stage, no adjustments to the methodology for FSkar within SA was necessary which followed the report being sent to relevant NRAs for information. As the Hungarian system is self-dispatch model based and there is no specific product introduced, there is no information available in any cost-benefit analysis and on such volumes. 20 BSPs and 115 BRPs operated in Hungary in 2023. The DSR/BES/RESS prequalified volumes are the following:

- DSR 100 MW,
- BESS 35 MW,
- RES 2000 MW.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	does not intend to join	–
aFRR Platform	Q1 of 2026	market development and system upgrade (granted for 2 years)
mFRR Platform	Q1 of 2026	market development and system upgrade (granted for 2 years)
IN Platform	already participate in IGCC	–

Balancing capacity cooperations	Status	Accession timeline
AT–DE–CZ–HU aFRR BCC	Observer	to be defined after joining the Picasso platform

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	–
1.2. If response to Q1 is 'yes', what were the main results'?	With the following developments, we took further steps towards the introduction of the standard product, and we helped the Demand, RES and Storage technologies to participate in the balancing market: • The balancing energy market and the capacity market are completely separate because the energy offer includes both the energy price and the offered volume. A further development was that one volume-one price was replaced by the multiple volume-multiple price method, so the control range can be covered by several price-volume pairs. • The balancing energy bid GCT was reduced from 1 hour to 25 minutes, and the settlement period was also reduced from 1 hour to 15 minutes. • In addition, in the mFRR energy market a binding offer has been introduced from Q4 2023.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	–
2.2. If response to Q2 is 'yes', what were the main results?	See answer 1.2.
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	local products: aFRR with 15 min FAT; mFRR with 12.5 and 15 min FAT, direct activation
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	–
5.2. If response to Q6 is 'yes', what were the main results?	MAVIR wants to take advantages of exchange of balancing capacities or sharing of reserves, however joining a BCC requires the use of a standard product. MAVIR does not intend to use standard products until Q1 2026.
Q6: Are you already involved in a BCC as a member or as an observer?	Observer in ATDECZHU BCC

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
1. Introduction of regulatory and IT developments in the balancing energy market. (See answer 1.2.) 2. The Hungarian NRA initiated a significant market power procedure, which resulted in a market concentration based Herfindahl–Hirschman-index (HHI) limit price introduction in the balancing energy market. If the value of the HHI exceeds the threshold value (1800), a limit price is applied to the balancing energy bids. As a recent change, the HHI is calculated based on the offered volume of the balancing energy instead of the offered volume of the balancing capacity in D-1. 3. The redispatch market is a newly introduced market within the framework of ancillary services. The offer for the redispatch order was included in the balancing energy offer, but now the balancing energy and redispatch offers have been completely separated. 4. The TSO provides the opportunity for the controlled units of the independent balance group aggregator to ex post redistribute the received aFRR or mFRR order among balance groups. In each imbalance settlement period, the TSO shall calculate the aggregated imbalance adjustment by taking into account the redistributed orders.	1. Approved, entry into force: Q3 2023 2. Approved, entry into force: 1 November 2021, modified 16 November 2023 3. Approved, entry into force: 16 November 2023 4. Approved, entry into force: 1 October 2023
Evolution of the T&Cs for BRP	
1. The imbalance settlement methodology was changed by 1 January 2022 as MAVIR has fully implemented the ISH Methodology. The new methodology fully conforms with the harmonisation requirements, implementing a single imbalance price calculation system for BRP (Balance Responsible Party) imbalances in Hungary. Currently only a price incentive is applied (HUPX DAM market reference price), with no other components (scarcity component, financial neutrality component) to the imbalance price calculation methodology.	1. Approved, entry into force: 1 January 2022

Evolution of the terms and conditions for BRP – 'Content' should include, among other information, the following content as per the Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f)

Although Hungary has not joined the common European platforms, MAVIR has made many improvements towards it. MAVIR was able to use aFRR/mFRR local product in 2023. Due to the increase of the RES penetration, the sum of the prequalified control range increased as well.

Dimensioning of reserve capacities is based on SOGL principles, also considering the special characteristics of the Hungarian electrical system. In 2023, a more significant development was that the dimensioning and the daily tenders was transferred on hourly resolution.

Taking into account Article 6 of EU Regulation 2019/943 regarding the procurement of balancing capacities, MAVIR applies a derogation approved by the Hungarian Regulatory Authority until the end of 2025, so that a minimum of 30 % of balancing capacities are procured in a daily or intraday timeframe. Reserve capacities were procured via long-term

(monthly) and short-term (daily) tenders. Considering the structural conditions of the Hungarian reserve market, the mixed-term procurement procedure can be considered the most optimal as the strategic advantages of both short-term and long-term procurements can be utilised during the tenders. Long-term tenders ensure predictability for market participants and provide capacity-based revenue for power plants with higher marginal costs. Short-term purchases provide an opportunity for market participants to react to market changes that affect their real-time profitability.

MAVIR does not intend to use standard products and to join BCC until Q1 2026.

5.13 Ireland (EirGrid plc and SONI Limited)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, by EirGrid is published on the Irish website **here**, and by SONI on the Northern Irish website **here**. EirGrid and SONI are the TSOs for Ireland and Northern Ireland respectively. They are part of the Ireland and Northern Ireland SA, which operates a SEM, including a single balancing market covering both jurisdictions. As part of this, EirGrid and SONI operate the LFC block, which is equal to the LFC area, scheduling area and monitoring area covering both jurisdictions.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Prior to new market arrangements going live in October 2018, EirGrid and SONI respectively were undertaking a programme to align Ireland and Northern Ireland's SEM with the European approach and structure of day-ahead, intraday and balancing markets. While this project created the first balancing market arrangements in the jurisdiction under Article 64 of the EB Regulation, Ireland and Northern Ireland had a general derogation against compliance with all aspects of the EB Regulation outside the creation of methodologies until 31 December 2019. From that date, the code entered into force for Ireland and Northern Ireland, and the timelines under EB Regulation have begun to take effect. As a result, the TSOs have undertaken work to ensure the local T&Cs related to balancing comply with the EB Regulation. This analysis was completed in 2020.

The compliance analysis assessed the level of compliance of the SEM arrangements with each individual paragraph of the EB Regulation. This led to a determination for each element of the regulation as to whether the provision applies to the SEM at present or not. For example, where a product class is not currently procured, as is the case for balancing capacity in the SEM, or a provision relates to a methodology that does not currently apply in the local arrangements, those provisions were assessed as not being currently applicable.

For those provisions which do apply to the SEM, an assessment was made as to whether or not the local approach is compliant with the provisions of the regulation by comparing an outline of the SEM approach, as set out in the documents governing the local SEM T&Cs, against the requirements in the regulation. Where this was considered to be beneficial, either in terms of enhancing compliance, or adding clarity as to how the local T&Cs relate to the provisions of the regulation, changes were suggested. Where it was found that the local approach was materially different to the relevant EB Regulation provision, or that it was not possible to conclude that the local approach was in line with the requirement without additional detailed analysis, such items were marked for further consideration. Over 400 paragraphs of the EB Regulation were assessed in the initial analysis, and of them 271 were found not to be directly applicable to the SEM at this time. The SEM arrangements were considered compliant with 96 of the remaining paragraphs; 46 further paragraphs, spanning 23 topics, were found to warrant further detailed consideration. This additional consideration led to the following findings:

- Nine of the topics were found to be compliant in all material respects with no further action necessary.
- Six of the topics were found to be compliant in all material respects, with minor changes proposed to add clarity or transparency.
- For four topics it was not possible to arrive at a conclusive finding on compliance, so that further industry input was sought on the analysis via the regulatory consultation on compliance.
- For the final four topics, it was concluded that changes would be merited to ensure that the EB Regulation's requirements are met.

After this review, and consideration of the SEM arrangements in the context of compliance with the EB Regulation, they were found by the TSOs to be substantially compliant in material respects with the relevant requirements of the EB Regulation. While there are a small number of areas highlighted in this document where potential uncertainty is addressed, the TSOs do not believe these adversely affect the substantial compliance of the SEM arrangements with the EB Regulation's requirements. After a detailed submission was made to the regulatory authorities of the SEM, a public consultation was launched on the findings of the analysis. This consultation is now complete, and a decision is due to outline the next steps, which may include rules and systems changes.

There is separate work also under way to investigate future interactions with the arrangements for coupling with the European balancing energy platforms, such as TERRE and MARI, which is expected to take longer to complete. Meanwhile, the TSOs have renewed observer status in MARI and got the new observer status in TERRE in 2023. Because the exit of the UK from the EU has resulted in the SEM having no direct interconnection with another member state, this will further delay the full implementation of the substantial requirements of the EB Regulation, including participation on balancing energy platforms, until such time as the Celtic interconnector between the SEM and France is completed later in this decade.

Given the outstanding questions with respect to compliance of the current arrangements and the longer-term implementation of SEM participation on the balancing energy platforms, it is not possible to provide the information envisaged in Article 60 of the EB Regulation in this executive summary for this iteration of the report. It is intended that the work currently under way will enable the provision of the applicable information for future iterations of the report.

5.14 Italy (Terna – Rete Elettrica Nazionale SpA)

Introduction

a) Link to the National TSO report on Balancing (from which current executive summary is being provided).

a.1. At this **link**, the version of the report covering the period from 18 December 2019 to 17 December 2021 can be consulted. The updated version covering the period from 18 December 2021 to 17 December 2023 will be published in the coming months

b) Geographical scope: SA(s), LFC block(s), LFC area(s), scheduling area(s) = imbalance area(s), BZ(s) = imbalance price area(s), TSO(s).

b.1) SA: CE

b.2) LFC block = LFC area = Italy (Sardegna not included)

b.3) Scheduling Areas = BZs = Nord, Centro Nord, Centro Sud, Sud, Calabria, Sicilia, Sardegna (current BZs configuration)

b.4) Two imbalance price areas: (1) macro-area composed by the Nord BZ and (2) macro-area composed by all other Italian BZs.

c) General information about market design and reserve dimensioning: central / self-dispatch model, types of reserve used to balance the system and dimensioning, specific requirements defined in the T&Cs for BSP/BRP [15]according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.).

c.1) In Italy, a central dispatching model is adopted to determine both the unit-commitment status and the dispatching level of dispatchable facilities within an integrated scheduling process where commercial and technical data as well as the start-up characteristics of these facilities are considered as an input to the process itself, together with the latest control area adequacy analysis and the operational security limits. The central dispatching model is adopted in the Ancillary Services Market, where Terna procures the dispatching resources needed for the secure operation of the Italian electric power system. In particular, during the scheduling phase of the Italian Ancillary Services Market (named MSD ex-ante), upward and downward integrated scheduling process bids are selected, with the aim of relieving congestions within BZs and ensuring the availability of appropriate FRR and RR margins. During the real time phase of the Italian Ancillary Services Market (or Balancing Market), upward and downward integrated scheduling process bids are selected, with the aim of maintaining the balance between electricity injections and withdrawals, relieving real-time congestions within BZs and ensuring or restoring FRR and, if needed, RR margins.

c.2) In this regard, the minimum aFRR requirement is calculated for each hourly period and for each zonal aggregation, as a function of load forecasts and taking into account the safe operation of the interconnection between the Mainland, Sicily, Sardinia and, for islands, the regulating

15 Including the rules for suspension and restoration of market activities, in accordance with Article 36 of the EB Regulation, and the rules for settlement in case of market suspension pursuant to Article 39 of Regulation (EU) 2017/2196 once approved, in accordance with Article 4 of the EB Regulation.

contribution of interconnections. The mFRR requirement is dimensioned in order to cover, for each hourly period and for each zonal aggregation, the complete reconstitution of aFRR margins and taking into account the unplanned unavailability of thermal production, in case of upward capacity, or hydroelectrical loads, in case of downward capacity, for a quantity at least equal to, respectively, the maximum schedule among all thermal productions or the maximum schedule among all the hydroelectrical loads. The RR requirement is dimensioned, for each hourly period and for each zonal aggregation, taking into account the unplanned unavailability of thermal production, in case of upward capacity, or hydroelectrical loads, in case of downward capacity, for a quantity at least equal to, respectively, the maximum schedule among all the thermal production or the maximum schedule among all the hydroelectrical loads, together with the forecast error of electrical demand and intermittent RES production.

d) General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.

d.1) In 2022, the number of BRPs was 310 and 42 of these BRPs were also BSPs. In 2023 the number of BRPs was 333 and 40 of these BRPs were also BSPs. There were also other BSPs (16 in 2022 and 23 in 2023) that participated in the Ancillary Services Market by means of pilot projects described hereafter.

d.2) The participation in the Ancillary Services Market for batteries with a size of a least 10 MW has been allowed since July 2023 following the provisions of the ARERA Resolution 98/2023. DSR, RES and batteries below the above mentioned threshold can participate in the ancillary services market through pilot projects (Decision 300/2017/R/eel) aimed at collecting useful elements for an overall reform of this market, also opening them to new participants through aggregators (Mixed Enabled Virtual Units - UVAM). Such in-progress pilot projects are to be understood as pilot regulation: this means that all subjects able to provide flexibility resources can participate (not only subjects chosen for experimental purposes) on the basis of a transient regulation that could be innovated taking into account the results of the experimental phase. This allows to affirm that in Italy the balancing market is already fully open to demand, although the modalities of participation could be gradually updated and innovated.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Participating since 13 January 2021	–
aFRR Platform	Participating since 19 July 2023	1 year derogation granted (ARERA Resolution 46/2022) Reasoning: implementation of all the needed changes (regulatory, market, IT, etc.) for the coordination between national processes and aFRR Platform.
mFRR Platform	By 24 July 2024	2 years derogation granted (ARERA Resolution 46/2022) Reasoning: implementation of all the needed changes (regulatory, market, IT, etc.) for the coordination between national processes and mFRR Platform.
IN Platform	Participating since 27 January 2020	–

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
Rules for integrated scheduling process bids conversion into RR standard product	Approved (ARERA Resolution 535/2018 and Resolution 344/2020) and implemented since 13 January 2021
Rules for integrated scheduling process bids conversion into aFRR standard product	Approved (ARERA Resolution 115/2023) and implemented since 19 July 2023
Evolution of the T&Cs for BRP	
ISH Methodology	Approved (ARERA Resolution 123/2022) and implemented since 1 April 2022

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation (ARERA Resolution 474/2020)
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Date: 31 December 2024
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes (since 1 April 2022)
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f)

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

With reference to Article 60(2)(b), please refer to point c) of Paragraph 1 (Introduction). Moreover, by adopting a central dispatching model, FRR and RR margins are implicitly ensured by correcting the unit-commitment status and/or the dispatching level of dispatchable facilities resulting from Day-Ahead and the Intraday Markets. This is carried out by means of integrated scheduling process bids which are used to procure different ancillary services in a co-optimised manner (e.g. congestion relief, FRR and RR margins setting and balancing). For this reason, provisions (c), (e) and (f) of article 60(2) of Commission Regulation (EU) 2017/2195 are not applicable to the Italian case.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

Since only integrated scheduling process bids are used to procure different ancillary services in a co-optimised manner (e.g. congestion relief within BZs and balancing), Articles 26(1) from (a) to (f) and provisions (a) and (d) of Article 60(2) of the EB Regulation are not applicable to the Italian case.

5.15 Netherlands (TenneT TSO B.V.)

Introduction

TenneT TSO BV (TenneT NL) is the Dutch TSO. TenneT NL is responsible for its single LFC block – with only one LFC area – as part of the Continental Europe Synchronous Area. TenneT NL is the single connecting TSO for the Netherlands bidding zone, equal to the single imbalance price area and imbalance area.

The market, including the balancing market, is organised according to a self-dispatching model. For frequency restoration, balancing energy from aFRR and mFRR is used, after reducing balancing energy demand by imbalance netting (IN). Balancing energy demand from directly activated mFRR is supplementary to activation of aFRR. The non-mandatory reserve replacement process is not implemented.

National settlement principles, in place since 2001, comply with the EB Regulation in the following ways.

a) The ISP is 15 minutes.

b) All imbalance prices comply with Article 55 (paragraphs 4, 5 and 6) of the EB Regulation.

c) Balancing energy bid prices are per ISP, and become firm two ISPs prior to ISP of delivery, to allow bid price consistency with all previous wholesale markets.

d) Non-contracted balancing energy bids for aFRR are allowed.

e) The value of avoided activation is defined at mid-price merit order list FRR.

f) Balancing energy prices are uniform per ISP, for all FRR balancing energy.

g) BRPs are allowed to notify position changes after intraday GCT.

h) Finalisation of imbalance settlement within 10 working days, including procedure for BRPs and BSPs to challenge settlement volumes.

i) Financial neutralisation on TSO is guaranteed in national grid code through Article 44(2) of the EB Regulation; no financial mechanism with BRPs, separate from imbalance settlement, is implemented or considered.

Electricity consumption (excluding grid losses) is around 109 TWh/y; Last years the amount of solar photovoltaic systems further increased to 24 GW by the end of 2023. There are currently 29 BSPs accredited, and 144 BRPs, of which around 30 serve connections. There is considerable and increasing interest from market participants with variable renewable energy (VRE) (mainly windfarms) batteries to participate in FCR and aFRR markets. There are 66 service providers offering congestion management services.

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, will be published on our website www.tennet.eu.

Chapter 10 of the Dutch **Gridcode** on electricity contains the current version of National Term & Conditions on balancing.

Progress, timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	
aFRR Platform	Derogation granted until 24.7.2024 from the connection to MARI and PICASSO. Current planned date of go-live on the PICASSO platform 1-10-2024.	Replacement of current EMS/SCADA is prerequisite to implement adaptations to connect to European platforms for aFRR and mFRR.
mFRR Platform	January 2022: Derogation granted until 24.7.2024 from the connection to MARI and PICASSO. Current planned date of go-live on the MARI platform Q3/Q4 2025	Replacement of current EMS/SCADA is prerequisite to implement adaptations to connect to European platforms for aFRR and mFRR.
IN Platform	Accession to IGCC since February 2012.	N/A

Balancing capacity cooperations	Status	Accession timeline
FCR cooperation, platform for procurement and exchange of FCRs	Member	April 2015

Evolutions of the terms and conditions for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
Approved since 18.12.2018
Evolution of the T&Cs for BRP
Approved since 18.12.2018

Evolution of the terms and conditions for BRP following content as per the Articles 52, 53, 54 and 55 of the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented, since 1 January 2021
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	n.a.
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Proposed
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes
3.1. Condition (a)	Implemented; formal approval by relevant NRA on 2 March 2022
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f)

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

The trends mentioned in the last report continued. For the calendar years covered by this report the stochastic criterion became larger than the deterministic, for down regulating only. The borders stayed being congested after intraday GCT so no possibility for reserve sharing remains. Free bids capacity continued to be very weather dependent so hardly a possibility to structurally reduce FRR capacity procurement.

For the calendar years covered by this report, no specific products for balancing capacity and balancing energy, in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d), were defined by TenneT NL, and consequently no specific products were approved by the relevant NRA, nor used by TenneT NL.

A numerical overview for TenneT NL and its connected BRPs and BSPs is given below.

Metric/Indicator	2021	2022	2023	Unit
Demand Netherlands	118	100	109	TWh/a
Σ Total balancing energy BSP	0.63	0.82	0.51	TWh/a
Σ Net imbalance BRP	1.6	1.8	1.6	TWh/a
Σ Net balancing energy	0.61	0.80	0.51	TWh/a
Σ Net IN	0.73	0.74	0.96	TWh/a
Σ Perfect ACE	0.24	–	–	TWh/a
Σ Actual ACE	0.37	–	–	TWh/a
TSO-BRP imbalance	−153.9	–	−285.0	M €/a
TSO-BSP balancing energy	86.4	–	118.0	M €/a
TSO-TSO IN	1.2	–	14.5	M €/a

Art60 a. available, procured and activated volumes

Product	Aspect	2022	2023
FCR	Available		
	Procured		111 MW
FRR UP	Available (capacity)		
	Procured (capacity)	1,304/1,304 MW	1,304/1,304 MW
	Activated (energy)		249,914 MWh
FRR Down	Available (capacity)		
	Procured (capacity)	1,148/1,164 MW	1,291/1,326 MW
	Activated (energy)		259,414 MWh

Art 60 b. dimensioned volumes

Product	Direction	2022 (H1/H2)	2023 (H1/H2)
FCR		116 MW	111 MW
FRR	Up	1,304/1304 MW	1,304/1,304 MW
FRR	Down	1,148/1,164 MW	1,291/1,326 MW

5.16 Norway (Statnett SF)

The Norwegian power transmission system is located geographically in Northern Europe and is a part of the Nordic SA, which consists of the transmission systems of Finland, Sweden, Norway and Eastern Denmark. This comprises the Nordic LFC block. There are five BZs: NO1, NO2, NO3, NO4 and NO5 in Statnett's control area.

The market design is based on the self-dispatch model. The types of reserve used in the Nordic SA to balance the system are FCR and FRR.

The FCRs are reserves used for the containment of frequency. The FCRs are divided into: Frequency Containment Reserve for Normal Operation (FCR-N) and Frequency Containment Reserve for Disturbances (FCR-D) products.

The FRRs are reserves to restore the frequency to the nominal value and release the activated FCRs. The FRRs are divided into two reserve products: aFRR and mFRR. RR are not used in the Nordic SA.

Statnett only procure FCR-N through the FCR market. Statnett's obligations of available FCR-D volumes have historically been covered through so-called 'base delivery', which will be explained further in this report.

aFRR balancing capacity is procured daily (D-1) in a national market. aFRR balancing capacity is procured to cope with imbalances in the control area.

mFRR balancing capacity is procured in a national market. The market is both seasonal and weekly. mFRR balancing capacity is procured to ensure reserves to cover dimensioning incidents and cope with imbalances in the control area.

Reserve product	Nordic volume	National share	National requirement	Number of BSPs
FCR-N	± 600 MW	39.05 %	234 MW	20
FCR-D Up	Up to 1450 MW	39.05 %	Up to 566 MW	20
FCR-D Down	Up to 1,400 MW	39.05 %	Up to 547 MW	20
aFRR	300/400 MW	35 %	105/140 MW	7
mFRR	N/A	N/A	Up to 1,400 +300 MW	30

Table 22 – Summary of the Balancing Reserve Volumes and Number of BSPs

During the reporting period, the IFs for the European platforms were approved by ACER. However, the IFs have not yet been implemented. Thus, the balancing products, which were used during the scoping period, cannot be defined as specific products, as denoted in the EB Regulation. Therefore, this summary does not further address questions related to specific products.

The existing products, however, create the current reserve market, which varies between these five products and provided by number of BSPs as reported in the table above. The resource of the balancing products varies as well. Statnett does not discriminate on the technologies and all types of technologies can participate in the reserve markets.

Opportunities for the exchange of balancing capacity and sharing of reserves

The Nordic TSOs exploit the possibility of sharing reserves (within the LFC block), both implicitly in the FRR dimensioning process, and explicitly in bilateral agreements, such as the Sweden–Denmark sharing agreement.

The Nordic TSOs also exchange FCR in bilateral agreements, in cases where such an exchange can be performed, respecting the operational security limits.

Moreover, the Nordic TSOs are working on common procurement procedures for aFRR and mFRR, to exploit more efficiently the possibility to exchange capacity within the LFC block. Currently, the status for this is a common Nordic aFRR capacity market. The method and market design were approved by ACER in 2020, and it started operation in December 2022. The **NBM roadmap** contains updated information on further plans and implementation.

Progress towards joining the European Balancing energy platforms and Balancing Capacity Cooperation

The common Nordic Balancing Model is a gateway work for joining the European Balancing energy platforms. As mentioned in the section above, the go-live awaits flow-based parallel run results. The set roadmap is currently waiting to have a common Nordic Balancing Model, shifting to 15min ISP and joining European Balancing energy platforms by Q2 2024 earliest.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	N/A
aFRR Platform	The planned connection time is expected in 2026.	Lack of technical solutions in the Nordic TSOs. Derogation until 24 July 2024.
mFRR Platform	The planned connection time is expected in 2026.	Lack of technical solutions in the Nordic TSOs. Derogation until 24 July 2024.
IN Platform	N/A	N/A

Balancing capacity cooperations	Status	Accession timeline
Nordic aFRR capacity market	The Nordic aFRR CM started operation in December 2022.	
Nordic mFRR capacity market	Trilateral market (Sweden/Denmark/Finland) to be implemented in Q4/2024. Transition to Nordic market when Norway joins, date not set as of Q2/2024.	To be determined.

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	
1.2. If response to Q1 is 'yes', what were the main results'?	The T&Cs for the BSPs are technology neutral and allow full participation from DSR, RES and batteries.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	
2.2. If response to Q2 is 'yes', what were the main results?	The market management system has been developed to enable the adoption of standard energy products.
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	N/A
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	
5.2. If response to Q6 is 'yes', what were the main results?	The exchange of balancing capacities creates socioeconomic benefits and common Nordic capacity markets for aFRR and mFRR are to be introduced.
Q6: Are you already involved in a BCC as a member or as an observer?	Yes

Evolution of the T&Cs for BRPs and BSPs

The T&Cs for BSPs, in accordance with Articles 18(5) and (7), are subject to an ongoing regulatory process and thus are not yet approved.

The T&Cs for BRPs, in accordance with Articles 18(6) and (7), are subject to an ongoing regulatory process and thus are not yet approved.

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	22 May 2023
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	No
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

5.17 Poland (Polskie Sieci Elektroenergetyczne S.A.)

Introduction

a) Link to the National TSO report on Balancing.

b) PSE's website: Link to current version of National Terms & Conditions – Polish version only (detailed directions: 'Warunki Dotyczące Bilansowania (WDB)' –> 'WDB – tekst obowiązujący') or Transparency Platform

c) Geographical scope: SA(s), LFC block(s), LFC area(s), scheduling area(s) = imbalance area(s), BZ(s) = imbalance price area(s), TSO(s).

Polskie Sieci Elektroenergetyczne S.A. (PSE) is the sole transmission system operator in Poland responsible for Polish Balancing Market, launched in September 2001. Geographically Polish LFC block, LFC area, scheduling areas and BZs overlap with Polish borders. Polish LFC area is a part of the CE SA.

d) General information about market design and reserve dimensioning: central / self-dispatch model, types of reserve used to balance the system and dimensioning, specific requirements defined in the T&Cs for BSP/BRP[16] according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.).

The Polish Balancing Market is based on the Central Dispatching Model, in which the TSO is responsible for selecting and dispatching the capacity of all Centrally Dispatched Generation Units. The balancing market in Poland covers the 400 kV and 220 kV transmission networks, connection points for centrally dispatched units to the 110 kV and distribution network and points in the distribution network to which balancing market participants are connected. PSE uses the following types of reserves:

- FCR
- aFRR
- RR

The reserves dimensioning in Poland is based on the probability of generation units outage, demand forecast uncertainty, historical values of needed reserves and maximum generation units size. The required reserves capacity is as follows:

- FCR: + 170 MW/ - 170 MW
- aFRR: + 500 MW/ - 500 MW
- RR: +9 % of hourly system demand minus reserves available in FCR and aFRR

Each BSP should have at least one scheduling unit that actively participates in the balancing market and a dedicated IT system used for the communication between BSP and TSO, e.g. to activate the balancing energy. BSP provides balancing services through the scheduling units. Only the scheduling unit representing a generation unit with appropriate technical capabilities can provide the FCR and FRR. The RR can be provided by generation, storage and load units.

Each integrated scheduling process bid submitted by the BSP is assigned to the specific scheduling unit. Because the imbalance area is equal to the scheduling unit, the BRP owning these scheduling units is responsible for balancing all bids provided for that unit.

The evaluation of the provisions of balancing services pursuant to Article 18(5)(f) of EB regulation is performed based on the real-time measurements.

PSE uses neither standard nor specific products within the meaning of EB regulation. Because PSE has not yet joined any of the platforms for the exchange of balancing energy, currently PSE only uses local products based on the integrated scheduling process bids submitted by BSPs.

The definition of balancing responsibility for each connection is designed in such a manner as to avoid any gaps or duplication of balancing liability for different market participants providing services under that connection. Each balancing market participant is a BRP, while imbalance area is defined on scheduling unit level. The only entity responsible for balancing the interconnections with the transmission systems of other operators is PSE, which bears full responsibility for balancing them.

Each BRP is obliged to deliver to the connecting TSO the information about the energy contracts concluded at the scheduling unit level with other BRPs and the measurement data for each BRP's scheduling unit.

One imbalance price is determined for the whole scheduling area; therefore, the imbalance price area is equal to the scheduling area.

The integrated scheduling process in Poland starts in the day-ahead timeframe and the integrated scheduling process bids are submitted by BSPs no later than by 14:30 the day before the electricity supply. Submission of integrated scheduling process bid for whole available capacity is mandatory

16 Including the rules for suspension and restoration of market activities, in accordance with Article 36 of the EB Regulation, and the rules for settlement in case of market suspension pursuant to Article 39 of Regulation (EU) 2017/2196 once approved, in accordance with Article 4 of the EB Regulation.

for all centrally dispatched generation units. Integrated scheduling process bids submitted in the day-ahead market horizon may be corrected in the intra-day balancing process till h-0:45.

The settlements of balancing services and imbalance energy are performed for each decade of the month. Preliminary settlements data are available in the day d+1, while final ones in the day d+4. Settlements correction is possible in the following months: m+2, m+4, m+15.

e) General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.

Market participant	Number of market participants in 2022	Number of market participants in 2023
BSP (DUB)	27 entities 111 scheduling units	30 entities 113 scheduling units
BRP (POB)	132	141
DSR	1	1
Storage	2 entities 18 scheduling units	2 entities 18 scheduling units
RES	0	0

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	PSE plans not to connect to the TERRE platform regarding the context of the project	See details in point 2.1
aFRR Platform	Accession planned in mid-2025	Changes in internal balancing market process
mFRR Platform	Accession planned in mid-2025	Changes in internal balancing market process
IN Platform	In operation since March 2023	

At this moment, PSE does not plan to join any balancing capacity cooperations.

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	
1.2. If response to Q1 is 'yes', what were the main results'?	New T&C facilitating participation of RES, DSR and storage in Balancing market are approved and will enter into force in June 2024
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	
2.2. If response to Q2 is 'yes', what were the main results?	New T&Cs for balancing introducing standard products are approved and will enter into force in June 2024
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	Balancing capacity is not procured.
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	Balancing capacity is not procured by TSO at this stage.
5.2. If response to Q6 is 'yes', what were the main results?	
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
No major changes in last 2 calendar years. Complete reform of balancing market enters into force in June 2024 (T&C approved by NRA)
Evolution of the T&Cs for BRP
No major changes in last 2 calendar years. Complete reform of balancing market enters into force in June 2024 (T&C approved by NRA)

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Implementation planned in June 2024
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	No
2.1. Scarcity component?	Proposed
2.2. Incentivising component?	Proposed
2.3. Component related to financial neutrality of the TSO?	Implemented
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f):

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f) and Assessment of sharing/exchange of reserves:

1. Analysis of the dimensioning of reserve capacity, including the justification and explanation for the calculated reserve capacity requirements, in accordance with Article 60(2)(b) of EB regulation.

The reserves dimensioning is based on the probability of generation units outage, demand forecast uncertainty, historically required reserves volumes and maximum generation units size. Availability of reserves is monitored constantly looking ten days in advance. The required level is expressed as a percentage of forecasted demand and it lowers as it approaches real time. Currently required values are as follows:

- Daily Coordination Plan (9 %)
- from day d+2 to day d+9 (14 %)
- From day d+10 (18 %)

The total required reserve capacity consists of: 170 MW FCR, 500 MW aFRR and is padded to the total required value by RR.

2. Analysis of the optimal provision of reserve capacity, including the justification of the volume of balancing capacity in accordance with Article 60(2)(c) of the EB regulation.

The volume of required reserves narrows down approaching to real time, when the uncertainties decreases, which ensure that its level is optimal and ensure systems security while avoiding oversizing. Moreover, because energy and reserves are acquired jointly as a part of the integrated scheduling process taking place after the closing of the SDAC market, the reserves volume is not excluded from the day-ahead market. This way, the provision of reserves capacity does not negatively influence the wholesale energy market.

The joint provision of balancing energy and reserves as part of the co-optimisation process ensures the optimal use of available resources to obtain both energy and reserves while safeguarding system security.

3. An explanation and a justification for the procurement of balancing capacity without the exchange of balancing capacity or sharing of reserves in accordance with Article 60(2)f of the EB regulation.

PSE currently does not procure balancing capacity; required reserves volume is ensured in the integrated scheduling process.

4. Analysis of the opportunities for the exchange of balancing capacity and sharing of reserves in accordance with Article 60(2)e of the EB Regulation.

PSE does not contract balancing capacities, and consequently there is no possibility to exchange it.

Sharing reserves by the PSE with neighbouring TSOs would be inefficient due to significant uncertainties arising from the lack of a sufficiently coordinated mechanism for the allocation of transmission capacity in the CE region. Unscheduled power flows being the consequence of the meshed transmission grid in central Europe result in the inability to share power reserves due to the dynamic nature of unplanned loop flows and therefore the inability to ensure in advance that transmission capacity is available to provide electricity from shared reserves. Moreover, as PSE acquires reserves in the day-ahead timeframe within the integrated scheduling process while neighbouring TSOs do it in a longer time horizon, the possibility of reserves sharing is limited. However, even not sharing reserves, in case of urgent need PSE may provide energy to neighbouring TSOs using operational measures such as Agreed Supportive Power/ Emergency Deliveries.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d):

PSE does not use neither standard nor specific products within the meaning of the Regulation 2017/2195. Because PSE has not yet joined any of the platforms for the exchange of balancing energy, at present PSE only uses local products based on the integrated scheduling process bids submitted by BSPs.

5.18 Portugal (Rede Eléctrica Nacional S.A.)

Introduction

REN – Rede Eléctrica Nacional, S.A.(REN) is the sole TSO in Portugal, thus manages one LFC area, which geographically overlaps with the scheduling area BZ, imbalance and imbalance price area and monitoring area. The Portuguese LFC area is part of the SA CE and of the South-West Europe CCR.

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available in Portuguese **here**.

The market design is based on the self-dispatch model and the reserves used for balancing in the Portuguese LFC area, in 2023, were RR and Reserva de Regulação, and secondary regulation that is comparable to FRR.

The rules for pricing and evaluation of balancing reserve bids, the subsequent evaluation of balancing services, the rules for operating as a BSP in Portugal, the type of reserves and settlement for BSPs are set by the Manual de Procedimentos da Gestão Global do Sistema do setor elétrico (MPGGS), approved by the Entidade Reguladora dos Serviços Energéticos (ERSE), the Portuguese National Regulatory Authority.

Furthermore, the T&Cs defined in Article 18 of the EB Regulation have not been approved by ERSE. In relation to settlement and invoicing, it takes place after the balancing service evaluation period, followed by an appeal period, and is REN's responsibility.

The MPGGS defines the technical requirements for balancing services and the possibilities and conditions for aggregation. The consequences of non-compliance are also described. If a BSP fails to provide the contracted balancing reserves, the BSP will be subject to a penalty in the relevant settlement period, and if the BSP fails to provide the balancing energy (RR and Reserva de Regulação), the BSP will be subject to penalties. If the BSP does not provide the balancing services, according to the technical requirements established in the MPGGS, the BSP might be suspended from the provision of any balancing services and subject to a set of prequalification tests to verify compliance.

BRPs are responsible for their imbalance, and they cannot transfer the imbalance responsibility to another BRP under contract. REN computes the imbalance position of each BRP, based on the measured values of energy for the consumption, including losses, the measured values of energy for production facilities and the contracted energy on the organised markets, bilateral contracts and balancing services. REN defines the financial value for the imbalance of each BRP, based on the imbalance position of each BRP and the overcost associated with the activations in the balancing market. Tariffs cover the administrative costs of balancing. Regarding imbalance settlement and other balancing capacity costs, economic neutrality is guaranteed. No exemption is in place regarding the publication of bids (price and quantity) of balancing energy or capacity, in accordance with Article 12(4)

of the EB Regulation. Regarding the types of reserve used to balance the system and dimensioning, in Portugal there is a national market scheme that is evolving to aFRR reserve procurement. Regarding the market size, there were 25 BSPs that could provide balancing services, namely 5 producers and 20 consumers, in 2023. REN adopts the standard mFRR product, at national level, in March 2024.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Connected since September 2020	N/A
aFRR Platform	Q4 2024	Deep TSO and BSP IT/regulatory adaptation is currently ongoing to connect to the PICASSO platform. Derogation by the ERSE is still under analysis.
mFRR Platform	Q2 2024	Deep TSO and BSP IT adaptation is currently ongoing to connect to the MARI platform. Derogation has been granted by the ERSE until 24 July 2024.
IN Platform	Connected since December 2020	N/A

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	N/A
1.2. If response to Q1 is 'yes', what were the main results'?	These assets can provide balancing services if they meet the conditions set out in the MPGGS, among others, the minimum bid quantity of 1 MW. Interest was demonstrated by new market players, particularly renewables (namely solar) and Storage installations, to become BSPs.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	N/A
2.2. If response to Q2 is 'yes', what were the main results?	Standard products of balancing energy will be adopted as written above, considering the current timelines.
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	Secondary reserves are comparable to aFRR standard product with the following principles: Procurement method is D-1 market-based and settled with marginal price. Contracted volume is divided into 24-hour contracting periods. Procurement of upward and downward balancing capacity is not carried out separately (same marginal price applies upward and downward).
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	Currently, REN is fully focused on IT/regulatory adaptation to fulfill the obligations set on the EBGL.
5.2. If response to Q6 is 'yes', what were the main results?	N/A
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
Pending approval by ERSE
Evolution of the T&Cs for BRP
Pending approval by ERSE

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Derogation until December 2024.
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Proposed
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes
3.1. Condition (a)	Proposed
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Proposed

Summaries and main results of the analysis of Articles 60(2)(a-f):

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Regarding FCR, every year ENTSO-E evaluates and publishes the value of the primary reserve for different LFC areas. The technical characteristics of FCR, and the operational requirements that must be met by the producers participating in FCR, are defined in the grid rules. The balancing capacity and balancing energy from FCR units are not the subject of the financial settlement between the BSP and the TSO.

Based on a deterministic process of dimensioning of aFRR, it was concluded that the required amount of aFRR for Portugal was around 200 MW of upwards reserves and 100 MW of downwards reserves in 2023.

The dimensioning of mFRR is considered the forecast error of the wind, solar and consumption forecast and the loss of the largest generator or pump storage unit.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

Standard products for balancing energy, consequently specific products, will only be fully applicable when the European platforms for the exchange of standard products for balancing energy are implemented and in operation, which was not the case for REN in 2023. REN, considering these circumstances, has not used specific products during this reporting period.

5.19 Romania (National Power Grid Company Transelectrica S.A)

Introduction

In adherence to the COMMISSION REGULATION (EU) 2017/2195 of 23 November 2017, which sets forth guidelines on electricity balancing, this report outlines the Romanian electricity balancing framework managed by Transelectrica, the national TSO. Our system plays a critical role in the CE SA, characterised by a LFC Area, scheduling area and BZ.

The Romanian electricity market operates on a self-dispatch model. Significant strides have been made towards the procurement of balancing products, aligning with EU regulations as of September 2020. By October 2022, all balancing products fully complied with the EU guideline, ensuring a robust framework for electricity balancing within our control area.

The T&Cs for BSPs and BRPs have been formulated and approved by the NRA. These terms were initially set to become effective on 1 October 2022, but were postponed for 1 June 2024. Until this date, existing regulations outlined in the President of the Regulatory Authority's Orders No. 61/2020 for BSPs and No. 213/2020 for BRPs remain in force. These orders mandate participation in the centralised balancing market and impose balancing responsibilities on all market participants.

Detailed information on the T&Cs can be found **here**.

Our current framework delineates the financial transactions between the TSO and both BSPs and BRPs, including payments for upward and downward balancing energy, penalties for non-compliance, and mechanisms for handling imbalances. This ensures a fair and transparent process for managing frequency restoration and balancing responsibilities.

Transelectrica utilises system tariffs as a mechanism to cover the costs associated with balancing capacity, ensuring the financial sustainability of the electricity balancing system.

Transelectrica remains committed to upholding the EU regulations on electricity balancing, fostering a stable, efficient and compliant electricity market in Romania. The forthcoming T&Cs represent a significant milestone towards enhancing our balancing framework, poised to further align with European standards and best practices.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Isolated TSO	N/A
aFRR Platform	2026 after MAVIR accession (Sharing ATC is not possible), till then – isolated TSO	24 July 2024 New SCADA system and local platform have been developed. Local 'Go live' of the two systems will take place in June 2024
mFRR Platform	2026 after MAVIR accession (Sharing ATC is not possible), till then – isolated TSO Presently we are beginning to test the ECP and the real-time communication is being configured.	24 July 2024 New local BM platform has been developed. Local 'Go live' in June 2024
IN Platform	Connected	N/A

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	
1.2. If response to Q1 is 'yes', what were the main results'?	For the moment, we have storage facilities as reserves providing units and they are working very well. The activation is just for local purposes, but they will participate in European balancing energy platforms when our connection is settled.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	
2.2. If response to Q2 is 'yes', what were the main results?	'T&Cs' fully respecting the provisions from SOGL and EBGL will come into force starting June 2024.
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	According to ACER decision nr.11/2020
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	Not interested for the moment
5.2. If response to Q6 is 'yes', what were the main results?	
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
Approved on 1 October 2022
Evolution of the T&Cs for BRP
Approved on 1 October 2022

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Implemented
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes
3.1. Condition (a)	Implemented
3.2. Condition (b)	Implemented
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f)

Beginning 1 June 2024, Transelectrica will implement standard products in line with the established T&Cs for BSPs and BRPs. Currently, Transelectrica does not plan to utilise specific products beyond these standard offerings.

Regarding the assessment of the sharing or exchange of reserves remains pending. This reflects a recognised area of interest and agreement within our team; however, a definitive conclusion has not been reached, nor have there been any operational needs to share or exchange reserves as of yet.

5.20 Serbia (Elektromreža Srbije)

Introduction

Joint Stock Company Elektromreža Srbije (JSC EMS) is the transmission system operator in the Republic of Serbia and the owner of the entire transmission network of Serbia.

JSC EMS is responsible for the organisation of the Serbian balancing market and for the Serbian Load-Frequency Control (LFC) area, scheduling area, and monitoring area that covers the entire country. Together with two neighbouring TSOs, the Transmission System Operator of Montenegro (CGES) and the Electricity Transmission System Operator of the Republic of North Macedonia (MEPSO), JSC EMS forms Load-Frequency Control Block Serbia – Montenegro – North Macedonia (LFC block SMM) where imbalance netting process is performed.

Also, within the SMM block there is the project of switching from an hourly to a 15-minute accounting interval. After the completion of this project, data needed for the calculation of the required reserve will be more precise, which will improve the quality of work of all members of the SMM block. In October 2022, JSC EMS joined the IN platform as a full member of IGCC.

a) Link to the TSO report on Balancing

b) Link to current version of National Terms & Conditions

c) Geographical scope: synchronous area, LFC block, LFC area, scheduling area = BZ = imbalance price area, TSO:

- synchronous area = Continental Europe synchronous area;
- LFC block = Serbia, Montenegro, and North Macedonia (LFC block SMM);
- LFC area = Serbia;
- scheduling area = bidding zone = imbalance price area = Serbia;
- TSO = Joint Stock Company Elektromreža Srbije (JSC EMS).

d) General information about market design and reserve dimensioning:

- self-dispatch model,
- types of reserve used to balance the system: FCR, aFRR and mFRR
- dimensioning:
  - FCR = +−36 MW symmetrical product,
  - aFRR = +−80 MW separated per positive and negative direction,
  - FRR = 300 MW positive direction, 150 MW negative direction.

e) Specific requirements defined in the T&Cs for BSP/BRP[17] according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.): N/A

f) General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation:

Balancing Rules are written in accordance with the Energy Law, also taking into consideration the relevant European Union regulations, as well as obligations arising from the membership of JSC EMS in the European Network of Transmission System Operators ENTSO-E. Balancing Rules regulate necessary matter needed for the functioning of the electricity market, including balance responsibility of market participants, the balancing market, securing payments, electricity billing for balancing purposes, as well as the method of providing system services. JSC EMS adopted the current version of Market Code on 09 December 2022 after approval by the Serbian NRA.

According to Balancing Rules, participation in the balance market is regulated by the contract concluded by the transmission system operator with the participant in the electricity market.

For balancing services on the balancing market of Serbia, there is only one dominant BSP – Joint Stock company "Elektroprivreda Srbije". Joint Stock company "Elektroprivreda Srbije" concluded Ancillary services contract with JSC EMS. Balancing service – balancing capacity (balancing reserve) is procured through direct contracting with the dominant service provider, with the prior approval of the Serbian NRA.

Balancing energy is procured on the market according to Contract for participation in balancing mechanism with one and only participant. In order to limit status of dominant participant Balancing rules imposed several limitation for mFRR balancing energy bid of dominant participant. Prices of aFRR is calculated according to methodology foe aFRR proce calculation described in Balancing Rules.

The participation of Transmission system operators from other market areas in the balancing mechanism is regulated by contracts between Transmission system operators governing the purchasing and selling of cross-border tertiary regulation energy and imbalance netting. JSC EMS signed the Agreement on the cross-border exchange of mFRR with the Transmission System Operator of Montenegro (CGES)

17 Including the rules for suspension and restoration of market activities, in accordance with Article 36 of the EB Regulation, and the rules for settlement in case of market suspension pursuant to Article 39 of Regulation (EU) 2017/2196 once approved, in accordance with Article 4 of the EB Regulation.

and the Independent System Operator in Bosnia and Herzegovina (NOSBiH) bilaterally. Compared to emergency balancing energy, cross-border tertiary regulation energy can be activated much faster (in 15 minutes), the activation procedure is simple and the cost of energy is usually lower.

The terms and conditions for BRPs are defined in the Serbian Market Code issued by JSC EMS and approved by the Serbian NRA. Any market participant can become BRP if they comply with the conditions defined in Balancing Rules and sign the Balance Responsibility Agreement. Balancing Rules defined several conditions for BRP status including the necessity to deliver a specific amount of instrument for payment securing. These BRPs are financially responsible for the imbalances of their balancing groups.

By 31 December 2023, on Serbian balancing market are present:

- number of BSP(s): 1 for FCR, aFRR, mFRR
- number of BRP(s): approx. 54
- information about historical/new market players: historical limit was around 60 participants
- DSR/RES/Batteries participation: At this moment there is 480 MW of installed capacity in wind generation on transmission system level.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps with further remarks by each TSO if needed (to provide most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	
aFRR Platform	N/A	
mFRR Platform	N/A	EMS is currently an observer to the platform
IN Platform	Participating member since October 2022	

Balancing capacity cooperations	Status	Accession timeline
Sharing reserves within LFC block SMM	Member	EMS has implemented joint FRR dimensioning inside SMM LFC block, in accordance with SMM LFC block Agreement.
Exchange of cross-border mFRR	Member	EMS signed two billateral Agreements on the cross-border exchange of mFRR with the Transmission System Operator of Montenegro (CGES) and with the Independent System Operator in Bosnia and Herzegovina (NOSBiH).
ALPACA cooperation – application of the probabilistic approach for the exchange of aFRR capacity at the DE–CZ border	Project member	Planned go-live in the first half of 2025

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	No
1.1. If response to Q1 is 'no', why?	EMS is waiting for expected changes in legislation and is actively preparing for changes that will align the Balancing Rules with the EB regulation.
1.2. If response to Q1 is 'yes', what were the main results'?	
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	No
2.1. If response to Q2 is 'no', why?	EMS is waiting for expected changes in legislation and is actively preparing for changes that will align the Balancing Rules with the EB regulation.
2.2. If response to Q2 is 'yes', what were the main results?	
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	
5.2. If response to Q6 is 'yes', what were the main results?	EMS has implemented joint FRR dimensioning inside SMM LFC block, in accordance with SMM LFC block Agreement.
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
EMS JSC changed the Balancing Rules in Serbia in the last 2 years, but it is still not fully aligned with the EB regulation. Currently, EMS is waiting for expected changes in legislation and is actively preparing for changes that will align the Balancing Rules with the EB regulation. Envisaged changes in future are: • Balancing capacity procurement • Negative pricing for balancing energy • Inclusion of agregators, BES, RES and DSM • 15-min MTU
Evolution of the T&Cs for BRP
EMS JSC changed the Market Code in Serbia in the last 2 years, but it is still not fully aligned with the EB regulation. Currently, EMS is waiting for expected changes in legislation and is actively preparing for changes that will align the Balancing Rules with the EB regulation. Envisaged changes in future are: • Risk value to be calculated according to futures and not balancing energy prices in past • Inclusion of new market participants (especialy aggregators and active buyers in electricity market)

Evolution of the T&Cs for BRP – "Content" should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	EMS currently uses and 60-min ISP, however the process for implementation of 15min ISP is now being reviewed. mplemented 15-min Imbalance Settlement Period is expected to go live on 1 January 2025.
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes/No
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Implemented
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes/No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f):

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Regarding the FCR, every year ENTSO-E evaluates and publishes the value for the primary reserve for different LFC area. The technical characteristics of the FCR and the operational requirements that must be met by the producers participating in the FCR, are defined in the Grid Rules. The balancing capacity and balancing energy from FCR units are not the subject of financial settlement between the BSP and the TSO.

Based on statistical analysis of average values of LFC area imbalance over a period of past 12 months and deterministic process of dimensioning of aFRR it was concluded that the required amount of aFRR for Serbia was ± 80 MW.

Dimensioning of mFRR considered both a reference incident of LFC control block SMM which are 600 MW and 280 MW respectively for positive and negative direction, and the LFC block SMM Agreement. Thus, the amount of mFRR for Serbia was in positive direction 300 MW, and in negative direction 150 MW for the year 2020 and 2021 respectively.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

No specific products are defined which would distort the competition or would have a negative impact on the integration of balancing markets or side effects on other markets. However the balancing entities have its own characteristics but only mFRR and aFRR are used.

5.21 Slovak Republic (Slovenská elektrizačná prenosová sústava a.s.)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

As the sole TSO in the defined area of Slovakia, SEPS consists of one LFC area, which geographically overlaps with a scheduling area and BZ. Slovak LFC area is part of the SA CE and the CCR Region.

The rules for pricing and evaluation of balancing reserve bids and the subsequent evaluation of balancing services are set up in the T&Cs for BSPs (available here). The rules for balancing energy evaluation are described in the T&Cs for BSPs. The volume and price of the positive and negative balancing energy is transmitted to the NEMO (OKTE, a.s.) by SEPS within the terms defined in the T&Cs for BRPs (available here).

SEPS employs a self-dispatch model. Reserves are procured from the BSPs who comply with the criteria set by the T&Cs and Operational Rules of the TSO. The technical requirements for acquired reserves form a part of the Document B of the T&Cs. T&Cs is approved by the NRA (Úrad pre reguláciu sieťových odvetví).

From 2022 on, SEPS has employed specific products for balancing energy and capacity, at least until the moment of connection to the aFRR and mFRR platform (Go-live is planned for 2024). The use of special products by SEPS has been approved by Regulatory Authority Decision No 0005/2021/E-EU.

The dimensioning of reserve capacity is determined by the System Operation Guideline and further specified in the SAFA for the Continental Europe Regional Group. Regarding the volumes procured for 2023, the calculation approach has been revised based on the audit requirements, resulting in a reduction of the balancing capacity volumes.

Years	FCR +/−	aFRR+	aFRR−	mFRR+	mFRR−	TRV3MIN+	TRV3MIN−
2022	28	130	130	280	288	355	235
2023	30	125	125	150	130	360	30

TRV3MIN+− is a specific manually activated product with the full activation time of 3 minutes

Procurement of balancing capacity was done with the aim of cost minimisation. The procurement for 2022 has been implemented as a multi-year. The auction procedure was carried out in 2019. Procurement of reserves for 2023 was organised as a yearly auction in 2022, supplemented by monthly and daily auctions during the 2023. There are currently 27 BSPs accredited, and 88 BRPs. In 2023, the BRPs providing FCR from BESS started to appear. By the end of the year, the number of pre-certified BRPs from BESS increased to 6.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	N/A
aFRR Platform	5 November 2024	Derogation until 24 July 2024; Go-life has been postponed because of missing legal framework
mFRR Platform	3 December 2024	Derogation until 24 July 2024; Go-life has been postponed because of missing legal framework
IN Platform	May 2020	N/A

Balancing capacity cooperations	Status	Accession timeline
FCR Cooperation (Regelleistung)	Observer	No timeline of accession

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	
1.2. If response to Q1 is 'yes', what were the main results'?	Changes introduced to T&C have led to increase in the number of BSPs from battery energy storage system. Demand has already been participating in balancing services provision (mFRR).
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	
2.2. If response to Q2 is 'yes', what were the main results?	Until the moment of connection to the aFRR and mFRR platform, SEPS will employ specific products for balancing energy and capacity.
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	Yes
5.1. If response to Q6 is 'no', why?	
5.2. If response to Q6 is 'yes', what were the main results?	Membership in FCR platform (Regelleistung) is being assessed.
Q6: Are you already involved in a BCC as a member or as an observer?	Observer in FCR Cooperation (Regelleistung)

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
Provision of balancing services allowed to all technologies that meet T&C requirements	Approved by NRA March 2023
Provision of balancing services enabled for aggregation blocks employing different variations of technologies	Approved by NRA March 2023
Pre-certification simplified for aggregation blocks when adding new identical or already	Approved by NRA July 2023
Evolution of the T&Cs for BRP	
Imbalance price calculation adjustment	Approved by NRA April 2023

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	No
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a-f)

Types of products

As of 2023, SEPS employed only specific products. In accordance with paragraph 2 article 26 of EBGL, the justification for the use of specific products has been examined in the document **'Návrh na určenie a využívanie osobitných produktov pre regulačnú energiu a disponibilitu'**. The use of specific products by SEPS was approved by the NRA Decree No 0005/2021/E-EU of 21.12.2021 for the period of maximum 2 years, from 1 January 2022 until the moment of connection to the European platforms for the exchange of balancing energy or until 31 December 2023. In 2023, SEPS requested that NRA approve the use of specific products also for 2024 and 2025.

Dimensioning

Operational experience for 2022 and 2023 shows that under normal operating conditions, the dimensioning of reserves is sufficient to ensure the safe and reliable operation of the Slovak Power Grid. However, during the period under review, several incidents were recorded in which it was necessary to activate all available balancing reserves. These incidents were of a commercial nature and related to the behavior of commercial entities (traders) on the electricity market. The situation was resolved by adjusting the calculation of the imbalance price.

High electricity prices in the 2022 directly impacted SEPS's ability to procure balancing capacity in the required volumes in regulated environment. This was reflected in the low participation of BSPs in the short-term and daily balancing reserves tenders. The situation has reached a point where, between 1 August 2022 and 20 September 2022, the EAS alert system (State 2) had to be triggered 8 times for the FCR service for a total duration of 267 hours (a drop in FCR availability below 80 % of the requirement). SEPS also reported the incidents to the ENTSO-E. In cooperation with the regulatory authority, the problem has been remedied by increasing the regulated maximum prices for the provision of balancing capacity.

The determination of the required volumes of balancing reserves is subject to the Methodology described in Chapter 3 of **Document F, T&C**. The Methodology defines a procedure for calculating the optimal volume of each type of balancing reserves that applies economic and reliability criteria and minimises the use of the TRV3MIN service (specific local product). The output of the calculation thus represents the value of the optimal volume for each type of balancing reserve and the value of minimum volume of the TRV3MIN service that ensures compliance with the ACE (FRCE) level as required by the Synchronous Area Framework Agreement.

Based on the resulting values from the assessment of the quality of regulation under Article 131 of the SOGL, it can be concluded that a high quality of regulation was achieved in 2022 and 2023, with a very low number of exceedances of the limit, well below the maximum allowable levels.

	Number of Intervals in 2022	Number of Intervals in 2023
Level 1	67	133*
Level 2	5	44*

*Preliminary values

Procurement of reserves

As SEPS was not connected to any of the existing platforms for exchange of balancing capacity and sharing of reserves in 2022 and 2023, it did not benefit from the optimisation within these tools. Therefore, a risk mitigation approach was used for the procurement of balancing reserves, i.e. tenders were organised for different time horizons:

- daily – tender is organised for each trading hour of the following trading day;
- short-term – tender is organised for each trading hour of the selected period, however, at least for two trading days and maximum for one calendar month;
- medium-term – tender is organised for individual energy weeks and for maximum of one calendar year.

SEPS is currently assessing the connection to Western European FCR cooperation project for the exchange of balancing reserves (Regelleistung). Since 1 February 2023 SEPS has become an observer of the FCR Cooperation.

In view of the identified shortage of aFRR service, SEPS will be analysing the possibility of joining the DE/AT project for the exchange of aFRR reserves (ALPACA project). A prerequisite is the successful connection to the PICASSO project.

5.22 Slovenia (ELES Ltd. Electricity Transmission System Operator)

Introduction

a) TSO report on Balancing: www.eles.si

b) Current version of National Term & Conditions for BSP: www.eles.si and for BSP www.borzen.si

c) Geographical scope:

c.1) LFC block=Slovenia, Croatia, and Bosnia and Hercegovina;

c.2) LFC area=Slovenia;

c.3) scheduling area=BZ=imbalance price area=Slovenia;

c.4) TSO=ELES

d) General information about market design and reserve dimensioning:

d.1) self-dispatch model,

d.2) types of reserve used to balance the system: FCR, aFRR and mFRR

d.3) dimensioning for 2022:

d.3.1) FCR= +-15MW symmetrical product,

d.3.2) aFRR= +-60 MW separated per positive and negative direction,

d.3.3) FRR= 242 MW positive direction, 47 MW negative direction.

d.4) dimensioning for 2023

d.4.1) FCR= +-15MW symmetrical product,

d.4.2) aFRR= +-60 MW separated per positive and negative direction,

d.4.3) FRR= 240 MW positive direction, 41 MW negative direction.

d.5) specific requirements defined in the T&Cs for BSP/BRP[18] according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.): N/A

e) General information about the market size in 2021:

e.1) number of BSP(s): 2 for FCR, 2 for aFRR, 5 for mFRR

e.2) number of BRP(s): approx. 41

e.3) information about historical/new market players: N/A

e.4) DSR/RES/Batteries participation: provide aFRR and/or mFRR reserves.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	
aFRR Platform	After July 2024	• Local implementation of IT tools needed to be used after connection to the platforms, e.g. balancing energy settlement tool, local IT solution to be used to connect to platforms, management of balancing energy bids, etc. • Implementation of requirements defined in T&Cs for BSPs by local BSPs.
mFRR Platform	After July 2024	• Local implementation of IT tools needed to be used after connection to the platforms, e.g. balancing energy settlement tool, local IT solution to be used to connect to platforms, management of balancing energy bids, etc. • Implementation of requirements defined in T&Cs for BSPs by local BSPs.
IN Platform	Connected 1 February 2019	

18 Including the rules for suspension and restoration of market activities, in accordance with Article 36 of the EB Regulation, and the rules for settlement in case of market suspension pursuant to Article 39 of Regulation (EU) 2017/2196 once approved, in accordance with Article 4 of the EB Regulation.

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the Future

Evolution of the terms and conditions for BSP	
T&Cs for BSP	Approved by NRA on 6 July 2023. Current valid T&Cs for BSPs.

Evolution of the T&Cs for BRP

According to Slovenian legislation, imbalance settlement responsibility is awarded to Market Operator Borzen, who is responsible for the development of T&Cs for BRPs (T&C for BRPs). Through this process, a financial neutrality of a TSO regarding procurement of balancing energy is guaranteed.

Requirements of ISH Methodology are implemented. Imbalance settlement period is 15 min. If financial neutrality of a TSO cannot be guaranteed, additional components pursuant to ISH methodology may be applied, including dual pricing. In the reporting period, no additional components were used as well as no dual pricing.

Summaries and main results of the analysis of Articles 60(2)(a–f)

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Dimensioning of reserve capacity is done commonly within LFC control block of Slovenia, Croatia and Bosnia&Hercegovina (LFC block SHB). Reserve capacity requirements are dimensioned based on the operational experiences, where technical requirements defined in the ENTSO-E operational handbook for Continental Europe, Synchronous Area Framework Agreement, SO Regulation, ER Regulation and provisions defined in the Operational agreement of LFC block SHB (Agreement) where, among others, T&Cs for common dimensioning of reserves are defined.

Based on the statistical analysis of 15-minute average values of LFC area imbalance over a period of past 12 months and a deterministic process of dimensioning of aFRR, it was concluded that the required amount of aFRR for Slovenia was ± 60 MW, both for the year 2022 and 2023.

Dimensioning of mFRR considered both a reference incident of LFC control block SHB, which is 696 MW and 220 MW respectively for positive and negative direction, and the LFC block SHB Agreement. Thus, the amount of mFRR for Slovenia was in a positive direction 242 MW, and in a negative direction 47 MW for the year 2022, and 240 MW in a positive direction and 41 MW in negative direction for the year 2023.

The procurement of the reserve capacity was local; no exchange of balancing capacity or common procurement was applied as Eles doesn't participate in any balancing capacity cooperation.

Costs of procurement of reserve capacity are reimbursed to ELES through grid tariffs, no additional mechanism is in place to settle the procurement costs of balancing capacity, in accordance with Article 44(3) of the EB Regulation.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

There was no usage of specific products in years 2022 and 2023, therefore no information on procured or used specific product volumes is available. Until the go-live of balancing energy platforms in accordance with EB Regulation Art. 19(5), 20(6) and 21(6), ELES cannot provide any justification that standard balancing energy products are not sufficient to ensure operational security to maintain the system balance efficiently, as there is no usage of specific products.

According to T&Cs for BSP demand response and RES participate in the balancing market on equal basis as other sources. No specific products are defined which would distort the competition or would have a negative impact on the integration of balancing markets or side effects on other markets.

Due to the limited liquidity on the balancing capacity market, dimensioned volumes of reserves were procured using long-term contracts, yearly and monthly auctions during the reporting period.

5.23 Spain (Red Eléctrica de España S.A.U)

Introduction

In accordance with Article 60 of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a Guideline on Electricity Balancing (hereinafter referred to as 'EB Regulation'), at least once every two years, each TSO shall publish a report on balancing, covering the previous two calendar years. Thus, this **Spanish EB Regulation report** describes the main actions being taken to adapt the Spanish electrical system to Guideline on Electricity Balancing, in the period May 2022 – May 2024.

The main achievements accomplished in the period 2022–2024 regarding EB Regulation at the Spanish system are described next:

- IT changes to adapt the Spanish System towards a 15 minute resolution at all balancing markets processes (RR energy, mFRR energy and aFRR reserve/energy) and real time processes. This project is linked to necessary local adaptations in the Spanish system for its integration to European mFRR platform (MARI) and the change towards a 15 minutes Market Time Unit (MTU) in energy markets. These IT changes were implemented at the national level on 24 May 2022.
- A new specific upward mFRR product for demand have been introduced in the Spanish system in 2022 to encourage demand units to become balancing service providers ('Sistema deRespuesta Activa de la Demanda' - SRAD). Reserve from SRAD has been allocated in two auctions covering the periods [1/11/2022–31/10/2023] and [1/1/2024–31/12/2024], respectively[19]. This demand response service is used to address situations of insufficient upward tertiary regulation energy.
- IT changes ongoing to adapt the current aFRR market towards the European aFRR platform (PICASSO). This project, called SRS (Servicio de Regulación Secundaria), focuses on local implementation of an aFRR activation market as a previous step towards PICASSO platform connection. The main changes are:

a) New local aFRR energy market;

b) Adaptation of the local LFC to an activation approach based on aFRR energy bids instead of pro rata activation;

c) Real time calculation of the aFRR energy delivered based on a linearised real time market schedule baseline, the key aspect to minimise frequency deviations (in place since March 2023); and

d) New settlement module to implement the European methodology for pricing the aFRR energy at local level.

e) Revision of the reserve aFRR local market to separate it into 2 independent upward/downward reserve auctions to be harmonised with the standard reserve product.

f) Price tolerance will be introduced in the reserve market to avoid sharp marginal reserve price increase.

- Spanish system connection to European mFRR platform (MARI) is under development. An adaptation of Full Activation Time (FAT) from 15 minutes towards standard mFRR FAT of 12.5 minutes will be done at the go-live.
- Connection to European aFRR platform (PICASSO) will be implemented after SRS and MARI go-live. Subsequently, two correction signals coming from both PICASSO and IGCC platforms will coexist (IGCC correction signal will remain as long as other TSOs will operate connected to IGCC platform while not participating in PICASSO).
- Ongoing IT developments in Red Eléctrica to join Capacity Management IT (CM IT) platform in the second half of 2024.
- Evolution of Imbalance Settlement Period (ISP) from 1 hour towards 15 minutes is ongoing. Derogation from CNMC was granted until 1 January 2025.

Periodically, Red Electrica updates the implementation dates of all the projects described in the previous paragraphs in the Spanish Roadmap for MIE projects[20].

For the implementation of SRS and connection to both PICASSO and MARI platform, several tests with Spanish BSPs are being carried out since 2023 to ensure their readiness for the new implementations.

Moreover, several webinars were organised in the period 2022–2024 to engage Spanish Stakeholders in the EB regulation roadmap.

19 Results can be found **here**.

20 Last version is available **here**. Further updates can be found at this **link**.

In parallel, a review of the regulations applicable to the balance services of the Spanish electrical system is being carried out regarding the following topics:

- New operating procedure 7.5 defining the already mentioned SRAD service was approved on 19 October 2023 by the CNMC.
- Adaptation of Spanish T&Cs for BSPs and BRPs according to article 18 of EB Regulation and Spanish Operating Procedures for the implementation of SRS and connection to MARI and PICASSO were sent to CNMC on 31 October 2023.

Next, some characteristics of the Spanish system are provided below:

- Geographical scope of Spanish system:
  - SA(s) of the Spanish system is CE;
  - For the Spanish case, the following concepts are fully equivalent: LFC Spanish control block(s)= Spanish Scheduling area(s) = Spanish imbalance area(s) = Spanish BZ(s) = Spanish imbalance price area(s).
- General information about market design and reserve dimensioning:
  - Spanish system follows a self-dispatch model;
  - Types of reserve used to balance the system and dimensioning: currently, only aFRR reserve procurement.
- General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.
  - Number of prequalified standard mFRR BSPs: 24 BSPs in Q1 2024.
  - Number of prequalified aFRR BSPs: 22 BSPs in Q1 2024.
  - Number of prequalified RR BSPs: 27 BSPs in Q1 2024.
  - Number of prequalified specific mFRR BSPs: 15 BSPs in Q1 2024.
  - Number of BRPs (Q1 2024): 518.

In addition, the next table shows the participation of RES units in Balancing (information updated in January 2024)

	Installed power of licensed units for RR or mFRR (MW)	Power of licensed for aFRR (MW)	Total installed power (MW)
Wind	17,614	2,412	30,069
CHP	261	220	5,582
Minihydro	255	255	2,181
Thermosolar	567	0	2,304
Photovoltaic	4,394	1,763	24,184
Biomass and biogas	84	317	1,087
Demand	609	0	

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	3 March 2020	Derogation granted until 15 October 2020 (i.e. 9 months after the legal date of implementation)
aFRR Platform	Expected November 2024	IT/regulatory adaptations currently on going at Spanish system for future connection to PICASSO platform. Derogation granted by CNMC.
mFRR Platform	Expected September 2024	IT adaptations currently on going at Spanish system for future connection to MARI platform. Derogation granted by CNMC
IN Platform	21 October 2020	

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	Yes
1.1. If response to Q1 is 'no', why?	
1.2. If response to Q1 is 'yes', what were the main results'?	Demand scheduling units can participate since January 2021 at different RR/mFRR/aFRR processes, subject to previous prequalification. A new specific upward mFRR product for demand BSPs units was introduced in the Spanish system in 2022 to encourage demand units to become BSPs. An independent aggregator figure is yet to come, expected in 2025 (regulatory changes still under development). RES units are already active at RR/mFRR/aFRR processes (very important RES contribution to balancing services according to RES high penetration in the Spanish system). Storage units provision is currently mainly focused on hydro pump storage units; rest of storage technologies are being implemented alone or hybridised*, (composed of generation, demand and/or storage) to participate in balancing services.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	Yes
2.1. If response to Q2 is 'no', why?	
2.2. If response to Q2 is 'yes', what were the main results?	Ongoing. Regulatory changes (proposal sent to the NRA in October 2023 by the TSO) and IT adaptations for future MARI and PICASSO go-lives (RR and IN already in operation).
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	There is only one balancing capacity product in the Spanish System, and it is referred to the aFRR. Adaptation to the standard product (separation of upward and downward procurement) is expected at the SRS go-live.
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	Currently, the Spanish TSO is focused on all balancing energy platforms' implementation. In addition, an interconnection reinforcement is judged as a prerequisite for the future sharing/exchange of reserves.
5.2. If response to Q6 is 'yes', what were the main results?	
Q6: Are you already involved in a BCC as a member or as an observer?	No

*Hybrid units with storage already participating. Further developments to include hybrid technologies units will be implemented in Q2 2024.

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP
A proposal to modify the Spanish T&Cs on balancing (T&C), according to article 18 of EB Regulation was sent by Red Eléctrica to the Spanish NRA (CNMC) on 31 October 2023. Approval is expected in Q2 2024. Its main objective is to adapt the T&Cs to the participation of the Spanish electrical system on the European platforms MARI and PICASSO.
Evolution of the T&Cs for BRP
A proposal to modify the Spanish T&Cs on balancing (T&C), according to article 18 of EB Regulation, was sent by RE to the Spanish NRA (CNMC) on 31 October 2023. Approval is expected in Q2 2024. Its main objective is to adapt the T&C to the participation of the Spanish electrical system on the European platforms MARI and PICASSO.

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Exemption
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	31 December 2024
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	No
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes
3.1. Condition (a)	Implemented
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f)

Dimensioning and balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f)

Regarding reserve dimensioning, Spanish system follows SOGL dimensioning requirements; further details can be found at **Spanish Operating procedure 1.5**.

Assessment of sharing/exchange of reserves

Analysis of opportunities for the exchange of balancing capacity and sharing of reserves with other TSOs will be evaluated once the Spanish system joins all European balancing energy platforms. REE is willing to continue both on further designing balancing capacity markets and studying the opportunities and benefits of sharing such reserves according to regional methodologies, after enough experience will be gained after different balancing energy platforms go-live.

Specific products in accordance with Articles 26(1) from (a) to (f) and 60(2)(a) and 60(2)(d)

A new mFRR specific product ('Sistema de Respuesta Activa de la Demanda' SRAD) was introduced in 2022, focused on demand BSPs. In this sense, a new operating procedure 7.5 was approved by CNMC Resolution of 19 October, 2023. The aim of this service is to obtain flexibility for balancing from the demand side, not participating in standard balancing markets so far. This initiative approaches the aggregated participation of demand through its supplier as BSPs (instead of the previous schemes of individual demand response by consumer).

5.24 Sweden (Affärsverket Svenska kraftnät)

Introduction

Svenska kraftnät is the Swedish TSO. The Swedish transmission system is a part of the Nordic SA, where the Nordic TSOs cooperate both operationally and with the development of the balancing system. The Nordic TSOs (Svenska kraftnät, Fingrid, Energinet and Statnett) have one common LFC block that corresponds to the Nordic SA (Sweden, Finland, East-Denmark and Norway). The LFC areas, scheduling areas and monitoring areas equal four BZs (SE1, SE2, SE3 and SE4).

The market design is based on the self-dispatch model and the reserves used for balancing in the Nordic SA are FCR and FRR, while RR are not used in the Nordic power system.

The Nordic TSOs define two types of FCR for the Nordic synchronous area: FCR-N (Normal operation) and FCR-D (Disturbance situations). FCR-D is used to mitigate the impact of incidental disturbances, including the reference incident. The current Nordic FRR market is strongly dominated by mFRR, which have had a national capacity market since 17 October 2023. The go-live and initial phase of the capacity market went well, and the procured volumes are steadily increasing to reach the required volume for Sweden. The Nordic aFRR capacity market was launched 7 December 2022; see chapter 3.1 for more information.

The market sizes for the different products can be seen in Table 25 below, together with participating BRPs. The dimensioning is set on a Nordic level and then distributed among the four Nordic TSOs according to the national shares. The procured aFRR varies between 300 and 400 MW and has a different national share for up and down regulation which is why the national requirement is divided into four different values. mFRR will eventually have a Nordic market and therefore Nordic volume and share but since the market only is national so far, only a national requirement is specified.

Currently, the main power source for ancillary services in Sweden is hydro, but there is an increasing interest from the market participants to participate with (other) RES. Wind and solar is especially interested in downregulation for all reserves but have some prequalified for upregulation as well. The interest of prequalifying batteries have seen an increase, especially for FCR but some interest for FRR exist as well. DSR have also seen a large increase, but from low levels. The largest share of prequalified volume of DSR is for FCR-D up, which have gone from 5 % to 15 % since the start of 2022.

Reserve product	Nordic volume	National share	National requirement	Number of BSPs
FCR-N	600 MW	39.10 %	235 MW	9
FCR-D Up	1450 MW	39.10 %	567 MW	16
FCR-D Down	1400 MW	39.10 %	547 MW	16
aFRR	300/400 MW	(26.5 % and 27.7 %)	79/106 MW and 83/111 MW	6
mFRR	N/A	N/A	300 MW	14

Table 23 – Reserve volumes and number of BRPs at the beginning of 2024.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	N/A	N/A
aFRR Platform	2026	Derogation granted until 24 July 2024.
mFRR Platform	2026	Derogation granted until 24 July 2024 due to simultaneous accession of the Nordic synchronous area.
IN Platform	N/A	N/A

Balancing capacity cooperations	Status	Accession timeline
Nordic aFRR capacity market	Member	In operation
Trilateral mFRR capacity market between Denmark, Finland and Sweden	Member	Planned to be implemented around the year-shift 2024/2025

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

The T&Cs for BRPs in accordance with the EB regulation are listed in Table 28. T&Cs for the BSPs are still subject for regulatory approval. In addition, Table 30 below shows how the T&Cs for BRPs will evolve in the future.

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
Balance agreement	Approved, valid as of 1 February 2024
Appendix 1, Definitions	Approved, valid as of 1 February 2024
Appendix 2, General T&Cs for Balance responsible parties	Approved, valid as of 1 February 2024
Appendix 3, T&Cs for providers of Frequency Containment Reserves (FCR)	Approved, valid as of 1 February 2024
Appendix 4, T&Cs for providers of automatic Frequency Restoration Reserves (aFRR)	Approved, valid as of 1 February 2024
Appendix 5, T&Cs for providers of manual Frequency Restorations Reserves (mFRR)	Approved, valid as of 1 February 2024
Evolution of the T&Cs for BRP	
Imbalance price calculation adjustment	Submitted

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Derogation
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	22 May 2023
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

Summaries and main results of the analysis of Articles 60(2)(a–f)

Dimensioning of balancing capacity

The dimensioned volume for FCR-N is at least 600 MW for the Nordic synchronous system. FCR-N is used for continuous imbalances to keep the frequency within the 100 mHz range. For this reason, the purpose of FCR-N is not to mitigate the consequences of a disturbance such as a reference incident. The distribution between control areas is revised each year based on annual consumption in the previous year. Svenska kraftnät has a national share of 39.10 % corresponding to 235 MW.

The required FCR-D capacity for the synchronous system is equal to the largest possible imbalance caused by the loss of individual major components (production units, lines, transformers, bus bars etc.) and is currently up to 1,450 MW for FCR-D up and up to 1400 MW for FCR-D down. The volume is updated weekly or more often if needed and reflects each TSO's current situation. Svenska kraftnät has a national share of 39.10 % corresponding to up to 567 and 547 MW respectively.

mFRR is dimensioned by the individual TSOs based on their control area assessment of local requirements, such as bottlenecks in the network, dimensioning faults, sharing of reserves and similar. The current mFRR capacity procurement of 300 MW is not the final procurement volume. The market is new and will continually increase the procured capacity until an adequate volume is reached. The final volume needed for each area will vary depending on bottlenecks, dimensioning faults and sharing of reserves as mentioned above.

The aFRR product shall be seen as an automatic 'complement' to mFRR in the Frequency Restoration process. Each yearly quarter, all Nordic TSOs determine the hours for which aFRR shall be dimensioned. Currently, the Nordic TSOs procure 300–400 MW for the Nordic SA, which has been the same for the whole reporting period. However, the share for Sweden changed when the Nordic market was implemented. Sweden's share was 35 % before the Nordic market and was reduced to 26.5 % for upregulation and 27.7 % for downregulation. The TSOs expect that future challenges will require more automated balancing which will increase the number of aFRR contracting hours to all hours. Subsequently, the aFRR volume will gradually be increased from today's level of 300–400 MW to a tentative target volume of 600 MW.

Provisioning of balancing capacity

The dimensioning rules as referred to in Articles 127, 157 and 160 of the SO regulation were not applied during the reporting period in the Nordic LFC block. Thus, Svenska kraftnät has not performed analyses on optimal provision of reserve capacity pursuant to article 32(1) of the EB regulation.

The Nordic TSOs do exploit the possibility of sharing reserves (within the LFC block) both implicitly in the FRR dimensioning process and explicitly in bilateral agreements. When deemed feasible, mFRR capacity may be shared between control areas and there is currently an mFRR sharing agreement of 300 MW in place between Sweden and Denmark. The Nordic TSOs also exchange FCR in bilateral agreements in cases where such exchange can be performed respecting the operational security limits.

Through the joint Nordic Balancing Model (NBM) program the Nordic common aFRR capacity market was implemented in December 2022, which enabled a greater exchange of reserves in the Nordics. In the coming years, the Nordic market will enable the exchange of balancing capacity and sharing of reserves even further through NBM. According to the NBM Roadmap, a trilateral mFRR capacity market between Denmark, Finland and Sweden will be implemented around the year shift 2024/2025. Norway is planning to join the trilateral market, making it a Nordic market, but at a later point in time.

Specific products

Standard products for balancing energy, and thus specific products, will be applicable when the IFs for the European platforms are implemented and in operation, which is not yet the case. Svenska kraftnät has therefore not used specific products during this reporting period.

5.25 Switzerland (Swissgrid)

Introduction

With the Swiss market liberalisation beginning 2009, Swissgrid took the role as TSO of Switzerland and balancing group coordinator. The Swiss territory consists mainly of one scheduling area equal to Swiss control block and control area, although there are slight differences due to Liechtenstein, smaller regions in Alsace (France) and around Schaffhausen (Germany), which are in the Swiss control block, and others which belong to Switzerland such as distribution grids around Laufenburg which are not included in the control block. Within ENTSO-E the Swiss control block is part of the SA of the Regional Group Continental Europe. As 'Coordination Center South', Swissgrid also assumes important monitoring and coordination tasks in cooperation with the Coordination Center North, Amprion, for a stable LFC in CE.

The detailed TSO reports on balancing according to Article 60 of Commission Regulation (EU) 2017/2195 (EBGL) by Swissgrid are published on the Swissgrid Website under the following link: **Energy statistic Switzerland (swissgrid.ch)**

Regarding the legal implementation, the regulatory framework in Switzerland consists of different hierarchical levels. On the federal law level, electricity supply is mainly regulated by the Law on Electricity Supply (Stromversorgungsgesetz, 'StromVG'). Its purpose is to define the conditions for a secure energy supply as well as for a competitive electricity market. The implementing provision to the StromVG is regulated in the Regulation on Energy Supply (Stromversorgungsverordnung, 'StromVV'). The StromVV specifies the technical and economic rules for the participants in the Swiss energy markets. Thus, the StromVG and the StromVV form the basis for the market contracts which Swissgrid, as TSO, concludes with other parties.

The federal law is implemented on a contractual basis between Swissgrid and the BSP. The contracts regulate the mechanisms for each type of balancing energy (FCR, aFRR and mFRR) to ensure the availability of balancing capacity and energy. After an examination of the technical and operational requirements of a supplier (prequalification), standard contracts can be concluded for the respective product (ancillary services). After conclusion of the contract, BSPs can submit bids in response to Swissgrid's invitations to tender. The respective contracts and conditions are listed below and published on Swissgrid's website.

Regarding the market size, the annual consumption in Switzerland is about 66 TWh (pumping incl.) and for the balancing markets there were approximately 19 BSP and 116 BRP by end of 2023.

The LFC process at Swissgrid comprises the three sub-processes FCR process, the FRR process and the RR process.

The FCR, also known as primary frequency control reserve, restores the balance between power generation and consumption within seconds of the disturbance occurring. The dimensioning of FCR is performed in accordance with Article 153 Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation by the dedicated Group within ENTSO-E for the SA CE. FCR are procured in the FCR cooperation with the following countries: Austria, Belgium, Germany, France, the Netherlands, Slovenia, Denmark and Czech Republic.

The FRR process comprises the activation of aFRR – also known as secondary frequency control reserve and the mFRR – also known as fast tertiary frequency control reserve. Dimensioning of balancing capacity for FRR is done in a yearly and a weekly/daily process to determine the most economically efficient combination of weekly and daily mFRR and weekly aFRR that satisfies the probabilistic and deterministic criteria for every given market time unit. The aFRR, mFRR and RR at the LFC of Swissgrid are activated on a merit order list basis. BSPs that are awarded offers of balancing capacity for aFRR or mFRR must subsequently provide bids for balancing energy products corresponding to the awarded balancing capacity in a different bidding process, whereas the voluntary submission of balancing energy offers for aFRR, mFRR or RR is allowed. Since October 2020, Swissgrid has activated a balancing energy offer for RR in the common activation process of the TERRE project.

Progress timeline towards joining the European platforms and/or balancing capacity cooperations

Based on information from the last available Accession Roadmaps, with further remarks by each TSO if needed (to provide most recent information closest to report publication date)

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	Implemented since October 2020	
aFRR Platform	Technical readiness since June 2022	The participation of Switzerland in the aFRR Platform is regulated based on article 1.6 and 1.7 of the EB Regulation and is currently the subject of litigation by Swissgrid at the Court of Justice of the European Union
mFRR Platform	Technical readiness since September 2022	The participation of Switzerland in the mFRR Platform is regulated based on article 1.6 and 1.7 of the EB Regulation and is currently the subject of litigation by Swissgrid at the Court of Justice of the European Union
IN Platform	Implemented since March 2012	

Balancing capacity cooperations	Status	Accession timeline
FCR Cooperation	Implemented since 2013	

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate in European balancing energy platforms	No
1.1. If response to Q1 is 'no', why?	Swissgrid didn't implement specific changes for Demand, RES and Storage but they are already taking part in the market
1.2. If response to Q1 is 'yes', what were the main results'?	N/A
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	No
2.1. If response to Q2 is 'no', why?	Swissgrid has already implemented since 2020 for RR, and 2022 for mFRR and aFRR respectively the standard balancing energy products
2.2. If response to Q2 is 'yes', what were the main results?	N/A
Q3: Do you procure a standard product for balancing capacity?	No
Q4: What are the main characteristics?	N/A
Q5: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	No
5.1. If response to Q6 is 'no', why?	N/A
5.2. If response to Q6 is 'yes', what were the main results?	N/A
Q6: Are you already involved in a BCC as a member or as an observer?	No

Evolutions of the T&Cs for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the future

Evolution of the terms and conditions for BSP	
Content	**Status (not submitted, submitted, approved) and timeline**
Content Adoption for standard products aFRR, mFRR and RR	Entered into force for RR in 2020 and for aFRR and mFRR in 2022
Evolution of the T&Cs for BRP	
Switzerland has an ex-post regulator. Swissgrid cannot apply for derogations or submission for approval up front. The imbalance settlement mechanism described in the valid terms and conditions for BRPs is acknowledged by the Regulator	

Evolution of the T&Cs for BRP – 'Content' should include, among other information, the following content as per Articles 52, 53, 54 and 55 in the EB Regulation:

Question	Answer
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	Implemented
1.1. If response to Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components pursuant to ISH Methodology Art 9(6) as per 1 January 2024?	Yes
2.1. Scarcity component?	N/A
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	N/A
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	Yes: Swissgrid applies dual imbalance price in agreement with the valid T&Cs for BRPs and the acknowledgement of the Regulator
3.1. Condition (a)	N/A
3.2. Condition (b)	N/A
3.3. Condition (c)	N/A
3.4. Condition (d)	N/A
3.4. Condition (e)	N/A

Summaries and main results of the analysis of Articles 60(2)(a-f)

The availability of balancing energy bids during 2023 is shown in a weekly granularity in graph 1. It includes bids resulting from balancing capacity procurement in accordance with Articles 60(2)(b), 60(2)(c), 60(2)(e) and 60(2)(f), as well as voluntary standard balancing energy bids for aFRR and mFRR. It also comprises standard RR up-/downward balancing energy bids offered by Swiss market participants for the TERRE platform. The total volume generally reaches a level above 3,000 MW on the upward side and a level between 2,000 MW and 3,000 MW on the downward side.

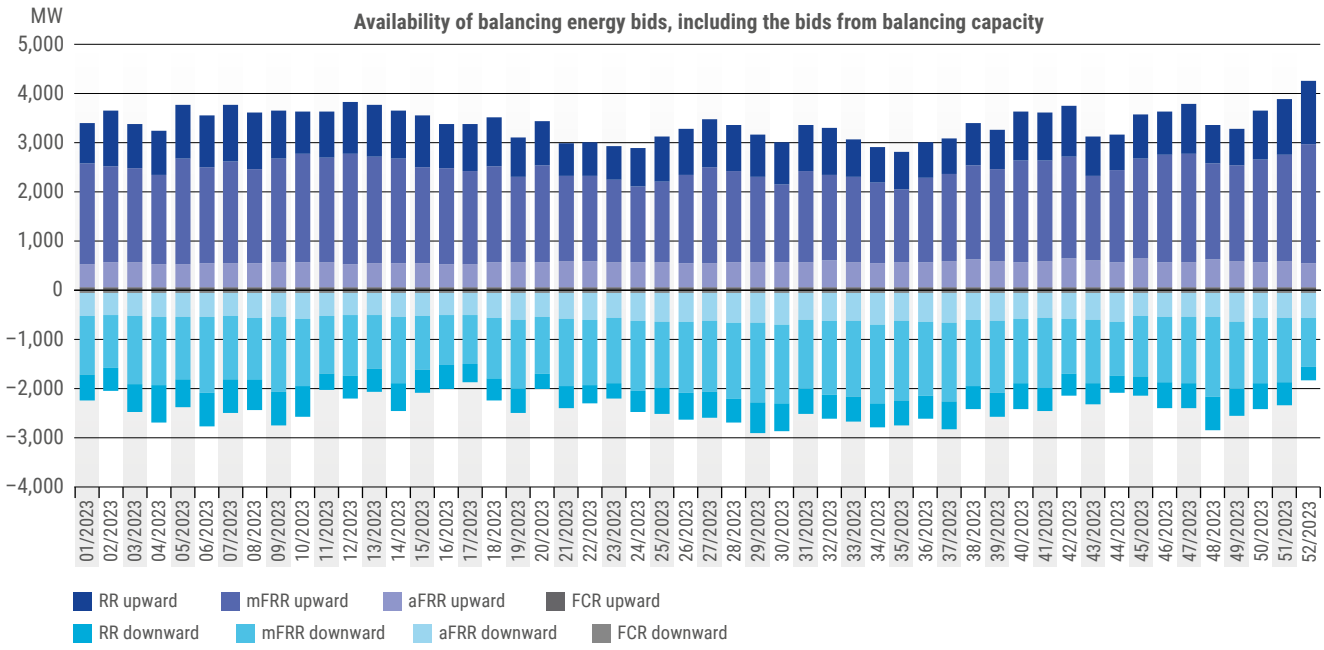


Figure 30 – Availability of balancing energy bids (MW)

The electricity wholesale market notations have substantially decreased in 2023 from their exceptional levels in the year before. This is reflected by a corresponding reduction of the prices for activated balancing and imbalance energy. The average yearly prices for each product for 2022 and 2023 can be found in Figure 31.

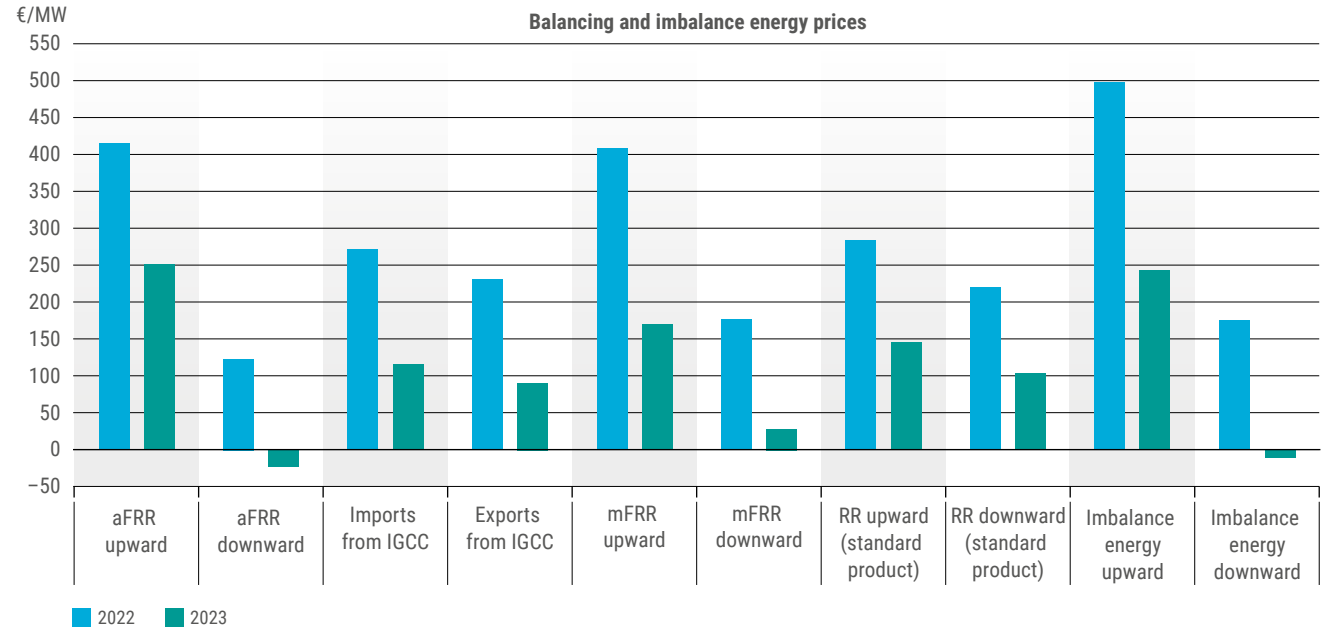


Figure 31 – Balancing and imbalance prices (€/MWh)

6 ANNEX

6.1 Annex I – Legal references and requirements

This report ensures the fulfilment of ENTSO-E reporting obligations as outlined in Article 59(2)(a) of the EB Regulation. Moreover, the performance indicators agreed upon by all TSOs, and de facto approved by ACER , which are incorporated in Chapter 4 of this report.

The requirements for ENTSO-E reporting on the detailed European report under Articles 59(2)(a), 59(3), 59(4) and 59(6) of the EB Regulation read as follows:

59(2) The format of the report shall vary as follow:

(a) two years after entry into force of this regulation and subsequently every second year a detailed report shall be published;

59 (3) The report pursuant to paragraph 2(a) shall:

(a) describe and analyse the harmonisation and integration process as well as the progress made in terms of harmonisation and integration of balancing markets through the application of this regulation;

(b) describe the status of implementation projects pursuant to this regulation;

(c) assess the compatibility between the implementation projects and investigate any possible developments that pose a risk for future integration;

(d) analyse the development of the exchanges of balancing capacity and the sharing of reserves and describe possible barriers, prerequisites, and actions to further enhance the exchange of balancing capacity and the sharing of reserves;

(e)describe the existing and analyse the potential exchanges of balancing services;

(f) analyse the suitability of standard products with respect to the latest development and evolution of different balancing resources and propose possible improvements of standard products;

(g) assess the need for further harmonisation of standard products and possible effects of non-harmonisation on integration of balancing markets;

(h) assess the existence and justifications for specific products used by TSOs and their effect on the integration of balancing markets;

(i) assess the progress of harmonisation of the main features of imbalance settlement as well as the consequences and possible distortions due to non-harmonisation;

(j) report the results of the cost-benefit analyses pursuant to Article 61.

59 (4) ENTSO-E shall set up performance indicators for balancing markets that will be used in the reports. These performance indicators shall reflect:

(a)the availability of balancing energy bids, including the bids from balancing capacity;

(b) the monetary gains and savings due to IN, exchange of balancing services and sharing of reserves;

(c) the benefits from the use of standard products;

(d) the total cost of balancing;

(e) the economic efficiency and reliability of the balancing markets;

(f) the possible inefficiencies and distortions on balancing markets;

(g) the efficiency losses due to specific products;

(h) the volume and price of balancing energy used for balancing purposes, both available and activated, from standard products and from specific products;

(i) the imbalance prices and the system imbalances;

(j) the evolution of balancing service prices of the previous years;

(k)the comparison of expected and realised costs and benefits from all allocations of cross-zonal capacity for balancing purposes.

[…]

59 (6). The report pursuant to paragraph 2(a) shall also contain an executive summary in English of each TSO report on balancing pursuant to Article 60.

6.2 Annex II – Glossary

50Hertz	50Hertz Transmission GmbH (1 out of 4 German TSOs)
ACE	Area Control Error
ACER	Agency for the Cooperation of Energy Regulators
aFRR	Frequency Restoration Reserves with automatic activation
AOF	Activation Optimisation Function
AL	Albania
ALPACA	Allocation of CZC and Procurement of aFRR Cooperation Agreement
APG	Austrian Power Grid AG
Amprion Amprion GmbH	(1 out of 4 German TSOs)
AST	AS Augstsprieguma tikls (Latvian TSO)
AT	Austria
ATC	Available transfer capability
BA	Bosnia and Herzegovina
BC	Balancing Capacity
BE	Belgium
BG	Bulgaria
BRP	Balance Responsible Party
BSP	Balancing Service Provider
BZ	Bidding Zone
BZB	Bidding Zone Border
CACM	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management
CBMP	Cross-border Marginal Price
CCR	Capacity Calculation Region
CGES	Crnogorski Elektroprenosni Sistem AD
CH	Switzerland
CE	Central Europe
CM IT	Capacity Management Information Technology
CMOL	Common Merit Order List
COBRA	Common Optimisation of Balancing Reserve & Cross-Zonal Capacity Allocation
CZ	Czech Republic
CZC	Cross-Zonal Capacity
CZCAOF	Cross-Zonal Capacity Allocation Optimisation Function
CZCL	Cross-Zonal Capacity Limits
DAM	Day-ahead Market
DE	Germany
DK	Denmark
DSR	Demand Side Response
EE	Estonia
EB	Commission Regulation (EU) 2017/2195 of 23 November establishing a guideline on electricity balancing
ELIA	Elia System Operator SA
ESO	Electroenergien Sistemen Operator EAD
EMS	Joint Stock Company Elektromreža Srbije
ENTSO-E	European Network of Transmission System Operators for Electricity
ES	Spain
EU	European Union
FAT	Full Activation Time
FCA	Forward Capacity Allocation

FCR	Frequency Containment Reserve
FI	Finland
FR	France
FRCE	Frequency Restoration Control Error
FRR	Frequency Restoration Reserves
FSkar	Financial Settlement of KΔf, ACE and ramping period
GB	Great Britain
GCT	Gate Closure Time
GR	Greece
HCZCAM	Harmonised Cross-Zonal Capacity Allocation Methodology
HHI	Herfindahl–Hirschman-index
HOPS	Croatian Transmission System Operator Plc.
HR	Croatia
HU	Hungary
HVDC	High-Voltage Direct Current
ID	Intraday
IF	Implementation Framework
IFA	Interconnexion France-Angleterre
IGCC	International Grid Control Cooperation
IE	Ireland
IN	Imbalance Netting
IPS	Integrated Power System
IPTO	Independent Power Transmission Operator S.A.
ISH	Imbalance Settlement Harmonisation
ISP	Imbalance Settlement Period
IT	Information Technology
IT	Italy
JAO	Joint Allocation Office
KPI	Key Performance Indicator
LFC area	Load-Frequency Control area
LFCBOA	LFC block Operational Agreement
LMP	Locational Marginal Price
LU	Luxembourg
MC	Market Coupling
MARI	Manually Activated Reserves Initiative
MAVIR	Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság
ME	Montenegro
MEMO	Electricity Market Operator of North Macedonia
MEPSO	Macedonian Transmission System Operator AD
mFRR	Frequency Restoration Reserves with manual activation
MSM	Market Supervision Module
MTU	Market Time Unit
NEMO	Nominated Electricity Market Operator or Power Exchange
NERC	Normative Emergency Capacity Reserve
NL	Netherlands
NO	Norway
NOS BiH	Nezavisni Operator Sustava u Bosni i Hercegovini
NRA	National Regulatory Authority
OC	Operational Committee
OST	OST sh.a – Albanian Transmission System Operator
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation

PL	Poland
PMO	Project Management Office
PSE	Polskie Sieci Elektroenergetyczne
PT	Portugal
RCC	Regional Coordination Centres
REE	Red Eléctrica de España S.A.U.
RE	Red Eléctrica
REN	Rede Eléctrica Nacional, S.A.
RES	Renewable Energy Sources
RO	Romania
RS	Serbia
RR	Replacement Reserves
RTE	Réseau de Transport d'Electricité
SAFA	Synchronous Area Framework Agreement
SA	Synchronous Areas
SC	Steering Committee
SDAC	Single Day-Ahead Coupling
SE	Sweden
SEPS	Slovenská elektrizačná prenosová sústava, a.s. (Slovakian TSO)
SI	Slovenia
SK	Slovakia
Statnett	Statnett SF (Norway TSO)
SOGL	System Operations Guideline National Implementation
SONI	System Operator for Northern Ireland Ltd.
Svenskä	Svenskä kraftnät (Swedish TSO)
Swissgrid	Swissgrid ag (Swiss TSO)
TenneT NL	TenneT TSO NV (Dutch TSO)
TenneT DE	TenneT TSO GmbH (1 out of 4 German TSOs)
Terna	Rete Elettrica Nazionale SpA (Italian TSO)
TERRE	Trans-European Replacement Reserves Exchange
Transelectrica	National Power Grid Company Transelectrica S.A. (Romanian TSO)
TransnetBW	TransnetBW GmbH (1 out of 4 German TSOs)
TSC	TERRE Steering Committee
TSO	Transmission System Operator
T&C	Terms and Conditions
UPS	Independent
VoLL	Volume of Lost Load
VUEN	Vorarlberger Übertragungsnetz GmbH
WG	Working Group
XB	Cross-border

The terms used in this document have the meaning of the definitions included in Article 2 of the CACM, FCA and EB Regulations.

6.3 Annex III – List of figures

6.4 Annex IV – List of tables

Drafting team

Bonda, Michael (Amprion)

Cur, Alexander (Amprion)

de Chambure, Cyprien (Sia Partners)

De La Fuente Leon, Jose Ignacio (REE)

Grüneberg, Axel (TenneT)

Hansson, Simon (Svenska kraftnät)

Maier, Sarah (TransnetBW)

Linnet Thomsen, Kristoffer (Energinet)

Løkka, Ingeborg (Statnett)

Özyildirim, Dilan (E-Bridge)

Paseka, David (ČEPS)

Pflanzer, Václav (ČEPS)

Thibaut, Louis (Sia Partners)

Vänskä, Vesa (Fingrid)

Veslin, Florian (Sia Partners)

Vonk, Tom (Magnus Energy)

Zajac, Tomáš (ČEPS)

Belichenko, Dmitry (ENTSO-E)

Brandauer, John (ENTSO-E)

Vakhtangishvili, Nino (ENTSO-E)

Publisher

ENTSO-E AISBL
8 Rue de Spa | 1000 Brussels | Belgium
www.entsoe.eu | info@ entsoe.eu

Design

DreiDreizehn GmbH, Berlin | www.313.de

Images

iStockphoto.com

Publishing date

30 June 2024

European Network of
Transmission System Operators
for Electricity

entsoe