ENTSO-E Balancing report 2022

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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 42 member TSOs, representing 35 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 European 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 the 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, 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 cooperation among its members at the European and regional level. 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 time frames;
- 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 transparent data-sharing with market participants.

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

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Executive summary

One of the major ongoing undertakings of transmission system operators (TSOs) over the past decade has been the integration of European electricity markets. In recent times, the focus has been particularly on the development and harmonisation of sets of technical, operational and market rules to govern the functioning of electricity balancing (EB) markets. TSOs have cooperated on such harmonisation efforts not only by proposing sets of rules, but also through the implementation of several projects such as the already accomplished and ongoing implementation of the European energy balancing platforms, and drafting and implementation of the cross-zonal capacity (CZC) calculation and CZC allocation methodologies, and the imbalance settlement harmonisation (ISH).

Balancing energy platforms (mandatory under the EB Regulation)

The implementation of European energy balancing platforms is the result of the efforts made by TSOs to ensure that each country's balancing demand is met through activating the most efficient bids in Europe, while also considering operational security constraints, as well as increasing the security of supply in Europe.

Among the four **balancing market platforms** that TSOs are implementing, the restoration reserve (RR[1]) and imbalance netting (IN[2]) platforms are already operational. The common objective of the four platforms is to increase balancing efficiency from an economic perspective, as well as from a security point of view. Besides this, additional efficiency is expected through the possibility that the frequency restoration reserves with manual activation (mFRR[3]) platform will later adopt the software solution of the RR platform (LIBRA) or through benefiting from the experience gained in the IN platform in the frequency restoration reserves with automatic activation (aFRR[4]) platform implementation.

Major undertakings in the two platforms not yet operational during the period from June 2021 to May 2022 (the mFRR and aFRR platforms) were the finalisation of the activation optimisation function (AOF) and testing activities for both platforms. Among other achievements were the finalisation and signing of contracts on individual property rights to enable the use of the common software environments (for example, the LIBRA platform).

Additional activities to highlight are as follows.

- The manual of procedures for transparency reporting was designed and collectively approved by the Manually Activated Reserves Initiative (MARI) steering committee (SC) on behalf of the other balancing platform projects, to meet the individual platform requirements within the expected timeline.
- For the IN process, the project successfully launched its official IN platform on 24 June 2021, meeting the legally

1 TERRE is the implementation project for the RR platform.
2 IGCC was chosen by ENTSO-E in February 2016 to become the European IN platform for aFRR real time needs.
3 MARI is the implementation project for the mFRR platform.
4 PICASSO is the implementation project for the aFRR platform.

mandated timeline, and managed to grow to 27 members in 24 countries, reaching close to EUR 1 billion[5] in savings since its start of operation in 2011.

- The RR platform has managed to achieve a social welfare gain compared to purely local markets[6] of approximately EUR 435 million from March to December 2021, with over 11 million bids from January to December 2021, amounting to close to 210 TWh of upward and downward offered volume. Currently, the platform is focusing on revising the AOF, the amendments to the RR implementation framework (RR IF) and the adaptation of technical price limits following the pricing methodology amendment approved by the European Union Agency for the Cooperation of Energy Regulators (ACER) on 25 February 2022[7] , next to the adaptation of LIBRA for the MARI and Nordic platforms.

Moreover, further efforts to optimise cross-border exchanges of balancing energy have been made by TSOs, who have collectively decided to implement a capacity management module (CMM) as a function of all European balancing platforms. A single TSO (for all platforms) has been designated to implement, operate and monitor the CMM information technology (IT) solution, which is expected to be finalised in 2023.

Voluntary regional cooperation

Besides pan-European projects, efforts have also been made to improve **market integration on a regional level** on unregulated activities. For example, some TSOs had agreements in place on sharing of reserves, allowing for sharing of balancing energy on a local level if sufficient CZC capacity is available. With the EB Regulation in place, several application concepts are on the table, or are even live. This regional cooperation and its major aspects are as follows.

- The **Nordic Balancing Model** (NBM) has managed to establish a single price model. Additionally, the Finnish aFRR capacity market has gone live while balancing service providers (BSPs) were able to place bids in the Norwegian aFRR capacity market for the first time.

- The **German-Austrian aFRR balancing capacity cooperation** (BCC) is assessing the potential expansion of the cooperation towards TSOs which have recently expressed their interest, including the Czech Transmission System Operator (ČEPS), TenneT Netherlands (TenneT NL), Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság (MAVIR), Elektro-Slovenija (ELES) and the Croatian Transmission System Operator (HOPS). Additionally, changes to optimisation necessitated by accession to PICASSO are being assessed. The savings calculated on the difference between the total procurement costs with and without cooperation are approximately EUR 16.5 million.

- ELES and Western Denmark have acceded to the common procurement of frequency containment reserves (FCR) in the **FCR cooperation**, and ČEPS has become an observer as a first step, aiming to fully take part in the joint procurement process in the first half of 2023. Moreover, the impact of the FCR cooperation on social welfare is estimated at over EUR 184 million per year.

Development of methodologies mandatory under EB Regulation

To cement the cross-zonal exchanges of balancing capacity, all capacity calculation regions (CCRs) have taken part in the design of the **CZC allocation and CZC calculation methodologies**, of which the former has already been approved[8] by national regulatory authorities (NRAs), and the latter will be submitted for approval at the end of 2022. On the implementation of CZC allocation, TSOs have collectively taken the effort to perform joint studies with initial prototyping to see whether a one-step or two-step co-optimisation process can be applied. More details on the co-optimisation process are available in Chapter 2 and Chapter 3.2.1 of this report.

Further harmonisation efforts (mandatory under EB Regulation)

The state, progress and limitations of ISH are visible through the evolution of the terms and conditions (T&Cs) for balance responsible parties (BRPs) and BSPs related to the EB Regulation. These include, among other information, content on the implementation of the 15-minute imbalance settlement period (ISP), the use of components under the ISH Methodology and the use of dual pricing[9].

5 This value has been exceeded in Q1 2022.

6 Available transfer capacity (ATC) equal to zero.

7 *Decision No 03/2022 of the European Union Agency for the Cooperation of Energy Regulators – Of 25 February 2022 – On the amendment to the methodology for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process* – [Link].

8 Further information on the approval dates for each CZC allocation methodology can be found in Table 1 of this report.

9 As per Arts. 52, 53, 54 and 55 of the EB Regulation.

1. Introduction

The *Commission Regulation (EU) 2017/2195 of 23 November 2017* (from here on referred to as the EB Regulation[10]) lays down the guidelines for creating a balancing market where countries can share their resources to make electricity generation equal to the demand at all times.

The balancing market 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 diminishing costs to 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 regulation lays down the principles for the exchange of balancing energy and the associated settlement between TSOs and between TSOs and connected BSPs, regarding the following set of products: frequency restoration reserves (FRR) both automatic and manual, RR, and a common methodology for the exchange and sharing of reserves, as well as for the procurement of FCR, although to a lesser extent.

The previous *Balancing Report 2020*[11], and the *Market Reports 2020*[12] and *2021*[13] outlined the statuses of the individual projects and cooperation facilitating the implementation of the evolving European balancing markets design. The reports focused on the balancing energy platform projects (i.e. PICASSO, MARI, TERRE and IGCC), reserve balancing cooperation (i.e. FCR cooperation, German-Austrian cooperation and NBM) and the design of the individual methodologies stemming from the EB Regulation (i.e. CZC allocation, TSO-TSO settlement, pricing methodology etc.).

The graph below showcases an overview of the major milestones which have been achieved, as reported in the *Balancing Report 2020* and *Market Reports 2020* and *2021*. For simplicity and easy readability of the following graph, the amendments to the approved methodologies are not depicted here. Background details on the amendments to the approved methodologies can be found in the *Balancing Report 2020* and *Market Reports 2020* and *2021*.

10 Commission Regulation (EU) 2017/2195 – of 23 November 2017 – establishing a guideline on electricity balancing – [Link].
11 ENTSO-E Balancing Report 2020 – [Link].
12 ENTSO-E Market Report 2020 – [Link].
13 ENTSO-E Market Report 2021 – [Link].

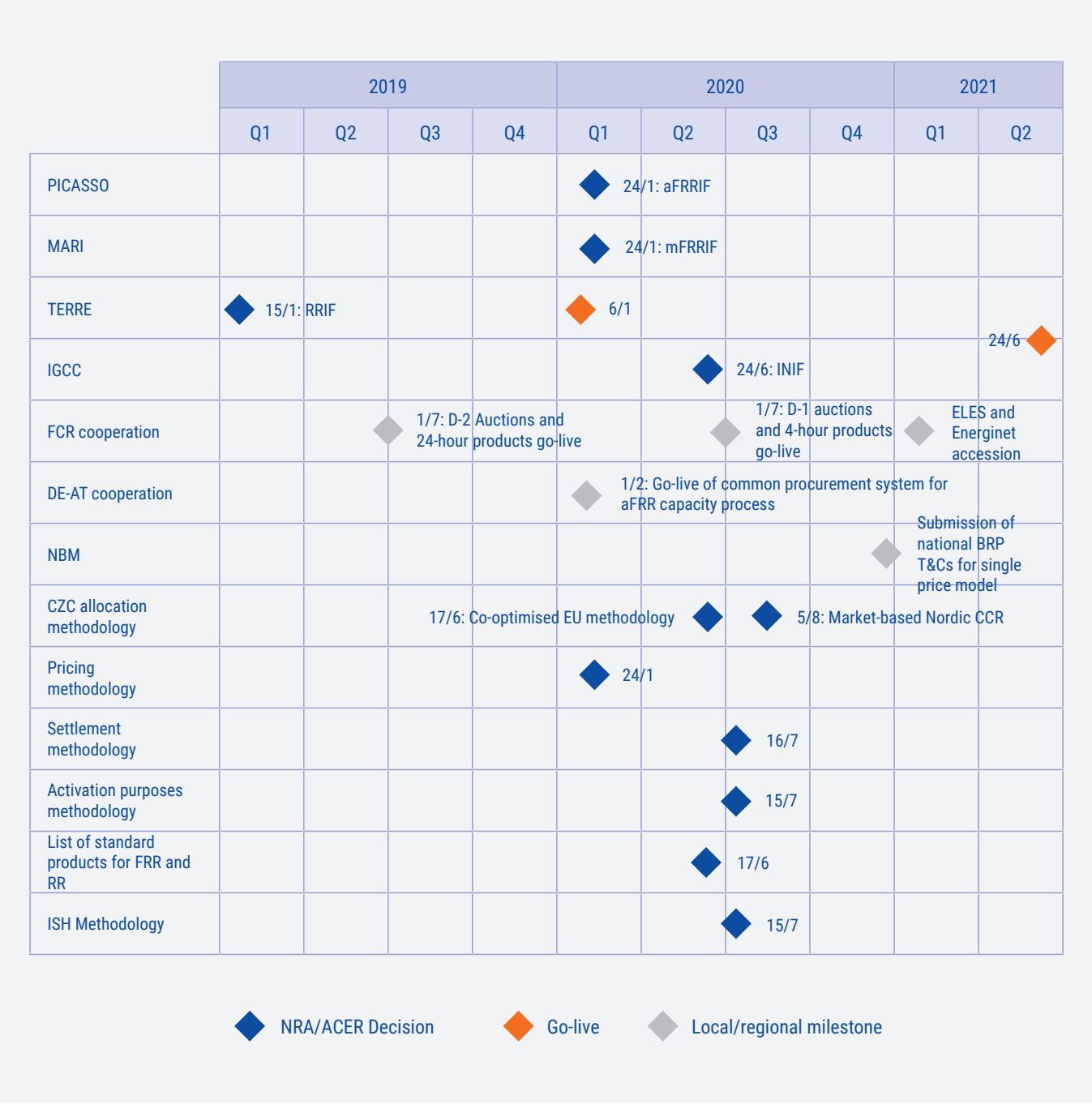


Figure 1 – Overview of major milestones achieved towards the implementation of energy market design reported in *Balancing Report 2020* and *Market Reports 2020* and *2021*

aFRR IF = aFRR implementing framework; IN IF = IN implementing framework; mFRR IF = mFRR implementing framework

To comply with the obligations derived from the EB Regulation, ENTSO-E has committed to providing a 2-yearly joint balancing report, the first edition of which was in 2020. Correspondingly, ENTSO-E has prepared for 2022 the publication of a second edition, which is here presented. This report will provide the reader with the latest developments in European balancing that have occurred since the publication of the first edition in June 2021. It will provide the reader with the latest developments in European balancing that have occurred since the publication of the first version of the report in June 2021 and also includes, whenever possible, developments that took place until May 2022 with minor exceptions. The performance indicators listed in this report are calculated considering the data available for the period from January to December 2021. Furthermore, the TSOs' executive summaries, related to their 2-yearly report, cover the 2-yearly period of 2020–2021.

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 ISH process.

The report is divided into the following chapters:

- Chapter 2 introduces the latest developments concerning the definition and implementation of the CZC allocation and calculation methodologies, as well as the pricing methodology amendments.
- Chapter 3 outlines the progress on the integration of the pan-European balancing markets.
- Chapter 4 describes the current state of ISH.
- Chapter 5 provides an overview of the EB performance indicators.
- 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.

In addition to the reporting obligation derived from the EB Regulation, the inclusion of executive summaries in line with the report that each TSO publishes every 2 years, under Article 60(1) of the EB Regulation, is required by Article 59(6) of the EB Regulation. These summaries can be found in Chapter 6 of this report.

2. Latest developments regarding EB methodologies

All CCR methodologies on CZC allocation were approved by either local NRAs or all relevant NRAs, or ACER. The harmonised methodology for CZC allocation is expected to be finalised by all TSOs by 17 December 2022. The harmonised methodology is supposed to capture all time frames[14], is based on the co-optimised methodology, and shall eventually replace all current CCR methodologies[15].

In addition, the European platforms for the exchange of balancing energy will require proper information on the available CZC on all relevant borders to correctly optimise the cross-border activation of balancing energy and for the IN process. For this, regional balancing time frame capacity calculation methodologies are expected to be drafted by all CCRs by the end of 2022 with the objective of achieving a minimum effort of harmonisation on data requirements. This is with the aim of ensuring the efficient and effective operation of the balancing platforms.

One of the main developments in the implementation of the EB Regulation regarding regional implementations is the start of the financial settlement of exchange of energy between the TSOs of the Continental Europe Synchronous Area. This exchange of energy, which became operational in June 2021, is a result of ramping, the frequency containment process, or unintended exchange (FSkar[16]). Further information can be found in Chapter 3 of the *Market Report 2022*.

2.1. CZC allocation: approval of the regional methodologies

According to Articles 41 and 42 of the EB Regulation, each CCR was able to submit a CZC allocation methodology voluntarily.

All submitted CCR methodologies were approved by either NRAs, or all NRAs, or ACER, as listed in the table below. CCRs are now implementing their respective approved methodologies according to the approved requirements and timelines defined in the respective methodologies. Further information on the CZC allocation methodologies for the exchange of balancing capacity or the sharing of reserves can be found in the *Market Report 2021*[17] and the *Balancing Report 2020*[18].

Region	Submitted Methodology	Current Status	Details
Baltic	Market-based (Art. 41)	Approved	Final approval of methodology by ACER received 13.8.2021
Core	Market-based (Art. 41)	Approved	Final approval of methodology by ACER received 13.8.2021
Nordic	Market-based (Art. 41)	Approved	Final approval of methodology by ACER received 5.8.2020
Greece and Italy	Market-based (Art. 41)	Approved	Final approval of methodology by NRAs (with amendments) received 22.6.2021

14 Including co-optimisation, market based and economic efficiency time frame.
15 According to Arts. 40, 41 and 42 of the EB Regulation.
16 *ENTSO-E Market Report 2021* – [Link]. See Table 10 on page 34.
17 *ENTSO-E Market Report 2021* – [Link]. See pages 99–101.
18 *ENTSO-E Balancing Report* 2020 – [Link]. See pages 24–30.

Region	Submitted Methodology	Current Status	Details
Greece and Italy	Economic efficiency (Art. 42)	Approved	Final approval of methodology by NRAs (with amendments) received 22.6.2021
Italy North	Market-based (Art. 41)	Approved	Final approval of methodology by NRAs (with amendments) received 3.6.2021

Table 1 – Regional state of play: market-based allocation and allocation based on economic efficiency

2.2. CZC allocation: development of the harmonised methodology

In 2021, all TSOs have started the harmonisation of all regional CZC allocation methodologies, which each only capture one single time frame, into one new harmonised methodology, according to Article 38(3) of the EB Regulation, capturing all relevant time frames. The harmonised methodology shall be submitted for approval to ACER by 17 December 2022. This methodology shall eventually replace all current methodologies, according to Articles 40, 41 and 42 of the EB Regulation.

The harmonised methodology will build upon the existing structure of the co-optimised allocation methodology. It will define general principles which are valid for all time frames, and each time frame itself is laid down in a separate title of the methodology. The following time frames will be covered: co-optimised allocation, inverted market-based allocation and market-based allocation[19]. The title sections covering the market-based and inverted market-based allocations will define the rules and process for the determination of the forecast market values of CZC.

Due to the complexity of the implementation of a co-optimised allocation, ACER agreed that TSOs, in collaboration with nominated electricity market operators of power exchange (NEMOs), conduct an implementation impact assessment[20], which was published by the end of 2021.

In accordance with Article 13(2) of the methodology for a co-optimised allocation process of CZC for the exchange of balancing capacity or sharing of reserves (Annex I of the ACER Decision on Methodology for Co-optimised Allocation[21]), the IIA addresses the eight topics depicted in Figure 2. For this purpose, the IIA follows four major strands of analysis (economic analysis, implementation option of co-optimisation, technical feasibility analysis, and governance). Based on the findings, the report shares some recommendations to be considered by TSOs when providing the set of requirements to NEMOs for the implementation of co-optimisation by June 2022. Submission of the set of requirements is a further obligation from the co-optimised methodology, after the IIA. Further information on the assessment can be found in the *Implementation Impact Assessment Report*.

19 The harmonised methodology does not cover the economic efficiency time frame, as all TSOs follow the day-ahead procurement processes according to the Clean Energy Package.

20 For the methodology for a co-optimised allocation process of CZC for the exchange of balancing capacity or sharing of reserves, see *Implementation Impact Assessment – For the methodology for a co-optimised allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves* – [Link].

21 *Methodology for a Co-optimised Allocation Process of Cross-Zonal Capacity for the Exchange of Balancing Capacity or Sharing of Reserves – In accordance with Article 40(1) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* – [Link].

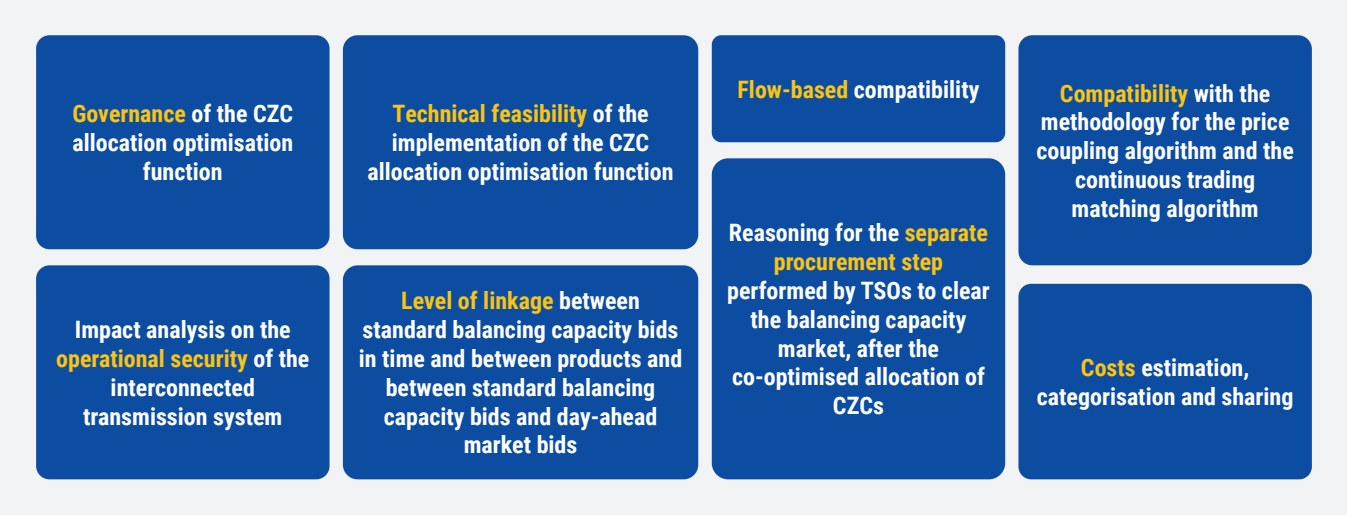


Figure 2 – Topics covered by the CZC impact assessment

The economic efficiency allocation methodology (Article 42 of EB Regulation) shall not be included in the harmonised methodology (Article 38(3) of EB Regulation) and will cease to exist, since all TSOs in alignment with NRAs and ACER have decided to apply the change of balancing capacity only on D-1 procurement.

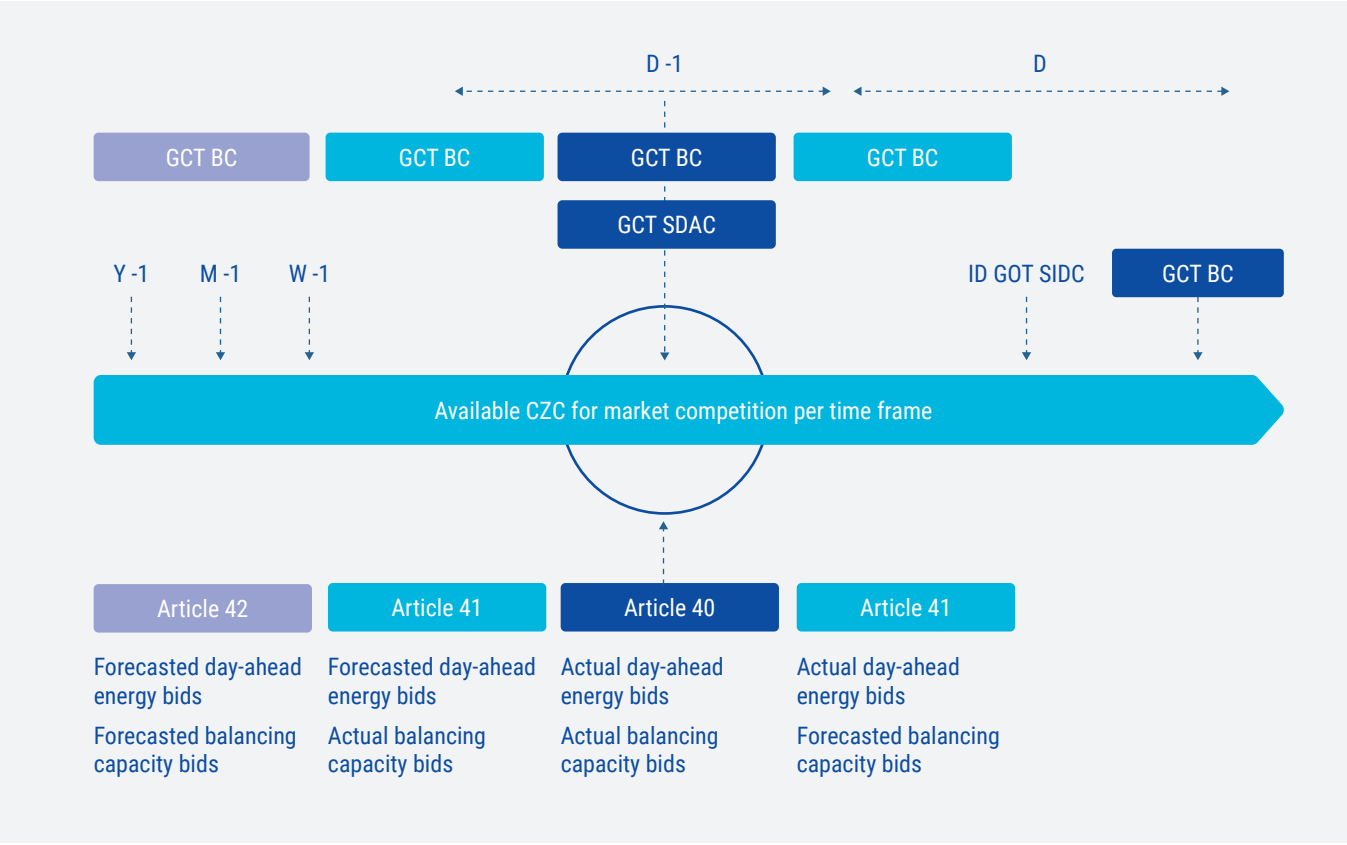


Figure 3 – Possible approaches for allocation of CZC for the exchange of balancing capacity or sharing of reserves

BC = balancing capacity; GCT = gate closure time; GOT = gate opening time; ID = intraday; SIDC = single intraday coupling

2.3. CZC calculation: regional methodologies

The European platforms for the exchange of balancing energy and for the IN process will allow for cross-border activation of balancing energy. In order to correctly optimise the cross-border activation, the balancing platforms need to receive information about the available CZC on all relevant borders. EB Regulation sets out in its Article 37 a two-step approach for the calculation of CZC that will be provided to the European balancing platforms.

In the first step[22], the TSOs shall use the remaining CZC after the closure of the cross-zonal intraday electricity market. During this step, no specific CZC calculation for the balancing time frame is implemented. The TSOs will continuously update each platform with the CZC limits. In the course of 2023, a centralised IT interface between TSOs and the balancing platforms (the CMM) will be implemented to perform these continuous updates (see Chapter 3.1.5).

In the second step, a dedicated balancing time frame capacity calculation (BT CC) shall be implemented. Article 37(3) of the EB Regulation foresees that by the end of 2022, all TSOs of a CCR shall develop a methodology for CZC within the balancing time frame for the exchange of balancing energy or for operating the IN process. This methodology shall be consistent with the CZC calculation methodology applied in the intraday time frame established in the respective CCR.

Over the course of 2021, ENTSO-E has started the high-level alignment on the core concepts and timeline of the BT CC development with the CCRs. The development and implementation of the BT CC process is a requirement for all CCRs and shall be based on their respective intraday capacity calculation methodologies (either flow-based or coordinated net transfer capacity-based calculation). However, the BT CC outputs are going to be centralised and used by the CMM and balancing platforms. Therefore, a certain level of harmonisation on the provided data and data formats is expected and necessary in order to allow the balancing platforms to operate in an effective and efficient way.

The approval of the methodologies is expected within 6 months after the submission to the CCRs' NRAs. Afterwards, the implementation of BT CC processes shall start in line with the implementation timelines specified in the proposals. The CCR for South East Europe has confirmed it is developing the methodology, but the planning has not yet been confirmed.

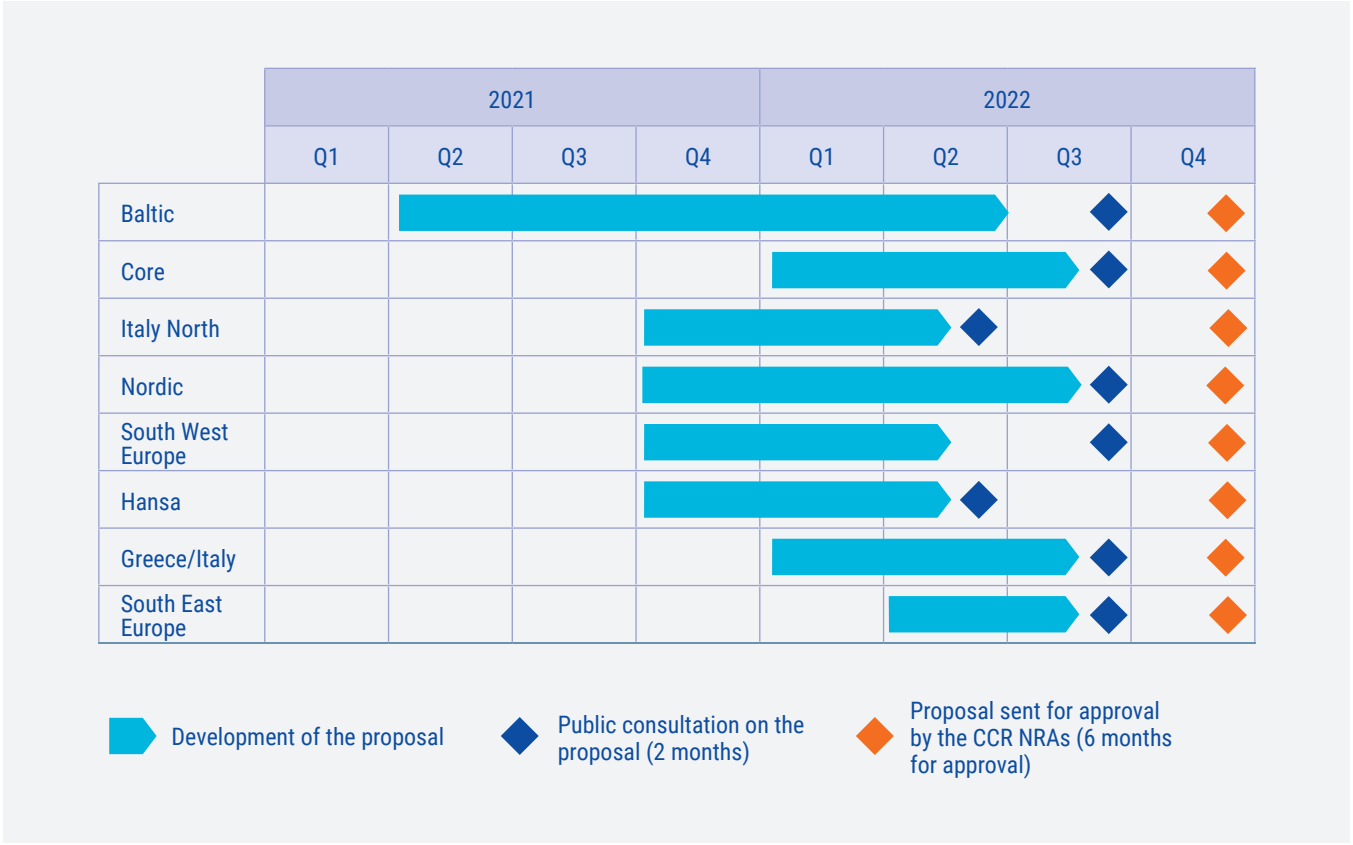


Figure 4 – Current planning of BT CC methodology development per CCR

22 According to Art. 37(2) of the EB Regulation.

2.4. Pricing methodology amendments

European TSOs strongly support the European target model for integrated balancing energy markets. This is the case in particular for the implementation and go-live of the balancing platforms for the exchange of balancing energy, which will lead to significant economic advantages. Due to developments and observations on balancing energy markets across Europe, all TSOs identified that technical price limits are needed for the efficient functioning of the market. Therefore, all TSOs considered it necessary to propose an amendment of the pricing methodology, namely an adjustment of the technical price limits and thus of the maximum and minimum balancing energy prices. The proposal for amendment was submitted to ACER on 26 August 2021.

All TSOs proposed to introduce a maximum price for all balancing energy product bids and a maximum value of the cross-border marginal price (CBMP) of EUR 15 000/MWh, and a minimum price for all balancing energy product bids and a minimum value of the CBMP of - EUR 15 000/MWh. The proposal was supported by one external study.

In their reasoning, the TSOs mainly focused on the drawbacks of the design of the European integrated balancing energy market given by regulation. Applying marginal pricing together with frequent auctions with similar participants may result in exaggerated balancing energy bids, leading at least to inefficiencies in the balancing energy market by causing distorted imbalance settlement prices. Additionally, this may induce financial risks for the BRPs, which cannot be mitigated even by best planning and forecasting. Furthermore, appropriate maximum and minimum balancing energy prices reduce the financial risks for BRPs resulting from the cross-border activation of balancing energy bids to a suitable level, and do not limit free price formation.

The simultaneous national implementation of the EB Regulation target on market design is a prerequisite for connection to the balancing platforms. This results in significant changes of the existing local balancing energy market designs and leads to transitory effects significantly increasing the probability for materialisation of high price spikes, which are uncorrelated with the real-time situation (artificial scarcity situations). This would result in distortive incentives, as frequent exaggerated high imbalance settlement prices may lead to increasing market entry and investment barriers. This would consequently prevent the foreseen development of the electricity transmission system and electricity sector in the European Union (EU).

Price spikes uncorrelated with the real-time situation may result from transitory effects and an immature market. The probability of materialisation of price spikes is even higher in the early stages of the balancing platforms, from after the go-live until all TSOs have joined the respective balancing platforms and for a certain time afterwards. The single market in electricity must be protected from undue distortions such as artificial scarcity situations. Therefore, all TSOs considered adjusting the maximum and minimum balancing energy prices as a suitable measure that can reduce these risks. This ensures a fair, objective, transparent and market-based procurement of balancing services, avoids undue barriers for the market entry of BRPs and investments into renewables, and thus fosters the competition on the wholesale energy markets. Additionally, appropriate maximum and minimum balancing energy prices do not negatively impact liquidity on the balancing market.

Therefore, all TSOs welcome the ACER Decision[23] on their amendment proposal, although the adjustment of the maximum and minimum balancing energy prices to ± EUR 15 000/MWh is valid for a transitional period of 4 years after the legal implementation deadline of the aFRR platform and mFRR platform. For the RR platform, the 4-year transitional period starts from 1 July 2022. The CBMP may be set by cross-border activation of balancing energy originating from a demand for balancing energy in another bidding zone. Even if the national balancing energy market is mature, the exchange of balancing energy entails the risk of exposure to unforeseen foreign market effects that cannot be influenced and predicted. Mitigating this risk may provide more security against exposure to prices resulting from the integrated market for balancing energy, and thus ensures effective regional cooperation.

23 *Decision No 03/2022 of the European Union Agency for the Cooperation of Energy Regulators – Of 25 February 2022 – On the amendment to the methodology for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process* – [Link].

3. Integration of the balancing markets

3.1. European platforms for the exchange of balancing energy

- The EB Regulation lays out a detailed set of rules for the integration of the balancing energy markets in Europe. A core element of this regulation is the establishment of platforms among interconnected EU TSOs for the operation of IN processes and the exchange of balancing energy from FRR and replacement reserves. In this way, the balancing demand in each country and at different time horizons is met by activation of the overall economically viable bids in Europe and/or netting of TSOs' demand needs, while considering operational security constraints. EU TSOs are required to jointly implement the respective European platforms. The design and implementation for each one of the platforms is being carried out by one of four projects:
  - **Trans-European Replacement Reserves Exchange (TERRE)** for the RR platform (applied for TSOs that use the RR product),
  - **Manually Activated Reserves Initiative (MARI)** for the mFRR platform,
  - **Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation (PICASSO)** for the aFRR platform,
  - **International Grid Control Cooperation (IGCC)** for the IN (IN for aFRR real-time needs) platform[24].

3.1.1. mFRR platform: MARI

General information

As described in Chapter 3 of the *Balancing Report 2020*[25], the primary objective of the mFRR platform is the exchange of balancing energy from FRR with manual activation, operated by TSOs, in order to restore system frequency to the nominal frequency. In terms of scope, the platform shall be implemented and operated by all EU TSOs.

On 24 July 2019, all regulatory authorities referred the TSOs' mFRR IF proposal to ACER. On 24 January 2020, ACER adopted a Decision[26] and set the deadline for the implementation of the mFRR platform, which shall fulfil all requirements defined in the mFRR IF by 30 months following the decision. According to the mFRR IF, July 2022 is the legal deadline to implement the mFRR platform and make it operational. On 26 April 2022, the European Balancing Implementation Group was informed by the MARI project that the go-live will be delayed.

A go-live window from mid-August to mid-September 2022 was announced. At the moment of writing this report, the go-live date is expected to be confirmed by the end of July. All TSOs will use the mFRR platform to submit and exchange standard mFRR balancing energy bids, and strive to fulfil their corresponding balancing energy needs, as a result of a single AOF.

Due to the participation of all EU TSOs from all synchronous areas, as requested by the EB Regulation, the MARI project is the largest implementation project in terms of the number of TSOs involved.

Further details on the governance or the high-level design can be found in the *ENTSO-E Market Reports 2021*[27] and *2022* and the *ENTSO-E Balancing Report 2020*[28].

24 The IN platform, contrary to the other platforms presented in this chapter, is not concerned with the exchange of balancing energy, but rather with the IN process.

25 *ENTSO-E Balancing Report* 2020 – [Link]. See pages 15–16.

26 *Decision No 03/2020 of the European Union Agency for the Cooperation of Energy Regulators – (Text rectified by corrigendum of 10 August 2021) – Of 24 January 2020 – On the implementation framework for a European platform for the exchange of balancing energy from frequency restoration reserves with manual activation* – [Link].

27 *ENTSO-E Market Report 2021* – [Link]. See pages 84–89.

28 *ENTSO-E Balancing Report 2020* – [Link]. See pages 15–16.

Main achievements, June 2021 to May 2022

- A stakeholder workshop was held on 2 December 2021 on the market and technical design and accession roadmap of MARI.
- European Balancing Implementation Group meetings took place online on 9 April, 17 June, 14 October and 10 December 2021.
- The designs of V1, V2 and V3.1 and V3.2 of the AOF, constituting the go-live release, were finalised.
- Factory acceptance testing for V1, V2, V3.1 and V3.2 was completed.
- Interoperability testing for V1 and V2 was completed, and user acceptance testing for V1, V2 and V3 was completed.
- On 1 December 2021, the MARI and TERRE SCs approved the agreement on the transfer and co-ownership of the intellectual property rights relating to the LIBRA software (the software for the MARI platform).
- MARI SC approved the TSO-TSO invoicing agent agreement on behalf of the MARI, PICASSO and IGCC projects.
- The update of *Manual of Procedures* for transparency reporting was closed, and detailed design finalised. A gap solution was agreed to bridge the time during which not all functionalities are available on the ENTSO-E Transparency Platform. TSOs mFRR reporting requirements will be fulfilled by the ENTSO-E Transparency Platform by July 2022.
- The fifth version of the accession roadmap was published on the ENTSO-E roadmap in April 2022[29].
- As part of the coordination of secure operation (CSO) notification process, the affected TSO procedure and CSO deliverables were approved by MARI SC and provided to the CSO working group (WG) in October 2021.
- The testing task force transitioned into a testing WG due to the increased scope of tasks under the testing group.

Governance

The governance of the MARI project was updated in Q1 2022, including the transition of the testing task force into a testing WG due to the extended scope of the body (**Figure 5**).

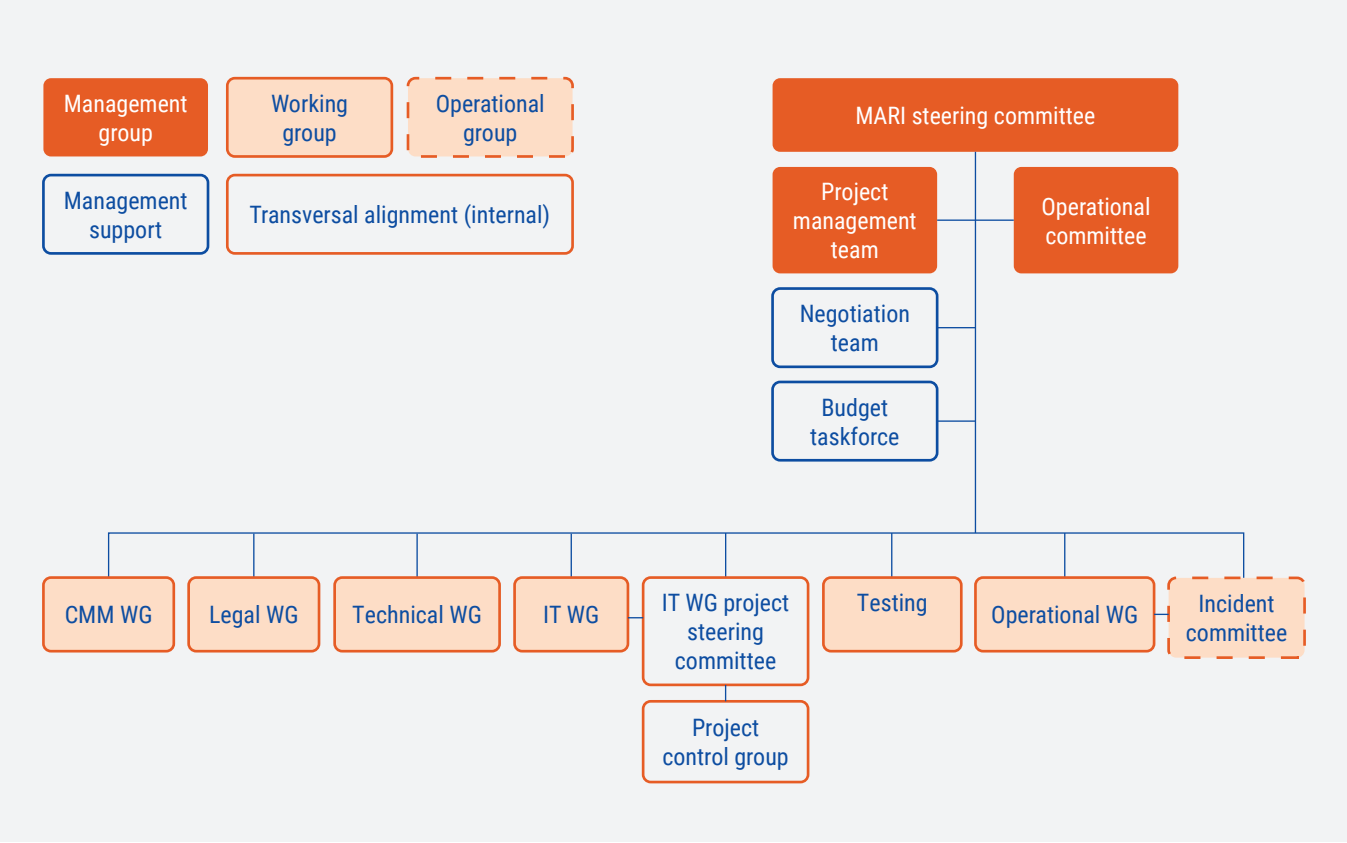


Figure 5 – Current organisation structure and open points: MARI internal structure, Q1 2022

29 *mFRR-Platform Accession Roadmap V5* – [Link].

Expenditure

The annual expenditures on establishing, amending and operating the mFRR platform from 2018 to 2021 are shown in **Figure 6**. The steep increase of expenditure can be explained by the fact that development activities ramped up significantly in 2021, and that the intellectual property rights costs for the LIBRA software, as paid to TERRE TSOs, were included in the 2021 budget.

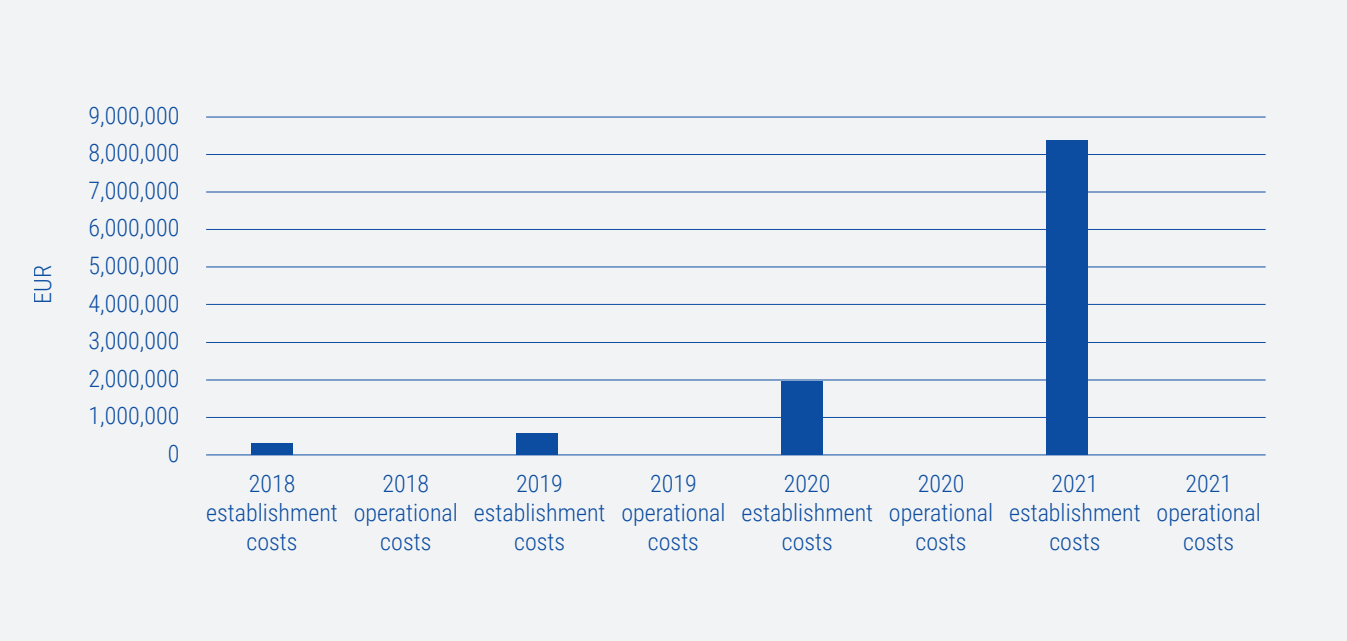


Figure 6 – Overview of costs for establishing and operating the mFRR platform, 2018–2021 (EUR)

Implementation timeline and TSO accession roadmap

As mentioned above, a go-live window from mid-August to mid-September 2022 was announced, which is expected to be confirmed by the end of July. TSOs will gain access to the platform according to the accession roadmap.

The scope of go-live platform specifications was fixed and closed during the period covered in this report (June 2021–May 2022). Until the operational go-live takes place, factory and user acceptance, interoperability, and performance tests will be carried out. Based on the results of these tests, some platform specifications may need to be adapted accordingly by means of a change request. Some inquired change requests have already been defined as not critical for go-live, and are planned for a post go-live release.

According to the mFRR IF, all TSOs shall establish and regularly update (at least twice per year) the accession roadmap for the implementation of the mFRR platform.

Information on national derogations is included in this *Balancing Report*. The latest accession roadmap (Table 2) was published in April 2022. Further detailed information can be found in the fifth accession roadmap developed by TSOs[30].

30 *mFRR-Platform Accession Roadmap V5* – [Link].

Country	TSO(s)	Remarks	Derogation deadline	Connection date
Austria	APG			November 2022
Belgium	Elia	7		Q2 2023
Bulgaria	ESO	16	30.6.2024	
Croatia	HOPS	9	24.7.2024	Q3 2023
Czechia	ČEPS			July 2022
Denmark	Energinet	3		Q1 2024
Estonia	ELERING	2		Q1 2024
Finland	Fingrid	3		Q1 2024
France	RTE	11		Q3 2024
Germany	50Hertz, Amprion, TenneT DE, TransnetBW			August 2022
Greece	ADMIE/IPTO	6		Q3 2024
Hungary	MAVIR	4		
Italy	Terna	13	24.7.2024	Q3 2024
Latvia	AST	2		Q1 2024
Lithuania	LITGRID	2		Q1 2024
Netherlands	TenneT BV	10		Q3 2024
Poland	PSE	12		Q3 2024
Portugal	REN			Q4 2023
Romania	Transelectrica			Q1 2023
Slovakia	SEPS	5		Q3 2024
Slovenia	ELES	14		Q3 2023
Spain	REE	15		Q3 2023
Sweden	SVK	3		Q1 2024
Norway	Statnett	3		Q1 2024
Switzerland	Swissgrid	8		July 2022

Table 2 – Accession roadmap of the mFRR platform (as at October 2021)

1. The go-live window of the MARI platform is from mid-August to mid-September. Most TSOs requesting a derogation from their NRA have 24.7.2024 as their requested derogation date.
2. The derogation request submitted by Baltic TSOs is approved by the Baltic NRAs. According to the NRAs' decision, the planned connection time will be aligned with the Nordic TSOs, expected in Q1–Q3 2024, but not later than 24.7.2024.
3. The plan presented in this roadmap shall be regarded as a preliminary, non-binding estimate. The planned connection time is expected in the period Q1–Q2 2024.
4. MAVIR – derogation was granted by the local NRA until 24.7.2024.
5. Slovenská elektrizačná prenosová sústava s.a. (SEPS) – derogation was granted by the local NRA until 24.7.2024.
6. Independent Power Transmission Operator (IPTO) – derogation was granted by the local NRA until 24.7.2024. The plan presented in this roadmap shall be regarded as a preliminary, non-binding estimate.
7. Elia has submitted a derogation request according to the results of public consultation. The plan presented in this roadmap shall be regarded as a preliminary, non-binding estimate.
8. The participation of Switzerland in the mFRR platform is regulated based on Articles 1.6 and 1.7 of the EB Regulation, and is currently the subject of litigation by Swissgrid at the General Court of the European Union.
9. HOPS – derogation was granted by the local NRA until 24.7.2024, but HOPS's ambition is to join the MARI platform earlier (dependent on the progress of local implementation).
10. TenneT NL aims for implementation and go-live by July 2024, and has a requested a derogation until then. However, there is a real risk that the final derogation will take place even later than the requested derogation period. Taking these risks into account, TenneT NL expects to participate in the mFRR platform in summer 2025, and will enter into discussions with relevant stakeholders if the risks already in the planning are fulfilled.
11. Réseau de Transport d'Électricité (RTE) is in discussion with the NRA.
12. Polskie Sieci Elektroenergetyczne (PSE) requested derogation until 24.7.2024, in progress of discussion with the NRA.
13. Terna – derogation was granted by the local NRA until 24.7.2024.
14. ELES requested derogation until 24.7.2024, pending approval by the NRA. The planned connection time is expected in Q3 2023.
15. Red Eléctrica de España (REE) – derogation was granted by the local NRA until 24.7.2021. However, REE is urged to make its best effort to connect before 24.12.2023 (i.e 17 months after the legal date of implementation).
16. Electroenergien Sistemen Operator EAD (ESO Bulgaria) – derogation was granted by the local NRA until 30.6.2024.

3.1.2. aFRR platform: Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation

General information

The PICASSO project is leading the design, and since 2017 also the implementation, of the aFRR European platform, which comprises 30 TSO members and observers. According to the EB Regulation, 24 July 2022 is the legal deadline to implement the platform and make it operational. 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. PICASSO leads the development of the aFRR platform in close coordination with other implementation projects via ENTSO-E and the IGCC project (see Chapter 3.1.4 of this report).

Further information on the governance or the high-level design can be found in the *Market Report 2021*[31] and *Balancing Report 2020*[32]. In these reports are also further details regarding the (optimisation) functions and aFRR standard products and bids.

Main achievements

Between June 2021 and May 2022, PICASSO achieved several goals, such as:

- creation and revision of main documents, including an implementation guide;
- finalisation of the design of the AOF setup, constituting the go-live release;
- design, implementation and testing of the non-real-time communication interface;
- security approach and business impact analysis;
- completion of factory acceptance testing;
- completion of the site acceptance test of AOF, together with different interoperability tests;
- approval of the TSO-TSO invoicing agent agreement (signed on Q1 2022 by MARI on behalf of the MARI, PICASSO and IGCC projects);
- approval of the affected TSO procedure and CSO deliverables and their provision to the CSO WG as part of the CSO notification process;
- development of a transparency and reporting concept for stakeholders;
- PICASSO-IGCC IT tool merge, scheduled in Q1 2022.

Governance

The governance of the PICASSO project was updated and is displayed in **Figure 7** below, which includes the transition of the testing task force into a testing WG due to the extended scope of the body. The governance now includes the operational SC (OPSCOM) and operational WG to focus the expertise in this field, in order to meet the go-live and post-go-live requirements of the platform. For reasons of cross-platform efficiency, the budget management task force and legal WG work jointly with MARI, while OPSCOM and the operational WG work jointly with IGCC.

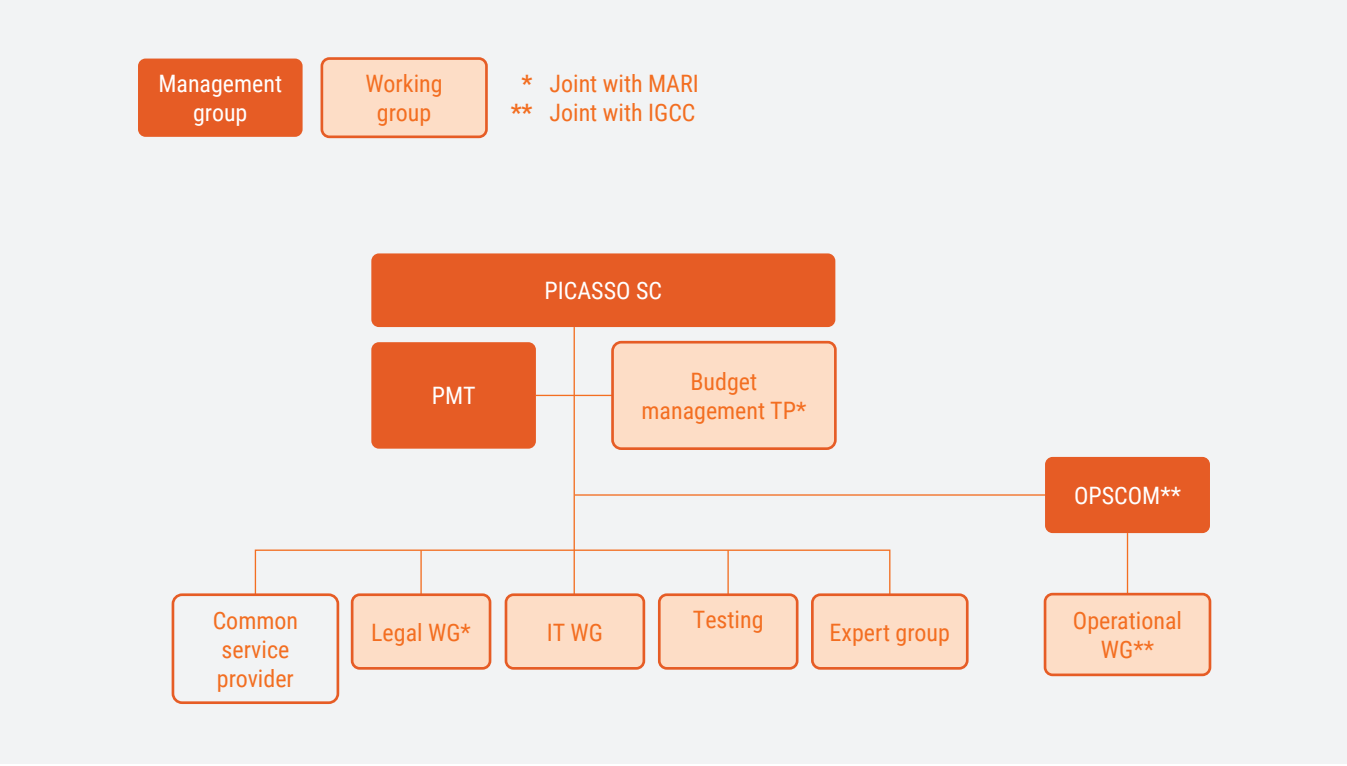


Figure 7 – Current organisational structure for PICASSO, Q1 2022

31 *ENTSO-E Market Report 2021* – [Link]. See pages 90–94.
32 *ENTSO-E Balancing Report 2020* – [Link]. See pages 19–20.

Expenditures

The annual expenditures of establishing, amending and operating the aFRR platform from 2018 to 2021 are shown in **Figure 8**. From 2020 to 2021, the project management office (PMO) and senior project lead (SPL) costs stayed nearly constant. The increase of the costs for 2021 can be explained by the fact that the costs for a testing convener have now been included in the values. As the go-live date draws nearer, testing and coordination of testing become more important, and therefore also have a significant impact on the budget. Since the platform has not yet gone into operation, there are no operating costs which can be reported.

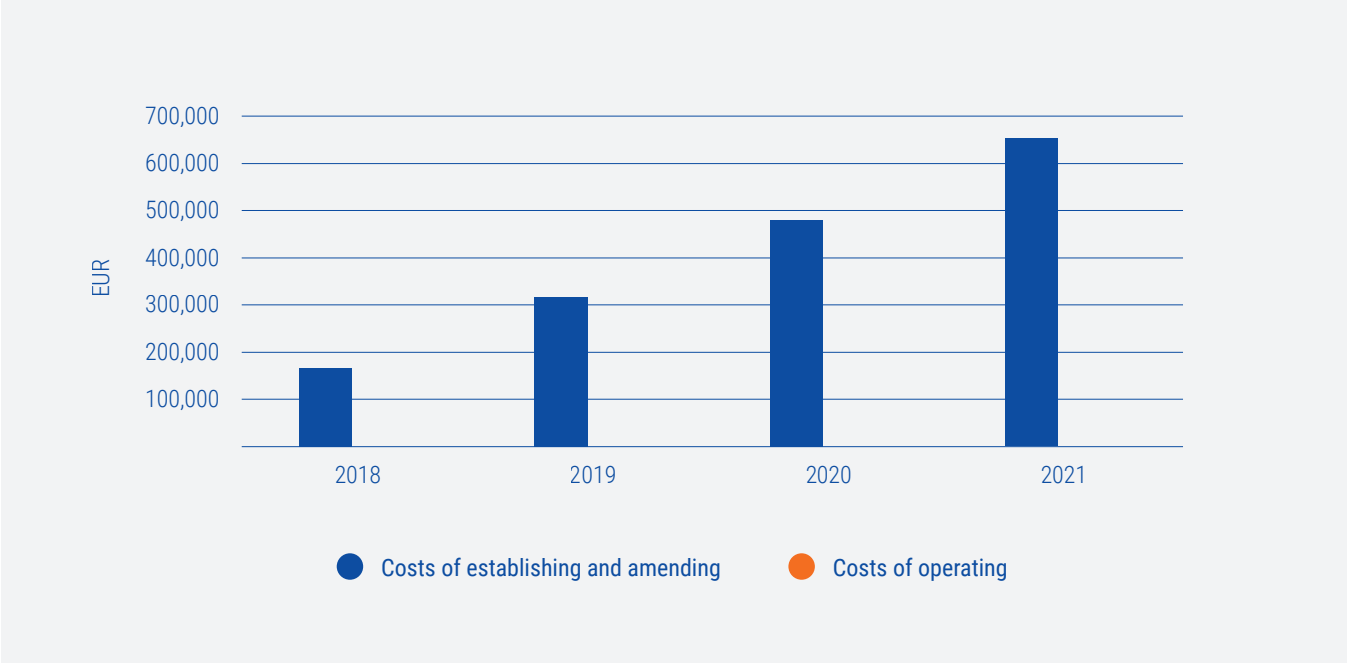


Figure 8 – Overview of costs for establishing and operating the aFRR platform (EUR)

Implementation timeline and TSOs accession roadmap

PICASSO will become operational before the legal deadline specified in the EB Regulation (24 July 2022). From that moment on, TSOs that have not requested a derogation for connection to PICASSO will operate their aFRR balancing markets through the PICASSO platform. The scope of go-live platform specifications was fixed and closed during the period covered in this report (June 2021–May 2022). Until the operational go-live takes place, factory and user acceptance, interoperability and performance testing will be carried out.

According to the aFRR IF, the TSOs must develop and update the platform's implementation timeline (Table 3)**.** 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 fifth accession roadmap[33]. This accession roadmap is updated at least twice a year to provide stakeholders with current information on the developments. Compared to the previous *Balancing Report*, the following dates represent a much more accurate estimate of the go-live and derogation dates.

The fifth version of the accession roadmap was approved on 5 April, and was published on the ENTSO-E website on 27 April 2022.

33 *aFRR Platform Accession Roadmap V5* – [Link].

Country	TSOs	Remarks	Derogation deadline	Connection date
EU:				
Austria	APG			June 2022
Belgium	Elia	1		September 2022
Bulgaria	ESO			Q4 2024
Croatia	HOPS	5		Q3 2023
Czechia	ČEPS			June 2022
Denmark	Energinet	2		Q2 2024
Finland	Fingrid	2		Q2 2024
France	RTE			December 2022
Germany	50Hertz, Amprion, TenneT DE, TransnetBW			June 2022
Greece	IPTO			Q4 2024
Hungary	MAVIR	6	24.7.2024	Q4 2024
Italy	Terna		24.7.2023	Q3 2023
Netherlands	TenneT BV	3		Q3 2024
Poland	PSE			Q4 2024
Portugal	REN			Q2 2024
Romania	Transelectrica		1.12.2022	December 2022
Slovakia	SEPS	7	24.7.2024	Q3 2024
Slovenia	ELES			Q2 2023
Spain	REE		24.7.2024	Q2 2024
Sweden	SVK	2		Q2 2024
EEA:				
Norway	Statnett	2		Q2 2024
Non-EU:				
Switzerland	Swissgrid	4		June 2022

Table 3 – Accession roadmap of the aFRR platform (as at April 2022)

1. A first version of the T&Cs will enter into force in early May when local bidding will be adapted, with a second version when Elia connects to PICASSO.

2. The Nordic TSOs sent their requests for derogation to their respective NRAs in January 2022. The plan presented in this roadmap shall be regarded as a preliminary, non-binding estimate. The planned connection time is expected in Q2 2024.

3. TenneT NL aims for implementation and go-live by July 2024, and has a requested a derogation until then. However, there is a real risk that the final derogation will take place even later than the requested derogation period. Taking these risks into account, TenneT NL expects to participate in the aFRR platform in summer 2025, and will enter into discussions with relevant stakeholders if the risks already in the planning are fulfilled.

4. The participation of Switzerland in the aFRR platform is regulated based on Articles 1.6 and 1.7 of the EB Regulation, and is currently the subject of litigation by Swissgrid at the General Court of the European Union.

5. Derogation was granted by the local NRA until 24.7.2024, but HOPS's ambition is to join the aFRR Platform in the second half of 2023.

6. MAVIR – derogation was granted by the local NRA until 24.7.2024.

7. Derogation was granted by local NRA until 24 July 2024, but SEPS's ambition is to join the aFRR platform in Q1 2024 (depending on the progress of local implementation).

3.1.3. RR platform: Trans-European Replacement Reserves Exchange

TERRE is the implementation project for the exchange of replacement reserves, in line with the EB Regulation. The RR platform has been operational since January 2020 and is currently used by six European TSOs.

Governance

The TERRE project comprises eight TSO members, namely ČEPS, National Grid ESO (United Kingdom of Great Britain and Northern Ireland), PSE, REE, Redes Energéticas Nacionais (REN), RTE, Swissgrid and 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, REE, REN, RTE, Terna and Swissgrid). PSE will connect in Q1/Q2 2023. In April 2021, National Grid ESO gave notice to the TERRE SC on its will to exit the TERRE project, as part of the United Kingdom's decision on Brexit, and in line with the provision included in the Cooperation Agreement.

In addition, three TSOs are TERRE project members: Amprion, Statnett and Svenska 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 Nordic TSOs, or as part of the MARI project. The LIBRA platform management board (LPMB) is the joint body enabling the cooperation between TERRE, MARI and the Nordic TSOs.

Further information on the structure and governance of the project can be found in the *Market Report 2020*[34].

34 *ENTSO-E Market Report 2020* – [Link]. See pages 18–21.

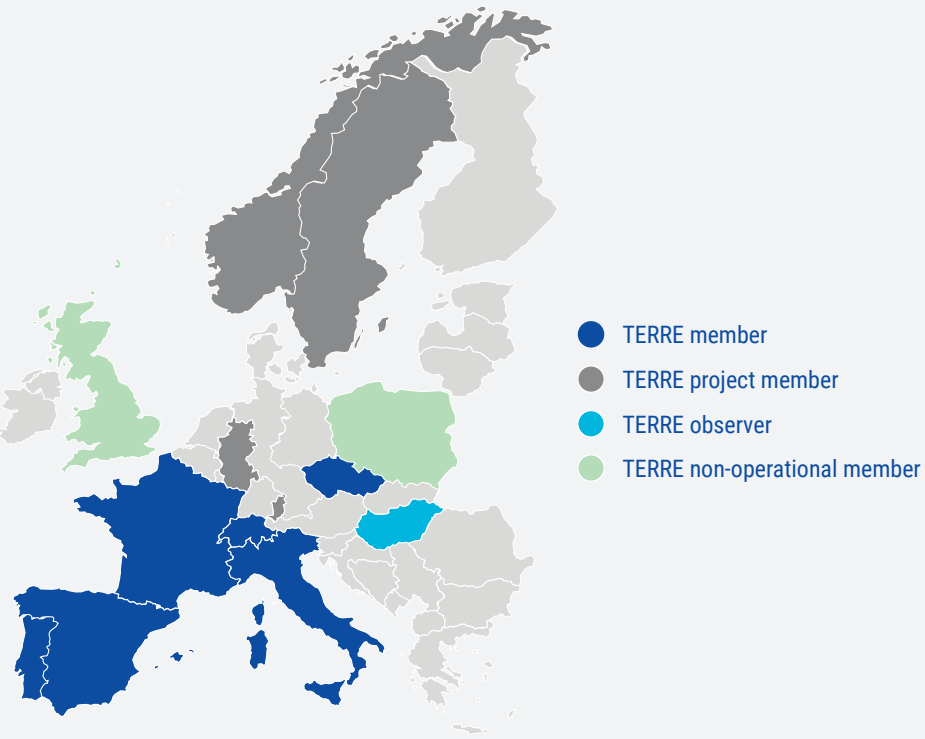


Figure 9 – RR platform: TSOs in the TERRE project (as at December 2021)

Operation of the platform

In January 2020 the RR platform went live, but it was only in January 2021 that the current six TSOs were connected to the platform. Therefore, the year 2021 marks the first full year of operations, with five TSOs exchanging RR products in Region 1 (comprising REE, REN, RTE, Swissgrid and Terna) and one TSO (ČEPS) still in isolated mode in Region 2 until the connection of PSE.

The LIBRA platform has proven to be a robust and reliable IT solution. In 2021, there were five critical incidents affecting usage of the platform. Between January and December 2021, the bidders on the platform submitted 11 268 392 bids, amounting to 209 707 921 MWh (Figure 10).

Figure 10 – Monthly offered volume of submitted bids per TSO (MWh)

On average, the hourly activations represent 665 MWh (see Figure 11), with a significantly rising trend due to increased participation in the platform.

Further information on the high-level architecture of the platform can be found in the *Market Report 2020*[35].

35 *ENTSO-E Market Report 2020* – [Link]. See pages 18–21.

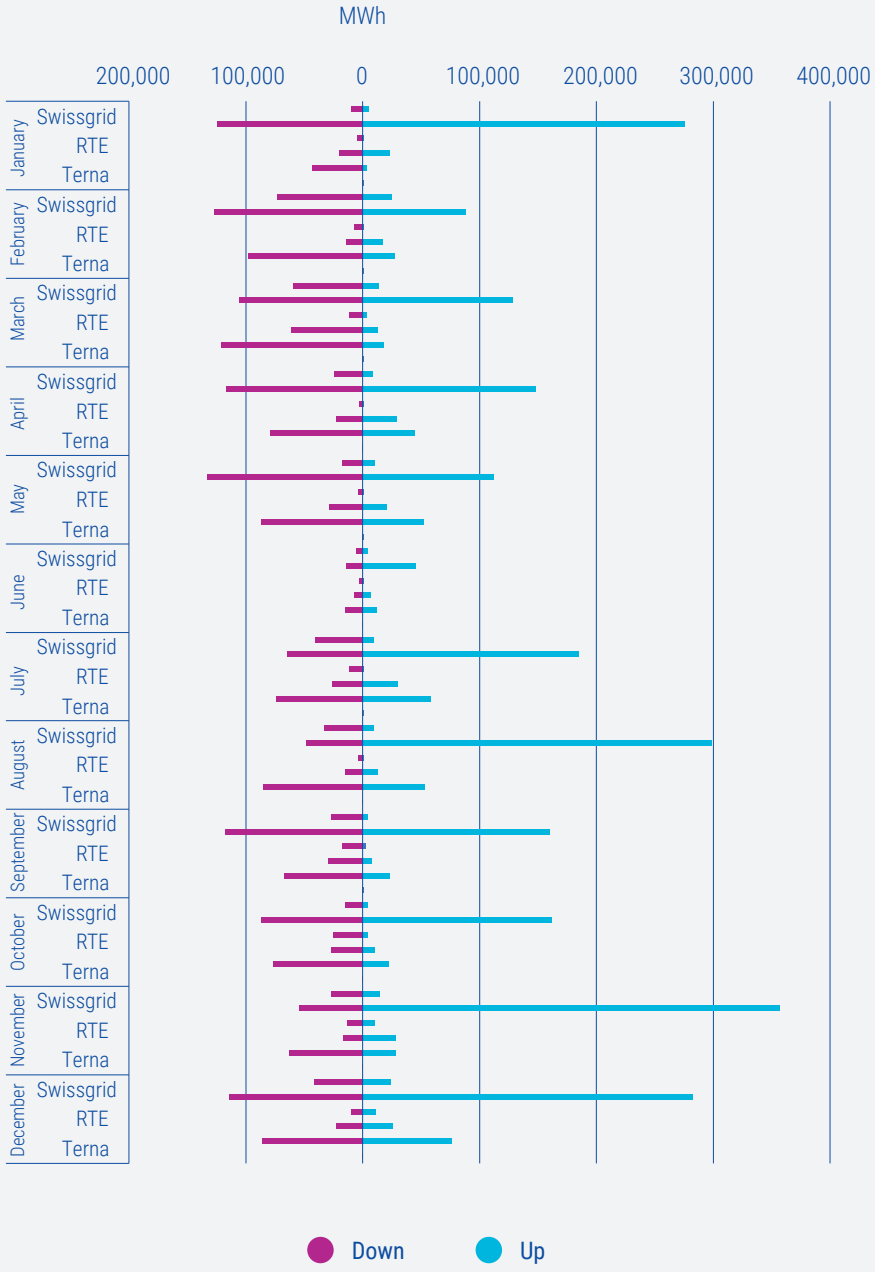


Figure 11 – Monthly activation volume of selected bids per TSO (MWh)

In the context of the AOF of the RR platform, the social welfare is the total surplus of the participating TSOs obtained from satisfying their RR demands submitted to the RR platform, and the total surplus of BSPs resulting from the activation of their associated submitted bids. The curve consisting of positive TSO RR balancing energy needs submitted to the RR platform, and downward BSP RR bids submitted to the RR platform constitutes the consumer curve, and therefore indicates the maximum price consumers (TSOs and BSPs) are willing to pay for consuming RR balancing energy. On the other hand, the curve consisting of negative TSO RR balancing energy needs submitted to the RR platform, and upward BSP bids submitted to the RR platform, constitutes the supply curve, and therefore shows the minimum price they are willing to receive for supplying RR balancing energy. Social welfare is the total benefit from the RR balancing energy transactions, and therefore is made up of the area corresponding to the consumer and the supply surplus.

The social welfare is computed as an output of the LIBRA AOF. For computing a value for social welfare, it is considered that upwards (resp. downwards) inelastic needs are priced at the market price cap/floor (± EUR 100 000/MWh). As ČEPS did not have a neighbouring TSO operational on the TERRE platform in 2021, its social welfare gain is 0 (resp. market price floor).

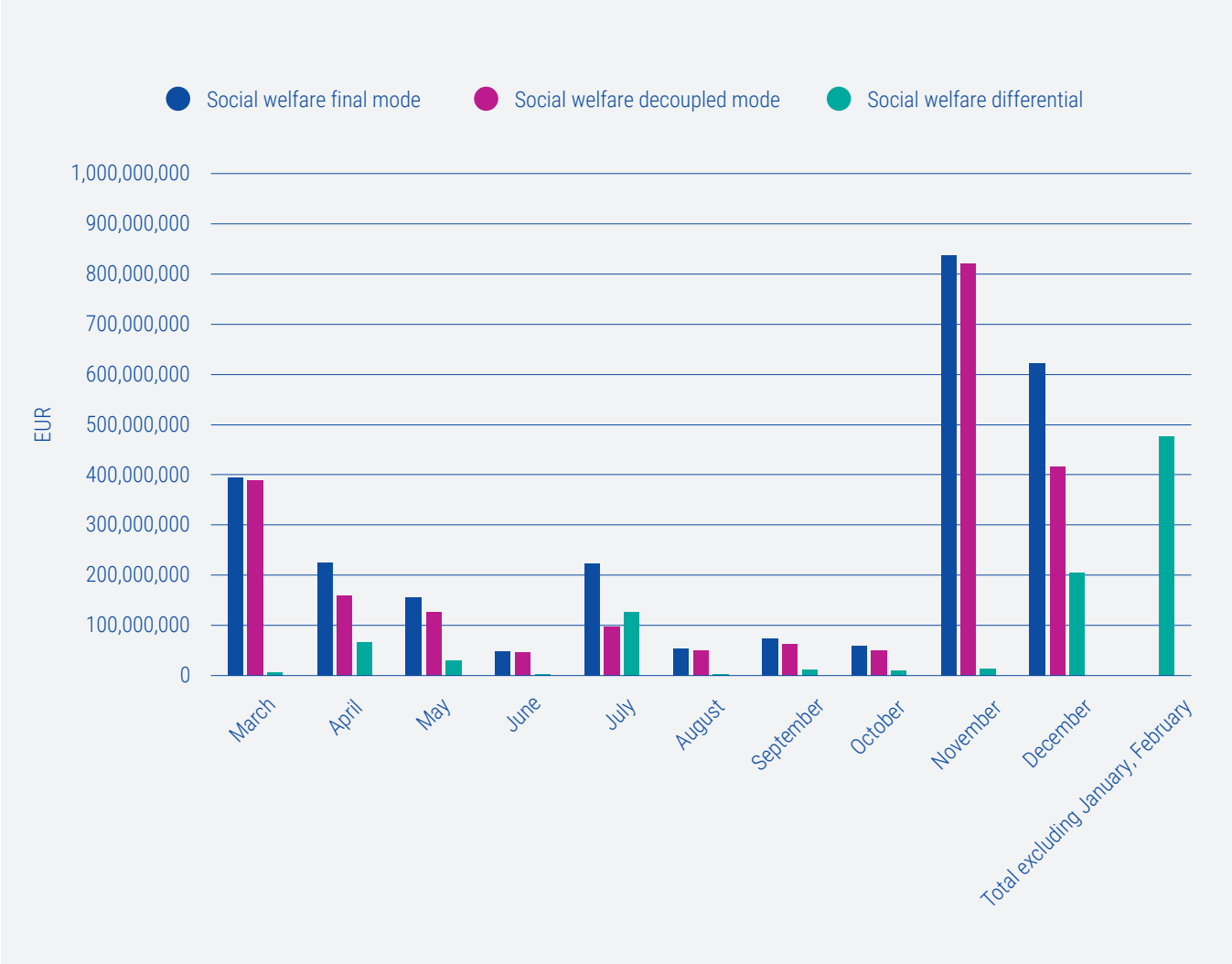


Figure 12 – RR platform comparison of social welfare final vs decoupled social welfare differential (EUR)

Note: The TERRE TWG is of an opinion that data for January and February should be withdrawn from the report as they provide unrealistic results. This is caused by the fact that in these months, inelastic needs were commonly used. These inelastic needs are modelled with a price of EUR 99 999 in the calculation of social welfare by the optimisation algorithm, hence the values are very large. TERRE project will work on alternative calculation of social welfare in case of inelastic needs, so we are able to provide complete information for future reports.

Evolution

The accession of the TSO PSE is scheduled in the first half of 2023, which will effectively enable cross-country exchanges in Region 2. At the time of writing this report, National Grid ESO (United Kingdom) is preparing its exit from the project.

The next steps within the TERRE project implementation are depicted in Figure 13.

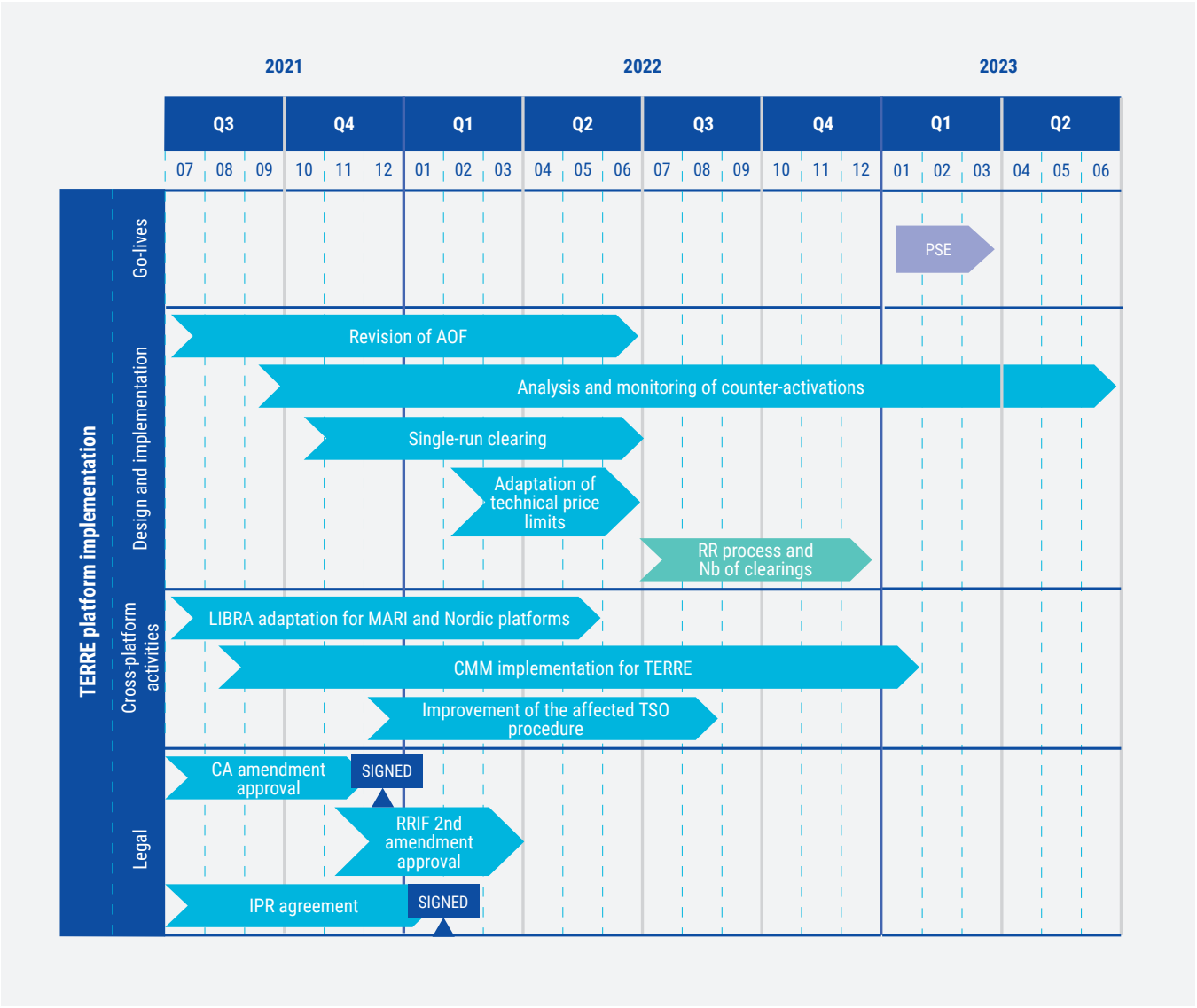


Figure 13 – TERRE project timeline

The main workstreams of the TERRE project, illustrated in **Figure 13**, can be summarised as follows.

- **Revision of AOF**: Design and implementation of measures to optimise the algorithm.
- **Analysis and monitoring counter-activations**: Monitoring, evaluation and reporting of the impact of counter-activations on balancing energy prices and on the efficient functioning of the RR platform.
- **Single-run clearing**: Design and implementation of the change following the approval of pricing and settlement methodologies by ACER in 2020.
- **Adaptation of technical price limits**: Implementation by 1 July 2022 of the change consisting in applying price limits ± EUR 15 000/MWh, following the approval of the pricing methodology by ACER in February 2022.
- **RR process and number of clearings**: Study and implementation of a cross-border scheduling step to 15 minutes in the TERRE region, and evaluation of the increase of daily gates/clearings.
- **LIBRA adaptation for MARI and Nordic platforms**: Cooperation between the TERRE project with the MARI and Nordic projects to exchange best practices and identify synergies in the design and adaptations of the LIBRA branches.
- **CMM implementation for TERRE:** Preparation of the connection of the CMM to the TERRE platform.
- **Improvement of the affected TSO procedure**: Design and implementation of the affected TSO procedure (red button functionality) aligned with MARI project.
- **Intellectual property rights agreement**: Drafting, approval and signature of the agreement covering the co-ownership

of intellectual property rights for both the MARI and the Fifty (Nordic LIBRA) projects

- **Second RR IF amendment**: Drafting, public consultation, and approval of the RR IF amendment.

Expenditures

The annual expenditures on establishing, amending and operating the RR platform from 2018 to 2021 are shown in **Figure 14**.

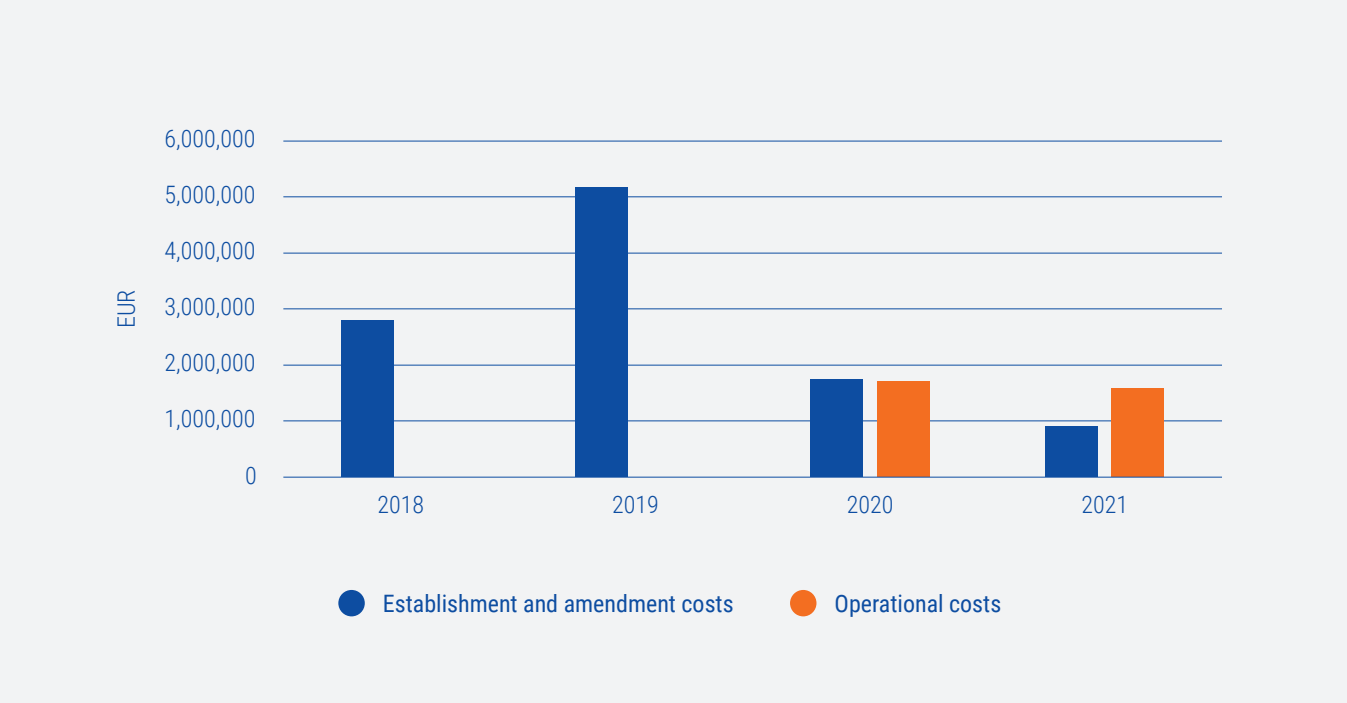


Figure 14 – Overview of costs for establishing and operating the RR platform (EUR)

3.1.4. IN platform: International Grid Control Cooperation

IGCC is the implementation project chosen by ENTSO-E in February 2016 to become the European platform for the IN process. In 2021, the establishment of a common European platform for operating the IN process was officially achieved by the legal deadline of 24 June 2021, following the successful completion of all requirements as defined in the EB Regulation (Article 22) and established in the IF for a European platform for the IN process[36].

Governance

The design and implementation of the IN platform is led by the IGCC implementation project, which numbers 27 TSO members and observers in 24 countries[37]. At the time of writing this report, two TSOs are expected to connect to the platform in the coming months: Elektromreža Srbije (EMS) in April 2022 and ESO Bulgaria in June 2022. Since the accession of ESO Bulgaria is expected for June 2022, confirmation of this will be included in the next *Balancing* or *Market Report* to be published.

36 *All TSOs' proposal for the implementation framework for a European platform for the imbalance netting process in accordance with Article 22 of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* – [Link].

37 There are 21 TSO operational members: 50Hertz, Amprion, Austrian Power Grid AG (APG), ČEPS, ELES, Elia, HOPS, Energinet, IPTO, MAVIR, PSE, REE, REN, RTE, SEPS, Swissgrid, TenneT DE, TenneT NL, Terna, Transelectrica and TransnetBW. There are three TSO non-operational members: Creos, EMS and ESO. Along with ENTSO-E, three TSOs serve as observers: Crnogorski elektroprenosni sistem AD, Macedonian Transmission System Operator AD (MEPSO) and Nezavisni operator sustava u Bosni i Hercegovini (NOSBiH).

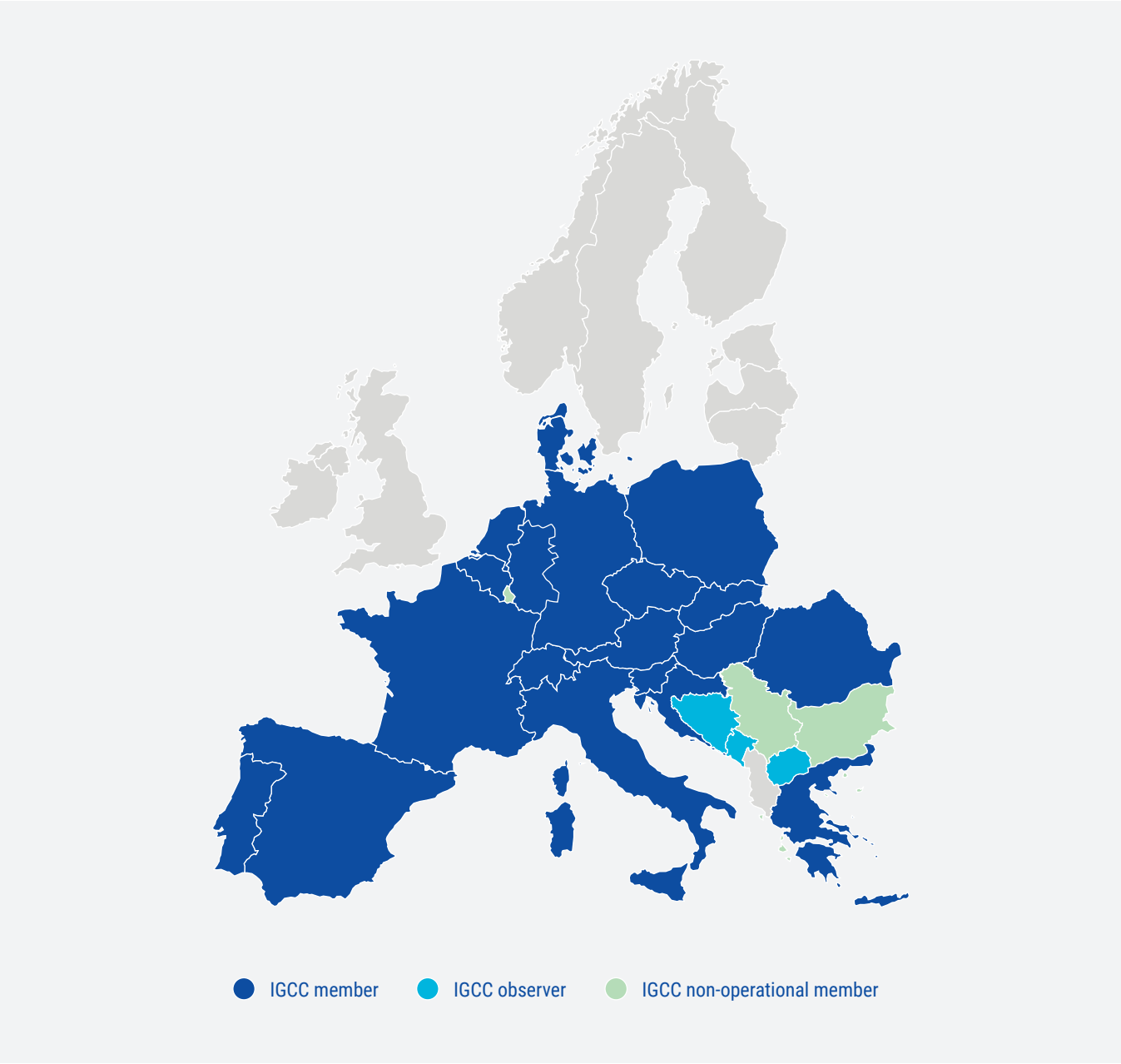


Figure 15 – IN platform: TSO members of the IGCC implementation project (as at January 2022)

Operation of the platform

Further information on the high-level design of the IN platform can be found in the *ENTSO-E Balancing Report 2020*[38].

The increase in the participation of TSOs in the IN process has enabled energy savings to reach more than 2 770 GWh per quarter, corresponding to quarterly savings of EUR 118 million (Figure 16). Not only does this have a positive effect on more efficient energy usage, but the additional available aFRR capacity leads to increased security of the European electricity transmission system.

38 ENTSO-E Balancing Report 2020 – [Link]. See page 29.

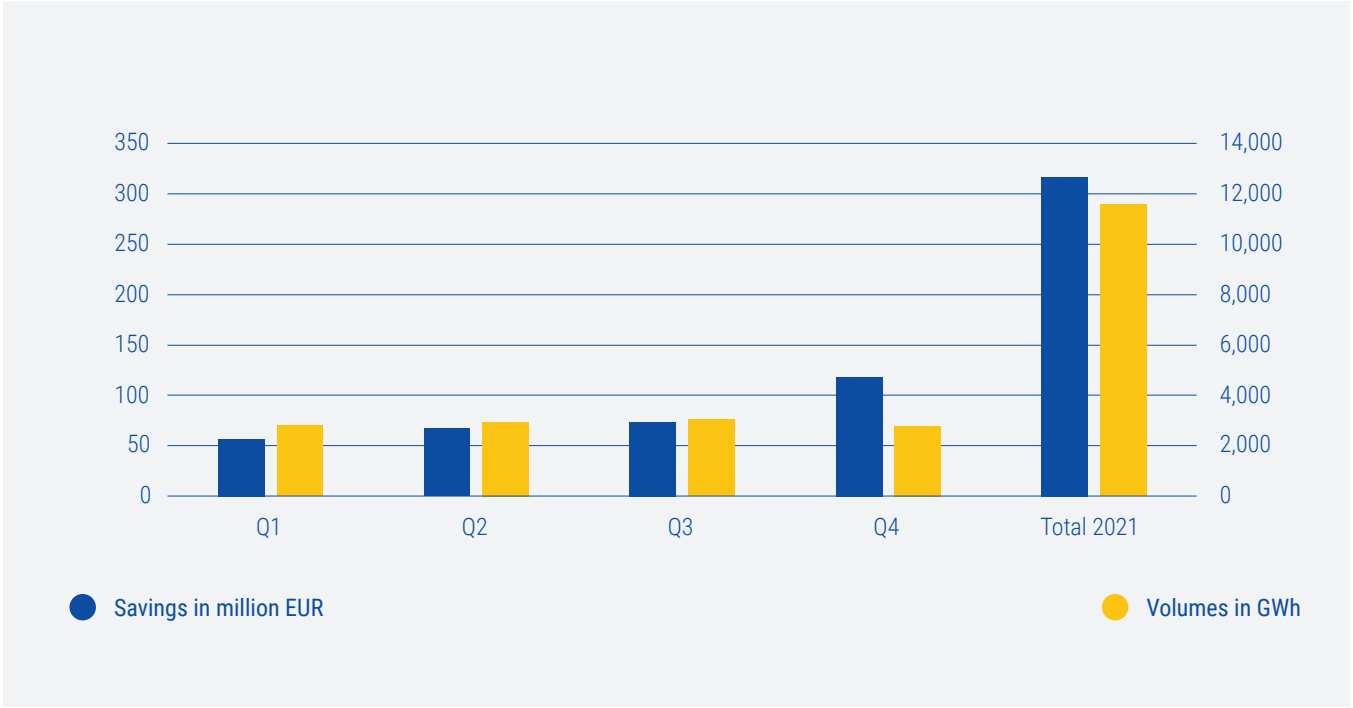


Figure 16 – IN platform quarterly savings in volumes GWh and financial savings (EUR)

The cumulative savings generated through international cooperation by IGCC, from the start of the project in October 2011 until December 2021, is approximately EUR 976 million. The data related to the IN platform has been published on the Transparency Platform since June 2021. The reports on IN volumes are published on a dedicated site of ENTSO-E[39].

Evolution

Greece (IPTO) became operational on 22 June 2021, and Romania (Transelectrica) on 17 December 2021. Bulgaria (ESO Bulgaria) and Serbia (EMS) are expected to connect to the IN platform in the course of 2022.

Expenditures

The annual expenditures on establishing, amending, and operating the IN platform from 2018 to 2021 are shown in the following graph.

39 See ENTSO-E – Imbalance netting – [Link].

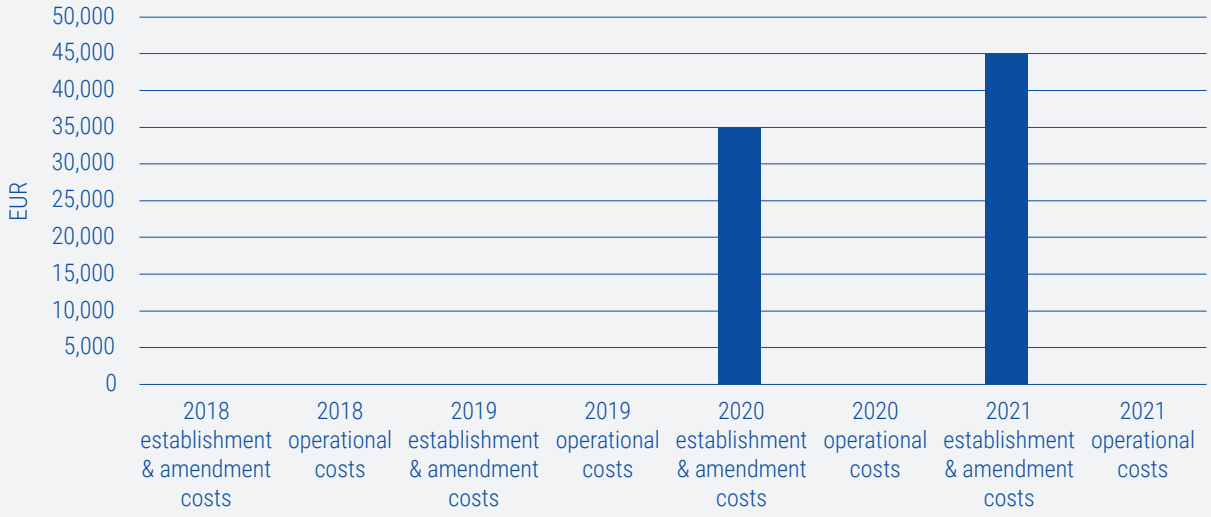


Figure 17 – Overview of costs for establishing, amending and operating the IGCC platform (EUR)

Note: This reflects the development of the IGCC project into the IN platform.

3.1.5. CMM implementation

The TSOs are implementing several balancing platforms for cross-border exchange of balancing energy and for the IN process (see Chapter 3.1.1 through to Chapter 3.1.4). In order to correctly optimise the cross-border exchanges, balancing platforms take into account the available CZC left after cross-zonal intraday and the allocated CZC as a result of the applications of CZC allocation[40]. In the currently operational IN and RR platforms, the CZC data are provided by the individual participating TSOs. This decentralised approach will also be used at the go-live of the aFRR and mFRR balancing platforms.

In order to further improve the management of the CZC in the balancing time frame, TSOs decided to centralise capacity management through the CMM. This tool will allow for automatic distribution of cross-border capacity limits (CBCL) from the TSOs to each of the balancing platforms, as well as manual changes to CBCL required in case of extraordinary grid situations, such as interconnector outages.

The main principles of the CMM are the following.

- Leftover CZC after previous market time frames (including cross-zonal intraday markets) and allocated volumes of CZC for the exchange of balancing capacity or sharing of reserves for RR, mFRR and aFRR balancing capacity, are provided to CMM (see Chapter 2[41]).
- CMM computes the initial CBCLs applicable for a border in the RR platform and provides them to the RR platform.
- The RR platform informs the CMM about the resulting cross-border flows, and the CMM re-determines the CBCLs for the next process and provides the CBCLs to the mFRR platform.
- The mFRR platform informs the CMM about the resulting cross-border flows, both from the scheduled and the direct activation of mFRR balancing energy. The CMM re-determines the CBCLs for the next process and provides the CBCLs to the aFRR platform. As the aFRR and IN balancing platforms operate in real time, in 4-second optimisation cycles, the provision of CBCLs occurs between the aFRR and IN platforms directly.

40 According to Arts. 40, 41 and 38(3) of the EB Regulation.

41 According to the mFRR, afRR and IN IFs, initial CZC which shall be either the CZC remaining after the single intraday coupling or CZC calculated in accordance with the methodologies pursuant to Art. 37(3) of the EB Regulation.

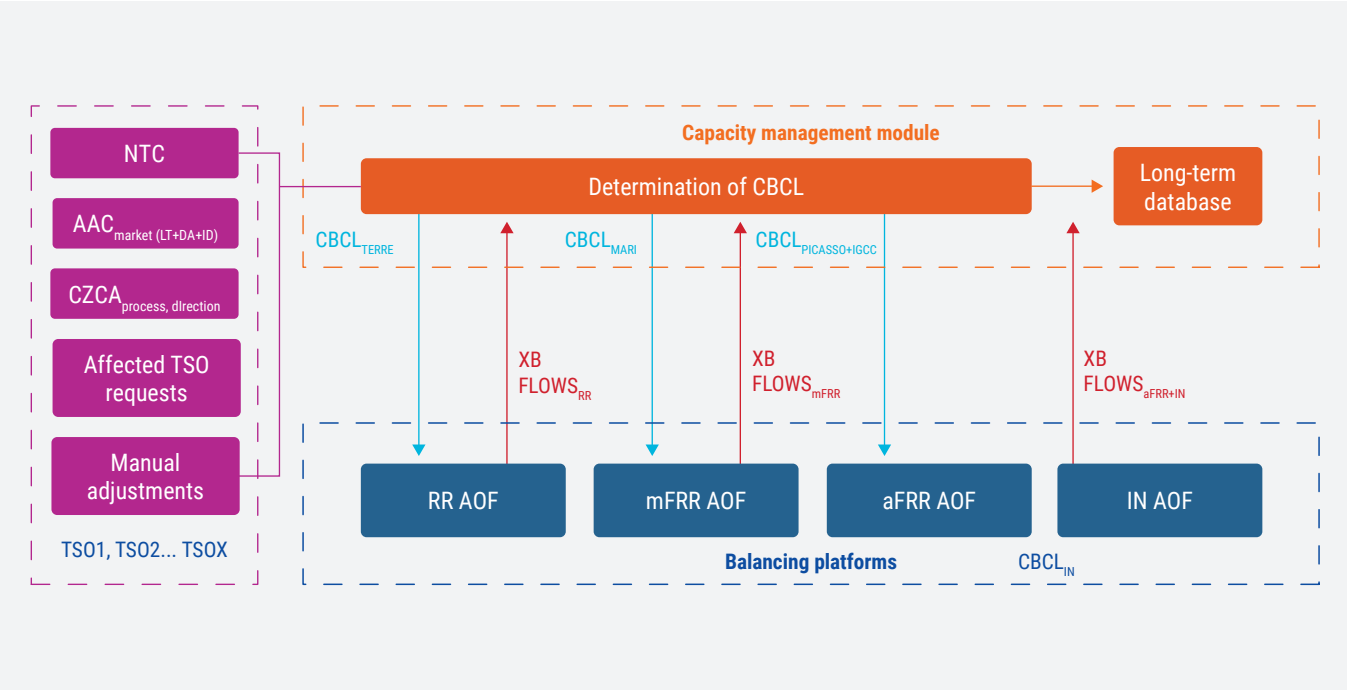


Figure 18 – CMM high-level design

The TSOs intend to develop the CMM IT system by the second half of 2023. The TSOs are currently amending the IFs of the mFRR, aFRR and IN balancing platforms to designate a single TSO to operate, monitor and further develop the CMM IT solution, similarly to the governance setup applied in the mFRR, aFRR and IN balancing platforms.

3.2. CZC allocation and exchange of balancing capacity or sharing of reserves

Next to the set of rules for the procurement of balancing capacity, the activation of balancing energy and the financial settlement of BRPs, the EB Regulation also prescribes the development of harmonised methodologies for the cross-zonal transmission capacity for balancing purposes. Moreover, the Clean Energy For All Europeans Package (CEP) instructs TSOs to facilitate the dimensioning of reserve capacity and the procurement of balancing capacity on a regional level[42]. In case two or more TSOs are mutually willing to exchange or share balancing capacity, they shall develop common and harmonised procurement rules. In addition to the common rules, the EB Regulation establishes three methodologies through which TSOs may allocate CZC for the exchange of balancing capacity and sharing of reserves, when supported on the basis of a cost-benefit analysis (the co-optimisation process, the market-based allocation process and the allocation based on economic efficiency analysis).

- Chapter 2 presents an overview on the implementation of methodologies for allocating CZC to the balancing time frame and on the cooperation for the exchange of balancing capacity or sharing of reserves, which are also being voluntarily implemented across Europe for certain countries and TSOs.

42 *Regulation (EU) 2019/943 of the European Parliament and of the Council – Of 5 June 2019 – On the internal market for electricity – (Recast) –* [Link].

3.2.1. CZC allocation methodology implementation

Since according to EB Regulation Articles 40 and 41, all CZC allocation methodologies have been approved, the process of implementation has started on the regional and all-TSO levels.

3.2.1.1. Co-optimised allocation

The implementation of the co-optimised allocation methodology will take 2 years in total, led by all TSOs. The activities are twofold. First, the TSOs in collaboration with NEMOs conducted the *Implementation Impact Assessment*[43] which was published in December 2021. This assessment took 1.5 years and investigated questions such as how bids can be linked across products and the impact on the market (welfare and its distribution), or how from governance, mathematical and operational points of view the co-optimisation of CZC allocation can be performed. The mathematical solution of co-optimisation can either be implemented in the function-operating single day-ahead coupling (SDAC), namely the Pan-European Hybrid Electricity Market Integration Algorithm (EUPHEMIA), or in a CZC allocation optimisation function that runs in parallel to EUPEHMIA and only makes the CZC split decisions.

Second, until June 2022, TSOs shall prepare the final set of business requirements to be sent to NEMOs. Therefore, an additional informal stakeholder workshop was organised on 25 January 2022. In preparation of the set of requirements, the aim of this workshop was to incorporate the thoughts and concerns of market participants. Furthermore, under SDAC, the first implementation project for co-optimisation was started. Its first task is the prototype study which shall assess the mathematical functions, accuracy, costs and timeline for two types of co-optimisation processes:

- one-step co-optimisation
- two-step co-optimisation

In the one-step co-optimisation, the optimisation function for CZC allocation would be integrated in the EUPHEMIA algorithm, providing the maximum accuracy for the CZC allocation. For this option, it is possible, subject to algorithmic performance, to place cross-product-linked bids (linking between the different capacity and energy products), which are then selected in the market where the highest total welfare is achieved. Unfortunately, this option puts pressure on EUPHEMIA's performance and represents a radical change of market coupling, which will impact the markets to the maximum extent.

The two-step co-optimisation allows the optimisation function for CZC allocation to be performed outside the EUPHEMIA algorithm, with the aim to impact EUPHEMIA to the least extent. Since a simplified day-ahead algorithm shall be used, this option may be less accurate in the CZC allocation compared to the one-step co-optimisation. However, these options can be seen as a compromise between EUPHEMIA's performance and the accuracy obtained in the CZC allocation. In order to continue to obtain correct market outcomes, the two-step co-optimisation will only allow cross-product linking with an a priori prioritisation of the markets. This means that the price of bids below or equal to the clearing price (bids in the money) in the first market will always be cleared, and the optimisation only focuses on the allocation of CZC and not on replacement of bids across the markets. This prioritisation of markets goes more in line with current sequential markets (first balancing capacity markets, then the day-ahead market) and can be regarded more as an evolution instead of the (theoretical) revolution of co-optimisation, where at one point in time all markets combined could be optimised not only on CZC allocation, but also on bid selection between the balancing capacity and day-ahead markets.

The SDAC prototype study will help all TSOs to make the correct decisions on where the first implementation of a co-optimisation process will be taken.

3.2.1.2. Market-based allocation

The implementation of the market-based allocation methodology has started.

The main deliverables are the development of one single CZC allocation optimisation function per CCR, that is to be used by all possible applications for the respective CCR. Furthermore, the day-ahead capacity calculation process of each CCR needs to be adapted, to be able to take into account the CZC allocated. Also, amendment of the congestion income distribution is foreseen, in order to capture additional financial flows from applications to the day-ahead congestion income distribution. The current expected date for the relevant CCRs to be ready is Q3 2023.

43 *Implementation Impact Assessment – For the methodology for a co-optimised allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves* – [Link].

3.2.2. Application of the CZC allocation methodologies and BCC

Before the EB Regulation came into place, cross-border agreements were in place to deploy several advantages for cost minimisation for the procurement of reserves, with and without CZC allocation.

For example, some TSOs had agreements on sharing of reserves in place, in which leftover CZC could be used in case sufficient balancing energy was not available locally. With the EB Regulation in place, several application concepts are on the table, or are even live. This section provides a list of current or intended applications of the official CZC allocation methodologies.

3.2.2.1. Nordic Balancing Model

The NBM programme was presented in the *Balancing Report 2020*[44] and the *Market Report 2021*[45], with an emphasis on the Nordic aFRR capacity market. This programme will ensure an efficient security of supply and secure a balancing scheme compliant with the European network codes. The most significant change this programme introduces is the transition from a manual common Nordic regulating power market, to an automated mFRR energy activation market (EAM).

The programme also contains the development of common Nordic aFRR and mFRR capacity markets, the transition to single price and single position imbalance settlement, the transition to a 15-minute ISP, and the connection to the common European balancing platforms MARI and PICASSO.

A dedicated SC with two representatives from each Nordic TSO (Energinet, Fingrid, Statnett and Svenska kraftnät) governs the programme. Svenska kraftnät and Statnett are common service providers (CSPs) with the responsibility to deliver common services.

In the period from June 2021 to May 2022, a number of milestones were passed in the NBM programme:

- 1 November 2021: The single price model was implemented in the Nordic TSOs. The single price model includes a number of changes in the imbalance settlement scheme, including the introduction of a single imbalance price for all imbalances (under ISH Methodology Article 7(1)) and a single calculation of imbalances and a position (under ISH Methodology Article 3(1)[46]) based on trade schedules per BRP and an updated BRP fee structure (conforming to EB Regulation, Article 44(3) or national legislation). In Norway, all implementation was done through national legislation.
- 29 November 2021: BSPs were for the first time able to place bids in the new Norwegian aFRR capacity market. The market is based on the same IT solutions as the forthcoming Nordic aFRR capacity market, the go-live of which is regulatorily dependent on the quality of the ongoing flow-based parallel runs.
- 18 January 2022: The go-live of the Finnish aFRR capacity market was based on the same IT solution as the forthcoming Nordic aFRR capacity market.
- January 2022: Requests for derogation from the connection to MARI and PICASSO were sent from all four Nordic TSOs. Although the TSOs request a derogation no later than 24 July 2024, the plan is to connect to MARI in Q4 2023 / Q1 2024 and to PICASSO in Q2 2024.

3.2.2.2. German-Austrian aFRR BCC

The German and Austrian TSOs have commonly procured aFRR balancing capacity since February 2020. The reduction trend in procurement costs seen in 2020 was replicated in 2021. The total capacity costs of the cooperation are EUR 400 million (EUR 375.2 million for Germany and EUR 24.5 million for Austria) in 2021, while the costs without cooperation would be EUR 417 million. Figure 19 shows the development of balancing capacity costs per month, as a comparison of costs without common procurement (yellow) and with common procurement (grey). The costs of the cooperation in 2021 are also compared to the costs from 2020.

44 *ENTSO-E Balancing Report 2020* – [Link]. See pages 108–110.

45 *ENTSO-E Market Report 2021* – [Link]. See page 27.

46 *ACER Decision on the Imbalance Settlement Harmonisation Methodology: Annex I – Methodology for the harmonisation of the main features of imbalance settlement – In accordance with Article 52(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* – [Link]. See page 7.

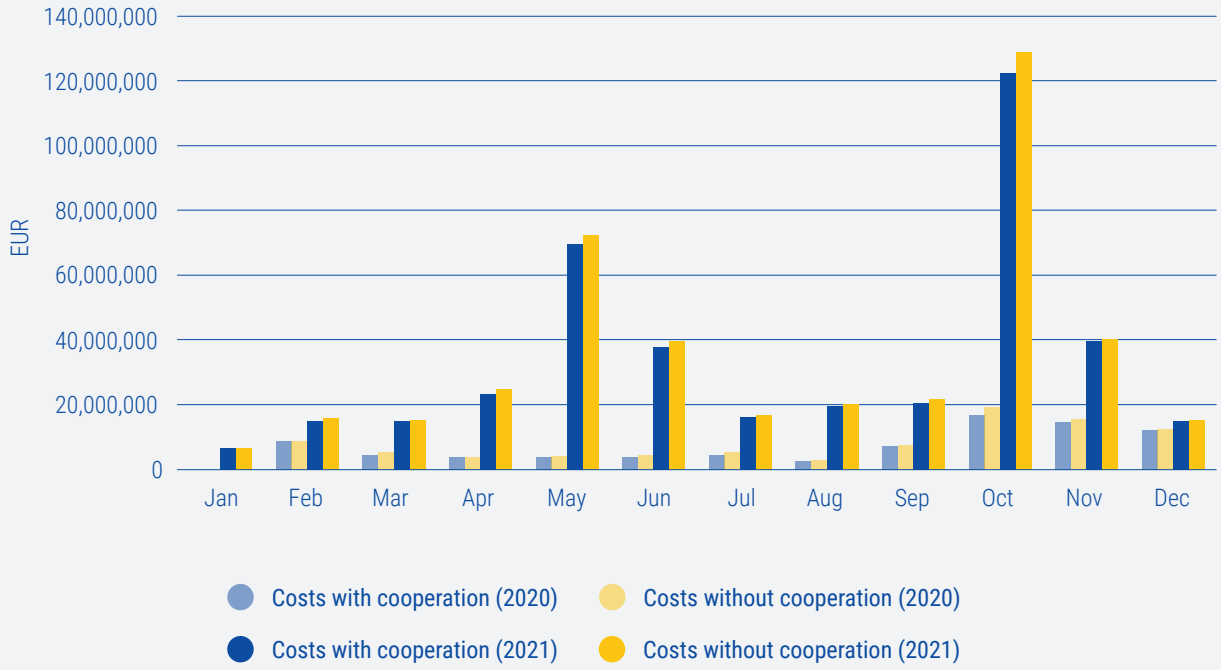


Figure 19 – German-Austrian cooperation: comparison of procurement cost (2020–2021) with and without aFRR cooperation (EUR)

The difference in the results from 2020 and 2021 are closely related to a special situation in the German and Austrian markets, based on the unavailability of hydroelectric power plants in the months of April, May and October 2021, and, in general, the increase of energy prices for the whole energy sector for 2021 in comparison to 2020, which had an influence on aFRR reserve prices which translated into general higher costs for 2021.

Figure 20 shows the savings per month in 2021 due to the cooperation in comparison to the savings in 2020. The savings for the German-Austrian cooperation are calculated on the difference between the total procurement costs with and without cooperation.

Figure 20 – Savings of German-Austrian aFRR cooperation (EUR)

Changes in 2021

The cooperation has defined a maximum of 80 MW for the allocation of CZC. As already stated in the *Market Report 2021*[47], the optimisation will be performed on both a monthly and a 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 case the result of the weekly optimisation is smaller than the monthly result, the difference will be returned to the energy market within the intraday increase or decrease process. The monthly and weekly optimisation use 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.

This process was not changed in 2021. However, due to the implementation of standard products for balancing capacity according to the approved methodology (minimum bid size 1 MW and price resolution of (EUR/MW)/h rather than (EUR/MW)/4h), in Germany – and in the relevant parts already implemented in Austria – the optimisation algorithm had to be slightly adjusted according to the minimum quantity of offers.

Expected changes in 2022

Five other TSOs (ČEPS, ELES, HOPS, MAVIR, TenneT NL) have shown their interest in taking part in the cooperation. A dedicated task force was formed to align on the development of the cooperation. This task force also tries to support the developments of the market-based methodology in the Core CCR according to Article 41 of EB Regulation.

Besides a potential increase in cooperation, German and Austrian TSOs will have to adjust the optimisation with the accession to PICASSO as follows:

- the pricing regime for balancing energy will change from pay-as-bid to pay-as-cleared;
- the validity period for balancing energy will change from 4 hours to 15 minutes.

47 *ENTSO-E Market Report 2021* – [Link]. See page 111.

3.2.2.3. Frequency containment reserve cooperation

General information

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 11 TSOs from eight countries. The main principles, governance and decision-making process did not change in 2021. A detailed overview can be found in the *Balancing Report 2020*[48] and *Market Report 2021*[49].

Developments in 2021

In January 2021, ELES (Slovenia) and Energinet (West Denmark) joined the common procurement of FCR in the FCR cooperation. The FCR demand for 2021 on Energinet is 20 MW, and for ELES 15 MW, increasing the total demand of the cooperation to ±1 444 MW, and therefore making the cooperation into the largest FCR market in Europe. Thereby, the FCR cooperation procures 48% of the FCR demand in continental Europe (which is 3 000 MW). Further information on the FCR demand to be procured in 2021 can be found in **Table 26** of the *Market Report 2021*[50].

The accession of ELES and Energinet has led to significant further socio-economic benefits for the FCR cooperation countries, and contributes to lowering costs for procurement of FCR. For example, the additional import and export for West Denmark and Slovenia were together over 45 GW in 2021, equal to 6% of the overall exchange of the FCR cooperation.

Moreover, in July 2021 ČEPS (Czechia) joined the FCR cooperation as an observer and aims to start the operational participation in the joint procurement of FCR during the first half of 2023. The detailed roadmap is currently under construction and will be published in the first half of 2022. ČEPS will procure its entire demand of FCR via the cooperation, while respecting the requirements of the Commission Regulation (EU) 2017/1485 of 2 August 2017 (the System Operation Guideline) of procuring at least 30% of FCR in Czechia.

The demand of each country of the regional FCR market for 2021 is given in the following table.

Country in FCR cooperation	FCR initial demand (MW)	Core share (MW) (Minimal FCR demand to be procured inside country)	Export limit [MW] (Limit to FCR demand imported [additionally procured] over FCR initial demand)
Austria	71	22	*100*
Germany	562	169	*168*
France	508	153	*152*
Switzerland	67	21	*100*
Belgium	87	27	*100*
Netherlands	114	35	*100*
West Denmark	20	6	*6*
Slovenia	15	0	*100*

Table 4 – Overview of demand, core share and export limit for FCR cooperation

48 *ENTSO-E Balancing Report 2020* – [Link]. See page 31.
49 *ENTSO-E Market Report 2021* – [Link]. See pages 101–108.
50 *ENTSO-E Market Report 2021* – [Link]. See Table 26 on page 103 for accession of new FCR members since 2015.

Background information on the description of the matching algorithm can be found on the FCR cooperation webpage.[51]

FCR market developments in 2021

The analysis of the evolution of the annual prices (**Figure 21**) for FCR capacities procured by 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.

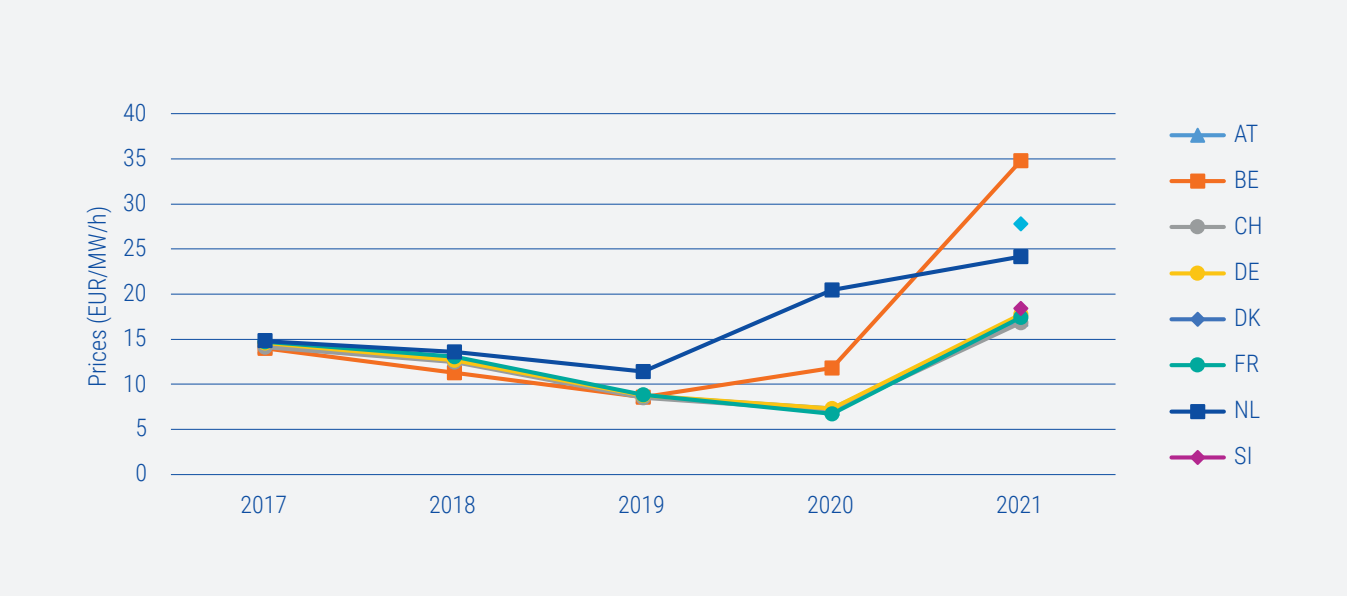


Figure 21 – Evolution of the annual prices of FCR cooperation

AT = Austria; BE = Belgium; CH = Switzerland; DE = Germany; DK = Denmark; FR = France; NL = Netherlands; SI = Slovenia

Note: As the four price level courses of Austria, France, Germany and Switzerland are very close to each other or even the same, it is not possible to distinguish them from each other in the graph.

Figure 22 shows the monthly prices for each country of the FCR cooperation for 2021, and the level of convergence of prices[52]. Austria, France, Germany, Slovenia and Switzerland have a (very) high convergence of prices, followed by the Netherlands and Denmark with nearly 90% and 73% of price convergence respectively. On the other hand, Belgium often reached its import limits (Figure 23) and prices were then decoupled from the rest of the cooperation.

51 See *ENTSO-E – Frequency containment reserves (FCR) –* [Link].

52 The situations of price convergence correspond to the situations for which the export and import limits are not active.

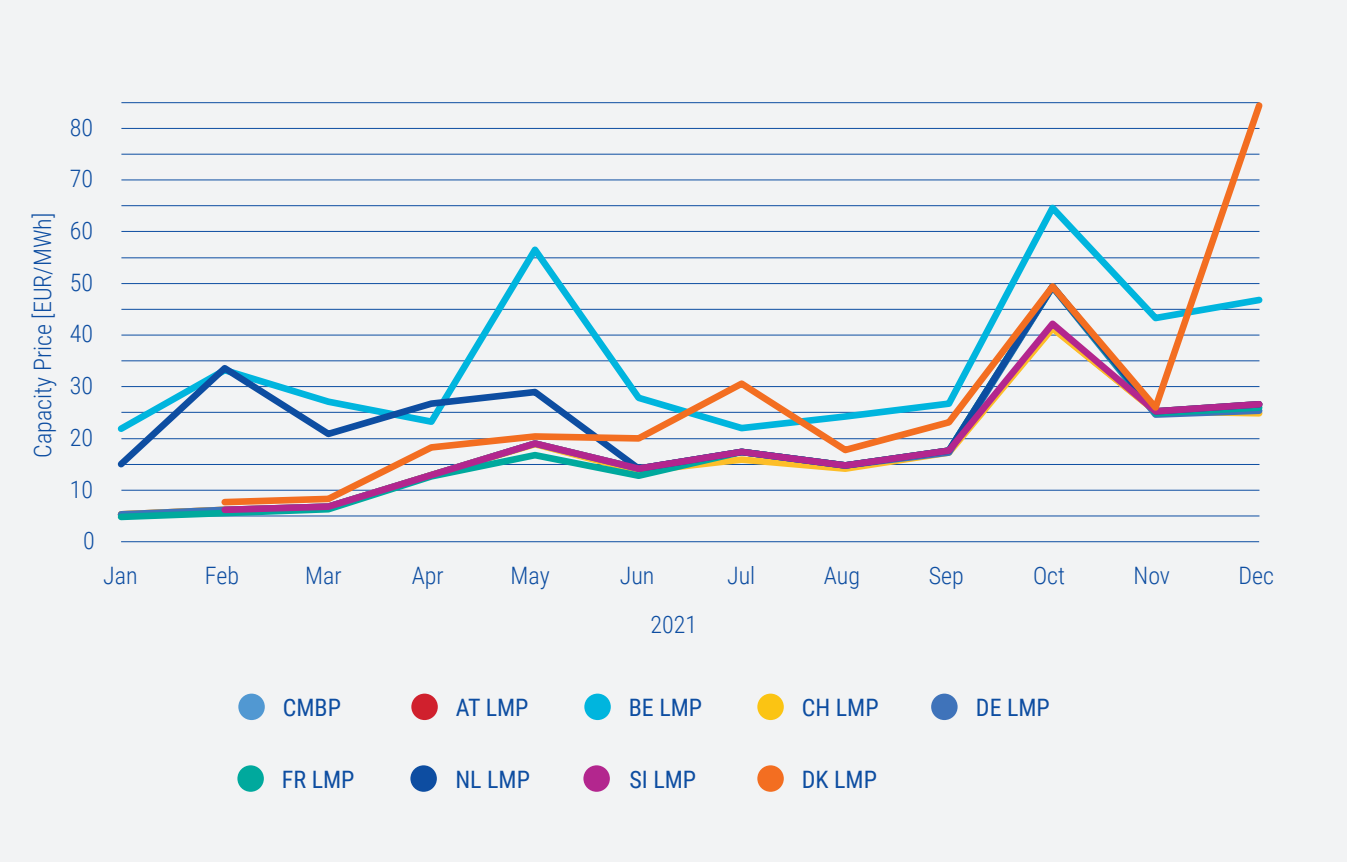


Figure 22 – Evolution of CBMP and local marginal monthly prices, 2021 (EUR/MWh)

Note: ELES and Energinet joined the cooperation in mid-January, and therefore the first monthly average was calculated for February. As the CMBP and the LMP of Austria, France, Germany and Switzerland are very close to each other or even the same, it is not possible to distinguish them from each other in the graph.

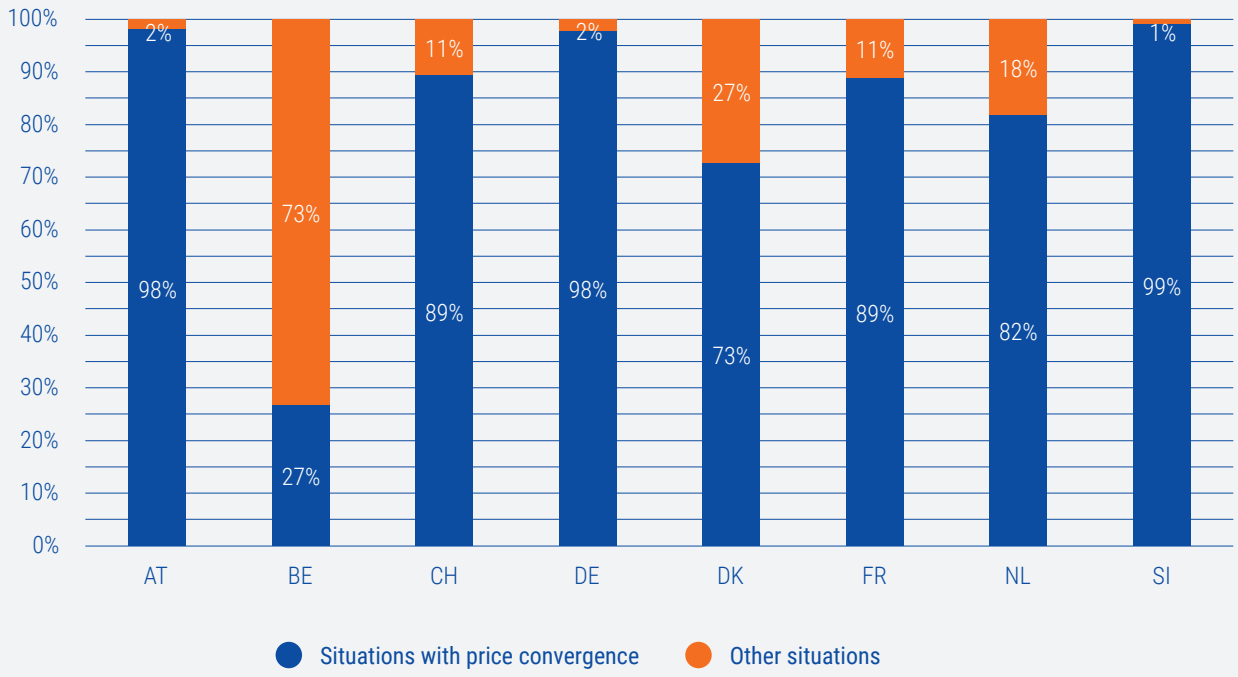


Figure 23 – Level of price convergence, 2021

Figure 24 shows the mean import and export positions of each country. Austria, France, Germany and Switzerland were mainly exporting countries, whereas Belgium and the Netherlands were mainly importing FCR to fulfil their demand.

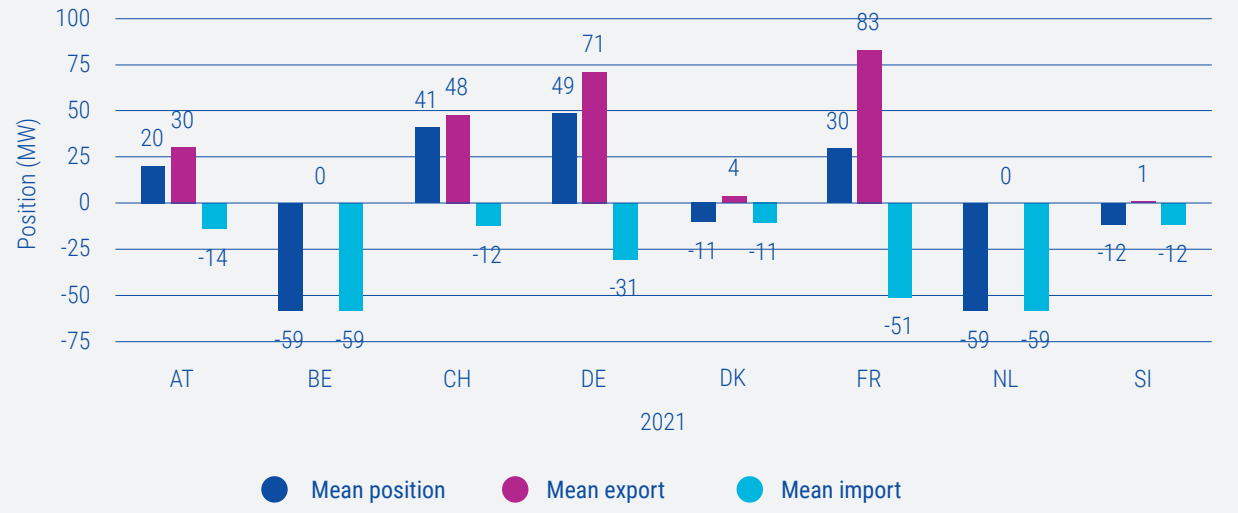


Figure 24 – Import and export positions of each country, 2021 (MW)

Evaluation of the benefits

Benefits are evaluated based on a comparison between two situations (**Figure 25**).

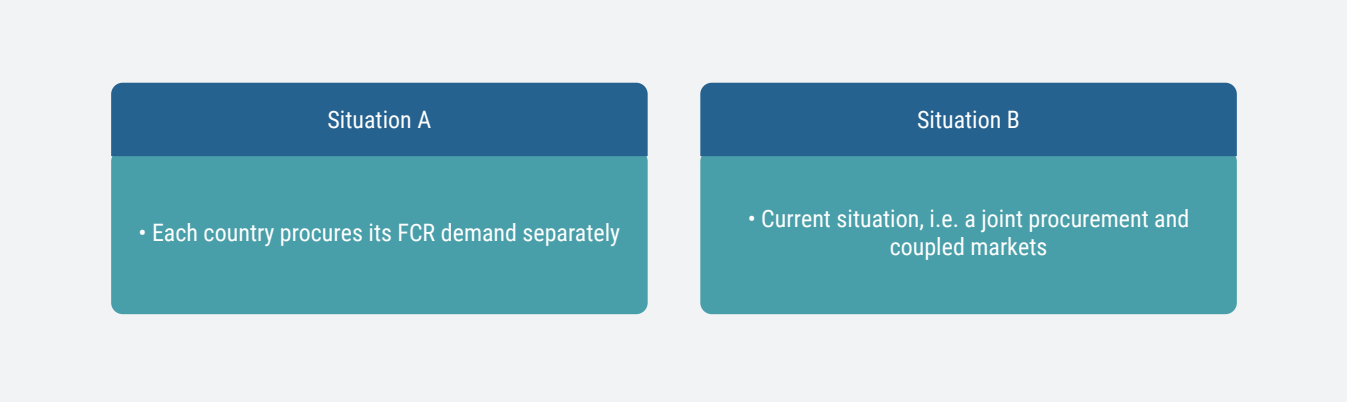


Figure 25 – Two situations for benefits evaluation

These scenarios are analysed in a situation for a 1-year period from January 2021 to December 2021. In both scenarios, the same FCR demand and the same bids from the BSPs are used. In situation B, the core share of each country and the export limits are taken into account.

For the two scenarios, the procurement costs, and the impact on 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 evaluation of the benefits linked to the joint procurement and in terms of social welfare. The simulation considers identical sets of bids in both scenarios. In reality, it is likely that the different conditions of the scenarios would affect the bids.

In situation A, there was under-procurement in Belgium and the Netherlands for each day (74 MW on average per auction). Under-procurement occurs in a country when there are insufficient bids to cover the demand for that country; this is not a problem in the current situation, as imports are possible. This occurs because, due to the cooperation, some BSPs have withdrawn expensive bids from the market. This under-procurement reveals the limit of this analysis, in particular, as identical sets of bids have been used for the simulation of both situations. The results are summarised in Table 5.

The impact of the FCR cooperation on the procurement costs is a decrease of EUR 483 million[53], creating a significant positive impact for the tariff payers. Under the limitations of the situation analysis described above, the impact on social welfare is estimated at over EUR 184 million per year.

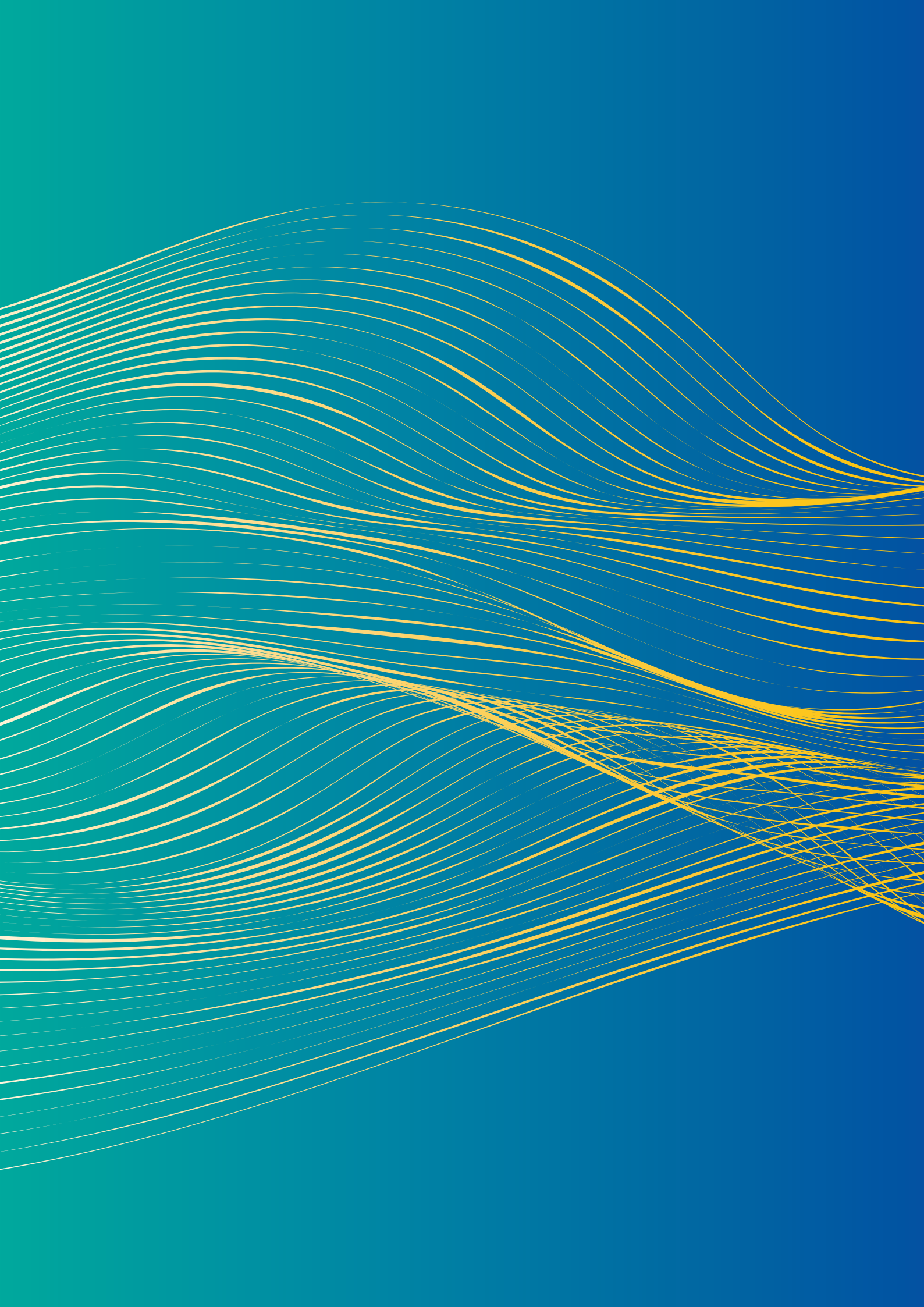
53 Note that the under-procurement has not been compensated in this analysis, so the total cost relates to a smaller volume than the volume contracted in reality.

	Procurement costs (million EUR)	BSP Surplus (million EUR)	Under-procurement in MW (avg. per auction)	Impact on social welfare (million EUR)
Situation A (local procurement – decoupled markets)	704	478	74	
Situation B (joint procurement – coupled markets)	221	179	0	
B-A	-483	-299		184

Table 5 – Evaluation of the benefits of the FCR cooperation

The following should be noted concerning these simulations.

- Procurement costs: value which TSOs pay to the BSPs and which TSOs pay to the platform (TSOs' procured amount × marginal price).
- BSP surplus: market margin of the BSPs, difference between the clearing price (which is marginal price) and price of the bids (costs that BSPs have).
- Social welfare: combined impact on procurement costs and BSPs' surplus.
- Under-procurement: situation in the decoupled mode where the total of bids in a country is not enough to cover the total demand.



4. ISH[54]

The process of ISH stems from requirements in the EB Regulation; its progress in harmonisation of main features is to be assessed in this *Balancing Report* according to EB Regulation Article 59(3)(a).

The EB Regulation and recast Electricity Regulation[55] establish a 15-minute ISP for which BRPs' imbalances have to be calculated. It also sets the minimum time interval for 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, in which case the ISP shall be 30 minutes (at the latest by 1 January 2025).

ACER decided on the ISH Methodology in July 2020 to further specify and harmonise imbalance settlement elements, to be implemented nationally at the latest by January 2022[56].

This methodology limits the number of additional price components each TSO may apply in its imbalance price calculation, and limits the number of conditions for application of dual imbalance pricing. The status of implementation of the 15-minute ISP and of choices regarding the ISH Methodology is displayed in Table 6.

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 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, as 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).

54 *Explanatory Document to all TSOs' Proposal to Further Specify and Harmonise Imbalance Settlement in Accordance with Article 52(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017, Establishing a Guideline on Electricity Balancing* – [Link].

55 *Regulation (EU) 2019/943 of the European Parliament and of the Council – Of 5 June 2019 – On the internal market for electricity – (Recast)* – [Link].

56 *ACER Decision on the Imbalance Settlement Harmonisation Methodology: Annex I – Methodology for the harmonisation of the main features of imbalance settlement – In accordance with Article 52(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* – [Link].

The state, progress and limitations of ISH[57] are visible in the evolution of the T&Cs for BRPs. These should include, among other information, the following content[58]:

Option	Status
Was the 15-minute ISP implemented by 1 January 2022?	Implemented: 15 TSOs Derogated: 12 TSOs Exemption: 0 TSOs
Has your TSO made use of additional components following ISH Methodology Art. 9(6)[59] as of 1 January 2022?	Yes: 18 TSOs No: 11 TSOs
Has your TSO made use of dual pricing as of 1 January 2022?	Yes: 8 TSOs No: 21 TSOs

Table 6 – BRP T&Cs

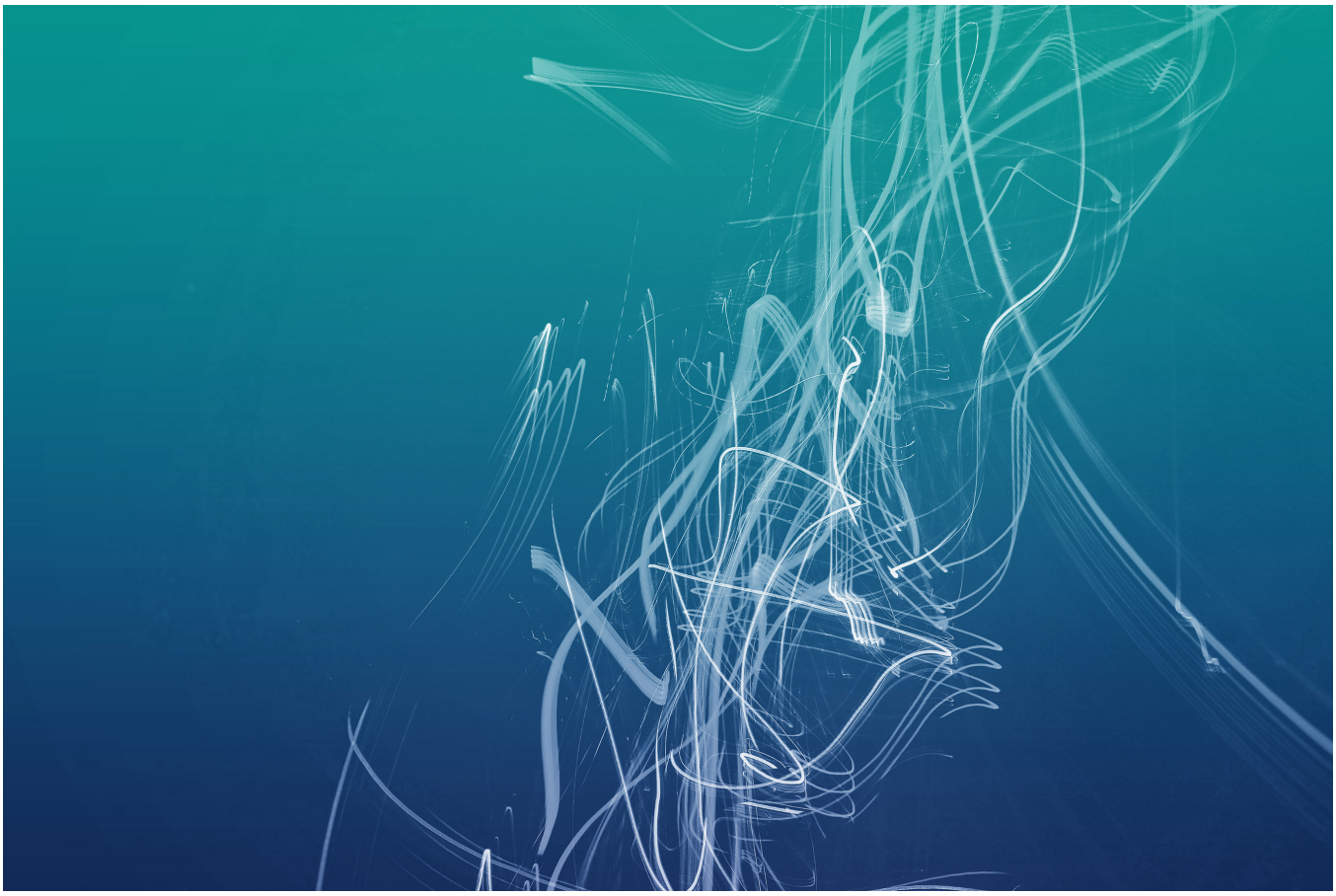
In its methodology, ACER provided clear and unequivocal definitions of single and dual imbalance pricing, that are applied in the development of performance indicators for imbalance prices.

57 Considering that the EB Regulation and ISH Methodology leave several aspects explicitly non-harmonised, it is too early to assess the consequences or possible distortions due to non-harmonisation.

58 As per Arts. 52–55 of the EB Regulation.

59 *ACER Decision on the Imbalance Settlement Harmonisation Methodology: Annex I – Methodology for the harmonisation of the main features of imbalance settlement – In accordance with Article 52(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity* balancing – [Link]. See page 13.

5. EB 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 *Balancing Report* has been created based on data available on the Transparency Platform, provisions from voluntary reserve exchange TSO cooperation, and the balancing platforms which are currently operational (i.e. TERRE and IGCC).

5.1. Indicator 3.1: availability of balancing energy bids, including the bids from balancing capacity

The availability of balancing energy bids, including the bids from balancing capacity, is calculated considering the average values of submitted available and unavailable bids (MW) of balancing energy per process (aFRR, mFRR and RR), per direction (upward/downward) and per type of product (standard/non-standard [incl. specific]) as collected by TSOs, in case of standard products respectively forwarded as standard balancing energy products to the European platforms.

Please note: MAVIR data currently only has a local product which is reported as a specific product in this report.

Legal reference	Article 59(4)(a) of EB Regulation
Data source	• ENTSO-E Transparency Platform according to Article 12(3)(e) of the EB Regulation per TSO
Calculation	The indicator is calculated per TSO / load frequency control (LFC) area / balancing zone / LFC block. 1. Available upward balancing energy bids 2. Available downward balancing energy bids 3. Unavailable upward balancing energy bids 4. Unavailable downward balancing energy bids

Figure 26 – Available upward/downward balancing energy bids (standard/non-standard incl. specific) for aFRR, 2021 (MWh/h)

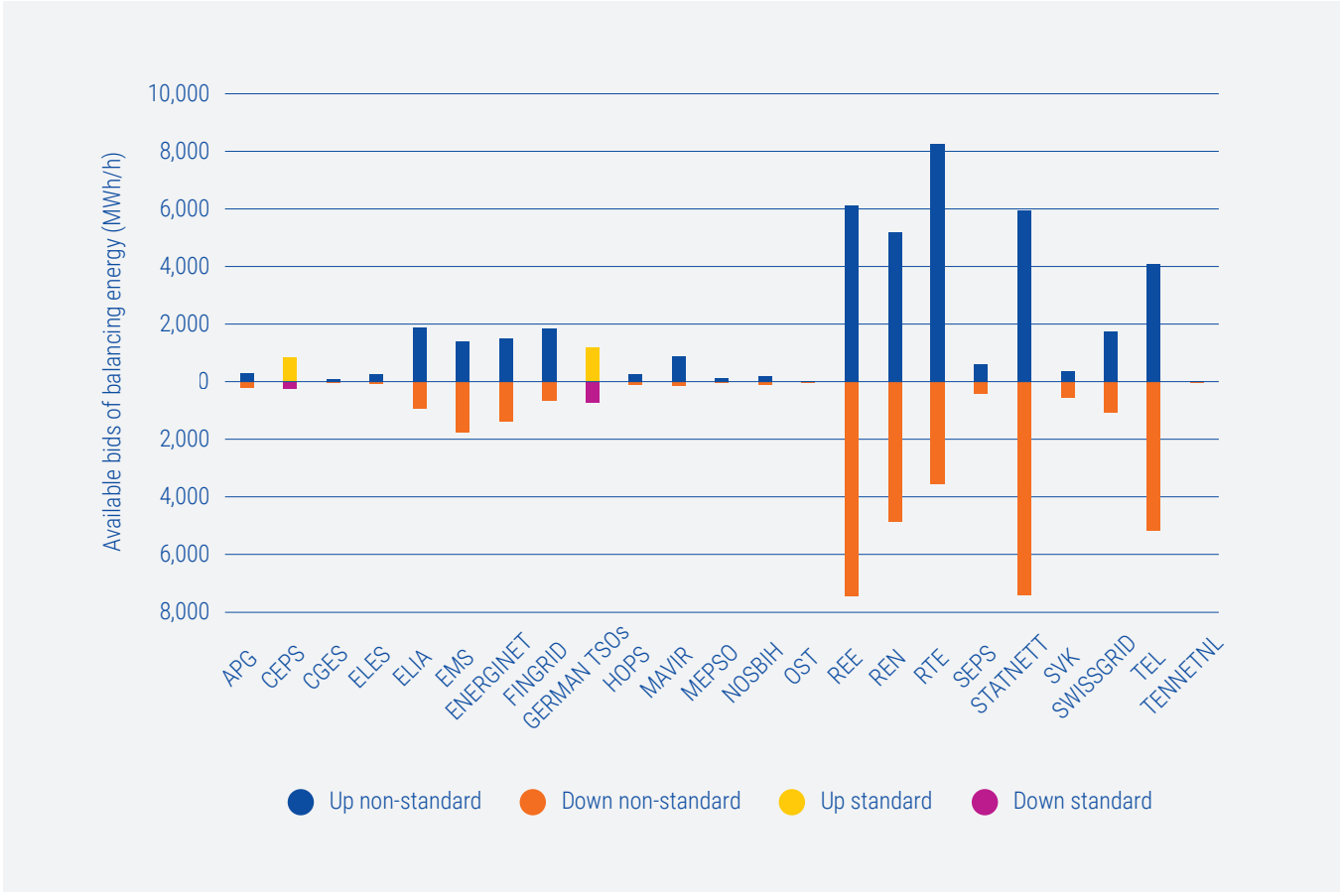


Figure 27 – Available upward/downward balancing energy bids (standard/non-standard incl. specific) for mFRR, 2021 (MWh/h)

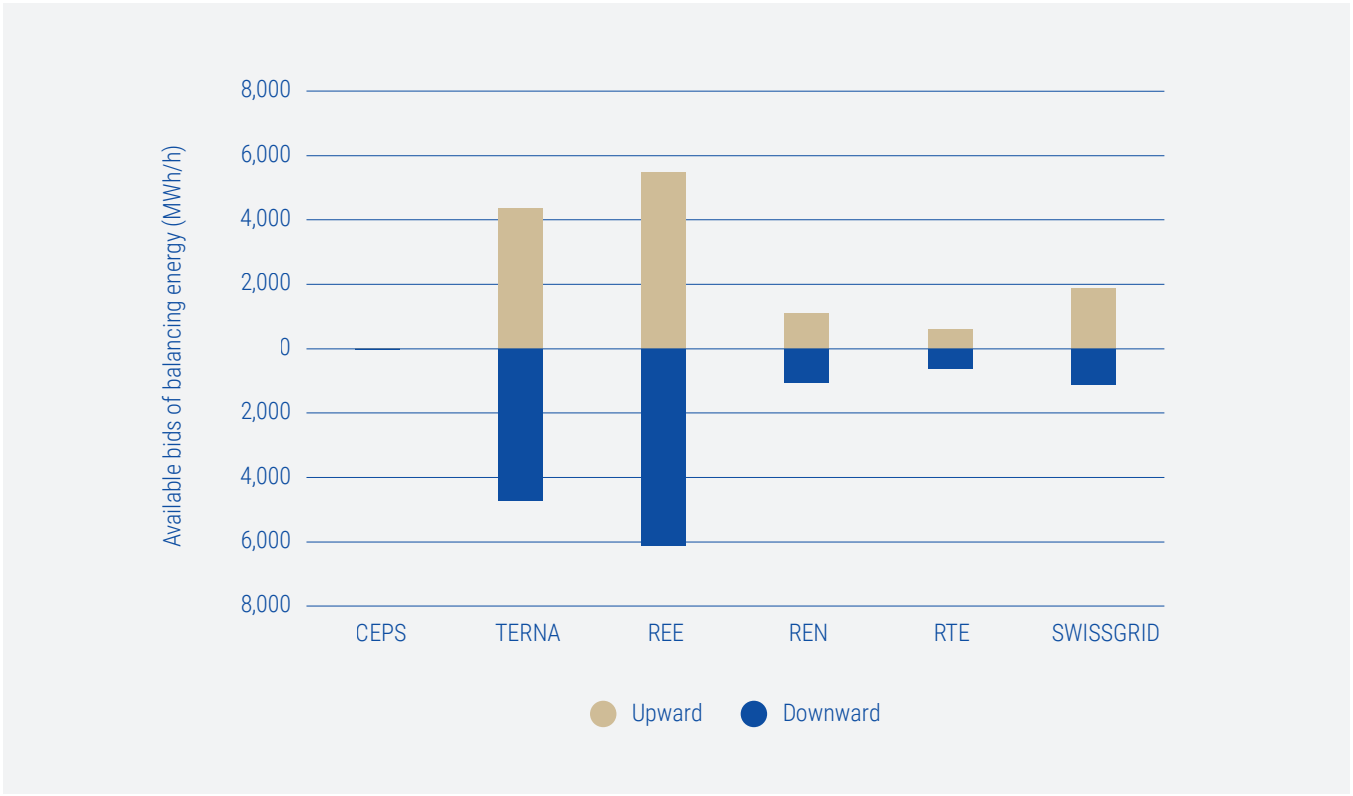


Figure 28 – RR platform: average value of submitted available bids in upward/downward direction (MWh/h)

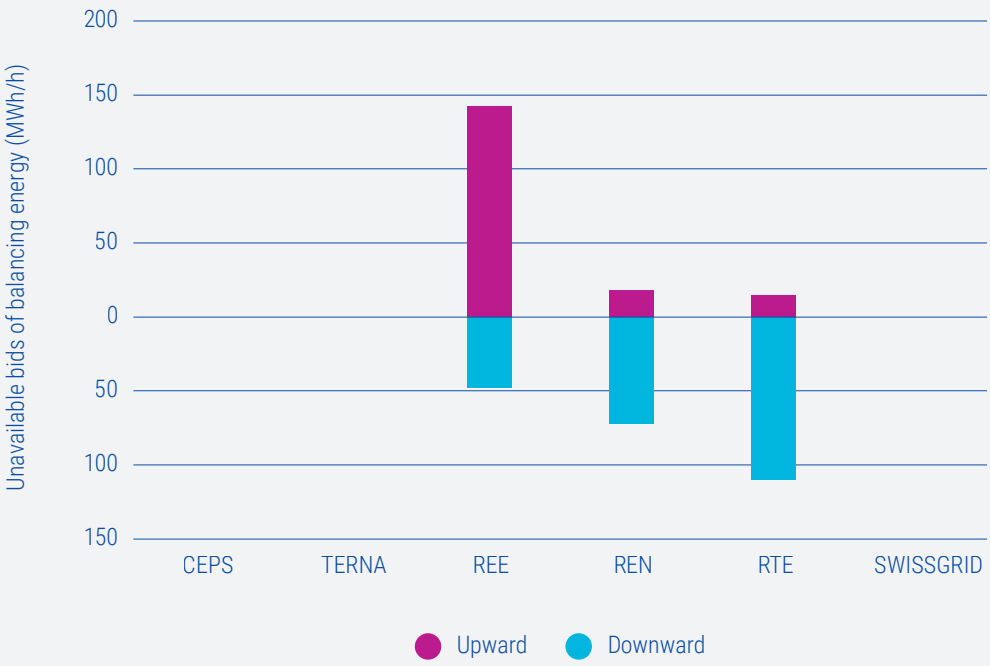


Figure 29 – RR platform: average value of unavailable bids of balancing energy (MWh/h)

In a balancing energy platform (such as TERRE), balancing energy bids are categorised as either 'available' or 'unavailable'. The term 'unavailable' describes the relevant bids which are submitted to the platform but are marked 'unavailable' (e.g. due to operational security constraints).

5.2. Indicator 3.2: monetary gains and savings due to IN, exchange of balancing services and sharing of reserves, and benefits from the use of standard products

The monetary gains and savings due to IN are calculated for each type of exchange of balancing energy, and for each type of sharing or exchange of reserves of balancing capacity. The monetary savings for IN are calculated based on the difference between opportunity prices and settlement prices, for imported or exported energy. The monetary gains and savings for both the exchange of balancing capacity and energy are calculated by comparing coupled and decoupled markets.

In general, for both balancing energy and balancing reserve platforms, the savings are understood as the impact of the exchange on the TSO procurement costs. The gains are understood as the impact of the exchange on the economic welfare (seller and buyer surplus, congestion income). In the case of exchange of balancing capacity with CZC allocation, the impact of economic surplus on the day-ahead market coupling has also to be considered.

Legal reference	Articles 59(4)(b) and 59(4)(c) of EB Regulation
Data source	• IN platform • FCR and DE-AT cooperation • RR platform
Calculation	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, in order 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, 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, 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): in order 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, actual TSO needs, • situation B (local procurement): actual bids, actual TSO needs but only local activation.

IN platform

The IN platform IN process has achieved EUR 316.2 million in monetary savings in 2021.

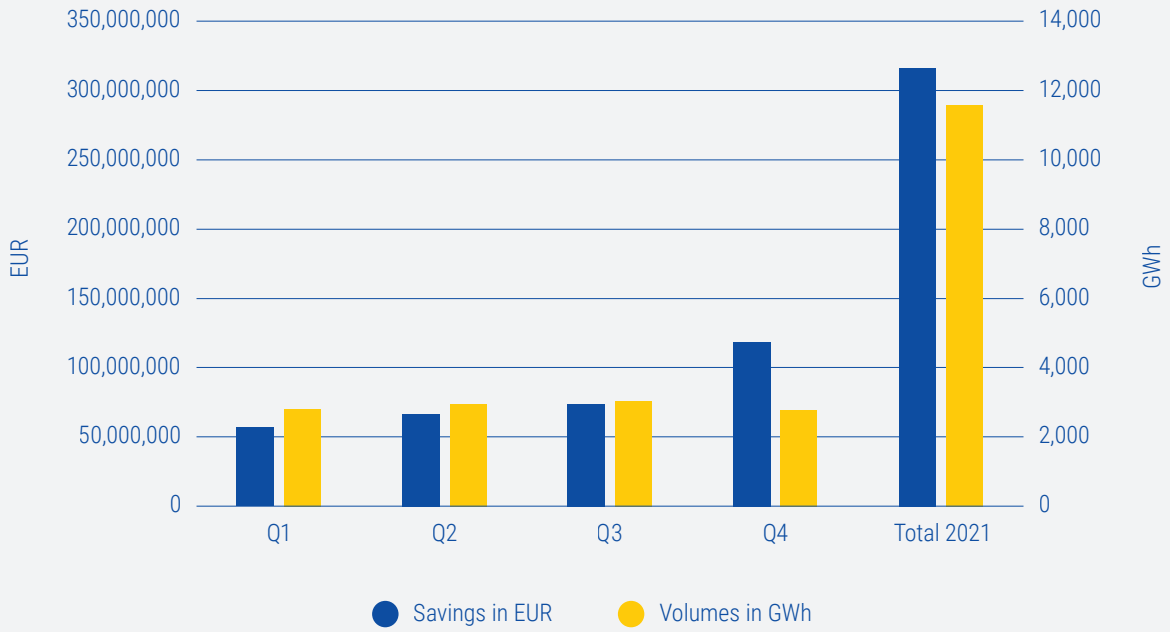


Figure 30 – IN platform quarterly data on the IN savings in volumes (GWh) and financial savings (EUR)

With the success of the official go-live in 2021 and the continuous accession of new TSOs, the annual IN savings have almost doubled in comparison to 2020 and have exceeded EUR 1 billion in total savings since the start of the project in October 2011 until the time of writing this report. The reports on IN volumes are published on a dedicated site at ENTSO-E[60]. A detailed overview of savings per TSO is displayed in **Figure 31**. A description of the relevant influencing factors is described in Chapter 3.1.4. A trend of increasing imbalance volumes can be observed throughout the year, with a major spike in December, which can be mostly attributed to increased netted volumes in Germany, France and Italy.

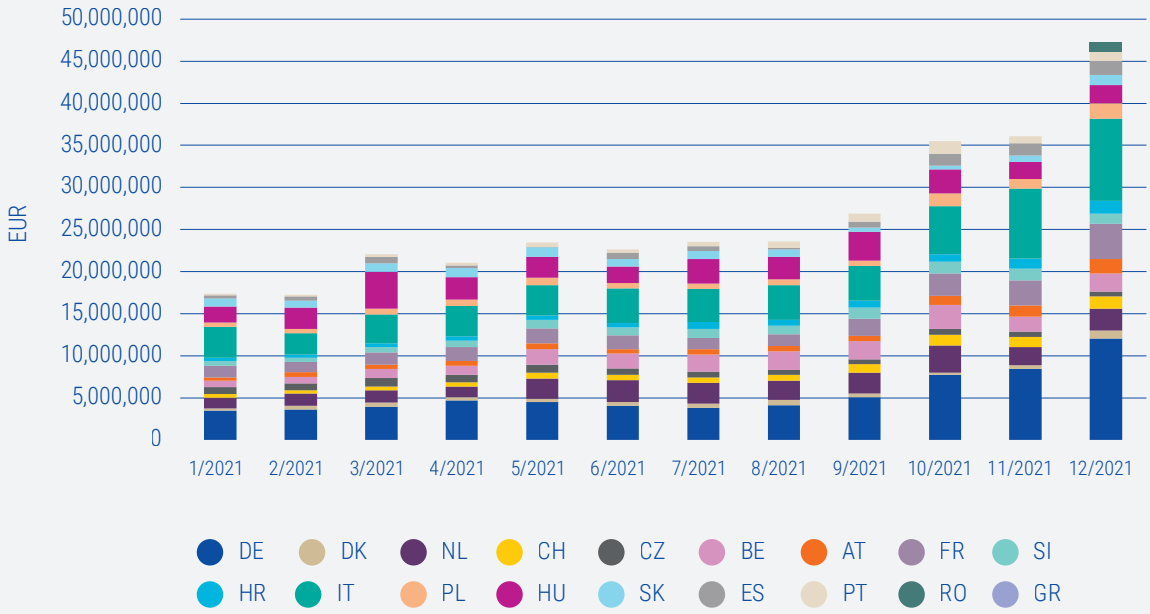


Figure 31 – IN platform: monetary savings per month and per TSO (EUR)

RR platform (TERRE)

An in-depth description of the displayed data below can be found in Chapter 3.1.4.

60 See *Inbalance Netting* – [Link].

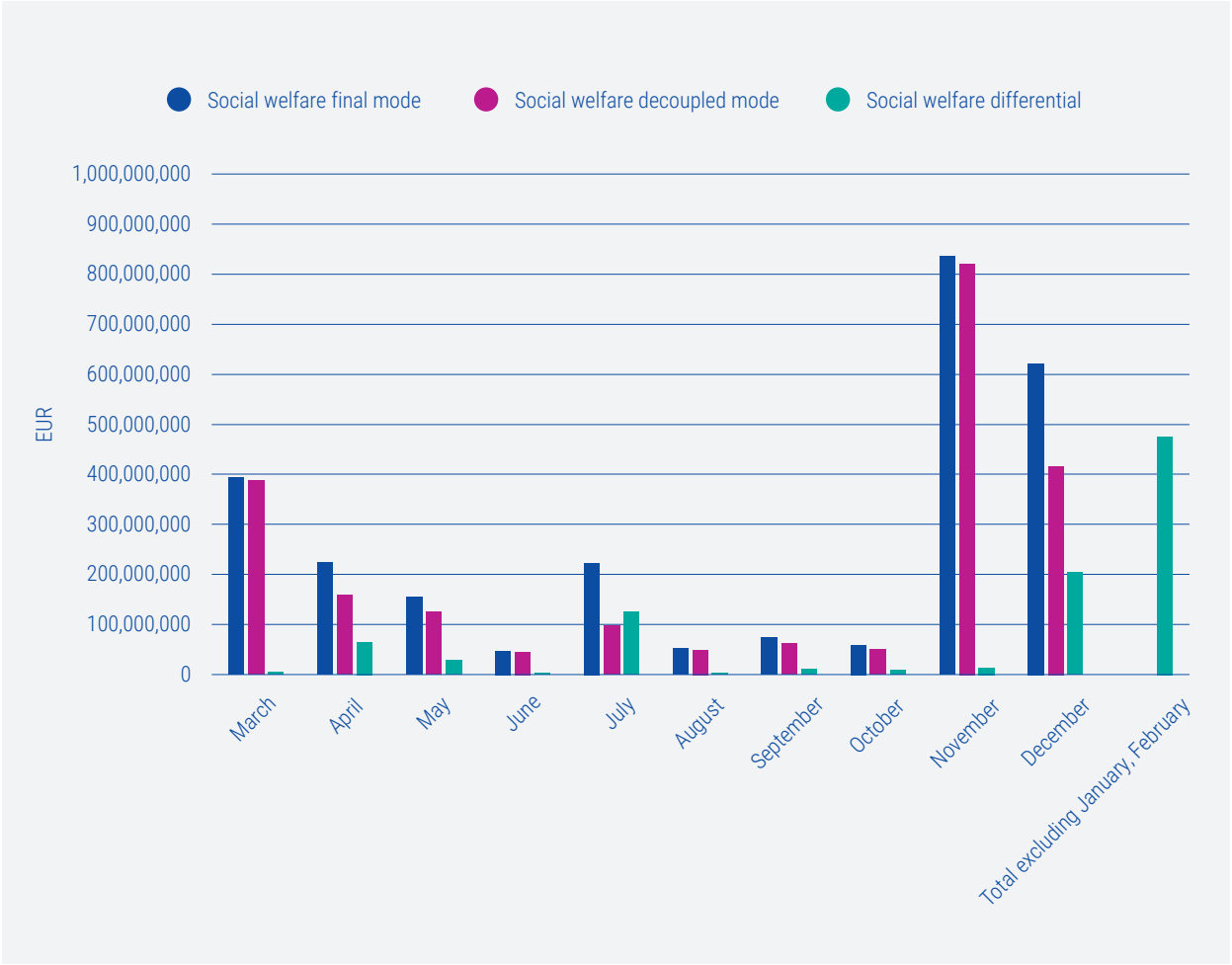


Figure 32 – RR platform: comparison of social welfare final vs decoupled social welfare differential (EUR)

Note: The TERRE TWG is of an opinion that data for January and February should be withdrawn from the report as they provide unrealistic results. This is caused by the fact that in these months, inelastic needs were commonly used. These inelastic needs are modelled with a price of EUR 99,999 in the calculation of social welfare by the optimisation algorithm, hence the values are very large. TERRE project will work on alternative calculation of social welfare in case of inelastic needs, so we are able to provide complete information for future reports.

German-Austrian aFRR capacity cooperation

An in-depth description of the displayed data below is available in Chapter 3.2.2.2.

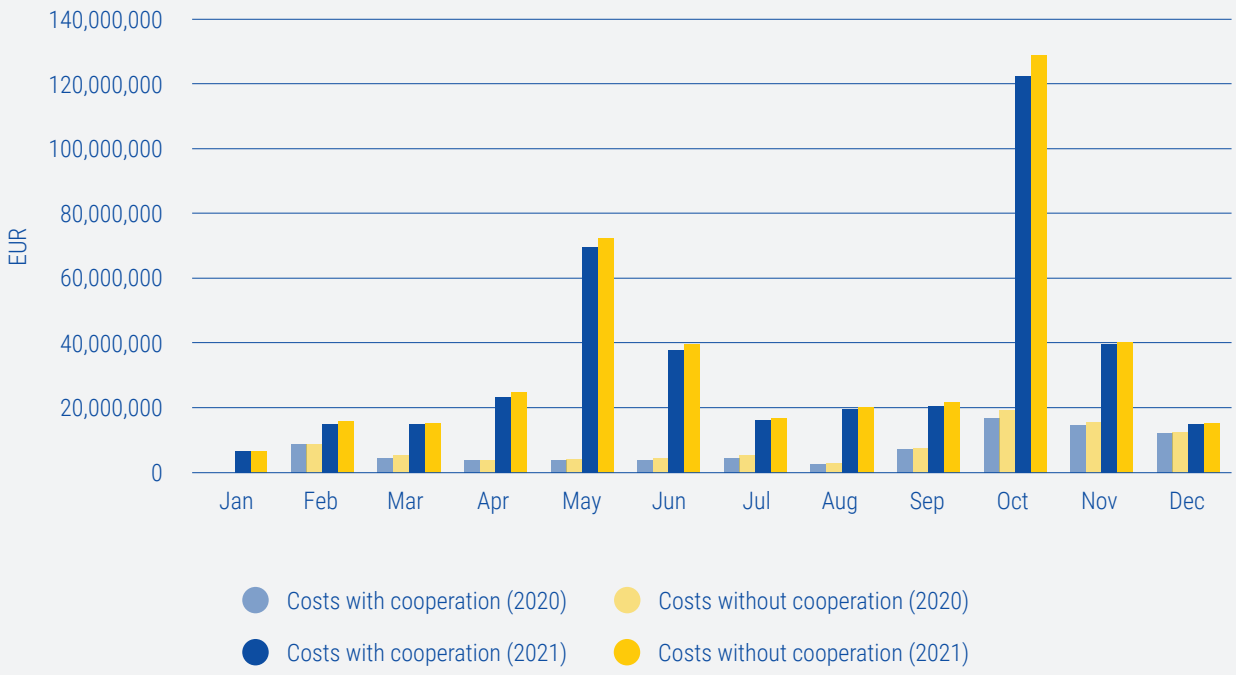


Figure 33 – German-Austrian cooperation: comparison of procurement cost with and without aFRR cooperation (EUR)

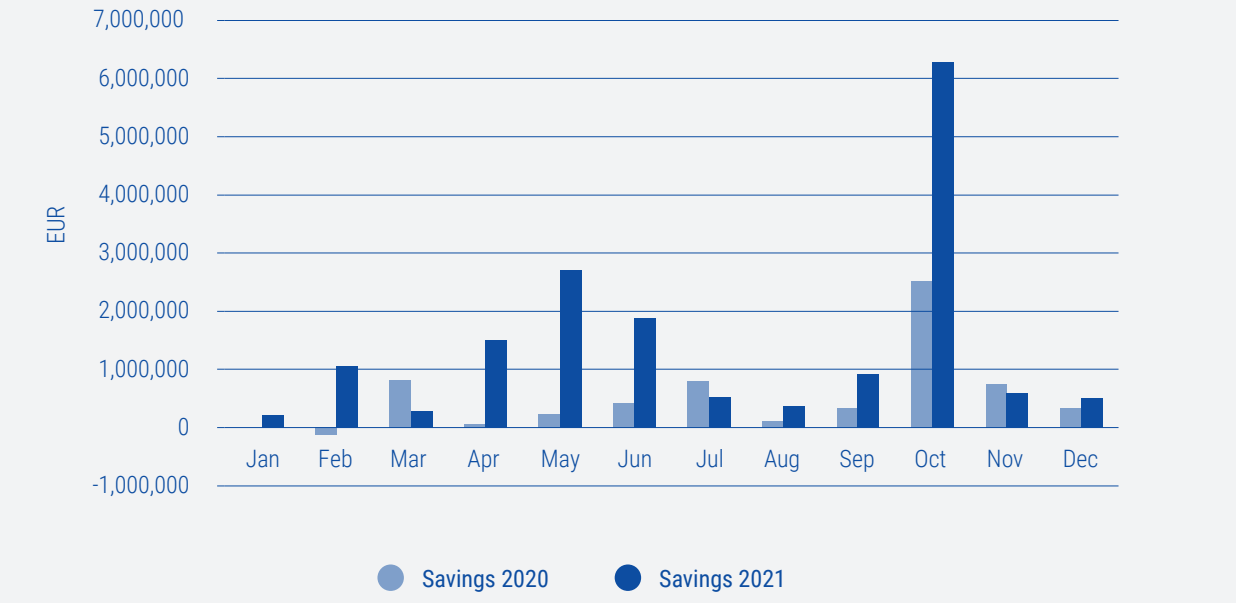


Figure 34 – Savings of German-Austrian aFRR cooperation (EUR)

FCR cooperation

An in-depth description of the data displayed below can be found in Chapter 3.2.2.3.

	Procurement costs (million EUR)	BSP Surplus (million EUR)	Under-procurement in MW (avg. per auction)	Impact on social welfare (million EUR)
Situation A (local procurement – decoupled markets)	704	478	74	
Situation B (joint procurement – coupled markets)	221	179	0	
B-A	-483	-299		184

Table 7 – Evaluation of the benefits of FCR cooperation

5.3. Indicator 3.3: total cost of balancing

This indicator calculates the annual costs (EUR) for each TSO and prices for the procured balancing capacity or balancing energy.

For each TSO or area, the total costs of balancing will be segmented by FCR, FRR and RR procurement costs, and costs for the activation of balancing energy. In addition to the total costs of balancing, weighted average prices for the procured capacity and energy will be presented (EUR/MWy or EUR/MWh) and separated per direction (upward/downward).

The total cost of balancing should be reported on the national level according to the data provided to the ENTSO-E Transparency Platform.

Legal reference	Article 59(4)(d) of EB Regulation
Data source	• Balancing capacity cost: ENTSO-E Transparency Platform Articles 17(1)(b) and (c) • Activated volume and price for balancing energy: ENTSO-E Transparency Platform Article 12(3)(e) (Article 17(1)(e) to be used when the data is not available), 17(1)(f) • PICASSO for activated volume and price for aFRR • Implementation projects (TERRE, MARI, PICASSO, IGCC) for TSO-TSO settlement. This is for separating TSOs' costs for own other cross-border purposes. • Balancing cooperation for TSO-TSO settlement.
Calculation	1. Weighted average price for the procured capacities, for FCR, aFRR, mFRR, RR 2. Weighted average price for upward energy activation 3. Weighted average price for downward energy activation

For the following graphs, the RR total cost is EUR 0 for those TSOs which are not performing reserve replacement. Moreover, the ISP duration associated with reserve availability time varies among TSOs (between 15 minutes and 60 minutes), based on which the weighted average prices of procured balancing capacities are calculated in this chapter.

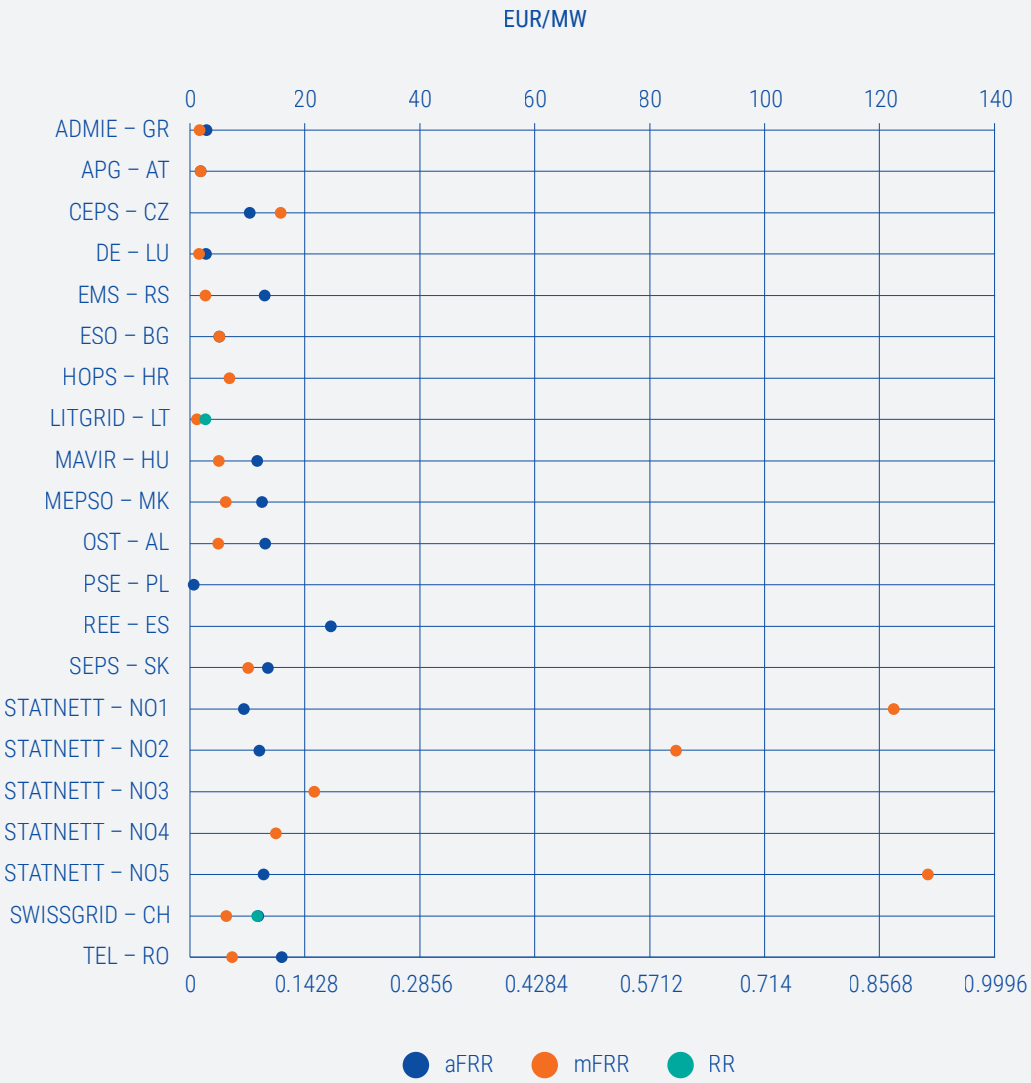


Figure 35 – Weighted average price of procured capacities (upward/downward) across balancing products (EUR/MW)

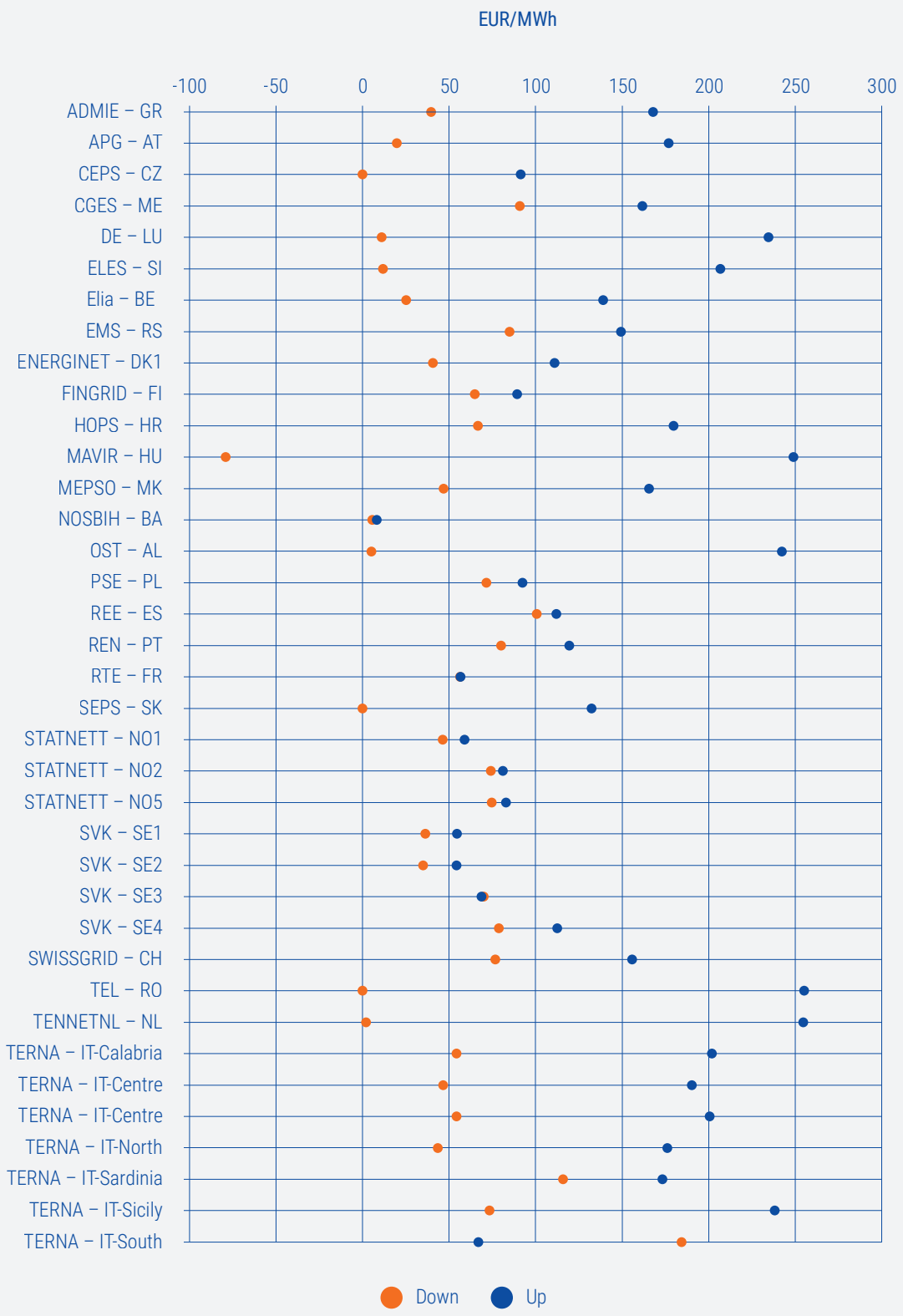


Figure 36 – Weighted average price of balancing energy activation (upward/downward) for aFRR (EUR/MWh)

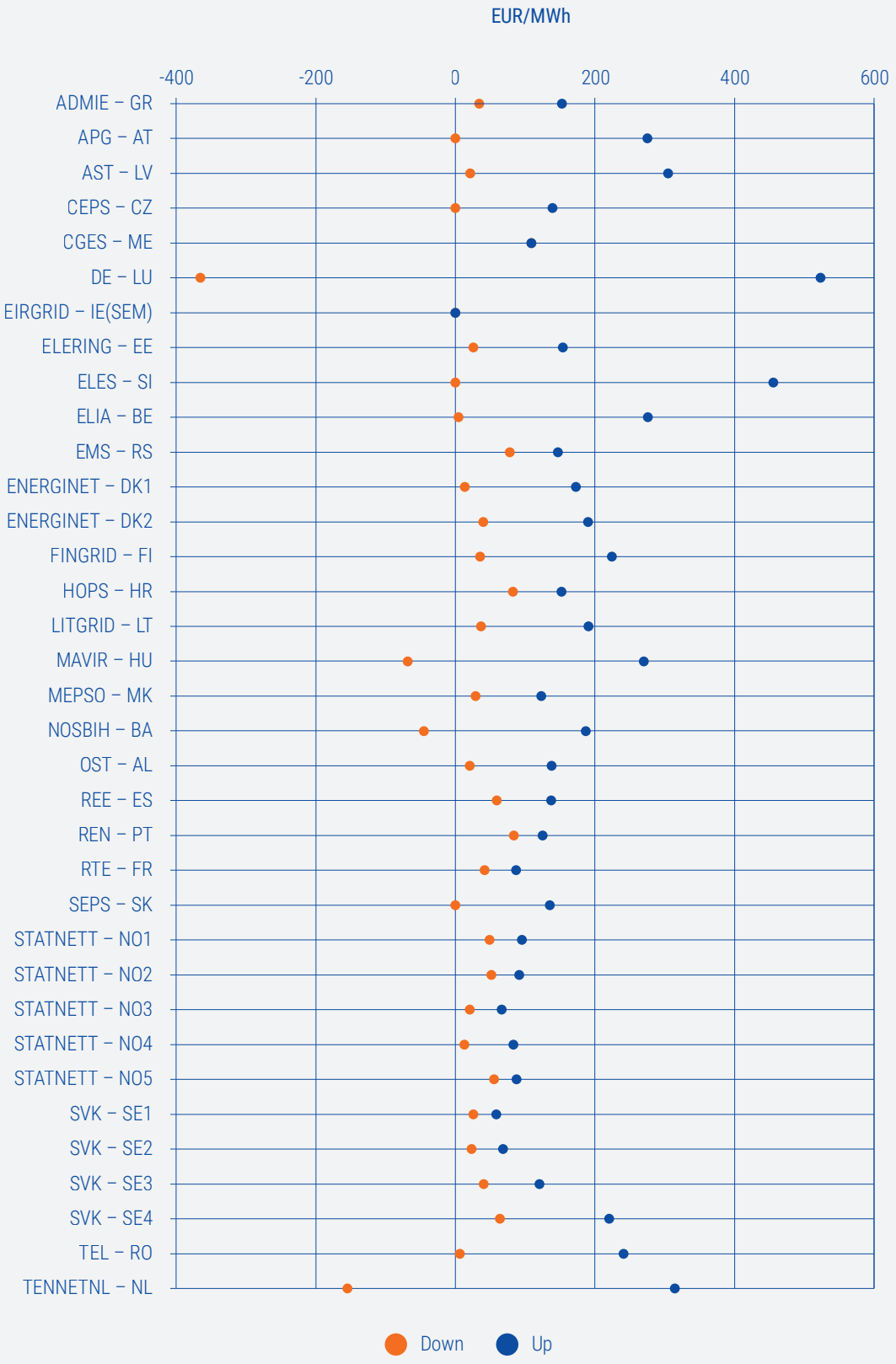


Figure 37 – Weighted average price of balancing energy activation (upward/downward) for mFRR (EUR/MWh)

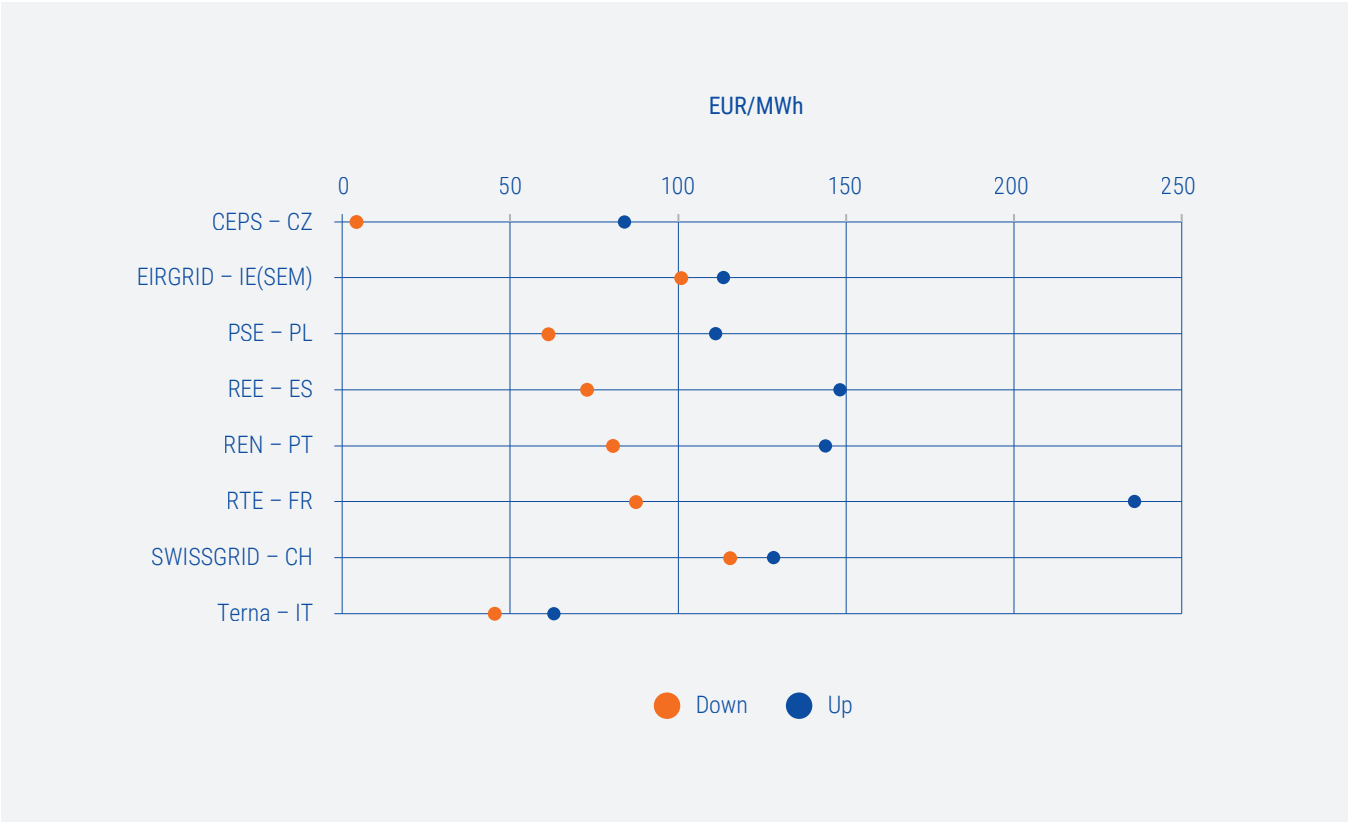


Figure 38 – Weighted average price of balancing energy activation (upward/downward) for RR (EUR/MWh)

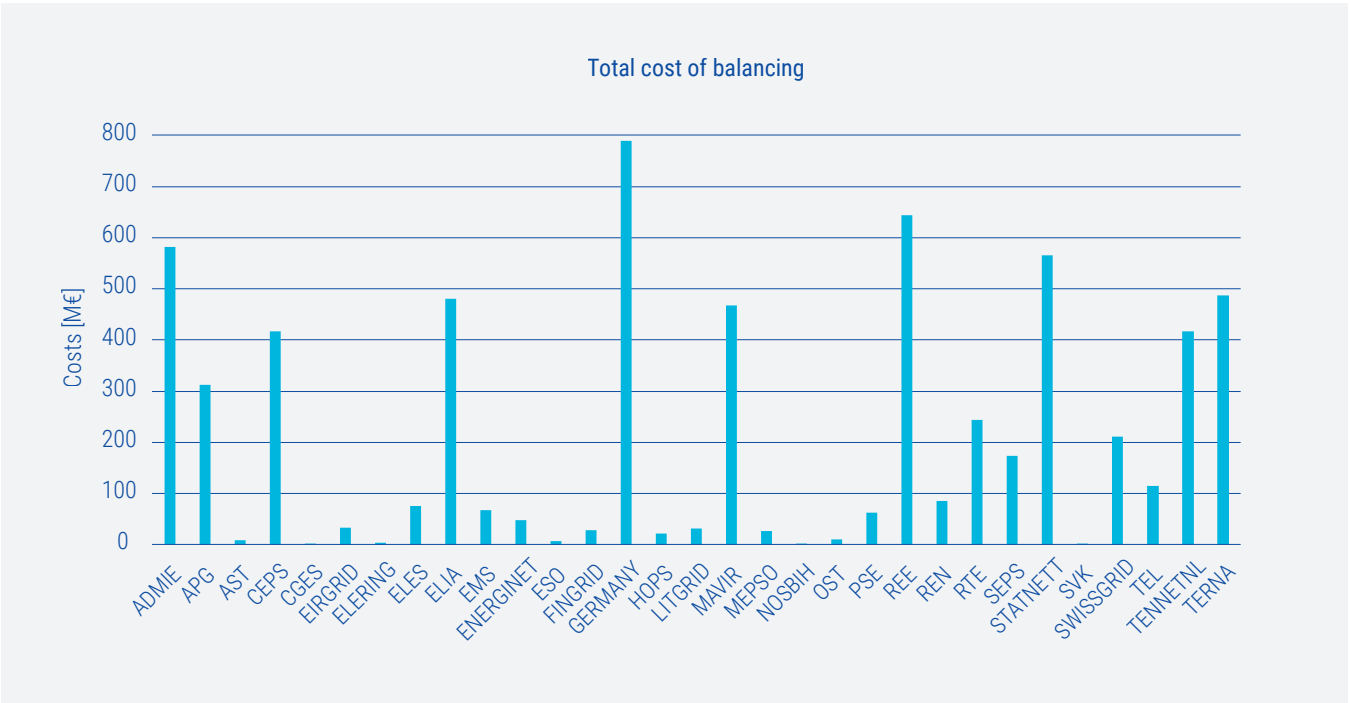


Figure 39 – Total cost of balancing (EUR)

5.4. Indicator 3.4: economic efficiency and reliability of the balancing markets

This indicator asses the efficiency and reliability of each balancing platform.

Legal reference	Article 59(4)(e) of EB Regulation
Data source	RR platform
Calculation	For each balancing platform, the following indicators are calculated: 1. total volume of submitted bids / month / direction / TSO (MWh) 2. total volume of demand / month / direction / TSO (MWh) 3. total volume of selected bids / month / direction / TSO (MWh) 4. total volume of exports / month / TSO (MWh) 5. total volume of imports / month / TSO (MWh) 6. repartition of the use of inelastic and elastic need / TSO (% elastic demand and inelastic demand) 7. monthly average and standard deviation values and distribution of the CBMP / month / TSO 8. monthly average value of the available and used CZC / border / direction (MW) 9. monthly average value of the number of uncongested areas / months 10. number of occurrences of unsatisfied inelastic need / TSO and volume (% of market time unit [MTU]) 11. incident overview.

The volume of import/export displays numbers which already consider the net position (needs covered and own assigned bids) of each TSO.

Figure 40 – RR platform: monthly submitted bids (upward/downward) per TSO (MWh)

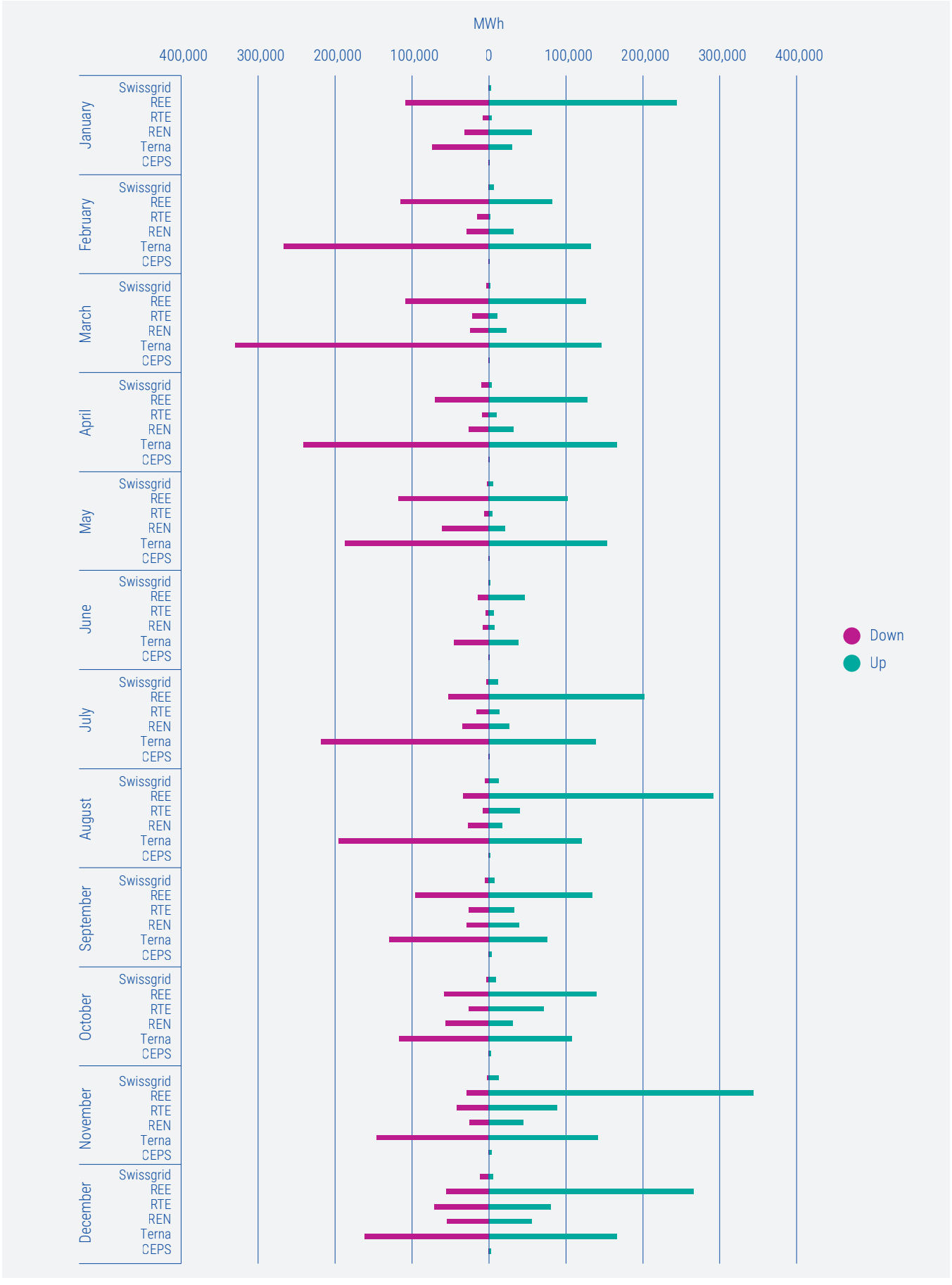


Figure 41 – RR platform: monthly volume of submitted bids (upward/downward) per TSO (MWh)

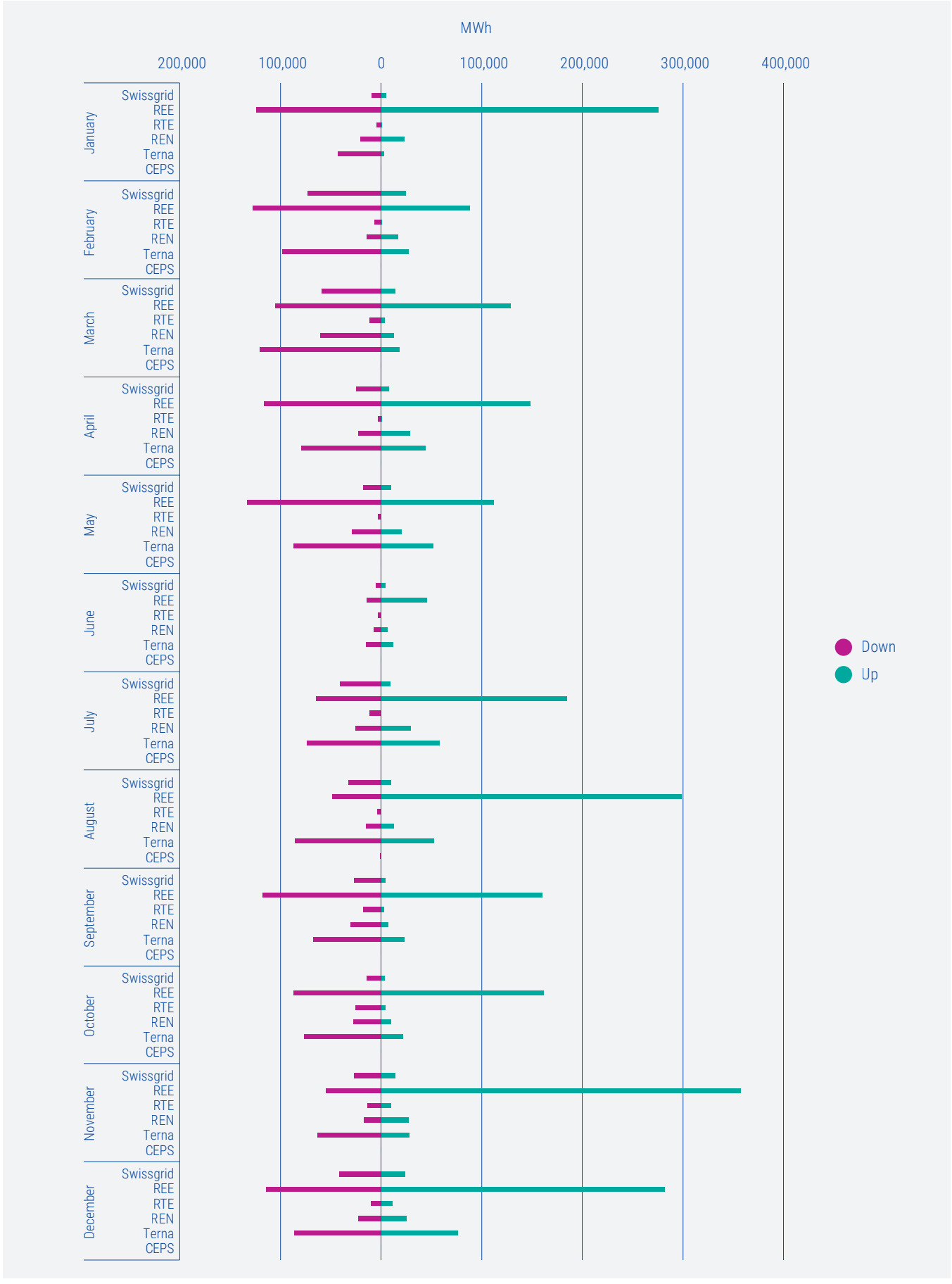


Figure 42 – RR platform: monthly volumes of selected bids (upward/downward) per TSO (MWh)

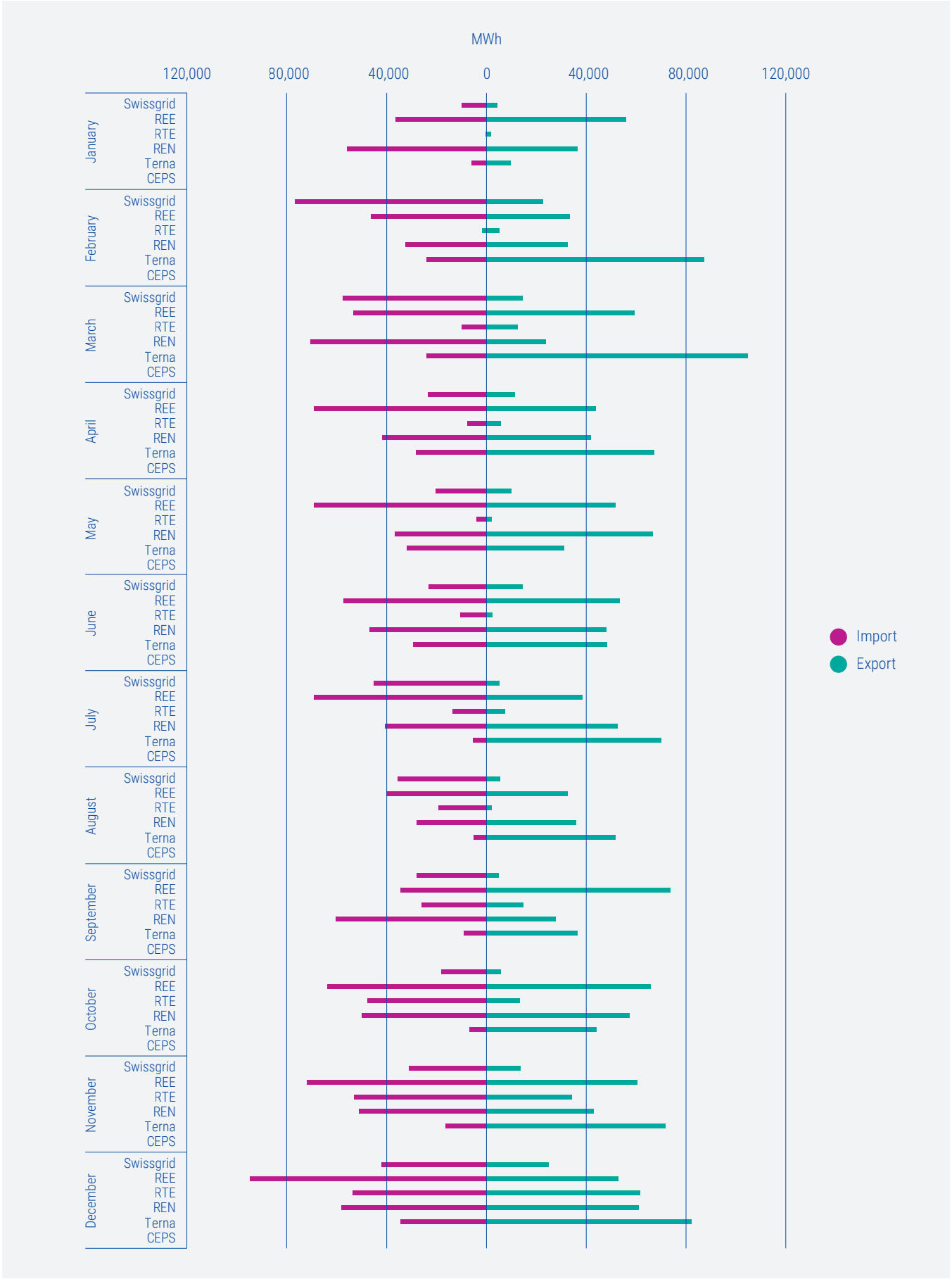


Figure 43 – RR platform: monthly volumes of imports/exports (upward/downward) per TSO (MWh)

Note: The maximum RR flow on the France-Spain border is limited by RTE in order to maintain power system reliability. Until 20 September 2021, the flows were limited to 300 MW. As of that date, RR flows are limited to a maximum of 300 MW in the direction of the scheduled flows and a maximum of 500 MW in the opposite direction of the scheduled flows.

Inelastic/elastic needs

Due to the nature of the replacement reserves, this product usually meets an elastic demand. In early 2021 (January and February), a considerable amount of inelastic needs arose in the South West Europe region. Generally, a higher volume of elastic needs in comparison to inelastic needs can be expected for RR.

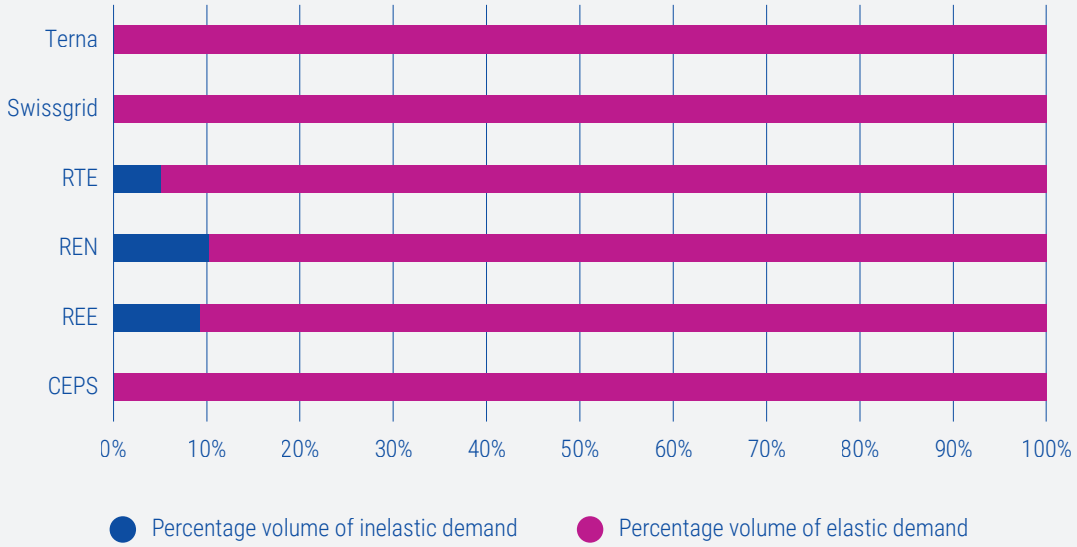


Figure 44 – RR platform: repartition of the use of inelastic and elastic needs per TSO

CMBP values for the RR platform

Among most of the TERRE TSOs, a general trend in increasing average costs for RR products can be observed in the following charts. This can be partly attributed to the overall trend of increasing wholesale prices of electricity in 2021. In this case, ČEPS is an exception as no borders to the other TERRE TSOs existed in 2021.

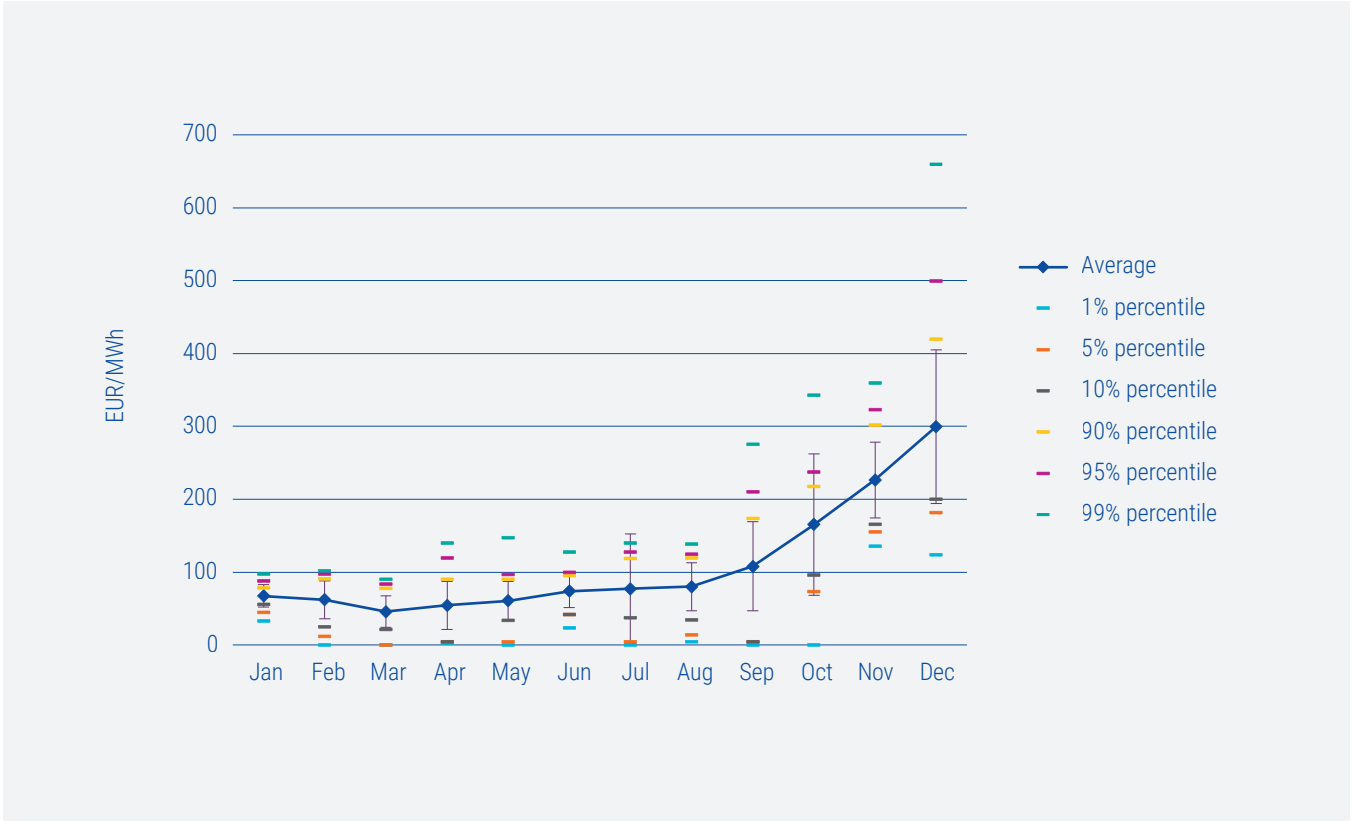


Figure 45 – RR platform: monthly average and standard deviation values and distribution of the CBMP per month – Swissgrid (EUR/MWh)

Figure 46 – RR platform: monthly average and standard deviation values and distribution of the CBMP per month – ČEPS (EUR/MWh)

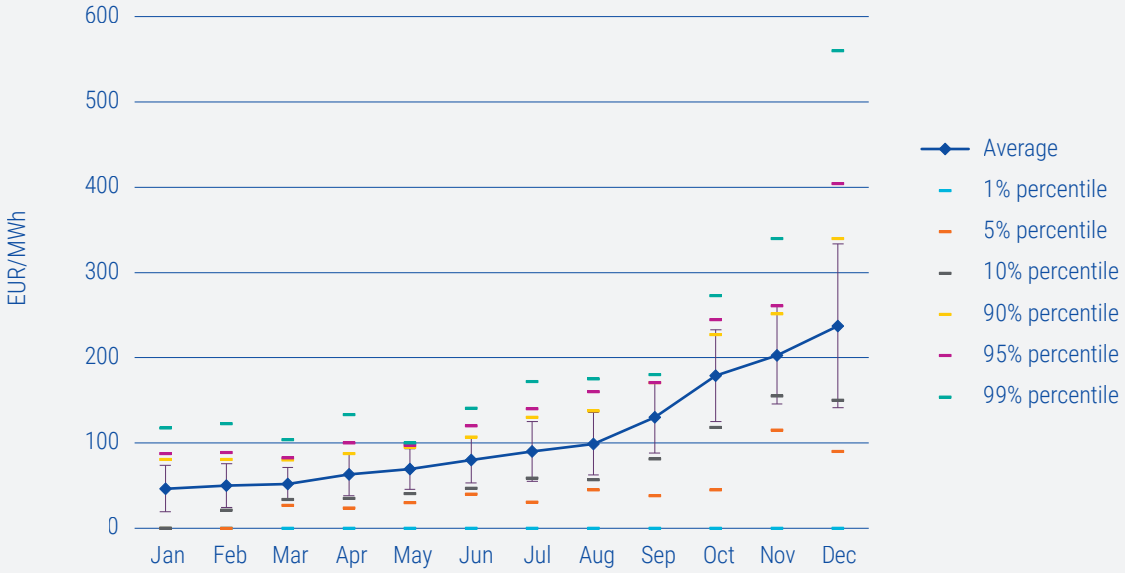


Figure 47 – RR platform: monthly average and standard deviation values and distribution of the CBMP per month – Terna (EUR/MWh)

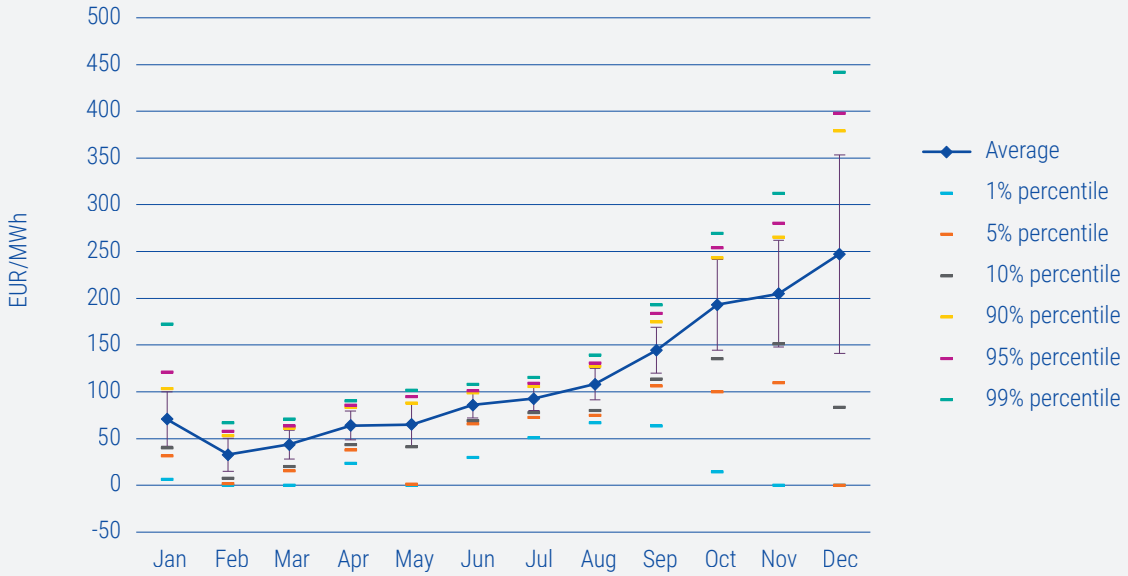


Figure 48 – RR platform: monthly average and standard deviation values and distribution of the CBMP per month – REE (EUR/MWh)

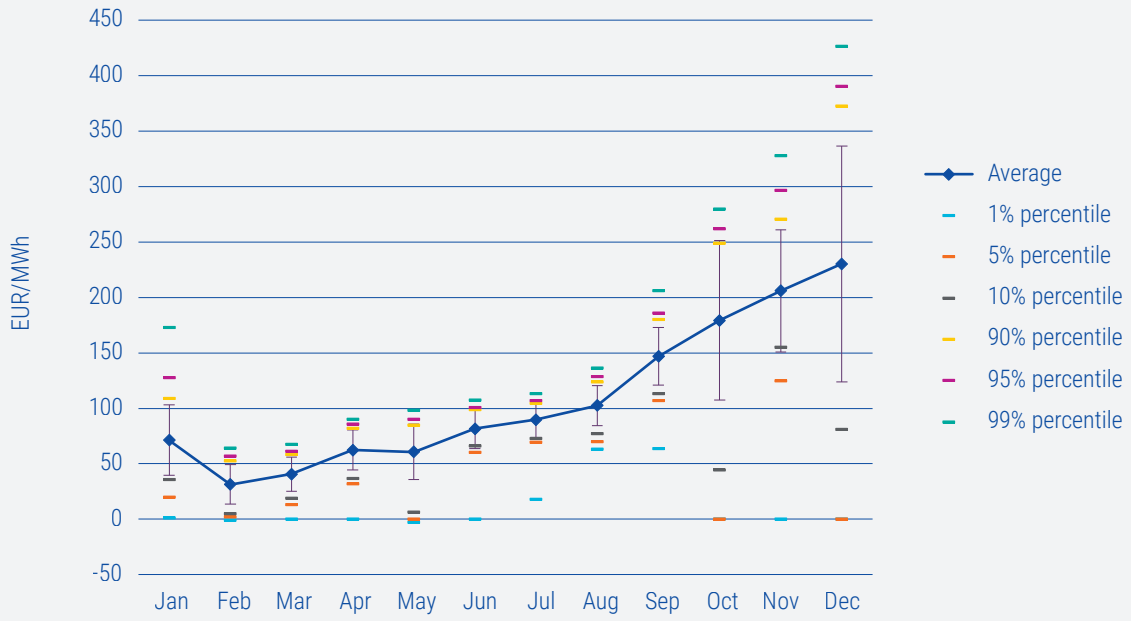


Figure 49 – RR platform: monthly average and standard deviation values and distribution of the CBMP per month – REN (EUR/MWh)

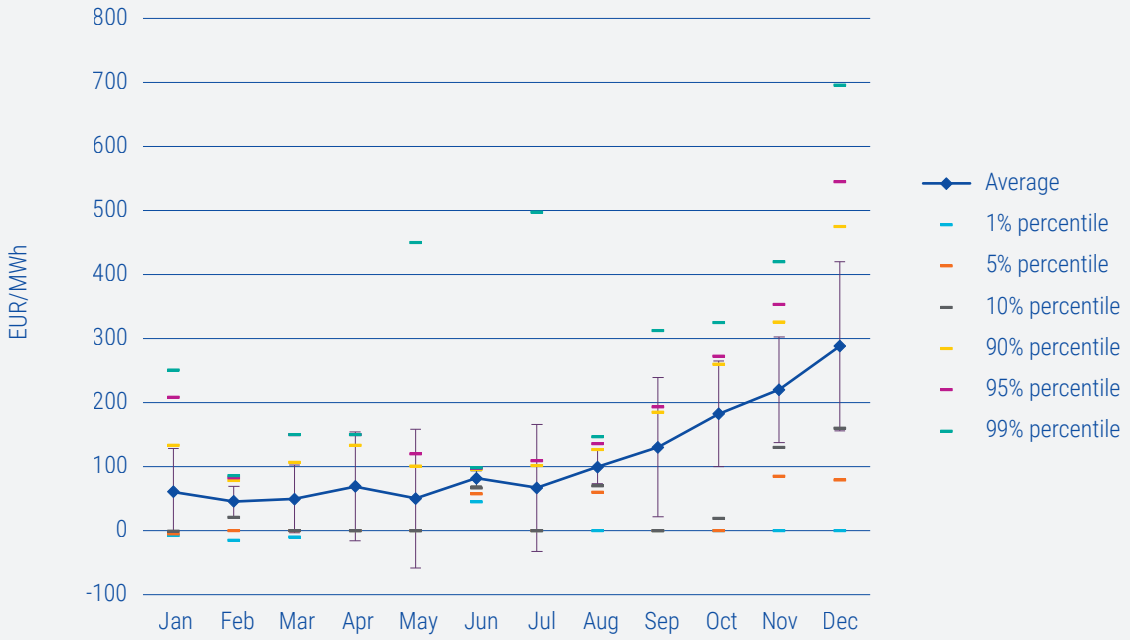


Figure 50 – RR platform: monthly average and standard deviation values and distribution of the CBMP per month – RTE (EUR/MWh)

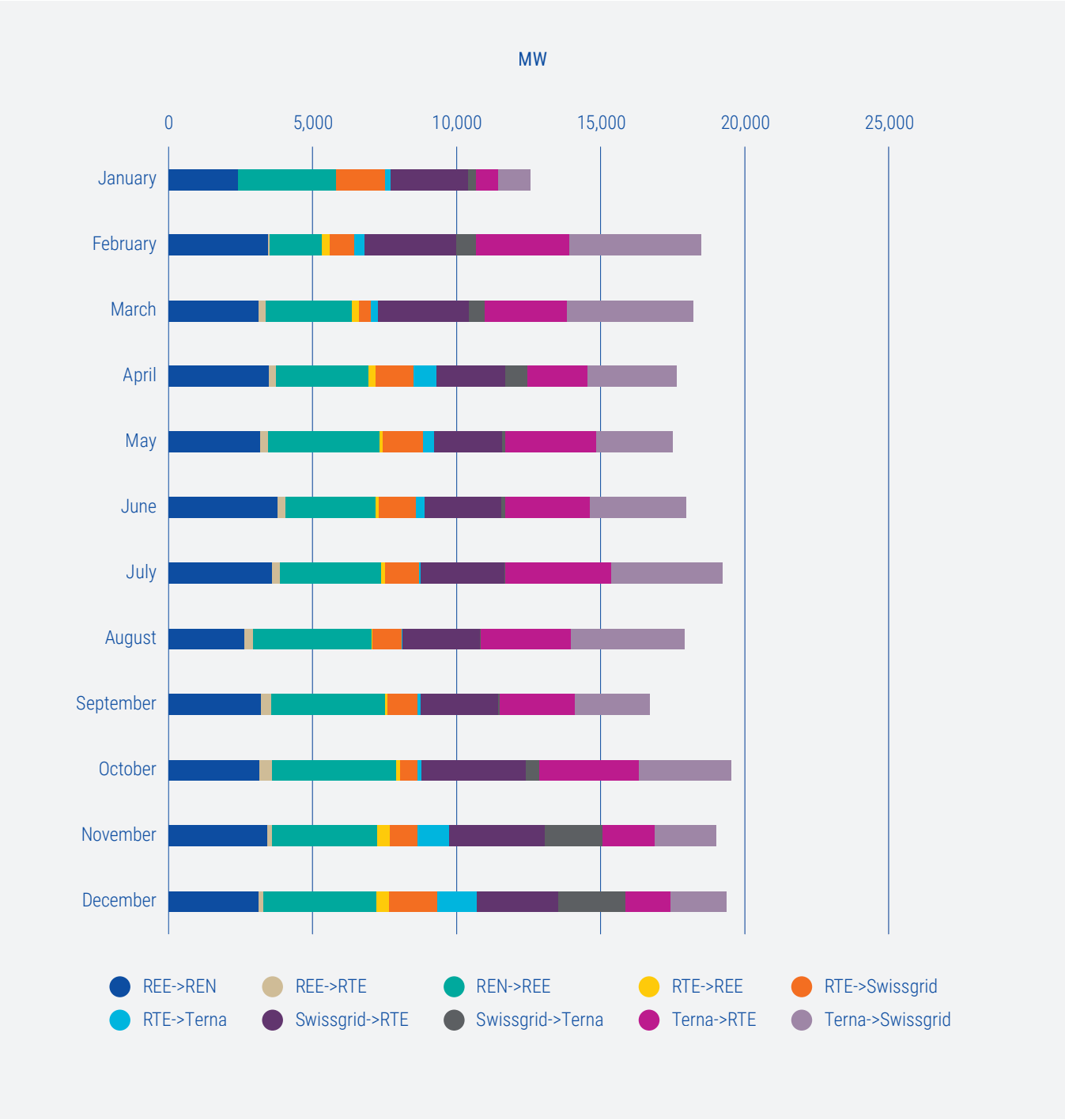


Figure 51 – RR platform: monthly average value of offered CZC per border and per direction (MW)

Note: The maximum RR flow on the France-Spain border is limited by RTE in order to maintain power system reliability. Until 20 September 2021, the flows were limited to 300 MW. As of that date, RR flows are limited to a maximum of 300 MW in the direction of the scheduled flows and a maximum of 500 MW in the opposite direction of the scheduled flows.

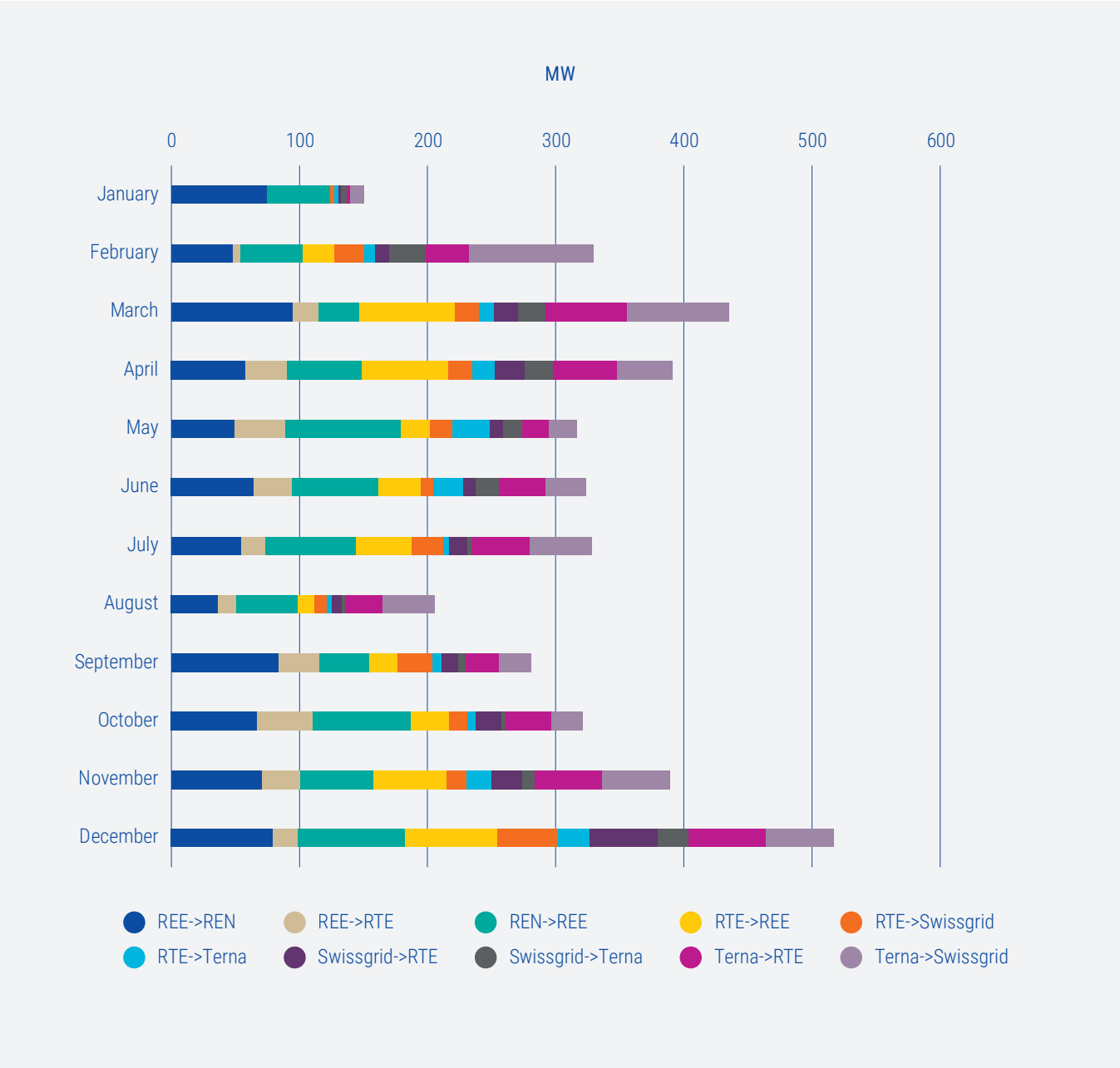


Figure 52 – RR platform: monthly average value of used CZC per border and per direction (MW)

	Average value of uncongested LFC areas
January	4.98
February	4.91
March	4.93
April	4.91
May	4.96
June	4.92
July	4.91
August	4.95
September	4.98
October	4.99
November	4.97
December	4.99

Table 8 – Monthly average value of the number of uncongested areas

For further reference, as ČEPS currently does not have any borders with the remaining TERRE TSOs, the maximum value achievable is 5 (i.e. no congestions were identified).

Incidents in 2021

The table below describes the overall incidents during the operation of the TERRE platform in 2021.

Criticality	Month	Description
Major incident	February	Connection issue between LIBRA and Verification Platform
Minor incident	February	Error on Transparency Platform for France RR prices – discrepancy on EAR file December
Major incident	February	Energy account report January 2021 incorrect
Major incident	April	Incorrect TERRE data on Transparency Platform
Major incident	April	Energy Communications Platform connection issue with Verification Platform

Criticality	Month	Description
Critical incident	April	TERRE-RR-REGION-2 not properly started
Minor incident	May	Aggregated bids – wrong publication sent to ENTSO-E
Minor incident	September	Unexpected error when downloading messages LIBRA-A34 and A35
Critical incident	September	Swissgrid, TERNA, RTE did not receive files from LIBRA for period 8:00–9:00. Issue with Energy Communications Platform connection
Critical incident	November	Process instances for period 1:00–2:00 were not run
Critical incident	December	LIBRA platform disconnected from the internet due to security vulnerability
Critical incident	December	Energy Communications Platform endpoints lost the external connection

Table 9 – RR platform incident overview, 2021

5.5. Indicator 3.5: possible inefficiencies and distortions on balancing markets

This indicator assesses the following data for each balancing platform and for each month:

- 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 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 EB Regulation
Data source	RR platform
Calculation	1. Performance indicators are included in amendment to pricing methodology. 2. This calculates the volume-weighted average price of the last (most expensive) 5% of the volume of submitted standard balancing energy bids for each European balancing platform, per direction and per participating TSO.

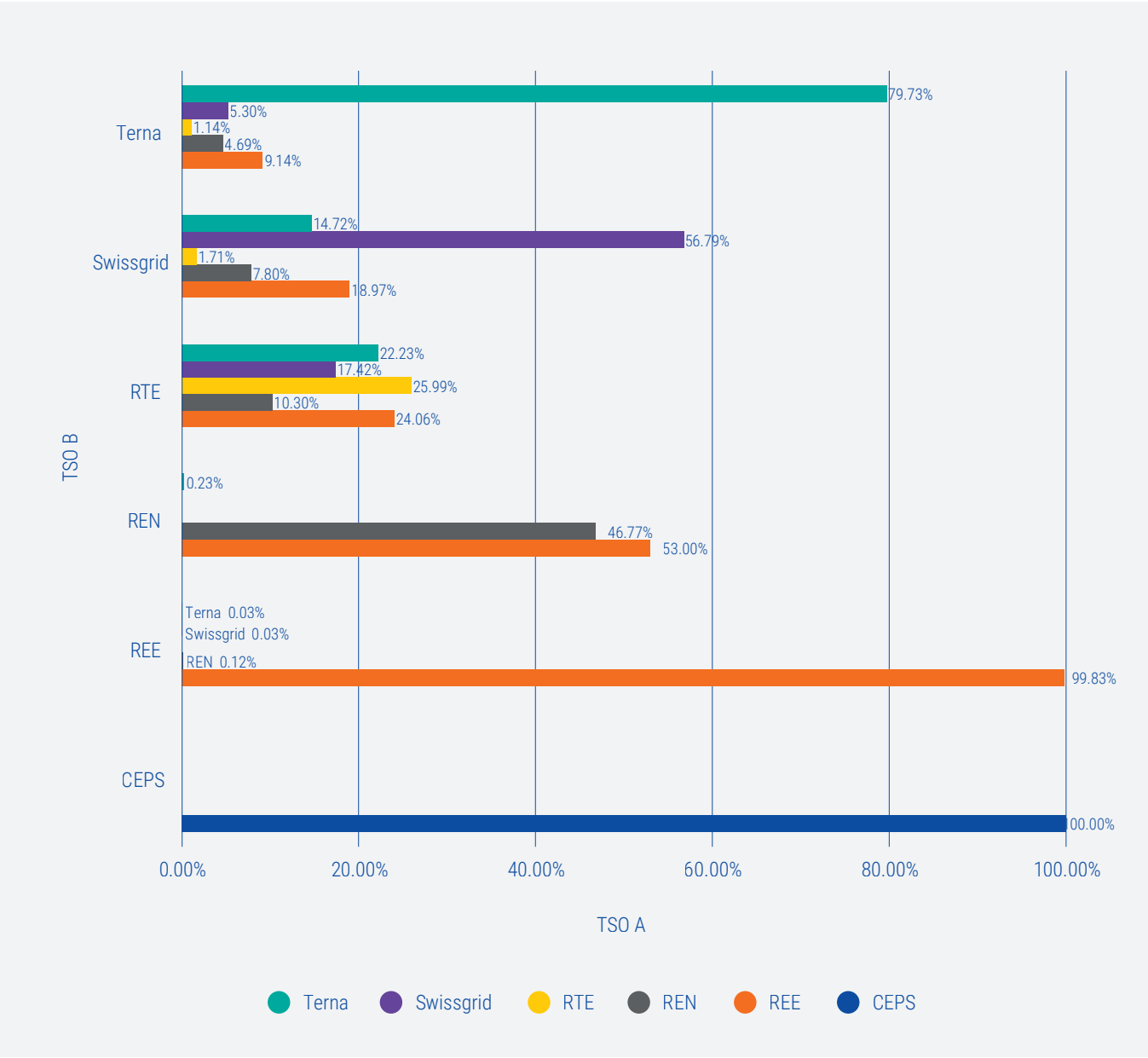


Figure 53 – RR platform: % of time when the bids from one TSO (TSO A) define the CBMP for another TSO (TSO B), for both TSOs

The CMBP prices correlations can partly be explained by the geographic location. As ČEPS is currently not bordering any of the TERRE TSOs, the CMBPs are fully influenced on their own. As REN is only bordering REE and the available transfer capacity (ATC) on the French-Spanish border has been limited in 2021, the CMBP has been mostly influenced by the local (Portuguese) and Spanish markets. RTE's level of interconnection is higher with other TERRE TSOs than the other Iberian TSOs, thus the CMBP is significantly more influenced by other TSO regions.

Figure 54 – RR platform: monthly volume-weighted average price of the 5% most expensive submitted standard energy bids for each European balancing platform and per participating TSO – upward direction (EUR/MWh)

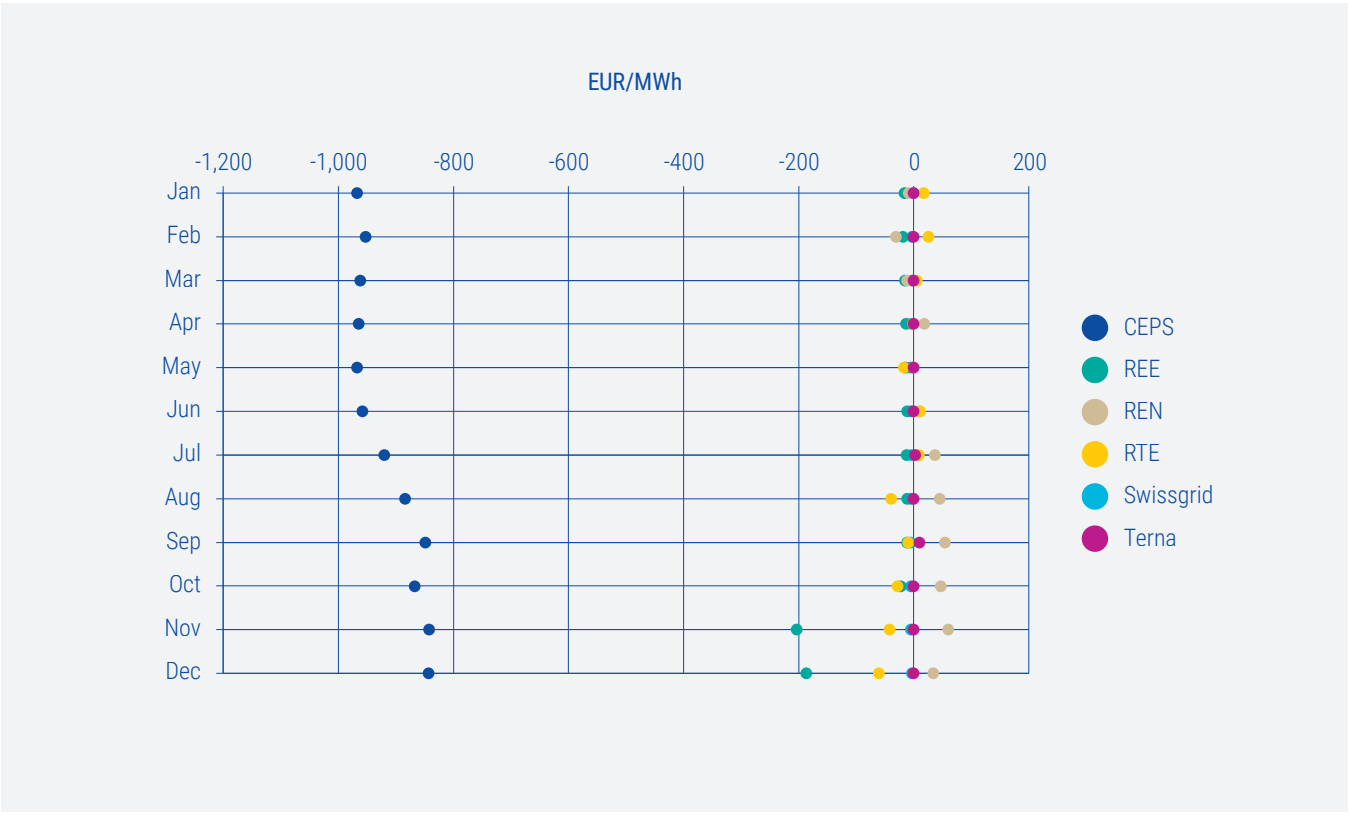


Figure 55 – RR platform: monthly volume-weighted average price of the 5% most expensive submitted standard energy bids for each European balancing platform and per participating TSO - downward direction (EUR/MWh)

5.6. Indicator 3.6: 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 Article 26(1)(f) of the EB Regulation, hence there is no loss to be reported on.

5.7. Indicator 3.7: volume and price of balancing energy used for balancing purposes, both available and activated, from standard and from specific products

This indicator displays the activated and available volume of balancing energy which is used for balancing purposes, and the yearly or monthly time-average price of the activated balancing energy.

Legal reference	Article 59(4)(h) of EB Regulation
Data source	• ENTSO-E Transparency Platform under Article 12(3)e of EB Regulation[61] • Article 3.16 of aFRR IF • Article 17(1)(f) of Transparency Regulation / per TSO
Calculation	1. 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 (aFRR/mFRR/RR) (MWh). 2. The annual yearly/monthly 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 (aFRR/mFRR/RR) (EUR/MWh).

61 See *ENTSO-E Transparency Platform – Aggregated bids* – [Link].
Certain TSOs yet not bound by the EB Regulation are submitting this information to the ENTSO-E Transparency Platform, in accordance with Articles 17(1)(d) and 17(1)(j) of the Transparency Regulation.

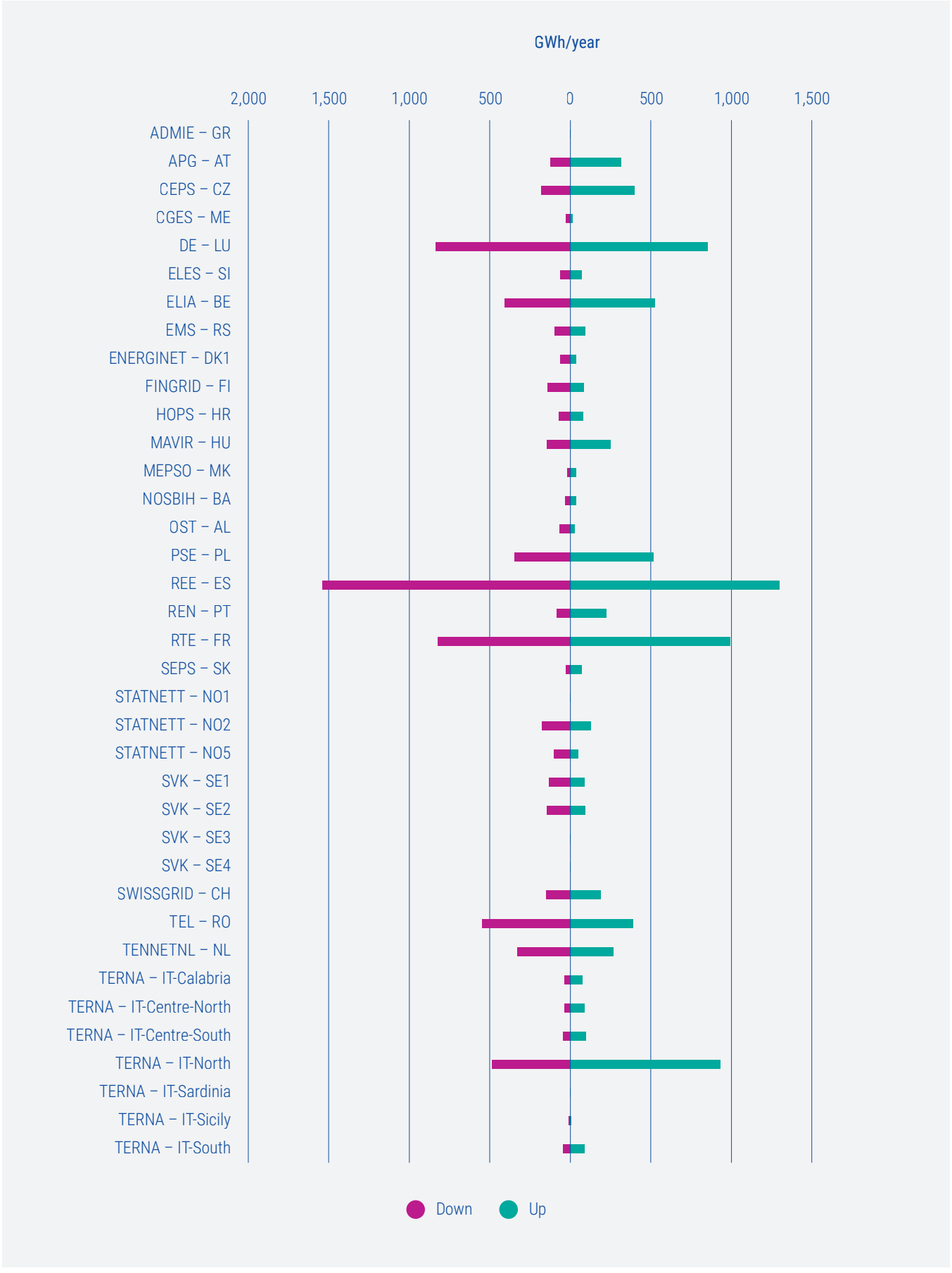


Figure 56 – Annual volume of activated balancing energy: aFRR (GWh/year)

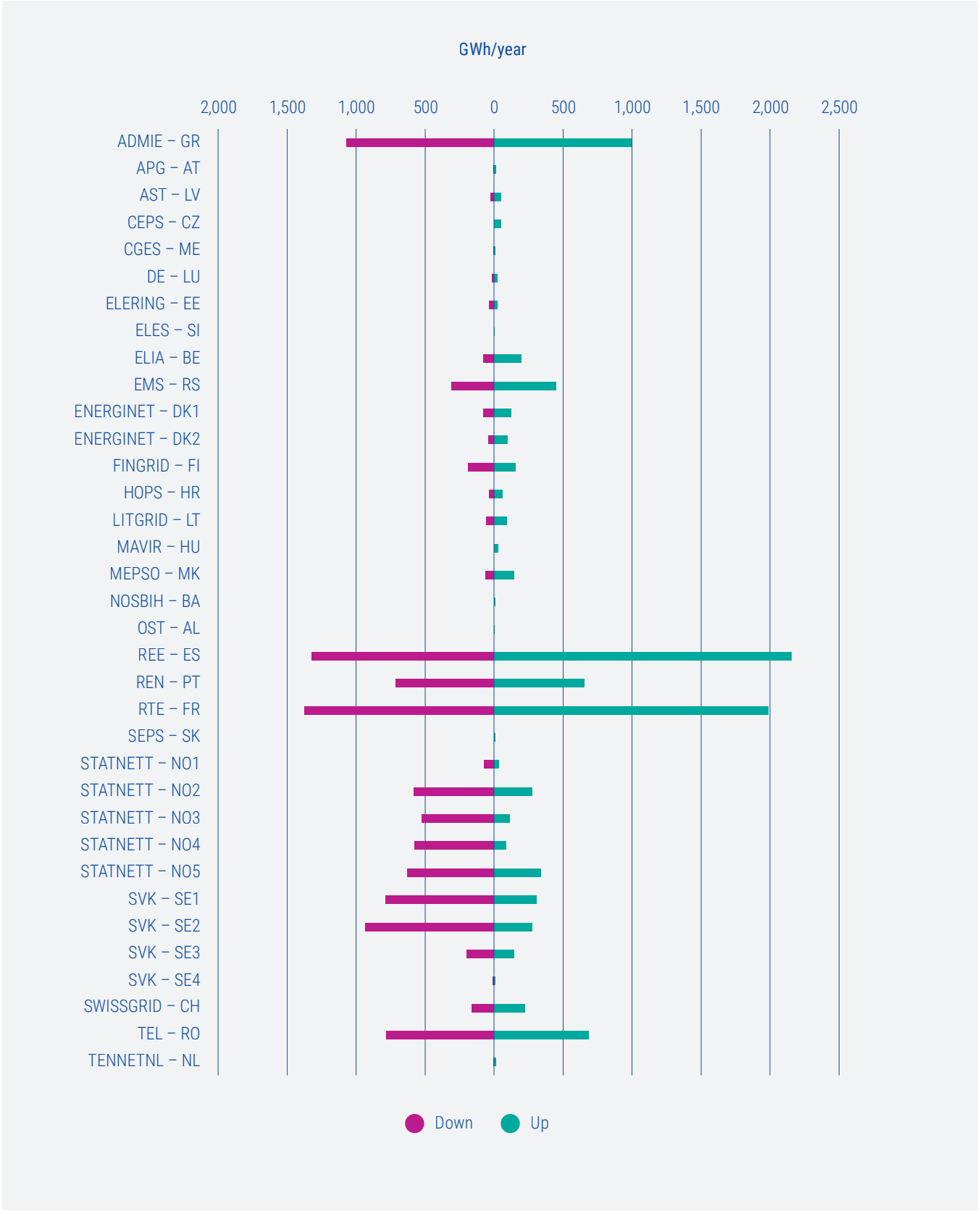


Figure 57 – Annual volume of activated balancing energy: mFRR (GWh/year)

Note: The values for IPTO have been adjusted in order to include only balancing activations.

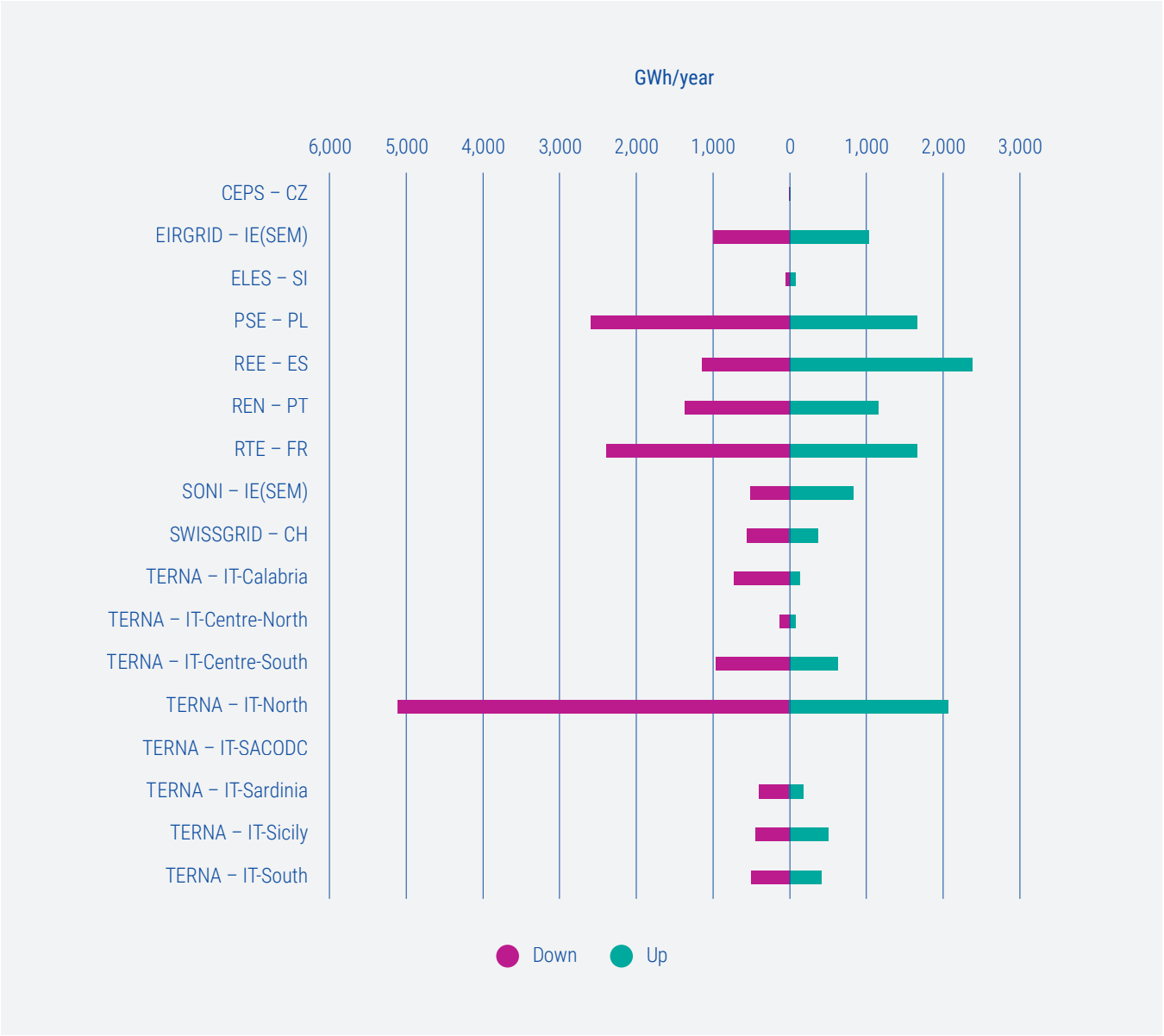


Figure 58 – Annual volume of activated balancing energy: RR (GWh/year)

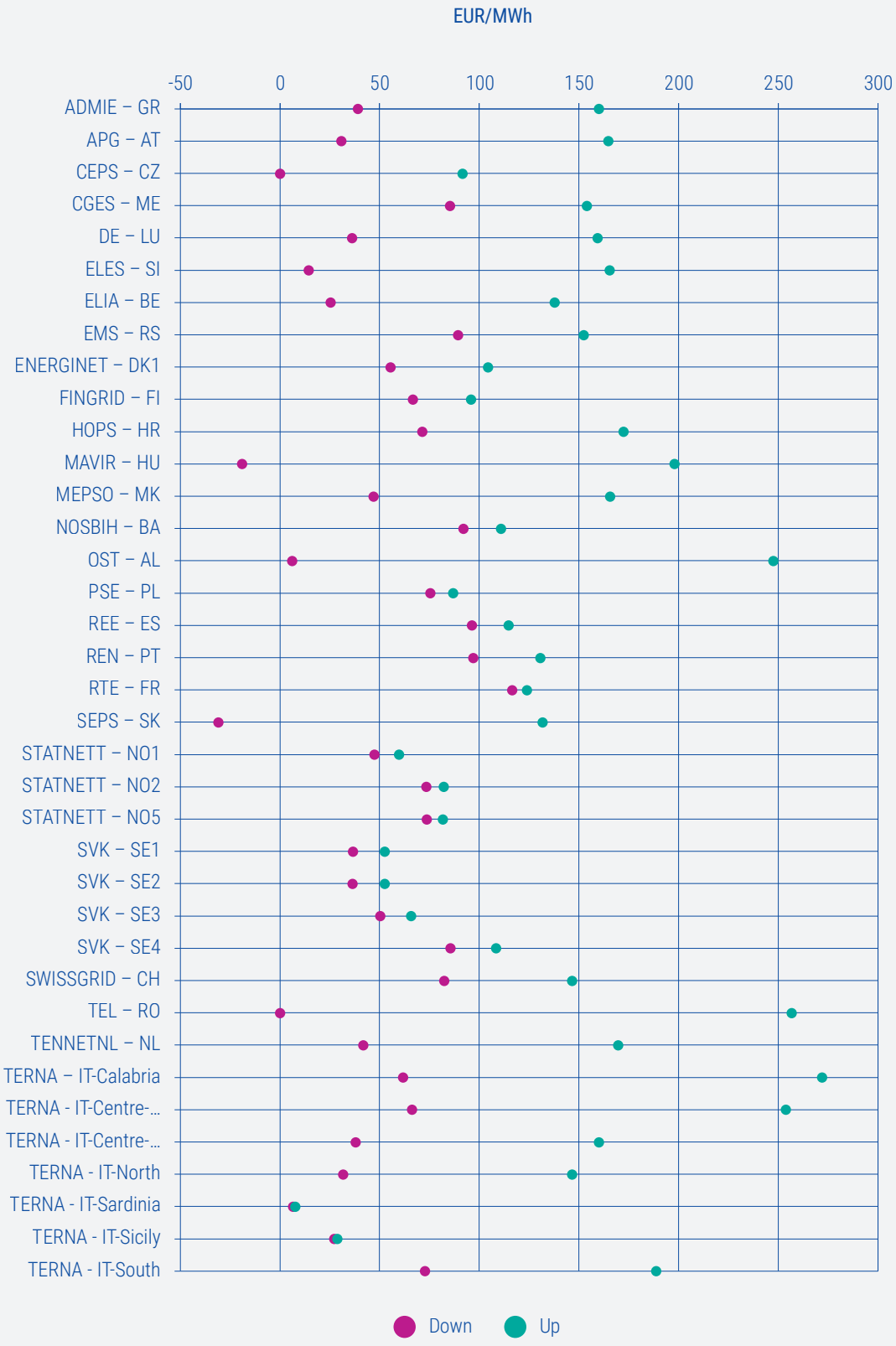


Figure 59 – Time-average price of activated balancing energy: aFRR (EUR/MWh)

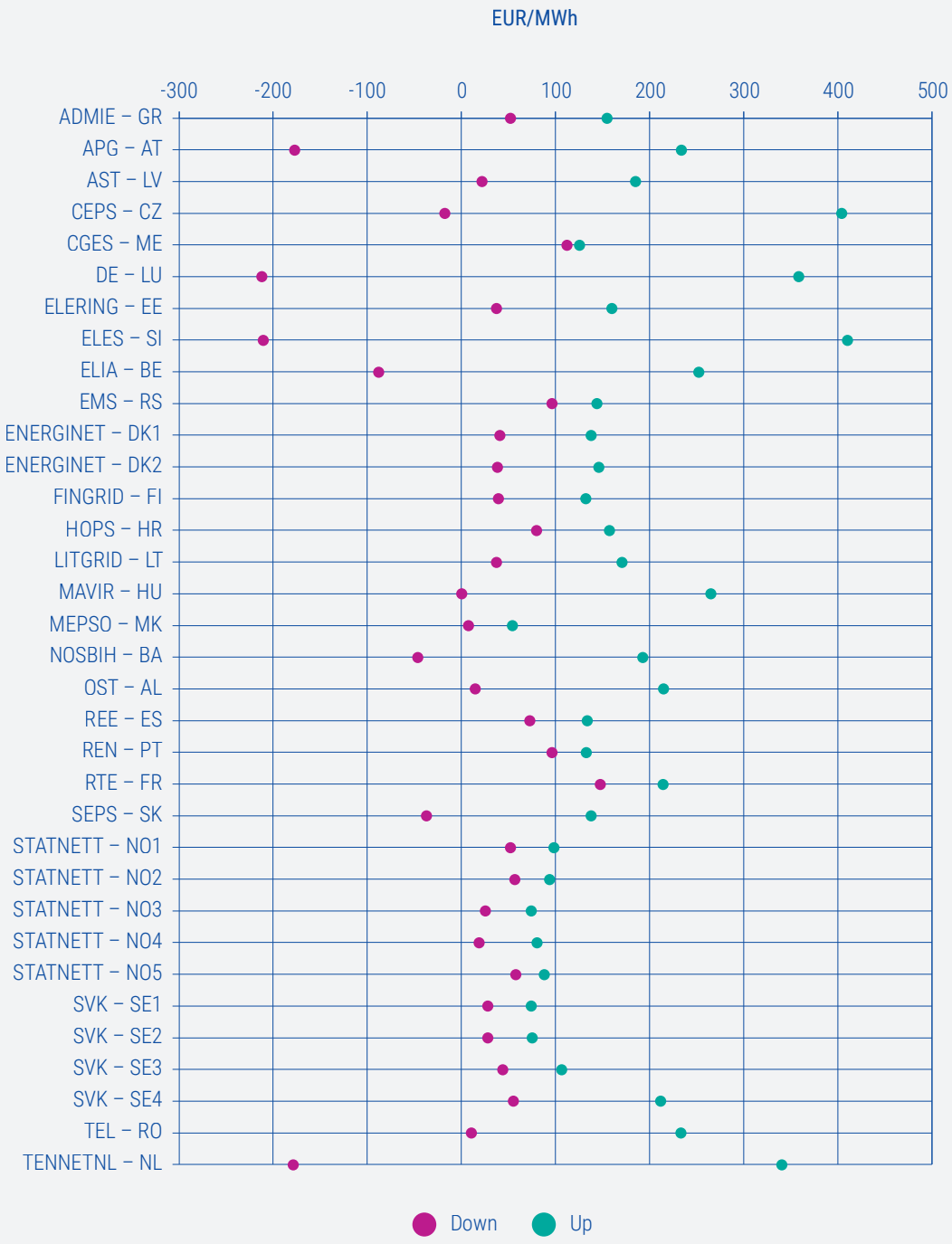


Figure 60 – Time-average price of activated balancing energy: mFRR (EUR/MWh)

Figure 61a – Time-average price of activated balancing energy: RR (EUR/MWh)

Some countries implement a proactive model (i.e. use the three processes, aFRR, mFRR, RR), while other TSOs follow a reactive model (focused on aFRR and mFRR). This can be one reason influencing the different intensity of volumes of activated aFRR, mFRR and RR which can be observed in the different graphs.

Figure 61b – Time-average price of activated balancing energy: RR non-standard products

5.8. Indicator 3.8: imbalance prices and the system imbalances

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).

Some point to consider for this indicator:

- In case there are no IPSs 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. This price can be compared to the price of energy on the wholesale day-ahead market.
- The spread of the average imbalance prices over those ISPs where the system imbalance is short respectively long indicates:

(a) the volatility of the imbalance prices;

(b) 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.

Legal reference	Article 59(4)(i) of EB Regulation	
Data source	ENTSO-E Transparency Platform under Articles 17(1)(g) and (h) of Transparency Regulation	
Calculation	The following sub-indicators are calculated: 1. Average price for BRP shortage over all ISPs 2. Average price for BRP surplus over all ISPs 3. Percentage of ISPs where price shortage and surplus are unequal (incidence of dual pricing) 4. Average prices for BRP shortage over all ISPs when system imbalance indicates short 5. Average prices for BRP surpluses over all ISPs when system imbalance indicates long 6. Percentage of ISPs with positive respectively negative system imbalance	
Imbalance price BRP shortage	All ISPs	All ISPs with negative system imbalance
Imbalance price BRP surplus	All ISPs	All ISPs with positive system imbalance

During 2021, ENTSO-E TSOs have been working on implementing the ISH Methodology. It is expected that the percentage of ISPs with dual pricing will reduce in the coming years, as the ISH Methodology only grants a limited window of exceptions for the application of dual pricing schemes.

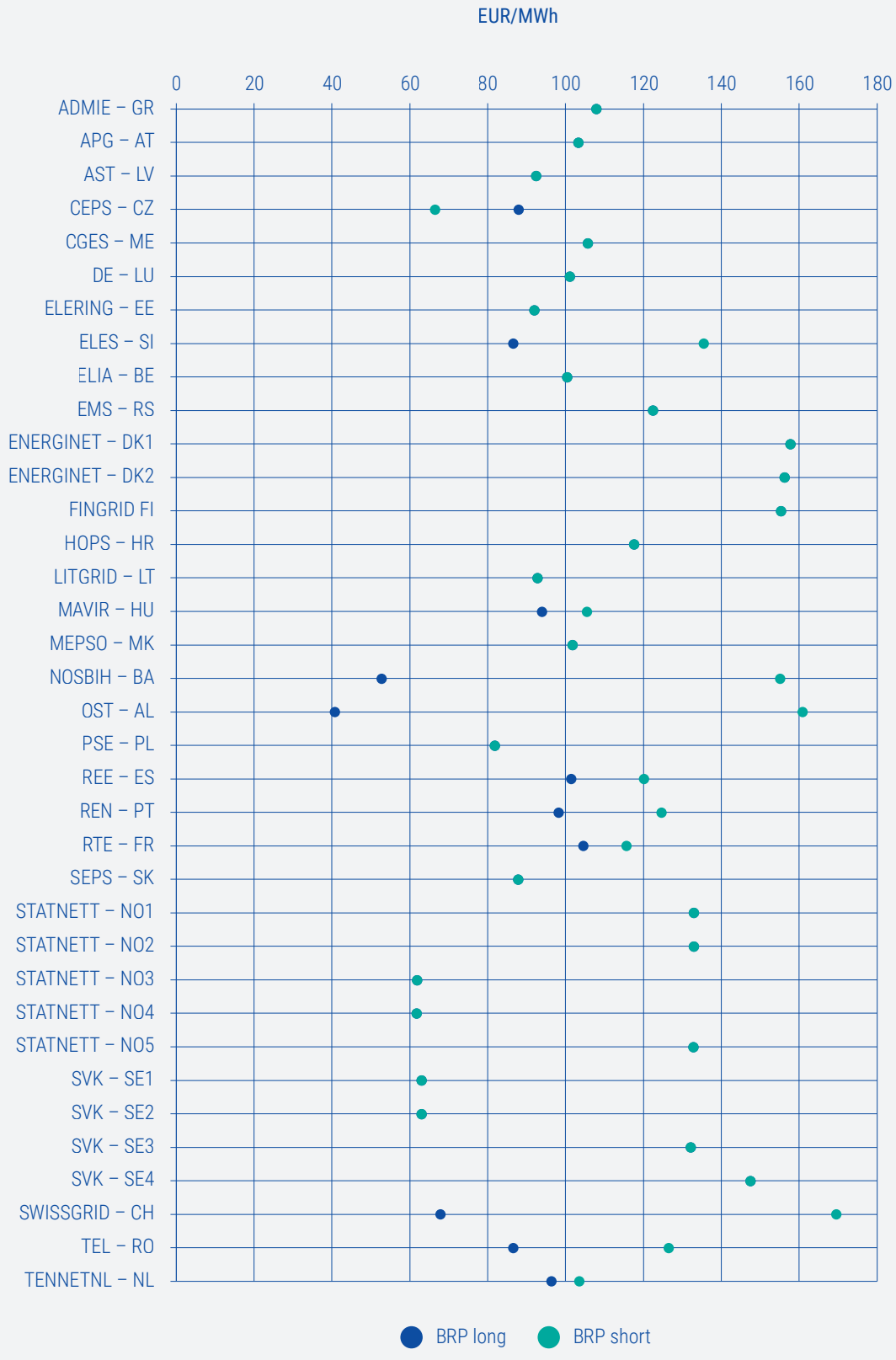


Figure 62 – Average price for BRP shortage/surplus over all ISPs (EUR/MWh)

Note: Values for Nordic TSOs are from November and December 2021.

Figure 63 – Average price for BRP generation and consumption shortage/surplus (dual position systems) (EUR/MWh)

Note: Values for Nordic TSOs are from January to October 2021.

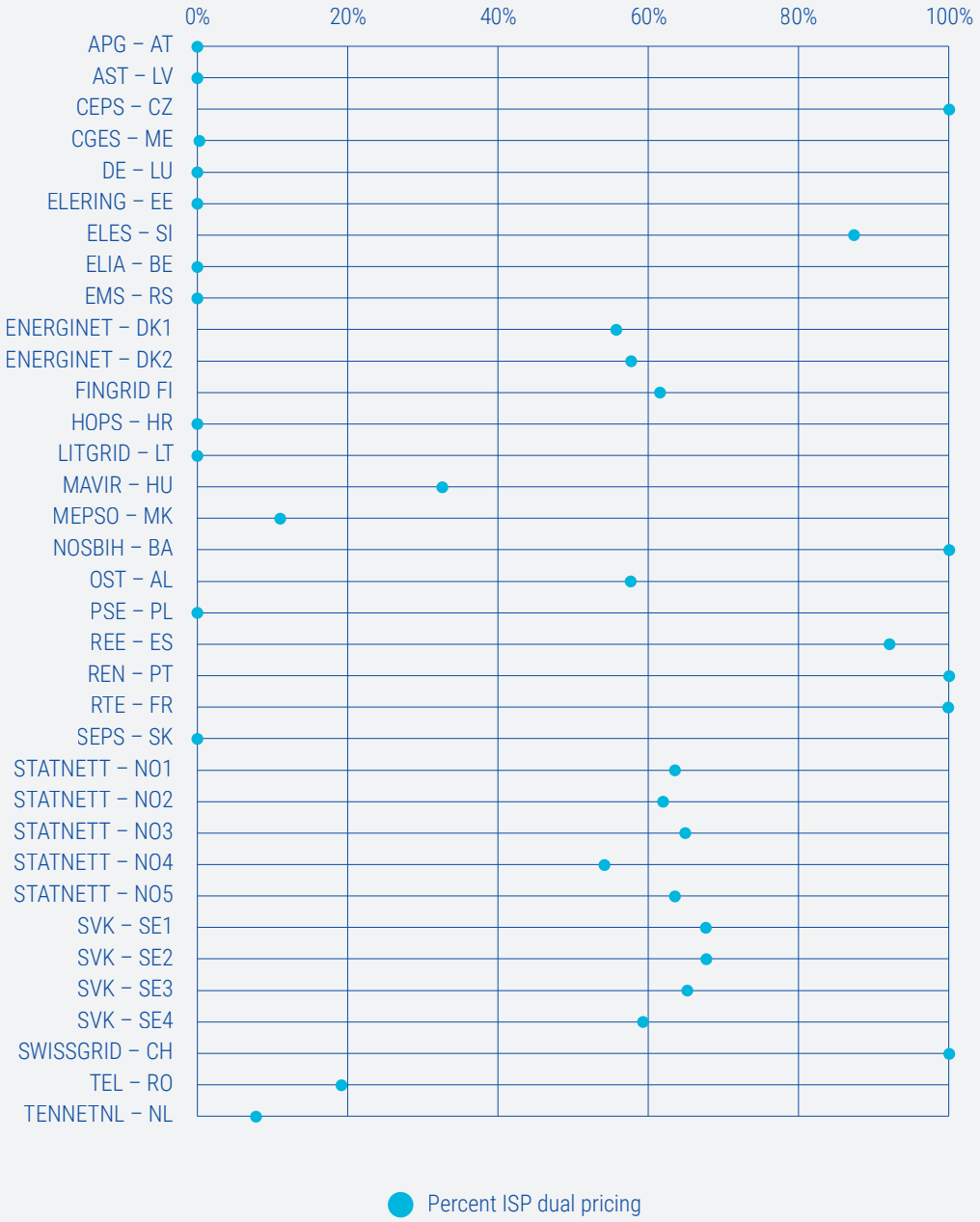


Figure 64 – Percentage of ISPs where price shortage and surplus are unequal (incidence of dual pricing according to harmonised ISH Methodology definition)

Note: Dual pricing for Nordic TSOs and Italy BRP generation imbalance only. Values for Nordic TSOs are from January to October 2021.

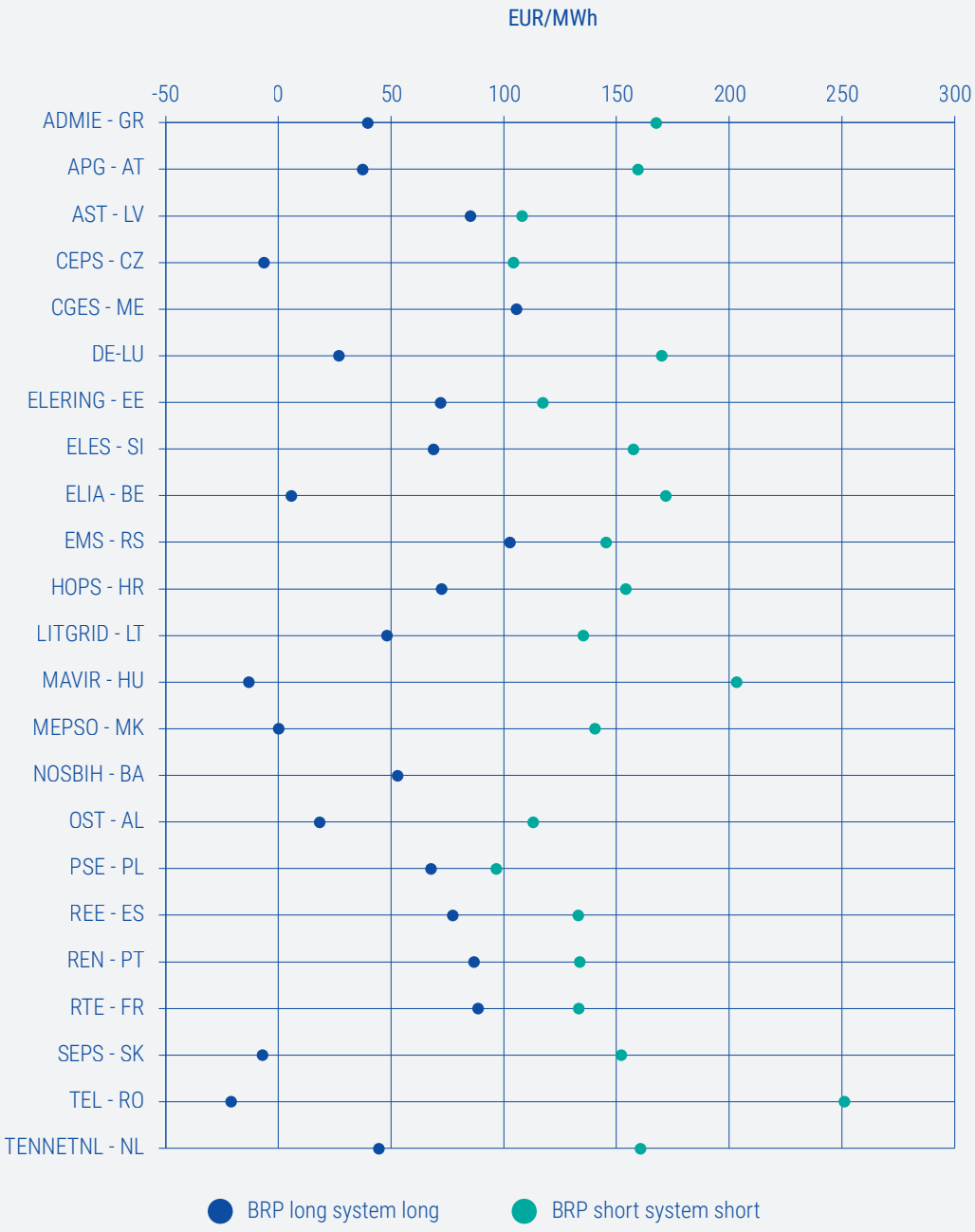


Figure 65 – Average prices for BRP shortage over all ISPs when system imbalance indicates short, and average prices for BRP surpluses over all ISPs when system imbalance indicates long (EUR/MWhISP all)

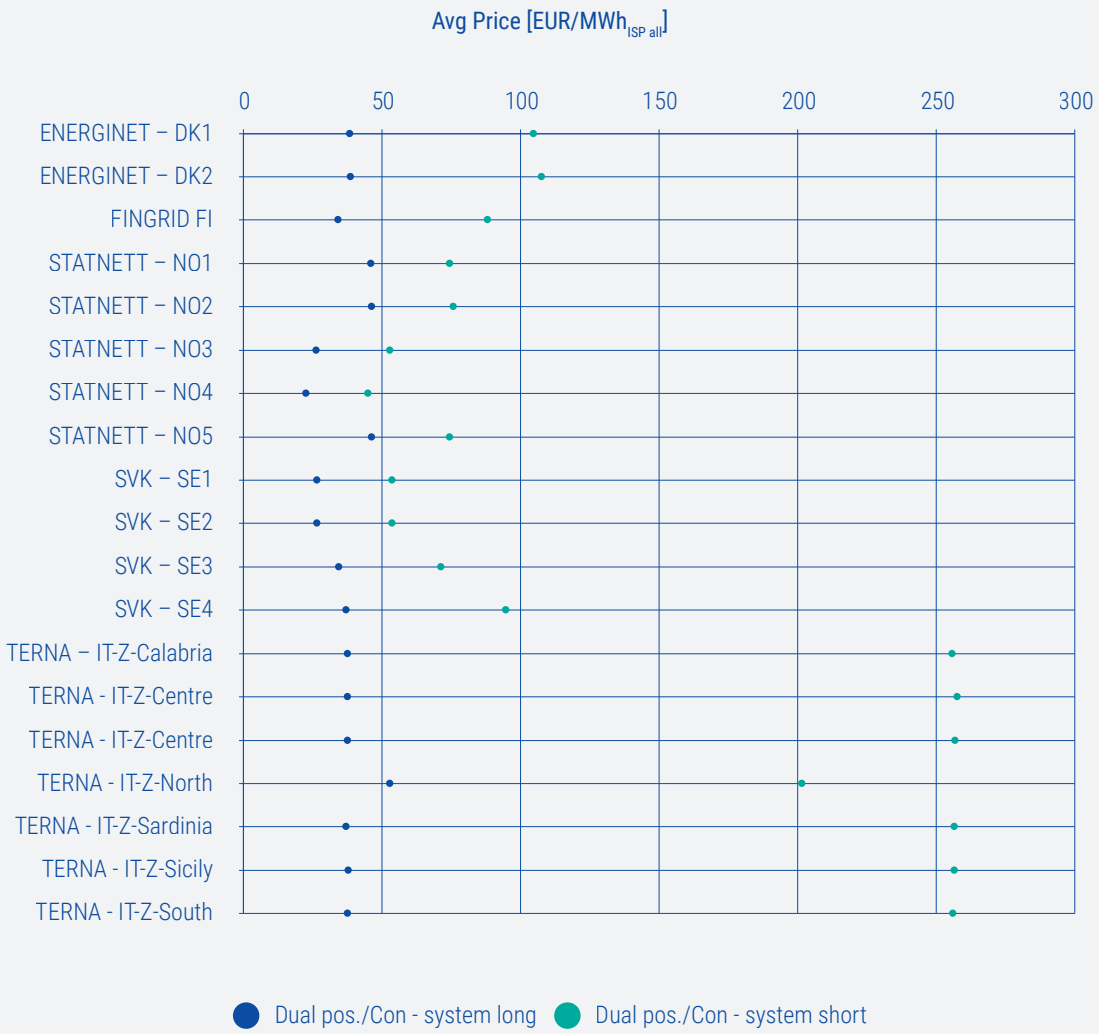


Figure 66 – Average prices for BRP generation shortage over all ISPs when system imbalance indicates short, and average prices for BRP generation surpluses over all ISPs when system imbalance indicates long (for systems with dual position) (EUR/MWhISP all)

Note: Values for Nordic TSOs are from January to October 2021.

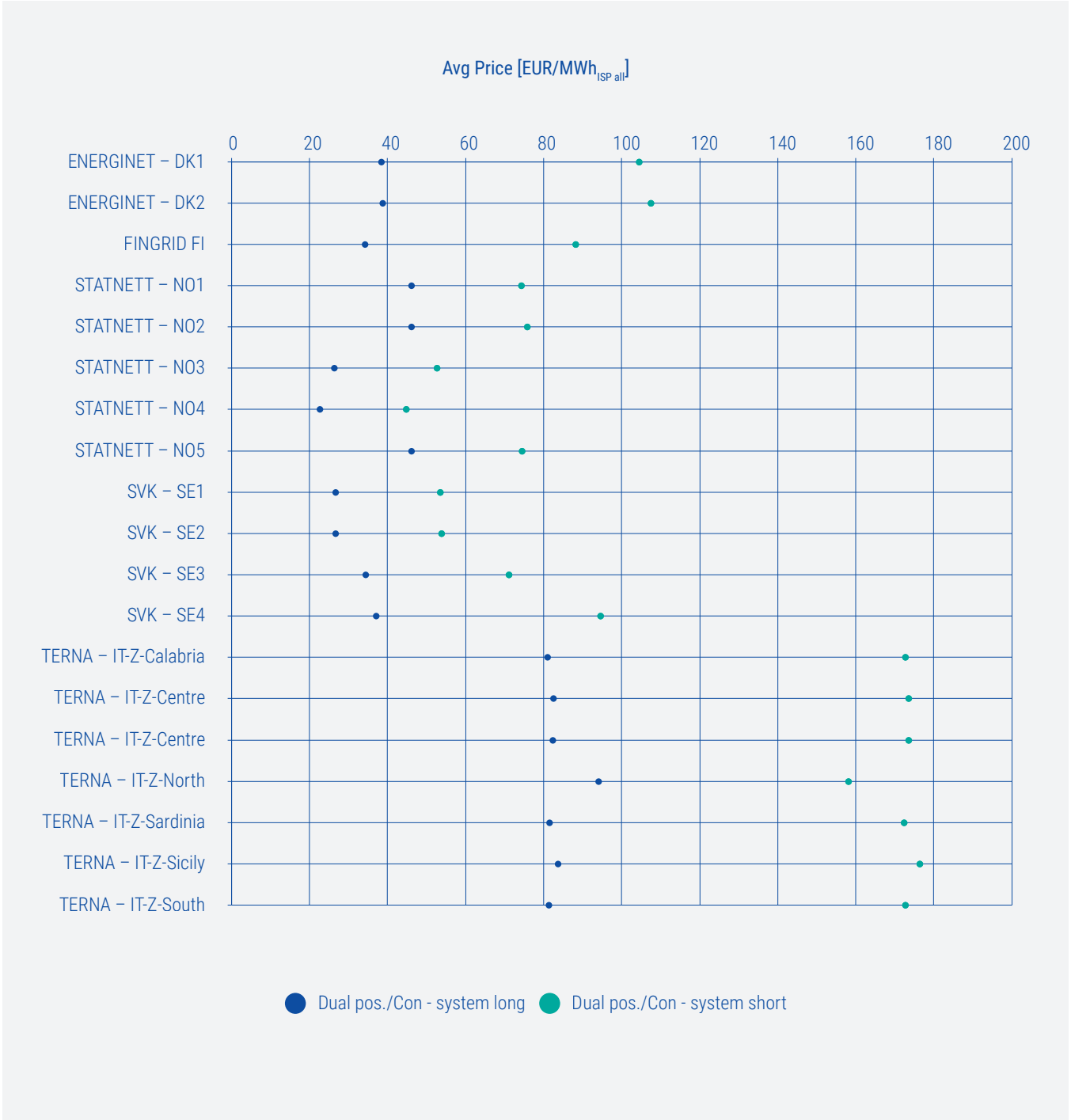


Figure 67 – Average prices for BRP consumption shortage over all ISPs when system imbalance indicates short, and average prices BRP consumption surpluses over all ISPs when system imbalance indicates long (for systems wth dual position) (EUR/MWhISP all)

Note: Values for Nordic TSOs are from January to October 2021.

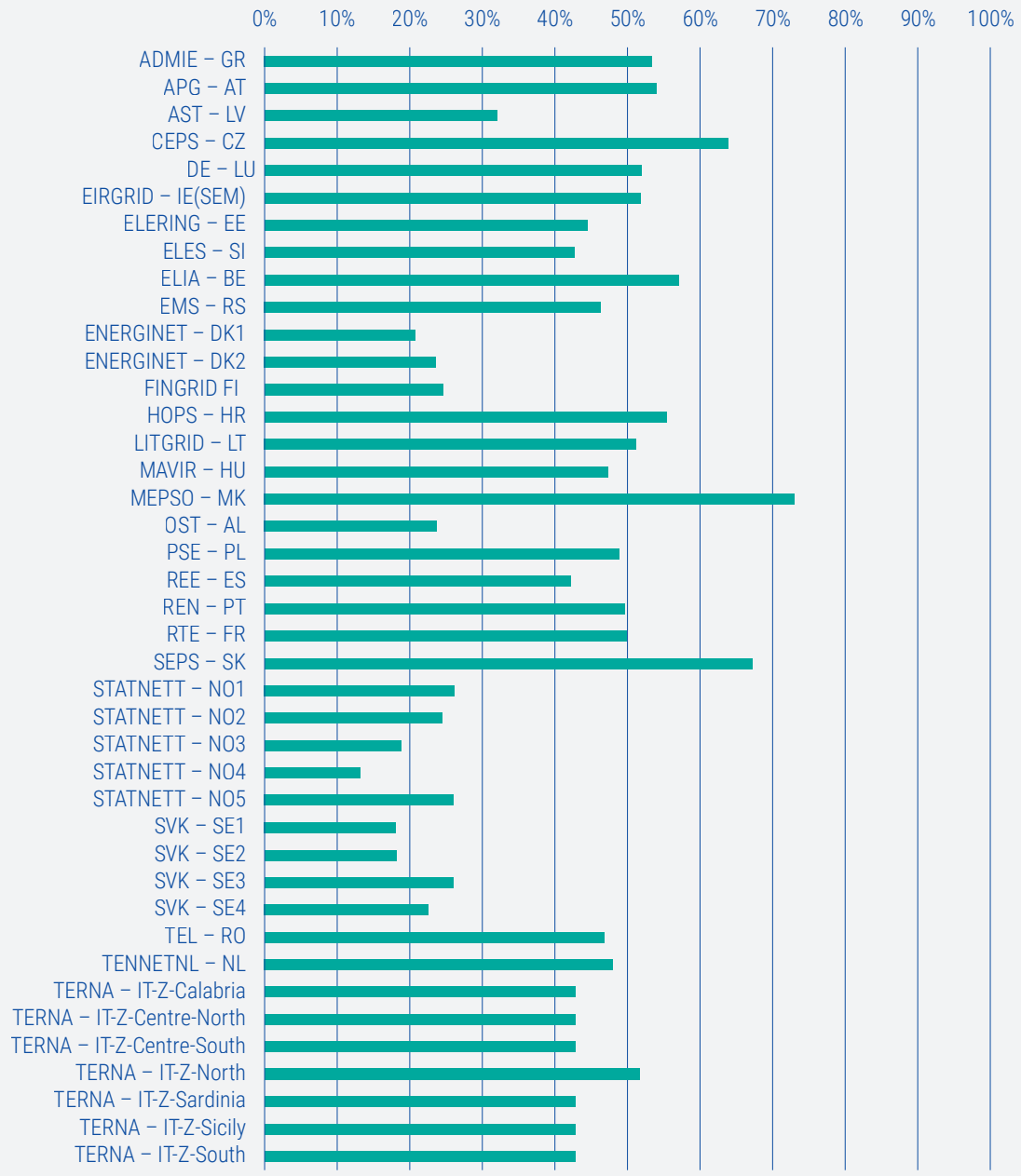


Figure 68 – Percentage of ISPs with negative system imbalance

Note: Values for Nordic TSOs are from January to October 2021. Nordic TSOs have a significant percentage of 'balanced ISPs'.

5.9. Indicator 3.9: evolution of balancing service prices of the previous years

This indicator displays the evolution of the annual average prices for the balancing services over the past 3 years (whenever data are available).

Legal reference	Article 59(4)(j) of EB Regulation
Data source	• ENTSO-E Transparency Platform under Article 17(1)(f)[62] (applies to a for MARI and b) • Article 3.16 of aFRR IF (applies to a) • Article 17(1)(c)[63] (applies to c) of the EB Regulation
Calculation	1. Evolution of balancing energy prices at the European balancing energy platforms (standard products only) 2. Evolution of balancing energy prices at each TSO and where available, per imbalance price area (including specific products) 3. Evolution of balancing capacity procurement cost

The average prices for the capacity and reserve procurement prices are expressed in EUR/MW/ISP per TSO and therefore may vary between TSOs due to different ISP lengths (15 minutes until 60 minutes).

62 See *ENTSO-E Transparency Platform – Prices of activated balancing energy* – [Link].
63 See *ENTSO-E Transparency Platform – Prices of reserved balancing reserves* – [Link].

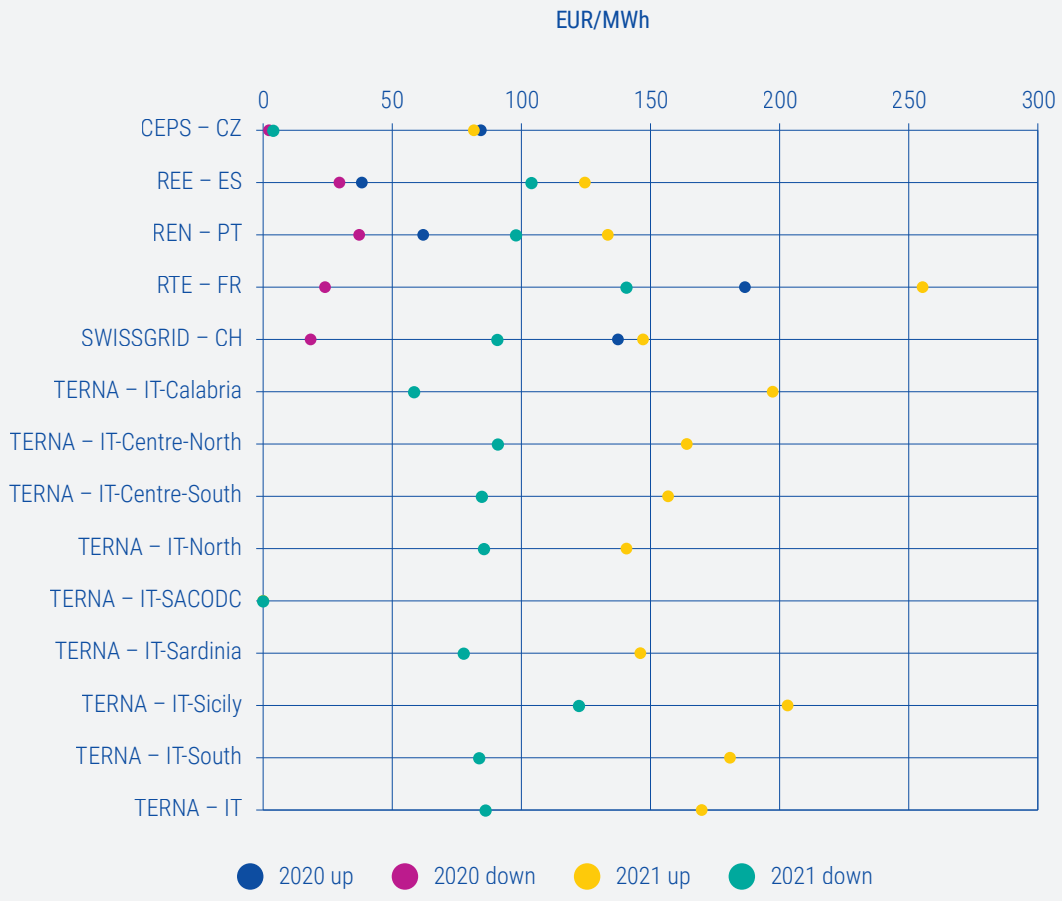


Figure 69 – Evolution of balancing energy prices at the European balancing energy platforms: average price (RR) (EUR/MWh)

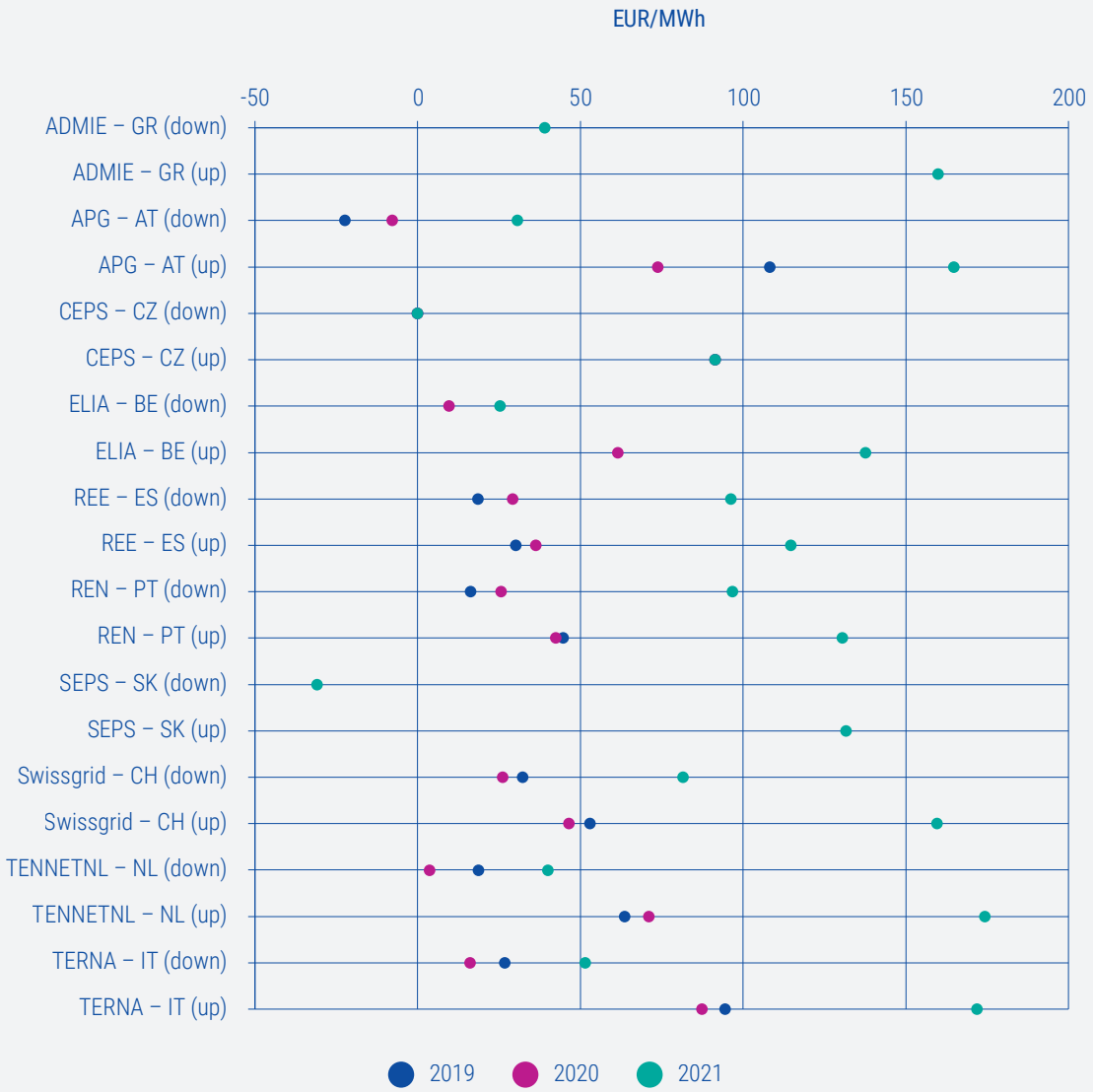


Figure 70 – Evolution of balancing energy prices at each TSO and, where available, per imbalance price area (including specific products): aFRR (EUR/MWh)

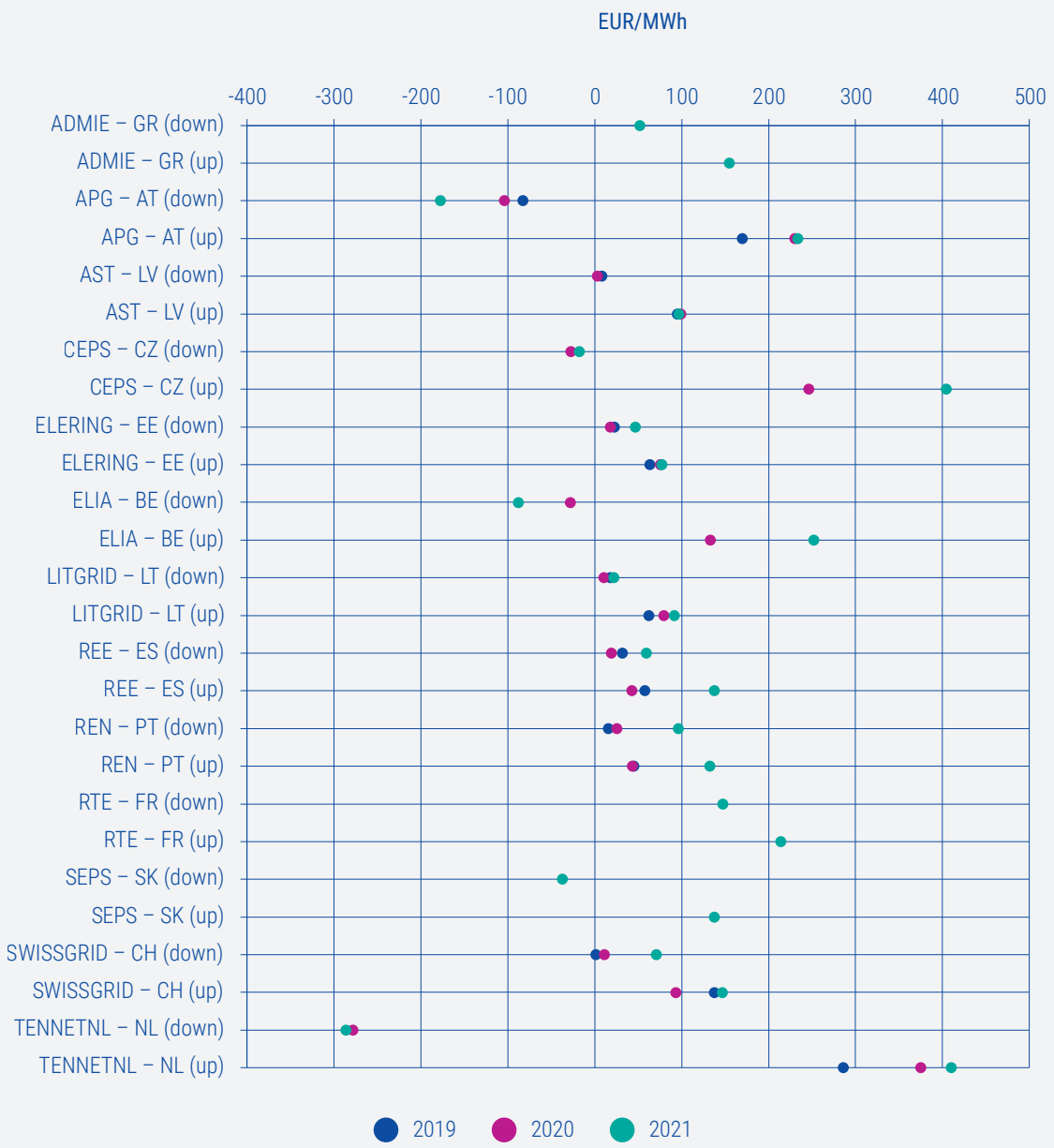


Figure 71 – Evolution of balancing energy prices at each TSO and, where available, per imbalance price area (including specific products): mFRR (EUR/MWh)

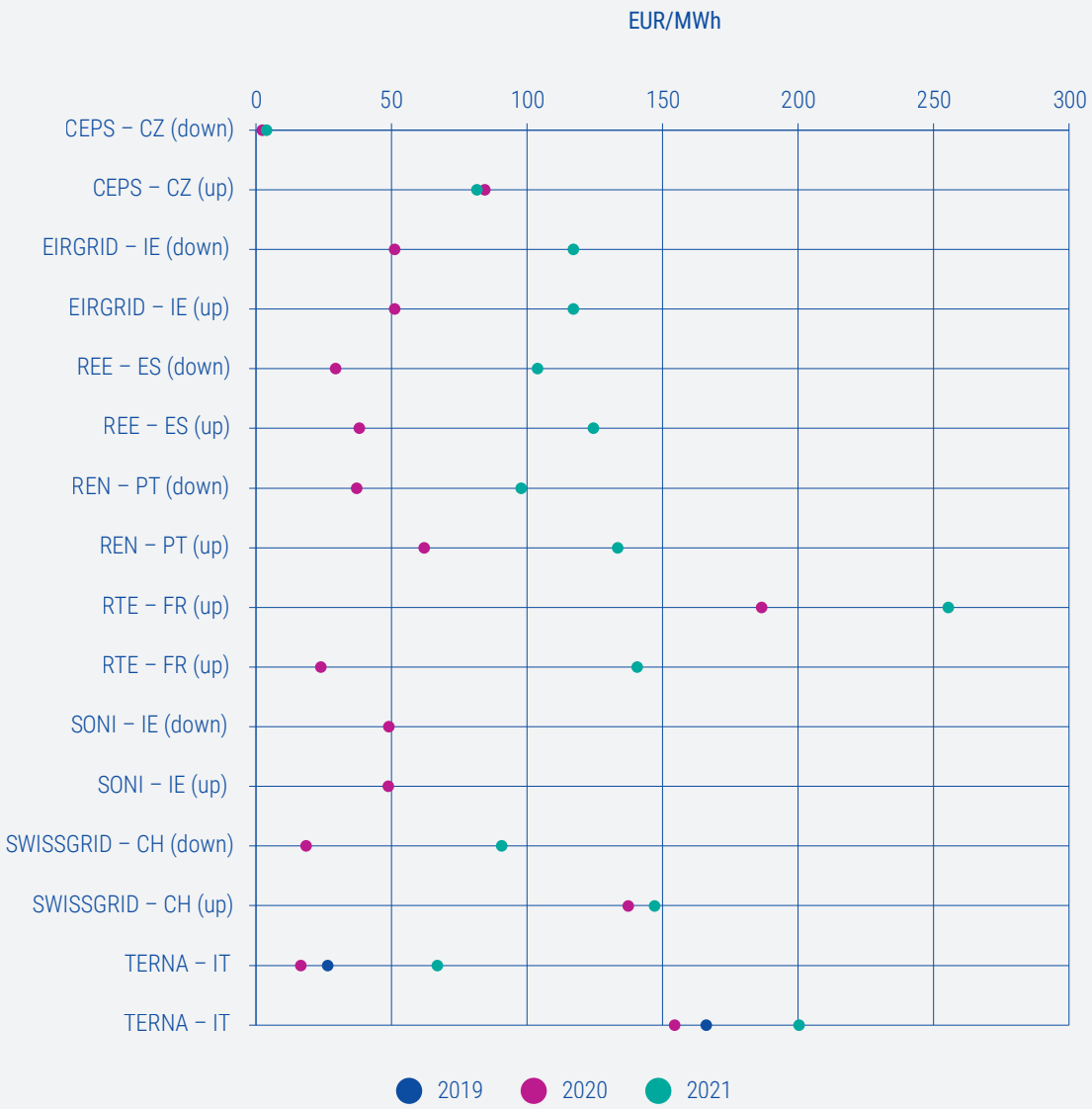


Figure 72 – Evolution of balancing energy prices at each TSO and, where available, per imbalance price area (including specific products): RR (EUR/MWh)

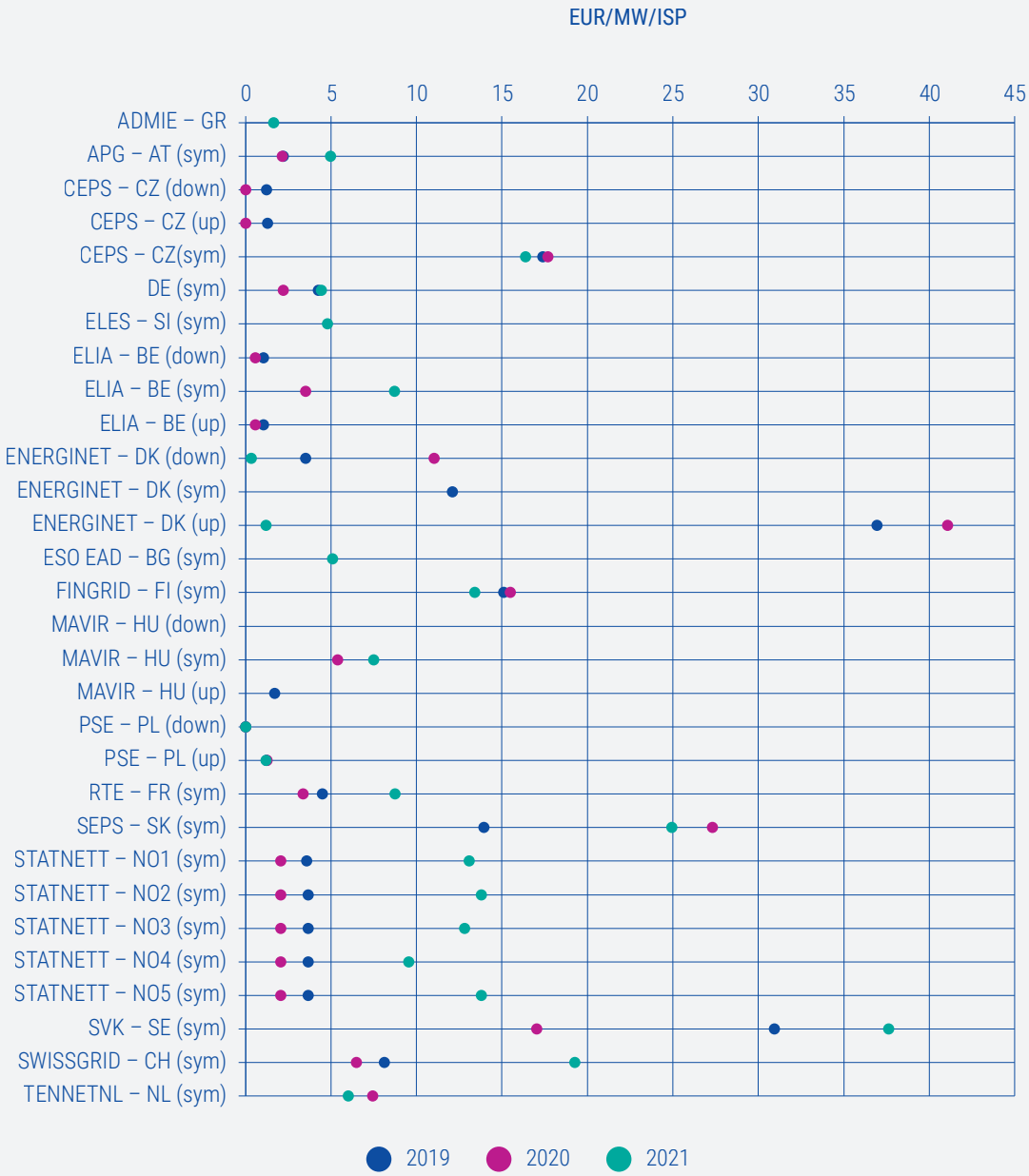


Figure 73 – Evolution of balancing capacity procurement cost: FCR (EUR/MW/ISP)

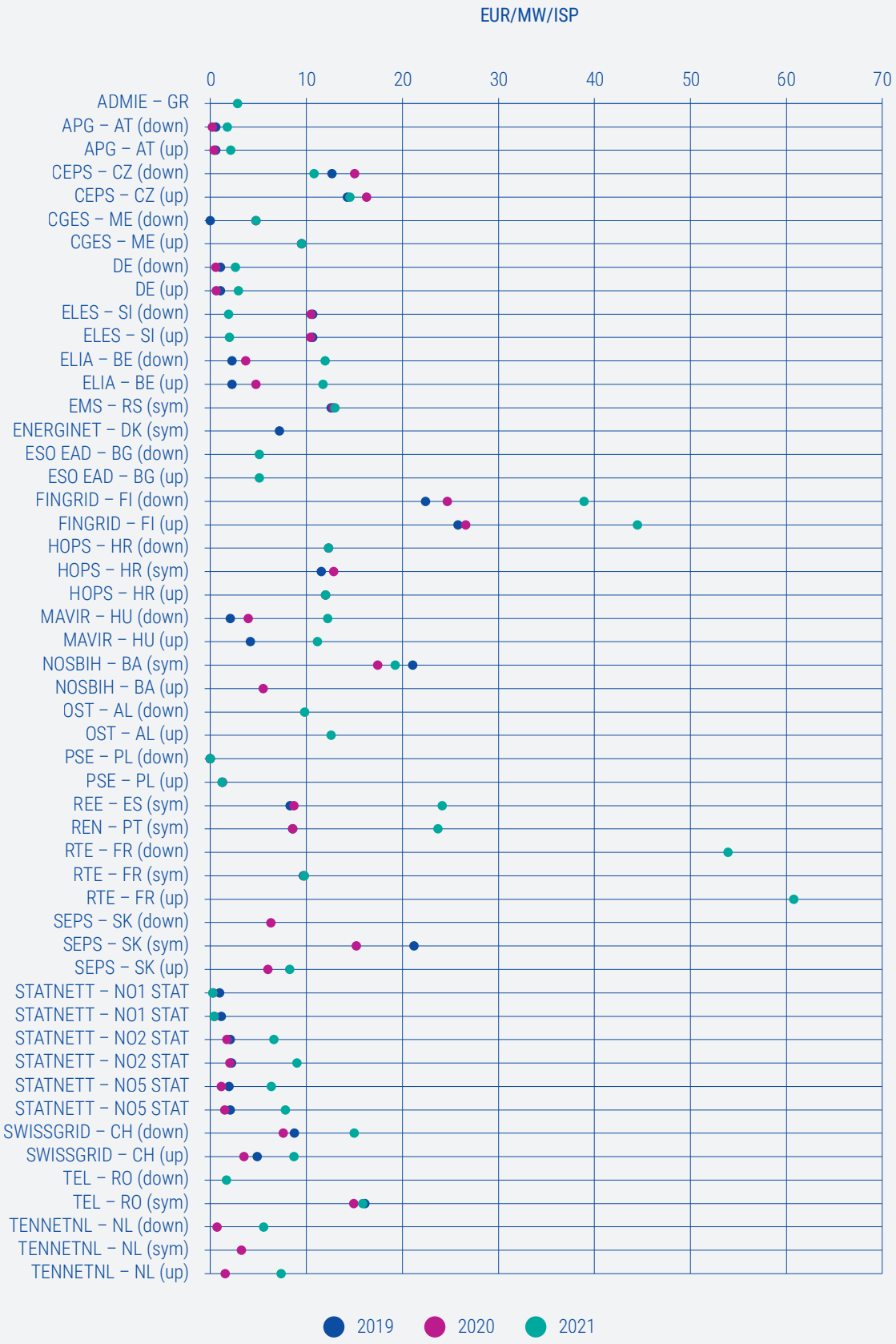


Figure 74 – Evolution of balancing capacity procurement cost: aFRR (EUR/MW/ISP)

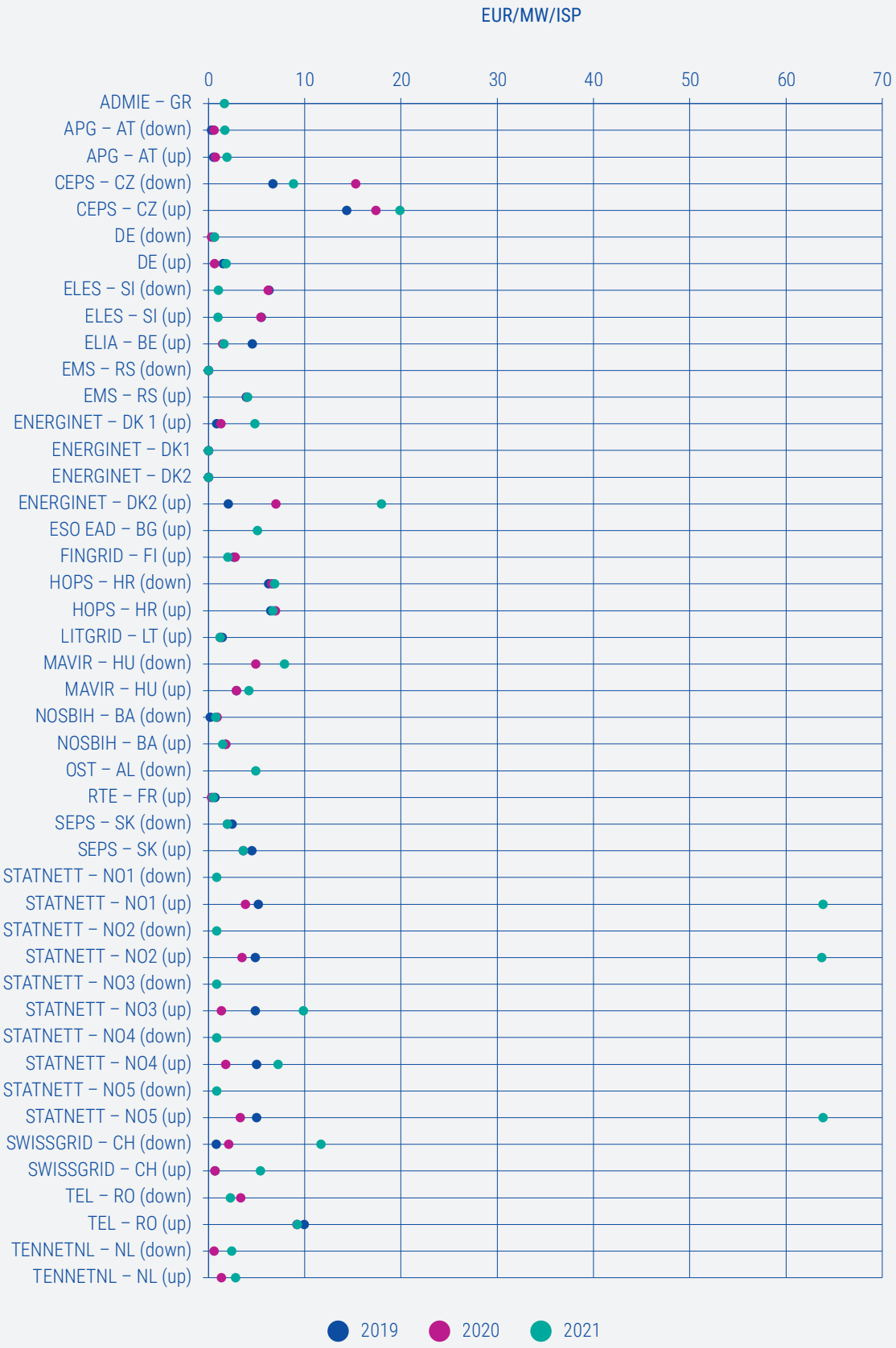


Figure 75 – Evolution of balancing capacity procurement cost: mFRR (EUR/MW/ISP)

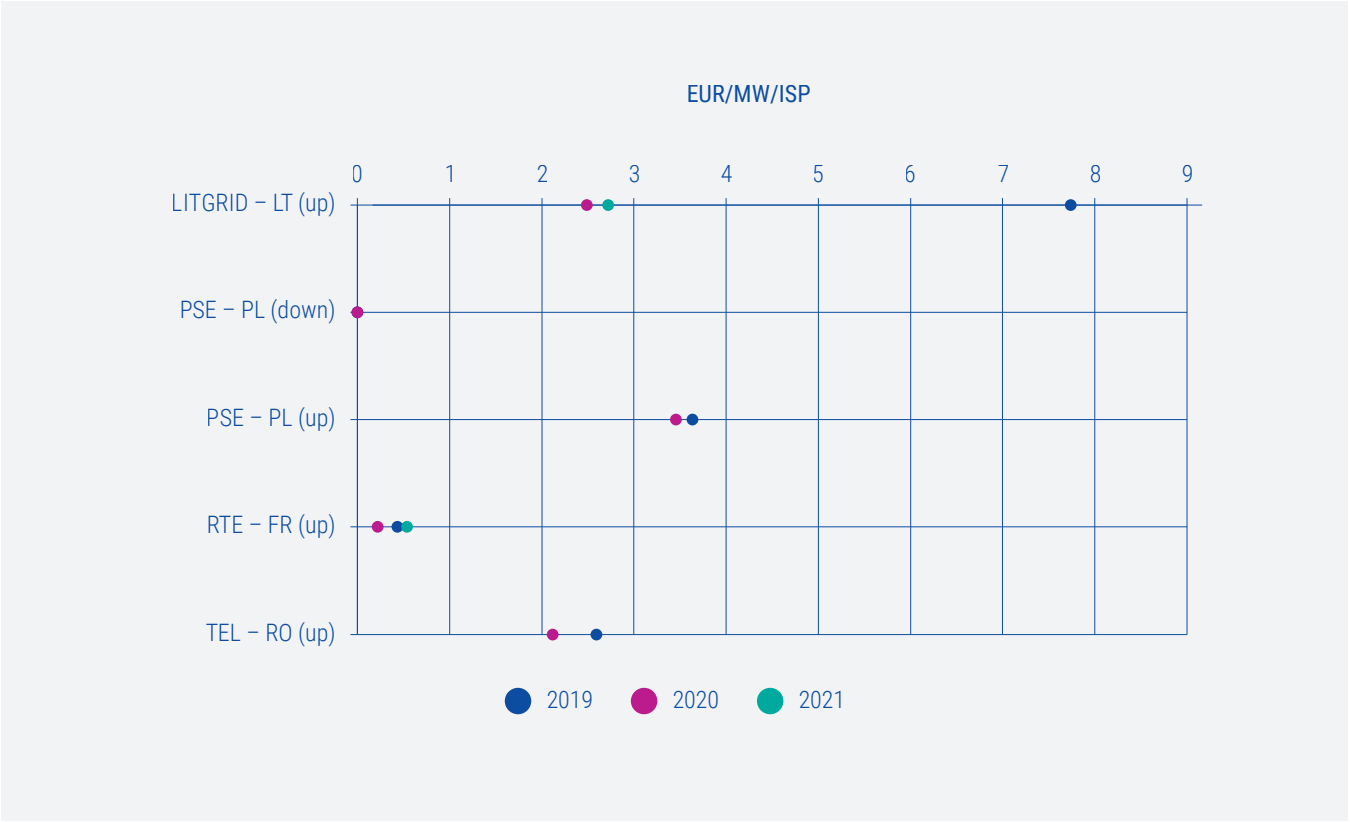


Figure 76 – Evolution of balancing capacity procurement cost: RR (EUR/MW/ISP)

Note: For REE, the upward RR reserve market ceased to exist in Q4 2019. The RR upward price for 2019 was EUR 9.47/MW/ISP.

Due to the COVID-19 pandemic, economic activity in Europe after Q2 2020 was restricted. The prices for the day-ahead market were reduced consequently, having a direct effect on balancing prices, which also reduced. As economic activity increased in 2021, higher prices can be observed in the day-ahead energy market and subsequently the balancing market for the year. Additionally, there was a sharp increase in gas prices (especially in Q3–Q4 2021), which further influenced the increase of balancing prices.

5.10. Indicator 3.10: comparison of expected and realised costs and benefits from all allocation of balancing capacity for balancing purposes

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 energy market bids).

Legal reference	Article 59(4)(k) of EB Regulation
Data source	• Each BCC with CZC allocation based on forecast values
Calculation	1. Evolution of balancing energy prices at the European balancing energy platforms (standard products only) 2. Evolution of balancing energy prices at each TSO (including specific products) 3. Evolution of balancing capacity procurement cost

For this *Balancing Report*, indicator 3.10 was not computed since there is no data available for the year 2021. This is because no go-live, whether of market-based or inverted market-based allocation of balancing capacity, took place in 2021.

6. Executive summaries of TSOs

6.1. Austria (Austrian Power Grid AG)

Preamble

According to Article 59(6) of the EB Regulation, the report pursuant to paragraph 2(a) (the so-called 'ENTSO-E Balancing Report') shall contain an executive summary of national balancing markets of each TSO pursuant to Article 60. The following document provides guidelines to harmonise the executive summaries of the different TSOs.

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Austrian Power Grid AG (APG) is one of the two TSOs in Austria. The other TSO is Vorarlberger Übertragungsnetz GmbH (VUEN), responsible for the westernmost federal state of Austria only. For the sake of simplicity, APG reports on behalf of both Austrian TSOs.

APG is the LFC block operator of the APG LFC block, which covers the geographical area of Austria. The APG LFC block is part of the Continental Europe Synchronous Area. Since VUEN assigned the obligation of organising its LFC area to APG, and both LFC areas were merged based on the Austrian Electricity Act, there now exists only one LFC area in Austria, which is congruent with the APG LFC block. Thus, the APG LFC block is equal to the LFC, scheduling and monitoring areas covering the entire country. APG is not a central dispatch TSO.

- *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).*

The dimensioning of FRR in APG is based on 15-minute average values of the LFC block imbalance (according to System Operation Guideline Article 3) over a period of 12 months, and applies the 99% criteria as well as the frequency restoration control error (FRCE) ranges in accordance with System Operation Guideline Article 128. In case of substantial changes in the general boundary conditions, the dimensioning of FRR will be adjusted accordingly.

In addition to the statistical approach, the tripping of the largest power plant and load within the APG LFC block are considered as reference incidents. 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). In applying the ENTSO-E quality criteria, the described dimensioning has proven to be sufficient.

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

FCR capacity and aFRR energy have already been exchanged within security limits and with reference to the defined minimum amount of reserves, which has to be kept within the LFC block. Mutual procurement of aFRR capacity with Germany started only in February 2020. The sharing of FRR has been considered too risky and has therefore not been envisaged.

APG is an operational member of IGCC, the future IN platform for the Continental Europe regional group (see Article 22 of the EB Regulation). APG also participates in MARI, which is the European implementation project for establishing the European mFRR platform. Regarding aFRR, APG takes part in PICASSO, which represents the implementation project establishing the European aFRR platform (see Article 21 of the EB Regulation).

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

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

In February 2020, APG and the German TSOs extended their cooperation and established a common procurement of aFRR balancing capacity.

The settlement processes take into account the general principles of EB Regulation Article 44. Imbalance settlement is designed to reflect the real-time value of energy, as both balancing and wholesale market prices are considered in imbalance settlement prices. BSPs are provided with incentives to be in balance generally or to 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 is 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 (for example, administrative costs and other costs related to balancing), in accordance with Article 44(3) of the EB Regulation. In Austrian national legislation, the procurement costs of balancing capacity for FCR, automatic FRR and positive manual FRR 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 Austrian national legislation was no longer consistent with the EB Regulation.

Progress and timeline towards joining the European platforms and/or BCC

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	4.5.2022	So far, no derogation requested
mFRR platform	13.7.2022	So far, no derogation requested
IN platform	Already connected to IGCC	N/A

BCC	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation	Austrian-German cooperation	In operation

Evolution 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 T&Cs for BSPs	
Content	Submitted (September 2022): All conditions necessary, especially in accordance with IFs of European balancing platforms (PICASSO, MARI). NRA approval expected in March 2022.
Evolution of the T&Cs for BRPs	
Content	Approved (July 2020): A minimum incentive in scarcity situations has been introduced in Q3 2021 by application of a scarcity component, as foreseen in the ISH Methodology.

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

Specific products according to Article 26: There were no specific products available, procured or used in the control area of APG.

Analysis of dimensioning of reserve capacity (2021)

- General approach: Dimensioning of control reserves is based on 15-minute average values of the LFC block imbalance (according to System Operation Guideline Article 3). The calculation analyses the LFC block imbalance values for the period of 12 months, and checks if these imbalances were covered by the dimensioned FRR for at least 99% of the time and if the FRCE ranges in accordance with System Operation Guideline Article 128 were met. In case of non-fulfilment, or if any substantial changes in the general boundary conditions are to be expected, the dimensioning of the FRR will be adjusted accordingly. In addition to the statistical approach, the tripping of the largest power plant and the tripping of largest load within the APG LFC block are considered as reference incidents and therefore as the minimum amount of FRR. In the following table, the results of the latest analysis (area control error [ACE] data for 2021) are depicted. For the sake of completeness, to what extent aFRR was able to cover the occurred imbalances was also checked.

	Dimensioning FRR (MW)		Covering 99% of imbalances		Covering outage of largest unit
Analysis of	Positive	Negative	Positive	Negative	
aFRR only	200	-200	× (94.3)	× (93.82)	N/A
Total FRR dimensioning, 2021	480	-395	✓ (99.52)	✓ (99.47)	✓
Optimal dimensioning without coverage of outage of largest generation unit	388	-344	✓ (99.00)	✓ (99.00)	×
Optimal dimensioning including coverage of outage of largest generation unit	480	-395	✓ (99.00)	✓ (99.00)	✓

Conclusion for the current dimensioning:

Product	Positive	Negative
aFRR	200	-200
mFRR	280	-195
Total FRR	480	-395

Apart from FRR, the amount of FCR to be procured by APG is determined by the agreed process within RGCE (see also the SAFA LFC and reserves policy). Thus, the dimensioning of FCR is not an issue for APG.

- Analysis of optimal provision of reserve capacity

To determine the optimal separation of FRR in aFRR and mFRR, APG uses the recommended empiric approach in the SAFA LFC and reserves policy ('aFRR minimum amount recommendation'), based on a reference load of 10 000 MW, as shown in **Figure 77**.

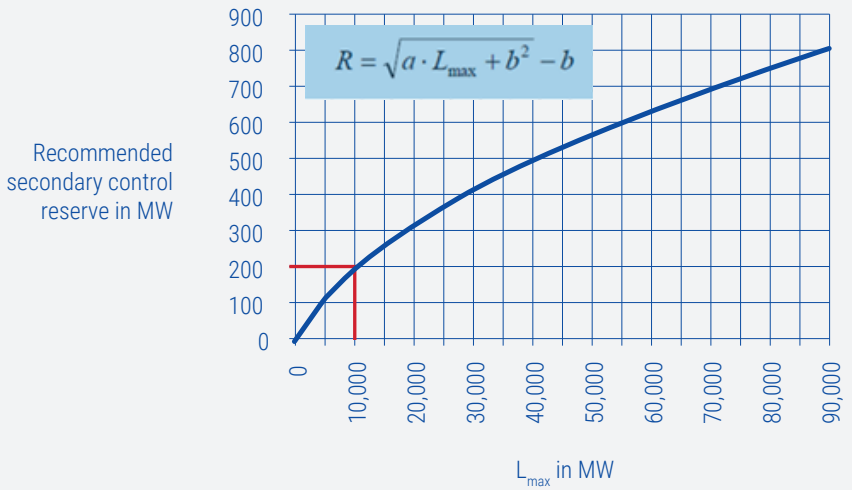


Figure 77 – Optimal separation of FRR in aFRR and mFRR (MW)

Since the dimensioning of aFRR cannot take fluctuating maximum load values into account, the reference load was determined to be slightly below the yearly maximum, which should be an effective compromise. Experience has shown sufficient performance of imbalance compensation. This can be seen, for example, in the distribution of ACE values on a 15-minute basis as a reference quarterly period against the target (representation of annual trend of ACE; Sigma 90 on a 15-minute basis; the value of 10% should not be exceeded). This is illustrated in **Figure 78**.

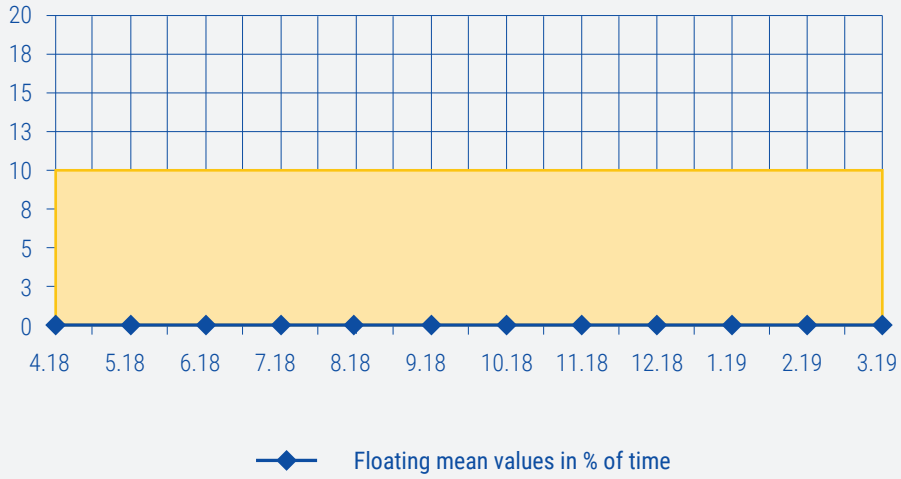


Figure 78 – Distribution of ACE values

- Cost-benefit analysis of specific products

  Not applicable.

- Opportunities for exchange/sharing of reserves

  FCR capacity and aFRR energy are already exchanged within security limits and with reference to the defined minimum amount of reserves, which has to be kept within the LFC block.

  The existing cooperation has therefore encompassed mutual FCR cooperation and aFRR optimisation of activation (with Germany), including IN. The aFRR optimisation will be transferred to PICASSO in mid-2022. In addition to the cross-border optimisation of activation, the first cross-border procurement of aFRR in RGCE was implemented between Austria and Germany considering the corresponding reservation of transmission capacity for ensuring the possibility of cross-border activation of the procured share of aFRR. Experience shows that efficiency of procurement and activation has significantly improved by combining the markets involved. However, due to transmission capacity aspects, and rare but nevertheless occasionally occurring simultaneous exhaustion of reserves of cooperation partners, the reduction of common reserves by reserve sharing is too risky.

  From the beginning of 2020, the optimisation of mFRR activation with Germany was also implemented, and will be transferred to MARI in 2022.

- Procurement without exchange/sharing of reserves

  APG already performs exchange of balancing capacity for FCR, balancing capacity/energy for aFRR, and balancing energy for mFRR. In fact, cross-border procurement and activation is very complicated and requires massive efforts for implementation. Cross-border procurement of aFRR/mFRR capacity, and activation optimisation of aFRR/mFRR, were not implemented in Europe in 2017/2018 at all, except between Austria and Germany. Thus, the TSOs of Austria and Germany were the first to implement respective cooperation.

  The sharing of reserves has not been envisaged since experience has shown that the risk of running out of reserves is too high. In fact, situations with full simultaneous activation in Austria and Germany have already occurred, and can therefore not be excluded for the future.

- Analysis of efficiency of the activation

  Not yet applicable, as neither AOF according to EB Regulation Articles 19–21 were operational during 2019–2021.

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

Introduction

The TSOs of the Baltic countries have prepared a common report, which can be found on the websites of all three TSOs:

- the website of Litgrid here
- the website of AST here
- the website of Elering here

Litgrid AB is the Lithuanian TSO, Augstsprieguma tikls AS (AST) is the Latvian TSO and Elering AS is the Estonian TSO. All three are part of a synchronous area with separate scheduling areas, monitoring areas and bidding zones. Under Article 2(4) of the System Operation Guideline, the Baltic TSOs are exempt from defining their LFC blocks. Once they are fully synchronised with the Continental Europe Synchronous Area, they will start implement such agreements. Each controls a scheduling area and monitoring area covering the entire country.

Starting from 1 January 2018, Litgrid, AST, and Elering (commonly referred to as the Baltic TSOs) have operated common balance control with the aim of minimising the Baltic 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 including a common imbalance pricing methodology.

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

In Lithuania, during the report period there were a total of two active BSPs. Litgrid's standard T&Cs for BSPs can be found here. During the report period, there were no more than 30 BRPs. Litgrid's standard T&Cs for BRPs can be found here.

In Latvia, during the report period there was a total of one active BSP. AST's standard T&Cs for BSPs can be found here. During the report period, there were a total of 13 BRPs. AST's standard T&Cs for BRPs can be found here.

In Estonia, during the report period 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 and timeline towards joining the European platforms and/or BCC

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	Q4 2024	N/A
mFRR platform	Q3 2023	Derogation granted by Baltic NRAs in order to join MARI together with Nordic TSOs. Therefore, Baltics accession is dependent on the Nordic TSOs.
IN platform	Q4 2024	N/A

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation	Project ongoing. Relevant mandatory methodologies are being prepared by Baltic TSOs. Submission for NRAs' approval expected during 2022.	Q4 2024

The following content can be included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, renewable energy sources (RES) and storage to participate in European balancing platforms?	**Litgrid AB: yes AST: yes Elering: no**
If response in Q1 is 'no', why?	Elering: Since May 2019, Elering allows demand, RES and storage facilities to participate in the regional balancing market. Preparations in relation to joining the EU balancing platforms shall be carried out during 2022 and 2023.
If response in Q1 is 'yes', what were the main results?	Litgrid AB: During the report period, starting January 2021, standard T&Cs went into force, allowing demand, RES and storage to participate in local balancing markets. AST: During the reference period, work started to accommodate demand response and aggregation in balancing market by developing IT exchange rules and system and T&Cs. This is expected to be finished in 2022.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	**No**
If response in Q2 is 'no', why?	aFRR and RR products are not procured in the Baltic region. Standard Baltic mFRR products were already introduced in January 2018.
If response in Q2 is 'yes', what were the main results?	N/A
Q4: Do you procure a standard product for balancing capacity?	**Litgrid AB: yes AST: no Elering: no**
Q5: 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 time frame. Elering: Elering did not procure balancing capacity during this time frame.**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**No**
6.1. If response in Q6 is 'no', why?	Common Baltic capacity market is being developed and shall be introduced in Q4 2024.
6.2. If response in Q6 is 'yes', what were the main results?	-
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&C for BSPs	
Content	Litgrid: During report period, starting January 2021, standard T&Cs went into force allowing demand, RES and storage to participate in local balancing markets. AST: N/A Elering: N/A
Evolution of the T&Cs for BRPs	
Content (see below)	Litgrid: Standard T&Cs for BRPs were updated to comply with the ISH Methodology, which was approved by ACER on 15.7.2020. AST: Standard T&Cs (in a form of changes in the Network Code for Electricity) for BRPs were updated to comply with the ISH Methodology, which was approved by ACER on 15.7.2020. Elering: Standard T&Cs for BRPs were updated to comply with the ISH Methodology, which was approved by ACER on 15.7.2020.

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	31.12.2024
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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), (c), (e) and (f)

Under Article 2(4) of the System Operation Guideline, the Baltic TSOs are exempted from the provisions of the System Operation Guideline that are related to dimensioning of FCR, FRR and RR. Baltic power systems operate in the Integrated Power System/Unified Power System of Russia (IPS/UPS) Synchronous Area; therefore dimensioning principles for active power reserves are defined in mutual agreements within IPS/UPS synchronous area and national legislation.

According to agreements with TSOs and network owners of a common synchronous area (Belarus, Russia, Estonia, Latvia and Lithuania [BRELL]), Baltic TSOs are mutually responsible for maintaining 100 MW of normative emergency capacity reserve.

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 capacity market for the needs of the Baltic LFC block. It is foreseen to go live in Q4 2024. The common procurement of balancing capacity shall allow Baltic TSOs to exchange the balancing capacity reserves within the Baltic LFC block.

- *Litgrid:*

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

- *AST:*

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

- *Elering:*

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

Specific products in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d) of the EB Regulation

Considering that neither standard nor specific balancing energy were implemented during the report period, no cost-benefit analysis or analysis on volumes, availability, procurement, usage and justification of usage of specific products were made.

During the report period, Baltic TSOs has been operating in the Baltic common balancing market. The Baltic common balancing market has two defined balancing energy products:

1. Baltic standard mFRR product for balancing
2. specific emergency mFRR (Baltic **emergency reserve mFRR**) products:
   (a) normative emergency capacity reserve
   (b) emergency capacity reserve

NERC is introduced as a mandatory reserve capacity to cover Baltic TSOs' obligations over BRELL agreement. Emergency capacity reserve is introduced separately by each Baltic TSO to ensure the operational security of their respective power system. All Baltic balancing energy products are incompatible with standard energy products as defined in the EB Regulation Articles 25 and 2(36).

- *Litgrid:*

  Since the start of operations of the Belarussian nuclear power plant on 4 November 2020, and in accordance with national legislation, Litgrid went into a state of force majeure for the BRELL network agreement, and is neither providing, nor has access to, the mandatory 100 MW normative emergency capacity reserve.

  Tertiary reserves are used to replace procured upward mFRR balancing reserves, as they may potentially have limited activation duration. The tertiary reserve must be fully activated in under 12 hours. The service provider is obligated to ensure that the reserve will be accessible for at least 10 days. Dimensioning for tertiary reserves is calculated taking into account the procured standard mFRR balancing capacities and overall procured balancing energy reserves among the Baltic TSOs. Litgrid calculates the volume of emergency reserve and replacement reserve capacity for every next calendar year.

- *AST:*

  No specific product was introduced in the report period.

- *Elering case:*

  No specific product was introduced in the report period.

6.3. Belgium (Elia Transmission Belgium SA/NV)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

- *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).*
- Synchronous area: Continental Europe
- LFC block: Belgium/Elia control block
- LFC area: Belgium/Elia control block
- Scheduling area/imbalance area: Belgium
- Bidding zone/imbalance price area: Belgium
- TSO: Elia Transmission Belgium
- *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 BSPs/BRPs[64] according to Articles 18(5–7) (information or requirements 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.
- *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: 10 (December 2020), 10 (December 2021)
- Number BRPs active in Belgium: 94 (December 2020), 104 (December 2021)
- Historical/new market players: The increasing number of BRPs is mainly explained by the increasing number of BRP traders (there has been no substantial increase in the 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.
- *Prequalified volumes in MW for participation in FCR, aFRR and mFRR balancing capacity in December 2021 (delivery point single unit and delivery point providing group).*

(MW)	FCR	aFRR	mFRR
DSR	0	0	340
Batteries	35	25	0
Other	340	3 270	5 195

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

Progress and timeline towards joining the European platforms and/or BCC

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	N/A
aFRR platform	Connection to the platform foreseen in September 2022	N/A
mFRR platform	Target planning aims for a connection in late Q1 2023 / early Q2 2023	Derogation requested submitted to NRA based on the target implementation roadmap as defined in interactions with the external stakeholders. The main reasons are challenges related to implementation (time taken to complete the local mFRR design, changes in the new mFRR design impacting Elia and market participants, interdependence and impact on resources from other major projects).
IN platform	ELIA is an active participating TSO	Not applicable

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
FCR cooperation	Participating TSO	

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	Status (not submitted, submitted, approved) and timeline
BSP FCR T&Cs were amended in July 2020 to ensure day-ahead procurement of all FCR volumes through the FCR cooperation, according to the standard products defined in the FCR cooperation. The prequalification processes have also been optimised and other design changes have been introduced, such as the alignment of the penalty schemes with aFRR and mFRR products.	Approved
The next modification will probably relate to the implementation of the harmonised T-minute limited energy reservoir requirements, and the implementation of the additional properties for FCR as introduced in the SAFA.	Not submitted, submission in 2023
BSP aFRR T&Cs were amended in October 2020 to open the aFRR service to all technologies and all voltage levels. Daily procurement for all-aFRR capacity, separately from FCR, has also been implemented, together with a move from pro rata activation to merit order activation of balancing energy bids, new data exchange requirements, and design changes related to baseline methods, availability control and other elements.	Approved

Evolution of the T&Cs for BSPs	
Next modifications currently planned (same request for amendment, different entry into force dates): April 2022: Modifications to the aFRR capacity auction design are planned. June 2022: Necessary modifications to access the PICASSO platform are planned (in particular, moving to a paid-as-cleared remuneration of BSPs, cross-border activation of energy and fallback mechanisms).	Submitted Q1 2022
BSP mFRR T&Cs were amended in February 2020. The most important changes related to the move to daily procurement of mFRR capacity and to the paid-as-cleared remuneration of balancing energy.	Approved
The next modification is currently planned for Q1 2023. Modifications will take place to prepare for the accession to the MARI platform. They will 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 product 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 minutes to 12.5 minutes in accordance with the mFRR IF.	Not submitted, submission in Q4 2022
Evolution of the T&Cs for BRP	
Content (see below)	Status (not submitted, submitted, approved) and timeline

Evolution of the T&Cs for BRP – should include, among other information, the following content as per the Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	Implemented
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	NA
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	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 of 1 January 2022?	No
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered

Question:	Please select an option:
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), (c), (e) and (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 System Operation Guideline, and as specified in the Synchronous Area Operational Agreement.

Until 3 February 2020, the dimensioning methodology for reserve capacity needs was specified in Elia's LFC block Operational Agreement, approved by the Belgian Federal Commission for Electricity and Gas Regulation (CREG) with Decision (B)1912/2 of 27 May 2019. As of 3 February 2020, a new dimensioning methodology for the FRR capacity needs has been applied, approved by CREG on 6 December 2019 (see description below).

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

- a **dynamic probabilistic methodology** in line with Article 157(2)b of the System Operation Guideline, designed to cover 99.0% of the LFC block imbalance risk. After a convolution of prediction risks and forced outage risks, the probability distribution is broken down in a distribution of potential positive LFC block imbalances, and a distribution of potential negative LFC block imbalances. This calculation is conducted for each 15 minutes of the next day, and the 99.0% percentile of each probability distribution curve determines the minimum positive and negative required reserve capacity.

- a **dynamic deterministic methodology** in line with Articles 157(2)(e) and 157(2)(f) of the System Operation Guideline based on the dimensioning incident. For each 15 minutes 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 incidents of the LFC block, as specified in Articles 3 and 157(2)(d) of the System Operation Guideline.

- 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 15 minutes 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 System Operation Guideline.

Elia determines the required positive and negative reserve capacity on FRR/mFRR each day before 7 AM for every 4-hour period of the next day as the difference between the required positive and negative reserve capacity of 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 2 years of expected variations between 15-minute periods of LFC block imbalances. The aFRR capacity needs are determined as the capacity that can cover 79% of the absolute variations of LFC block imbalances. It is determined as a fixed value at 151 MW. Elia plans to present a new methodology to assess the aFRR needs in the next version of the LFC block Operational Agreement. While awaiting the implementation of this new methodology, Elia limited the symmetric aFRR needs at the same value as in 2019, i.e. 145 MW.

Reserve capacity requirements	2020		2021	
	Positive	Negative	Positive	Negative
FCR (symmetric)	78 MW		87 MW	
FRR	1 037 MW	1 022 MW	1 037 MW	1 022 MW

Reserve capacity requirements	2020		2021	
aFRR (symmetric)	145 MW		145 MW	
mFRR	892 MW	877 MW	892 MW	877 MW

- **Summary analysis of the optimal provision of reserve capacity, including the justification of the volume of balancing capacity:**

Until 3 February 2020, the dimensioning methodology for the required balancing capacity was specified in Elia's *Proposal Dossier Volume 2019*, approved by CREG with Decision (B)1808 of 18 October 2018 in which the reserve capacity and balancing capacity requirements are determined. From 4 February 2020, the dimensioning methodology for the required balancing capacity was specified in Elia's LFC Means, approved by CREG on 6 December 2019, in which the balancing capacity requirements are determined (complementary to the LFC block Operational Agreement in which the reserve capacity needs are determined). The main modification of the above-mentioned approach entails the calculation of the positive mFRR balancing capacity.

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 490 MW of 'mFRR standard'. The rest of the capacity can be covered with 'mFRR flex' and 'mFRR standard' products. The minimum capacity was increased to 640 MW from 1 July 2020.

- As mFRR reserve capacity shared 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 50 MW of FRR sharing to cover positive mFRR requirements. As of 7 January 2021, the positive sharing capacity included in the dimensioning was increased to 250 MW, following the latest version of the LFC Means approved on 17 December 2020.

- 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 remain 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.

- **Explanation and a justification for the procurement of balancing capacity without the exchange of balancing capacity or sharing of reserves:**

Elia implements the exchange of balancing capacity for FCR. As FCR is dimensioned on regional basis by ENTSO-E, i.e. for continental Europe, 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.

Elia implements the sharing of mFRR reserve capacity. 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 day-ahead and intraday trading opportunities. It would also have required the establishment with of complex processes with neighbouring TSOs to be able to activate the reserve contracted abroad frequently.

- **Analysis of the efficiency of the AOF for the balancing energy from FRR and, if applicable, for the balancing energy from replacement reserves**:

As the implementation of the balancing energy exchange platforms according to Articles 20 and 21 of the EB Regulation were not implemented in 2020 and 2021, this is not yet relevant for Elia's LFC block.

Specific products in accordance with Articles 26(1) (a–f) and 60(2)(a) and (d) of the EB Regulation

No specific products were specified by Elia.

6.4. Bulgaria (Electroenergien Sistemen Operator EAD)

Introduction

For the national TSO report on balancing, see here.

- *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).*
- *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 BSPs/BRPs according to Articles 18(5–7) (information or requirements on unused capacity, requirements with regard to the BRP position, etc.).*
- *General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/batteries participation.*

The balancing market in Bulgaria was introduced in 2014 with a self-dispatch model and equal principals for 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 conducting daily auctions procedures, for the entire range of FCR, aFRR and mFRR – 100% of legally required balancing capacity. As of 23 June 2021, daily auctions procedures started also for the elaboration of merit order lists for procurement of balancing energy. Applicants, that can be generators, prosumers, storages or aggregators, shall pass a prequalification procedure to demonstrate their ability to provide FCR which is activated within 30 seconds, and aFRR and mFRR which is activated within 15 minutes. The auction rules and the register of BSPs participating in capacity auctions for FCR, aFRR and mFRR, are public on the website of ESO Bulgaria.

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 ESO Bulgaria and BSPs in EU balancing platforms in a process of development under the PICASSO, MARI and IGCC 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.

The integration of balancing markets and accession to the platforms requires a 15-minute ISP and a 15-minute MTU on the day-ahead and intraday markets.

The Bulgarian regulator granted derogation to ESO Bulgaria for the 15-minute ISP until the end of 2022, but ESO Bulgaria and the Independent Bulgarian Energy Exchange respectively plan to implement the 15-minute ISP and the 15-minute MTU on the intraday market earlier.

The registers of BRPs are also public, and according to the *Market Rules* the balancing groups are split in standard balancing groups (50 active), special balancing groups (20 active) and combined balancing groups (nine active), but they pay the same balancing prices for deficit and surplus that are calculated by ESO Bulgaria.

The Energy Law has been amended in order to provide possibilities for storage/batteries to participate in the balancing market.

Progress and timeline towards joining the European platforms and/or BCC

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 Bulgaria is an observer in this project.
aFRR platform	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 platforms for aFRR.
mFRR platform	July 2024	Market development and replacement of current EMS/SCADA is a prerequisite for implementing adaptations to connect to European platforms for mFRR.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
IN platform	24.7.2022	

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation	ESO Bulgaria is not involved.	

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**Yes**
If response in Q1 is 'no', why?	N/A
If response in Q1 is 'yes', what were the main results?	All producers, demand, RES, aggregators or storage can be registered as BSP if they meet the requirements of the Grid Code.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	**Yes**
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	Standard products are developed, taking into account the capabilities of BSPs.
Q4: Do you procure a standard product for balancing capacity?	**No**
Q5: What are the main characteristics?	**N/A**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**No**
6.1. If response in Q6 is 'no', why?	Negotiations are under way with neighbouring TSOs.
6.2. If response in Q6 is 'yes', what were the main results?	N/A
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	Grid Code submitted to the Energy and Water Regulatory Commission. The T&Cs for BSPs are part of the Code. Grid Code approval by the Energy and Water Regulatory Commission is pending soon.
Evolution of the T&Cs for BRPs	
Content (see below)	**No**

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	End of 2022
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**Yes**
3.1. Condition (a)	
3.2. Condition (b)	
3.3. Condition (c)	
3.4. Condition (d)	
3.4. Condition (e)	

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), (c), (e) and (f)

Specific products in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d) of the EB Regulation

There are no specific products defined for procurement.

6.5. Bosnia and Herzegovina (Nezavisni operator sústava u Bosni i Hercegovini [NOSBiH])

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

- *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).*
- For this information, see here.
- *General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/batteries participation.*
- For registers, see here.

Progress and timeline towards joining the European platforms and/or BCC

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	NOSBiH is not performing the reserve replacement process, thus it is not a member of TERRE project.
aFRR platform	N/A	Derogation, waiting decision of Energy Community
mFRR platform	N/A	Derogation, waiting decision of Energy Community
IN platform	Observer	

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Reserve sharing process in LFC block	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.

The following content can be included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**No**
If response in Q1 is 'no', why?	NOSBiH did not access balancing platforms.
If response in 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?	**Yes**

Question:	Please select an option:
If response in Q2 is 'no', why?	
If response in Q2 is 'yes', what were the main results?	These developments started from 1.1.2022. No analysis has yet been performed.
Q4: Do you procure a standard product for balancing capacity?	**Yes**
Q5: What are the main characteristics?	**This procurement started from 1.1.2022. No analysis has yet been performed. mFRR control has been activated several times, because the minimum activation time has been reduced from 1 hour to 15 minutes.**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**Yes**
6.2. If response in Q6 is 'yes', what were the main results?	The reserve sharing process in the SHB LFC block has been in operation from 2015, in accordance with the Operational Agreement of the SHB LFC block. In accordance with the provisions of the agreement, the TSOs within the SHB LFC block are responsible for the procurement/guarantee of the amount of common mFRR defined by the agreement, and specifying the requirements for the availability of mFRR power reserves and for quality control of control units and groups that provide mFRR in the prequalification process. Each TSO can procure the required amount of mFRR using exchange with other LFC blocks. The main results are reduced capacity costs of aFRR, and positive and negative mFRR.
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	*Market Rules* adopted by State Electricity Regulatory Commission (SERC) Decision No. 04-28-9-154-3/15, 21 May 2015, Tuzla. *Market Rules* adopted by SERC Decision No. 04-28-9-202-2/21, 13 October 2021, Tuzla. Ancillary Services Procedure (2015, 2021). Rulebook on daily balancing energy market operations (2015, 2022).
Evolution of the T&Cs for BRPs	
Content (see below)	*Market Rules* adopted by SERC Decision No. 04-28-9-154-3/15, 21 May 2015, Tuzla. *Market Rules* adopted by SERC Decision No. 04-28-9-202-2/21, 13 October 2021, Tuzla.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per the Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**No**
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Implemented through the reduced balancing capacity cost (network tariff)
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**Yes**
3.1. Condition (a)	Implemented
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), (c), (e) and (f)

Specific products in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d) of the EB Regulation

For the dimensioning of the aFRR balancing capacity, an empirical approach has been used in order to calculate the minimum amount of reserved capacity using empirical factors (a = 10, b = 150) and maximum load in the system in MW according to the formula:

$$R = \sqrt{a \times L_{max} + b^2} - b$$

For technical reasons, the formula is not applied on an hourly basis. The value of the required balancing capacity is extrapolated to hourly and monthly values depending on the expected load within a calendar month.

For calculation of 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. The required mFRR balancing capacity has been 275 MW for upward direction and 220 MW for downward direction in 2020 and 2021.

When the other impact factors have been taken into consideration (for example joint dimensioning in the SHB LFC block, the national legislative framework, the 10-year network development plan), mFRR capacity for 2021 has been calculated as 196 MW for upward direction and 68 MW for downward direction.

The Operational Agreement of the SHB LFC block covers part of the requirements of Article 60 (2)(e) of the EB Regulation

through the ability to exchange and share balancing capacity. The aim of cooperation within the SHB LFC block is to establish an adequate mechanism that would enable the efficient operation of 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.

There are no specific products to procure.

6.6. Croatia (Croatian Transmission System Operator ltd)

Introduction

- The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

- HOPS is the sole TSO in Croatia and the owner of the entire Croatian transmission network. HOPS is solely responsible for the Croatian LFC, scheduling and monitoring areas that cover the entire country. The Croatian LFC area is part of the Continental Europe Synchronous Area. Together with the Slovenian (ELES) and Bosnian and Herzegovinian (NOSBiH) TSOs, HOPS forms part of the SHB LFC block.

- Under Article 18 of the EB Regulation, with prior approval from the NRA the Croatian Energy Regulatory Agency (HERA), class: 310-03/19-16/9, Ur. number: 371-06-19-12, 29 November 2019, the HOPS management board adopted rules for balancing the power system (*Pravila o uravnoteženju elektroenergetskog sustava*, POUEES), effective from 7 December 2019.

- For balancing of the power system in 2020 and 2021, HOPS used a self-dispatch model for following reserves:

  (a) FCR

  (b) mFRR

  (c) aFRR

The total amount of FCR reserves within the Continental Europe Synchronous Area agreed in the amount of the largest reference imbalance phenomenon in the power system (3 000 MW) and required values of FCR reserve in 2020 and 2021 for the Croatian LFC area was 11 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) and the Operational Agreement of the SHB LFC block.

- POUEES defines the *Market Rules* for the national balancing services, and ensures the legal possibility for HOPS to participate in common European balancing energy exchange platforms in accordance with Articles 19 to 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.

- 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 successfully completed a prequalification process, demonstrated technical ability to provide balancing service, and have signed balancing service agreements with HOPS (separately for each service).

- For most balancing services, during 2020 and 2021 only one prequalified BSP was present inside the vertically integrated company (HEP DD), which is the dominant service provider in provision of balancing services in the Croatian power system. In such cases, respective balancing service is then procured via direct contracting with the dominant service provider, with prior HERA approval, in accordance with:

- the methodology for determining balancing capacity prices (HOPS 7/2016);

- the rules for determining the balancing energy price caps (Annex 1 of POUEES).

- In order to introduce competition to the balancing market, in June 2018, HOPS introduced a pilot project called 'Demand Side Response'. Since 14 December 2020, HOPS conducts the process of procuring mFRR balancing service through public tenders as an improvement on the previous pilot project, 'Securing mFRR balancing service from Demand Side Response', in accordance with POUEES.

- All BSPs which have concluded a balancing service agreement with HOPS have the right to bid. Procurement is carried out in accordance with the rules published on HOPS's website. By 31 December 2021, HOPS had prequalified and concluded eight balancing service agreements – mFRR with BSPs for mFRR beside dominant BSPs.

- Together with ELES and NOSBiH, HOPS has continued the operational practice of sharing mFRR in the SHB LFC block.

- T&Cs for BRPs, under Articles 18(6)(e), (i) and (j) of the EB Regulation, are defined in the local market rules *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. By March 2022, there were 28 BRPs present at the electricity market (i.e. 28 valid balance responsibility agreements had been signed 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.

Progress and timeline towards joining the European platforms and/or BCC

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 is not a member of the TERRE project.
aFRR platform	Until 24.7.2024	Under Art. 62 of the EB Regulation, the 15th session of the HERA management board on 23.7.2021 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 24.7.2022 to 24.7.2024, or sooner if HOPS becomes technically capable to connect to the aFRR/mFRR platforms earlier.
mFRR Platform	Until 24.7.2024	Under Art. 62 of the EB Regulation, the 15th session of the HERA management board on 23.7.2021 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 24.7.2022 to 24.7.2024, or sooner if HOPS becomes technically capable to connect to the aFRR/mFRR platforms earlier.
IN Platform	In full operation from 1.2.2019	

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Reserve sharing process in SHB LFC block	Member	In full operation from 2014, with adaptations in accordance with the Operational Agreement of SHB LFC block signed in 2019.

The following content can be included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**Yes**
If response in Q1 is 'no', why?	N/A

Question:	Please select an option:
If response in Q1 is 'yes', what were the main results?	In order to introduce competition to the national balancing market, in June 2018 HOPS introduced the DSR pilot project. Since 14.12.2020, HOPS conducts the process of procuring mFRR balancing service through public tenders as an improvement of the previous pilot project, in accordance with POUEES. By 31.12.2021, HOPS had prequalified and concluded eight balancing service agreements – mFRR with DSR BSPs for mFRR. As soon as HOPS operationally connects to the mFRR platform, DSR BSPs will be able to participate. The local IT solution (a local IT balancing platform) is still in the process of implementation.
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	**Yes**
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	By adopting POUEES, HOPS reassured regulatory capability to implement balancing energy standard products as soon as HOPS becomes operational on EU mFRR/aFRR platforms. By 31.12.2021, HOPS had prequalified and concluded eight balancing service agreements – mFRR with DSR BSPs for mFRR. The local IT solution (a local IT balancing platform) is still in the process of implementation.
Q4: Do you procure a standard product for balancing capacity?	**Yes**
Q5: What are the main characteristics?	**The main characteristics for aFRR standard balancing product in positive and negative directions, and mFRR standard balancing product in the negative direction, is a validity period of 1 hour, unlimited activation time and no neutralisation time. For mFRR in a positive direction, HOPS procures two standard balancing products. The first is characterised by a validity period of 1 hour, unlimited activation time and no neutralisation time, the second mFRR+ standard balancing product is characterised by a validity period of 1 hour, limited activation time of >2 hours and a neutralisation time of 0 to 8 hours.**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**Yes**
6.1. If response in Q6 is 'no', why?	N/A
6.2. If response in Q6 is 'yes', what were the main results?	The reserve sharing process in the SHB LFC block has been in operation from 2015, in accordance with the Operational Agreement of the SHB LFC block. In accordance with the provisions of the agreement, the TSOs within the SHB LFC block are responsible for the procurement/guarantee of the amount of common mFRR defined by the agreement, and specifying the requirements for the availability of mFRR power reserves and for quality control of control units and groups that provide mFRR in the prequalification process. Each TSO can procure the required amount of mFRR using exchange with other LFC blocks. The main results are reduced capacity costs of aFRR, and positive and negative mFRR.
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	The Croatian government adopted the new Electricity Market Law *Zakon o tržištu električne energije*, NN 111/2021 (ZOTEE), effective from 22.10.2021, 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. According to the provisions of ZOTEE, new adaptations of POUEES are expected by the end of 2022.
Evolution of the T&Cs for BRPs	
Content (see below)	According to provisions of ZOTEE, new adaptations of POUEES are expected by the end of 2022.

Evolution of the T&Cs for BRP – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	1.1.2023
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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), (c), (e) and (f)

Specific products in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d) of the EB Regulation

For the dimensioning of the aFRR balancing capacity, an empirical approach has been used in order to calculate the minimum amount of reserved capacity using empirical factors (a = 10, b = 150) and maximum load in the system in MW according to the formula:

$$R = \sqrt{a \times L_{max} + b^2} - b$$

For technical reasons, the formula is not applied on an hourly basis. The value of the required balancing capacity is extrapolated to hourly and monthly values depending on the expected load within a calendar month. In accordance with the above formula, the minimum and maximum amounts of aFRR have been set at ± 35 MW and ± 75 MW.

For calculation of 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. The required mFRR balancing capacity has been 348 MW for upward direction and 176 MW for downward direction in 2020, and 348 MW for upward direction and 171 MW for downward direction in 2021.

When the other impact factors have been taken into consideration (for example joint dimensioning in the SHB LFC block, the national legislative framework, the 10-year network development plan), mFRR capacity for 2021 has been calculated as 250 MW for up direction and 100 MW for down direction.

The Operational Agreement of the SHB LFC block covers part of the requirements of Article 60 (2)(e) of the EB Regulation through the ability to exchange and share balancing capacity. The aim of cooperation within the SHB LFC block is to establish an adequate mechanism that would enable the efficient operation of 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 2020 and 2021 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).

In accordance with Article 60 (2)(e) of the EB Regulation, the comparison analysis of balancing capacity prices in Hungary and Croatia is presented in the HOPS balancing report.

The basis of this analysis has been the prices of aFRR and mFRR balancing capacity, available on the ENTSO-E Transparency Platform and the Hungarian TSO (MAVIR) website.

According to the previous analyses (for 2018 and 2019), aFRR and mFRR balancing capacity prices within the neighbouring LFC areas have been lower than the prices of the balancing capacity available within the Croatian LFC area.

An outcome of the analysis is possible savings for HOPS in case of the introduction of common procurement mechanisms of the balancing capacity between Hungary and Croatia.

6.7. Czechia (ČEPS AS)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

ČEPS is the TSO of Czechia. It is within the Continental Europe Synchronous Area. As such, ČEPS is in charge of the LFC block, equal to the LFC, scheduling and monitoring areas covering the entire country. ČEPS is not a central dispatch TSO.

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. Settlement and invoicing take place after the balancing service evaluation period, followed by an appeal period. The T&Cs are available here, file: Kodex_PS_Část_II_6_21.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 is transmitted to the NEMO (OTE) by ČEPS within the terms defined in the Czech *Market Rules*, available here.

All new or existing BSPs in Czechia (the ČEPS LFC area) will have:

- a valid agreement on the terms of procurement and provision of balancing services (including T&Cs for BSPs),
- a valid certificate for the provision of balancing services – prequalification is performed by an independent certification authority, according to the procedures defined in the T&Cs,
- connection to the ČEPS control system and the protocol of the successful completion of point-to-point and functional tests.

The technical requirements for balancing services, possibilities and conditions of aggregation, and consequences of non-compliance, are all defined in the T&Cs. 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 aFRR, mFRR or RR quality parameters of the activated reserves are not respected, the activation is settled as unsuccessful or partially unsuccessful. In the case of mFRR and RR, the total monthly payment for balancing capacity is reduced by 10% for each failed activation, and by 5% for each partially failed activation. In the case that the BSP does not provide the balancing capacity in more than 10% of the business hours, the BSP may be suspended from the provision of any balancing services, and must fix the delivery issue as soon as possible.

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

The time frame for the settlement of balancing energy with the BSP is determined by OTE. The 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 they may transfer the imbalance responsibility to another BRP under contract. The Czech *Market Rules* further define responsibility for imbalance, applied to each individual 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 (which is itself a BRP or has transferred imbalance responsibility to another BRP) to cover the losses of their system.

The requirement that all BRPs bear financial responsibility for their imbalances, and that such imbalances are subject to clearing with the market operator, are prescribed by the Energy Act in Section 22(2) (Electricity market participants) and Section 18 (Liability for imbalance) of the *Market Rules*.

The rules according to which BRPs may change their plans before and after the closure of intraday electricity trading capacity (as required by Articles 17(3) and (4) of the EB Regulation) are described in the *Market Rules* Sections 7 (Intraday market) and 11 (Settlement of the balancing energy market).

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

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

There was no usage of specific products in the years 2019 and 2020; therefore, no information on procured or used specific product volumes is available. Until the go-live of balancing platforms in accordance with EB Regulation Articles 19(5), 20(6) and 21(6), ČEPS cannot provide any justification that standard products are not sufficient to ensure operational security to maintain the system balance efficiently.

Progress and timeline towards joining the European platforms and/or BCC

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR platform	Already connected since January 2020	N/A
aFRR platform	May 2022	Derogation not yet foreseen
mFRR platform	June–July 2022	Derogation not yet foreseen
IN platform	Already connected since June 2012	N/A

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
FRC cooperation	Observer	Q1 2023

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	T&Cs for BSPs were modified, to be in line with Arts. 18(4) and (5) of the EB Regulation.
Evolution of the T&Cs for BRPs	
Content	T&Cs for BRPs were modified, to be in line with the ISH Methodology.

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**No – derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	31.12.2024
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**Yes**
2.1. Scarcity component?	No
2.2. Incentivising component?	Yes
2.3. Component related to financial neutrality of the TSO?	Yes

Question:	Please select an option:
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**Yes**
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)	Applied

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

- Specific products were not exchanged in the ČEPS control area in 2019 and 2020, because there were no platforms that would allow this exchange at that time.
- Dimensioning of reserve capacity is based on the calculation of historical data following the requirements determined by the System Operation Guideline.
    - The calculated capacity requirement of aFRR for 2019 was ± 351 MW. The calculated capacity requirement of aFRR for 2020 was + 348 MW and - 351 MW.
    - The calculated capacity requirement of mFRR15 for 2019 was ± 288 MW. The calculated capacity requirement of aFRR15 for 2020 was + 284 MW and - 257 MW.
    - The calculated capacity requirement of mFRR5 for 2019 was 495 MW. The calculated capacity requirement of mFRR5 for 2020 was 505 MW.
- Optimal provision of reserve capacity is supported by the following market mechanisms:
    - technical replacements (enabling subcontracting other BSPs for technical or other reasons; in this case, the TSO does not need to purchase additional reserve capacity),
    - incident reporting (enabling a BSP with technical issues and no technical replacement to report the incident to the TSO; in this case, the TSO purchases additional reserve capacity to replace that which is unavailable),
    - penalties for unsuccessful activation of reserve capacity.
- Costs and benefits of having specific products cannot be determined, because ČEPS did not exchange any specific products in 2019 and 2020.
- There were no opportunities for the exchange of balancing capacity and the sharing of reserves due to a lack of appropriate methodologies for cross-border exchange in 2019 and 2020.
- The procurement of balancing capacity with the exchange of balancing capacity or sharing of reserves (see point above) did not occur due to a lack of appropriate methodologies.
- The efficiency of the AOF for balancing energy has a direct effect on the size of ACE. ČEPS has appropriate market mechanisms that motivate BSPs to deliver balancing energy in time, and with the required quality to minimise ACE.
    - aFRR
        - In case of activation of aFRR, all units providing reserve are activated at the same time.
        - The price of balancing energy from aFRR is unified and set for every provider aFRR by the price decision of the NRA.
    - mFRR
        - Activation is triggered after the activation of a certain percentage of available aFRR to replace it.
        - The price of balancing energy from mFRR is set by bid prices (merit order list).

6.8. Denmark (Energinet Elsystemansvar A/S)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Energinet is the Danish TSO. The Danish power transmission system is geographically located in Northern Europe and connects the Nordic synchronous area with the Continental European Synchronous Area. Denmark has two monitoring, bidding and scheduling areas, DK1 and DK2. DK1 is part of the TenneT Germany (TenneT DE) LFC area,[65] and thus a part of the Continental European Synchronous Area. DK2 is part of the Nordic synchronous area and the Nordic LFC block (together with Finland, Norway and Sweden).

Characteristics of DK2

The market design in the Nordic LFC block and thus DK2 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: 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 synchronous area, and Energinet started its procurement on 30 December of 2021.

FRRs are reserves meant to restore the frequency to the target value of 50.0 Hz and relieve the activated FCRs. The FRRs are divided into two reserve products:

1. aFRR, which is being implemented in Q4 2022, simultaneous with the connection to the common Nordic aFRR capacity market. The need is currently covered by FCR-N. Energinet has forecast the aFRR needed in 2023 in DK2 to approximately 80 MW.

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

RR is not used in the Nordic synchronous area.

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, with the exception of mFRR which is dimensioned on a national level.

Reserve volumes in DK2

Reserve product	Nordic volume	National share	National requirement
FCR-N	600 MW	3%	18 MW
FCR-D Up	Up to 1 450 MW	3%	44 MW
FCR-D Down1	Up to 1 400 MW	3%	44 MW
aFRR	300–400 MW	-	-
mFRR	N/A	N/A	600 MW

Characteristics of DK1

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

aFRR in DK1 is dimensioned in accordance with 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 2022 is determined to be ± 100 MW. Because DK1 is not yet an independent LFC area, the FRCE is defined as the unintended flow on DK1's only alternating current (AC) border, connecting DK1 and TenneT DE.

65 DK1 will become an independent LFC area during Q2/Q3-22

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 COBRAcable at 684 MW. This must be covered by both mFRR and aFRR, and thus the mFRR demand in DK1 is 584 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 284 MW.

Reserve volumes in DK1

Reserve product	Demand	Bought in LFC area
FCR	20 MW	20 MW
aFRR	100 MW	100 MW
mFRR	684 MW	284 MW

Progress and timeline towards joining the European platforms and/or BCC

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	24.7.2024	Derogation (not yet granted) due to simultaneous joining of the Nordic synchronous area.
mFRR platform	24.7.2024	Derogation (not yet granted) due to simultaneous joining of the Nordic synchronous area.
IN platform	1.6.2022	DK1 is part of the IGCC already, but as part of the TenneT DE LFC area, DK1 becomes its own LFC area on the specified date. There is no current plan to join DK2 to the IN platform at this time.

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Nordic aFRR capacity market	ACER published the decisions related to the capacity market proposals on 17.8.2020 and thus established the legal conditions for a common Nordic aFRR capacity market.	Q4 2022

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Nordic mFRR capacity market	The details of the market design for an mFRR capacity market are not yet decided.	Q4 2023

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSP	
The BRP balance agreement is available here.	Approved
The BSP balance agreement is available here.	Approved
Appendix 1 is available here.	Approved, valid as of 20.12.2021

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	22.5.2023
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**No**
3.1. Condition (a)	Not considered
3.2. Condition (b)	Not considered
3.3. Condition (c)	Not considered

Question:	Please select an option:
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

6.9. Finland (Fingrid Oyj)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Fingrid is the Finnish TSO. The Finnish power transmission system is geographically located in northern Europe and is a part of the Nordic synchronous area which consists of the transmission systems of Eastern Denmark, Finland, Norway and Sweden. This comprises the Nordic LFC block. There are only one scheduling area and one bidding zone 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. FCRs are reserves used for the containment of frequency, and are divided into three reserve products: FCRN, FCRD Up and FCRD Down. FCRD Down is the newest reserve product used in the Nordic synchronous area, and Fingrid started its procurement on 1 January 2022. FRRs are reserves the purpose of which 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 is not used in the Nordic synchronous area.

The size of the reserve markets varies between these five reserve products, as demonstrated in the table below presenting 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. Additionally, almost 19% of the prequalified capacity of FCR-N, 4% of the prequalified capacity of FCR-D Up and 21% of the prequalified capacity of FCR-D Down, is from batteries. There are not yet many BSPs representing RES in Finland if hydroelectricity is excluded. However, there is a growing interest among wind power producers for mFRR and FCRD Down, for example.

The reserve volumes and number of BSPs at the beginning of 2022

Reserve product	Nordic volume	National share	National requirement	Number of BSPs
FCR-N	600 MW	19.88%	119 MW	21
FCR-D Up	Up to 1 450 MW	19.88%	Up to 288 MW	19
FCR-D Down[66]	Up to 1 400 MW	19.88%	Up to 278 MW	7
aFRR	300–400 MW	20%	60–80 MW	6
mFRR	N/A	N/A	N/A	31

Progress and timeline towards joining the European platforms and/or BCC

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	24.7.2024	Derogation (not yet granted) due to simultaneous joining of the Nordic synchronous area.

66 New product, procured volume gradually increased.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
mFRR platform	24.7.2024	Derogation (not yet granted) due to simultaneous joining of the Nordic synchronous area.
IN platform	N/A	N/A

Balancing capacity cooperation	Status	Accession timeline
Nordic aFRR capacity market	Project ongoing	2023
Nordic mFRR capacity market	Project ongoing	2023

Question	Answer
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**Yes**
If response in Q1 is 'no', why?	N/A
If response in 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**
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	The market management system has been developed to enable the adoption of standard energy products.
Q4: Do you procure a standard product for balancing capacity?	**Yes (aFRR) and no (mFRR)**
Q5: What are the main characteristics?	**The aFRR balancing capacity product fulfils the characteristics of a standard product. mFRR balancing capacity is procured weekly.**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**Yes**
6.1. If response in Q6 is 'no', why?	N/A
6.2. If response in Q6 is 'yes', what were the main results?	The exchange of balancing capacities creates socio-economic benefits and common Nordic capacity markets for aFRR and mFRR are to be introduced.
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Reserve product	T&Cs for BSPs	Status and timeline
FCR-N and FCR for disturbances (FCR-D)	The T&Cs for providers of FCR are available here.	Approved, valid as of 1.11.2021
aFRR	The T&Cs for providers of aFRR are available here.	Approved, valid as of 18.1.2022
mFRR	The T&Cs for providers of mFRR are available here.	Approved, valid as of 1.11.2021

T&Cs for BRPs	Status and timeline
Balance agreement	Approved, valid as of 1.11.2021
Appendix 1, Part 1: Fingrid Oyj's general terms and conditions concerning balance management	Approved, valid as of 1.11.2021
Appendix 1, Part 2: Fingrid Oyj's general terms and conditions concerning imbalance settlement	Approved, valid as of 1.11.2021
Appendix 2: Fee components and determination of fees	Approved, valid as of 1.11.2021

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question	Answer
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	22.5.2023
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 2022?	**No**
3.1. Condition (a)	Not considered

Question	Answer
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 procurement of balancing capacity

During the reporting period, the Nordic TSOs maintained two types of FCR products for the Nordic synchronous area: FCR-N and FCR-D. However, at the beginning of 2022, Fingrid started to procure the FCR-D Down product in addition to the earlier FCR-D Up product. The Nordic TSOs have agreed that the FCR-N volume for the entire synchronous system is currently 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 synchronous area. The required Nordic volume of FCR-D is 1 450 MW for upwards regulation and 1 400 MW for downwards regulation, corresponding to the reference incidents in the Nordic synchronous area. The distribution of the FCRD Up and FCR-D Down capacities between the Nordic TSOs are calculated similarly to the FCR-N.

The national requirements for mFRR upwards regulation and downwards 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 3 months. The procurement hours have increased during the reporting period from 7–14 hours to 20 hours a day.

During the reporting period, the dimensioning rules as referred to in Articles 127, 157 and 160 of the System Operation Guideline 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 EB Regulation.

Fingrid utilises the exchange of balancing capacity and the sharing of reserves whenever needed and is cost effective. During the reporting period, Fingrid has purchased FCR-N and FCR-D (for upwards regulation) from the domestic yearly and hourly markets, as well as from the Estonian and Russian high-voltage direct current (HVDC) links, and other Nordic countries by inter-TSO trades. In addition, Fingrid has purchased aFRR from the domestic hourly market and has had the opportunity to purchase aFRR capacity from Sweden, Estonia and Russia when reasonable. Furthermore, Fingrid has purchased mFRR from the domestic markets and has a contract for the sharing and exchange of mFRR with the Estonian TSO Elering. However, transmission capacity has not been reserved for the exchange of balancing capacity, and therefore its utilisation has been avoided during times when all the transmission capacity is used in day-ahead and intraday markets. Along with the existing alternatives for the exchange of balancing capacity and sharing of reserves, Fingrid and the other Nordic TSOs are preparing to establish Nordic cross-border aFRR and mFRR capacity markets in the future.

Specific products

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 used during the reporting period cannot be defined as specific products as denoted in the EB Regulation.

6.10. France (Réseau de Transport d'Electricité)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

RTE is the French TSO. It is part of the Continental Europe Synchronous Area and manages its LFC block, which is equal to its LFC area, scheduling area and monitoring area.

Following Article 60(1) of the EB Regulation, RTE publishes a report on balancing covering the calendar years 2020 and 2021, which can be found here.

The French market is underpinned by the concept of BRPs. 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.

The power system is managed in a centralised and proactive way 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. In order to balance the French power system, RTE uses a dynamic system for sizing up 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 was involved since an early stage in almost all the European projects. It took an important step in December 2020 by joining the TERRE platform.

RTE is also preparing its connection to the European platform for the exchange of balancing energy from aFRR (the PICASSO platform) by the end of 2022.

In 2021, 200 BRPs were active on the French balancing market. The average system imbalance is 385 MWh for an ISP with a positive imbalance, and 362 MWh for a negative imbalance. On average, the system has a positive imbalance for 50.6% of the ISPs and a negative imbalance for 49.4% of the ISPs.

As for the BSPs, 75 were active in 2021, including producers connected to the transmission grid with a legal obligation to offer their available power on the balancing market, renewable energy producers and aggregators providing demand-side flexibility.

The French balancing market has already undergone major changes to take into account the specificities of technologies such as storage, renewables and demand-side management. It will pursue this evolution towards an efficient integration of flexible sources.

BSR is now able to participate in all French balancing markets for the different time frames, and, in 2021, demand-side management contributed respectively to 20% of the FCR and 45% of the mFRR/RR procured volumes.

The switch from procurement through prescription with a secondary market, to a primary market with a tender for FCR, and the participation of the inter-TSO FCR cooperation has increased the participation of storage facilities, especially batteries. In 2020 and 2021, 190 MW of batteries were certified for FCR. Since 2017, the whole certified volume of batteries has been activated.

Progress and timeline towards joining the European platforms and/or BCC

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	N/A
aFRR Platform	Q4 2022	Under discussion with French regulator
mFRR Platform	Q3 2024	Under discussion with French regulator
IN Platform	Connected since February 2016	N/A

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
FCR cooperation	Member	Connected since January 2017

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen in the future

Evolution of the T&Cs for BSPs
Frequency ancillary services T&Cs[67] (FCR and aFRR): • Introduction of standard energy bids for aFRR (approved and version applicable as of 1 January 2020) • introduction of a national daily tender for the procurement of aFRR capacities (approved and version applicable as of 1 September 2021) **Section 1: Rules relating to scheduling, the balancing mechanism and recovery of balancing charges**[68] (mFRR and RR): • Introduction of standard energy bids for RR (approved and version applicable as of 1 July 2019) • Precision in relation to the TSO balancing time frame: no activation for balancing purposes before the intraday GCT is allowed (approved and version applicable as of 1 April 2022) The mFRR-RR T&Cs[69] • Introduction of a national daily tender for the procurement of mFRR and RR capacities (approved and version applicable as of 1 January 2021)
Evolution of the T&Cs for BRPs[70]
• Implementation of the European methodology defining the new imbalance settlement at synchronous borders, in accordance with Arts. 50(3) and 51(1) of the EB Regulation (approved and version applicable as of 1 September 2021). • Establishment of the European ISH Methodology, based on Art. 52(2) of the EB Regulation (approved and version applicable as of 1 September 2021). • Implementation of the 15-minute ISP, in accordance with Art. 53(1) (approved and version applicable as of 1 April 2022). In accordance with the provisions of Art. 62(9) of the EB Regulation, the French regulator has granted a derogation to defer the introduction of a 15-minute ISP to 1 January 2025.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**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 following ISH Methodology Art. 9(6) as of 1 January 2022?	**Yes**
2.1. Scarcity component?	Not considered

67 *Frequency Ancillary Services Terms and Conditions* – [Link].
68 *Section 1:* Règles relatives à la programmation, au mécanisme d'ajustement et au recouvrement des charges d'ajustement – [Link].
69 *Manual Frequency Restoration Reserve and Replacement Reserve Terms and Conditions – Version in force on 1 January 2022* – [Link].
70 *Section 1:* Règles relatives à la programmation, au mécanisme d'ajustement et au recouvrement des charges d'ajustement – [Link].

Question:	Please select an option:
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 of 1 January 2022?	**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 reserve capacities

During the course of the year 2021, RTE has introduced new mechanisms for the procurement of aFRR and mFRR/RR capacities.

In November 2021, RTE introduced a daily tender for the procurement of aFRR capacities. The tender was suspended 1 month later at the request of the French regulator and since then RTE has resumed its procurement through a national prescription.

In June 2021, RTE introduced a daily tender for the procurement of mFRR and RR.

- RTE has procured on average 512 MW of FCR through a European tender, the FCR cooperation, performed daily:

FCR	2020	2021
TSO need (MW)	516	508
Total procurement cost (million EUR)	30.5	77.5
Average annual capacity price (thousand EUR/MW/y)	59.1	152.5

- RTE has prescribed a daily average of 620 MW of aFRR to the French stakeholders:

aFRR (national prescription)	2020	2021
TSO need (MW)	605	638
Total procurement cost (million EUR)	104.0	103.1
Average annual capacity price (thousand EUR/MW/y)	153.8	162.1

- RTE has procured, during the national aFRR tender in operation from 3 November until 23 November 2021:

aFRR (national daily tender)	Upward	Downward
TSO need (MW)	682	699
Total procurement cost (million EUR)	30.3	25.2
Average capacity price (EUR/MW/h)	85.45	70.60

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

RR reserve capacity	2020		2021			
	Annual		Annual*		Daily*	
	mFRR	RR	mFRR	RR	mFRR	RR
TSO need (MW)	1 500		1 000*		500*	
Average annual capacity price (thousand EUR/MW/y)	5.6	3.9	8.3*	7.3*	11.33*	13.55*

**The start of the daily tender took place on 1 June 2021. As a consequence, the actual volume of the daily tender was 0 for Q1–Q2 2021 and 500 MW for Q3–Q4. The actual volume of the annual tender was 1 500 MW for Q1–Q2 2021 and 1 000 MW for Q3–Q4.*

RTE actively contributes to European discussions about opportunities for the exchange of balancing capacity and sharing of reserves. However, it considers that certain prerequisites have to be met before joining such a cooperation for the procurement of balancing capacity (resumption of the national tender for aFRR capacities, connection to the PICASSO platform, the approval of 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. In order to ensure a smooth transition towards new processes guaranteeing system and operational security, RTE introduced a period of operation under control. During this period, RTE gradually increased its participation by connecting to a limited number of gates per day at the beginning, during working hours, to reach 24/7 operation in March 2022.

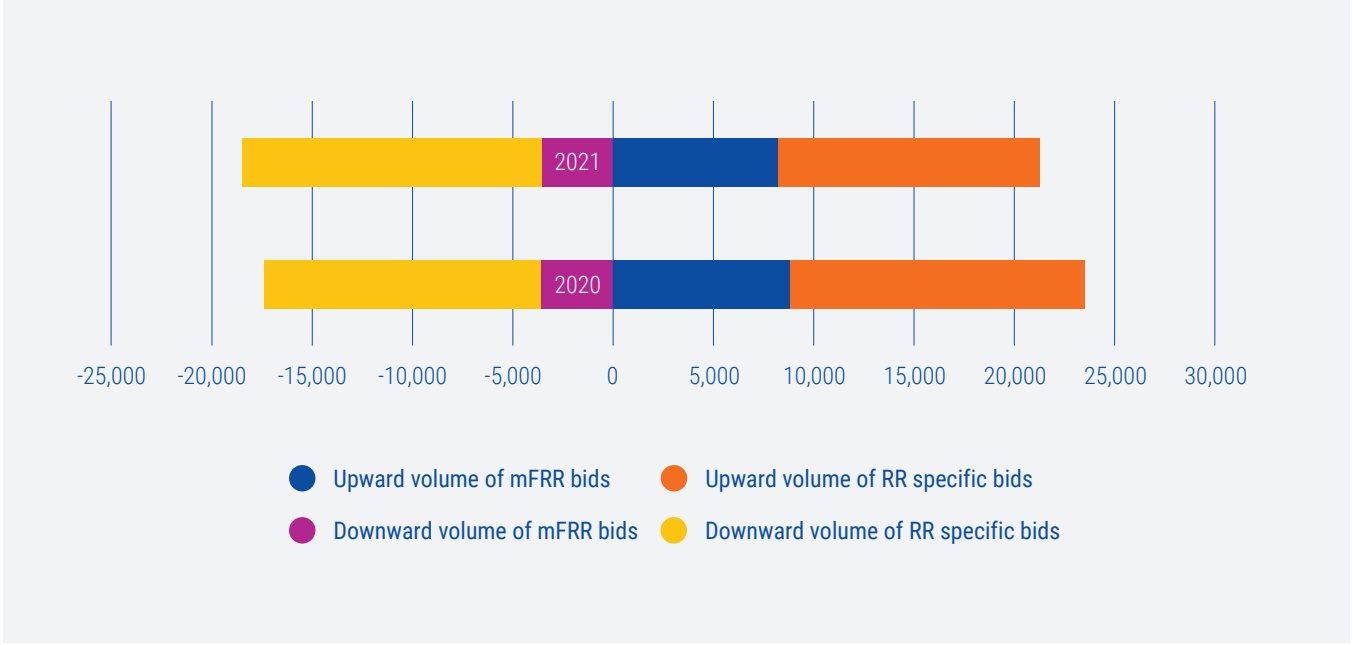


Figure 79 – Volume of submitted bids (MW)

In 2020 and 2021, there were on average 22 GW of upward submitted bids and 17.5 GW of downward submitted bids per ISP.

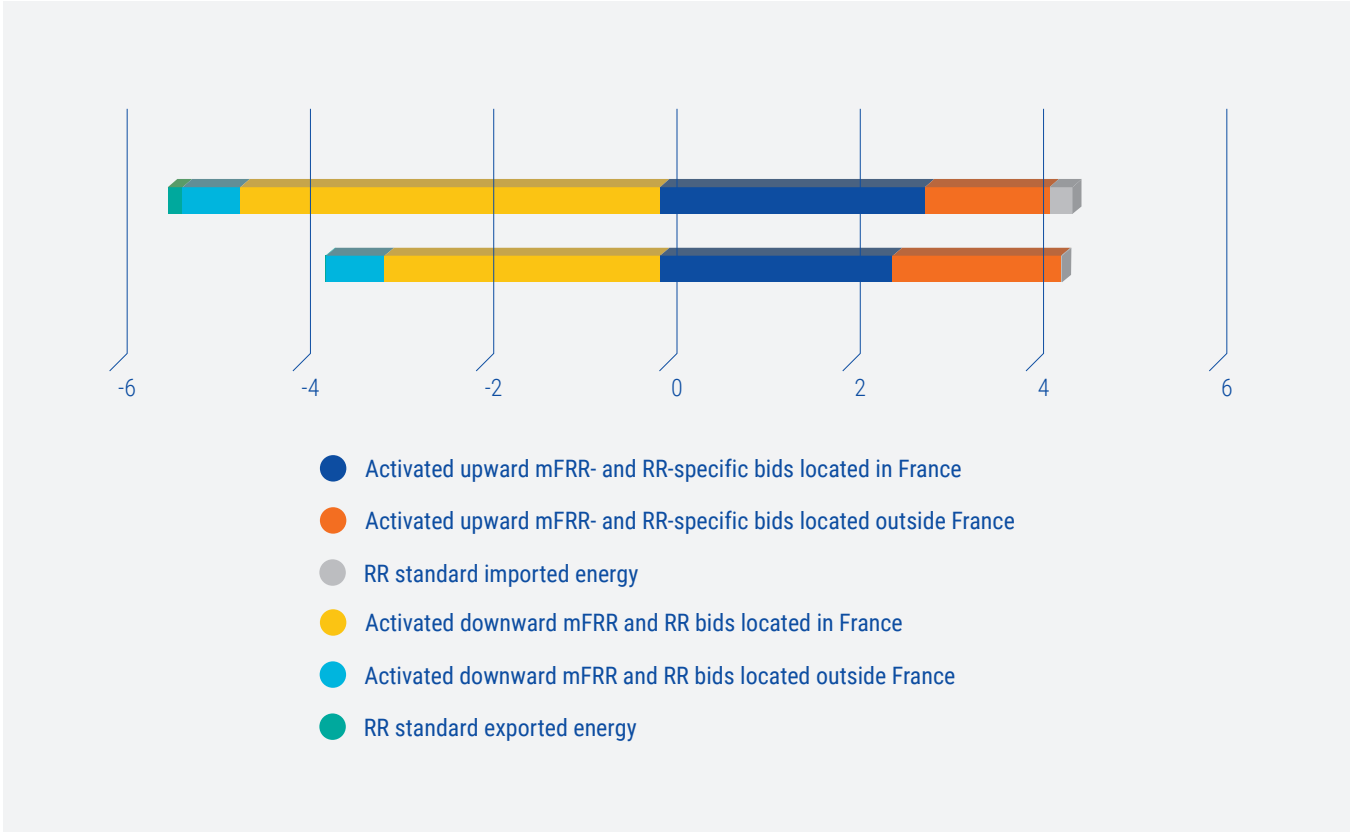


Figure 80 – Volume of activated bids (TWh)

In 2020, the volume of activated mFRR and RR balancing energy delivered by a facility outside France, through specific bids, represented 42% of the total upward volume activated and 17% of the total downward volume activated.

In 2021, the volume of activated mFRR and RR balancing energy delivered by a facility outside France, through specific bids, represented 30% (1 357 GWh) of the total upward volume activated and 12% (629 GWh) of the total downward volume activated. These volumes are gradually decreasing, being replaced by the use of standard products: 224 GWh of upward needs and 200 GWh of downward needs were satisfied by TERRE in 2021.

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 imbalances to be reabsorbed.

Besides, as presented previously, the liquidity on TERRE is gradually increasing, but is not yet sufficient. Therefore, as RTE cannot request more than the amount submitted by French BSPs on the platform, the use of specific products to balance the system is still required.

Also, these specific products are necessary for coordinated management of supply-demand balance and network constraints.

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

Finally, specific products remain necessary to continuously monitor available adequacy margins and risks at 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 TSO need) and consequently they cannot meet this purpose.

6.11. Germany (50Hertz Transmission GmbH, Amprion GmbH, TenneT GmbH and TransnetBW GmbH) and Luxembourg (Creos Luxembourg SA)

Introduction

The German TSOs publish a joint report on balancing, covering the previous 2 calendar years, which is summarized in this document.

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

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[71] and Denmark West are part of the Continental Europe Synchronous Area. According to the National Energy Act, the German TSOs 50Hertz Transmission GmbH, 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 is part of the LFC area of TenneT DE[72]. These LFC areas form an LFC block (DE-DKW-LU) in which the exchange capacities is treated as unlimited. The German TSOs cooperate under the German Grid Control Cooperation. This includes IN, a cost-optimal aFRR and mFRR activation, a joint dimensioning of reserve capacity and the joint-tendering of balancing capacity. 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 four scheduling areas form a bidding zone, 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 T&Cs for BSPs/BRPs according to Articles 18(5–7) (information or requirements 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 continental Europe, aFRR and mFRR are dimensioned and activated within the German LFC block. For FCR, the TSOs hold a share of the overall FCR requirement within continental Europe, equal to the share of the overall electricity generation and withdrawal in the synchronous area. 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[73]. 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. 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. 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:

The total number of balancing groups in Germany is 8 223 (end of April 2022).

Currently, there are 30 BSPs prequalified for offering FCR and 34 each for aFRR and mFRR[74]. Compared with the number of BSPs at the end of 2019, the number of BSPs for FCR decreased by 1, for aFRR by 3 and for mFRR by 11. However, the respective prequalified balancing capacity remained almost the same. German TSOs observed that not all prequalified BSPs, and thus not necessarily the total prequalified reserve capacities, are continuously active in the respective market.

71 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.

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

73 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)* – [Link].

74 See *Anbieterliste* – [Link].

The prequalified balancing capacity of DSR, RES and batteries can be found in the table below[75].

Prequalified balancing capacity (GW)	FCR	aFRR+	aFRR-	mFRR+	mFRR-
Battery	0.48	0.08	0.06	N/A	N/A
Demand/demand-side management	0.02	0.12	0.07	0.2	0.14
Wind	N/A	N/A	0.03	N/A	0.22
Total (all technologies)	6.94	23.35	23.68	33.36	32.8

Progress and timeline towards joining the European platforms and/or BCC

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	22.6.2022	N/A
mFRR platform	15.8.2022–15.9.2022	N/A
IN platform	May 2010	N/A

Balancing capacity cooperation	Status (MoU, project, member, observer…)	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

75 See *Prequalified Capacity in Germany* – [Link].

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Following Art. 18(5) of the EB Regulation, the T&Cs for BSPs were revised.	Submitted in 2018, the proposed T&Cs necessary to implement the EB Regulation's balancing market design and related processes[76] have been approved stepwise by the German NRA (Bundesnetzagentur). The remaining parts of the T&Cs are currently under approval (reference: BK6-18-004).
Evolution of the T&Cs for BRPs	
According to the provisions of Art. 18(6) of the EB Regulation, the T&Cs for BRPs were revised and reviewed by the TSOs. A new standard balancing group contract for BRPs and TSOs has been codified by the German NRA[77] (reference: BK6-18-061) and entered into force on 1.5.2020.	Submitted in 2018, approved and entered into force in 2020.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**Yes**
2.1. Scarcity component?	Implemented
2.2. Incentivising component?	Implemented
2.3. Component related to financial neutrality of the TSO?	Implemented
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**No**
3.1. Condition (a)	N/A
3.2. Condition (b)	N/A

76 For the TSO's T&Cs for BSPs, see *Consultation on Terms and Conditions for Balancing Service Providers* – [Link].

77 For documents related to the standard balancing group contract, *Beschlusskammer 6 - BK6-18-061 - Genehmigung der Modalitäten für Bilanzkreisverantwortliche (Standardbilanzkreisvertrag Strom)* - [Link].

Question:	Please select an option:
3.3. Condition (c)	N/A
3.4. Condition (d)	N/A
3.4. Condition (e)	N/A

German TSOs will establish the EB Regulation target market design in Q2 2022, together with the connection to the aFRR platform PICASSO. This change in market design will also include the adaptation of the imbalance settlement price calculation according to the provisions of the ISH Methodology.

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), (c), (e) and (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% of the time (see **Figure 81**). The sharing of reserves with other LFC blocks to reduce the procured capacity is currently not considered, since it is mostly used in LFC blocks where the procured capacity is determined by the reference incident.

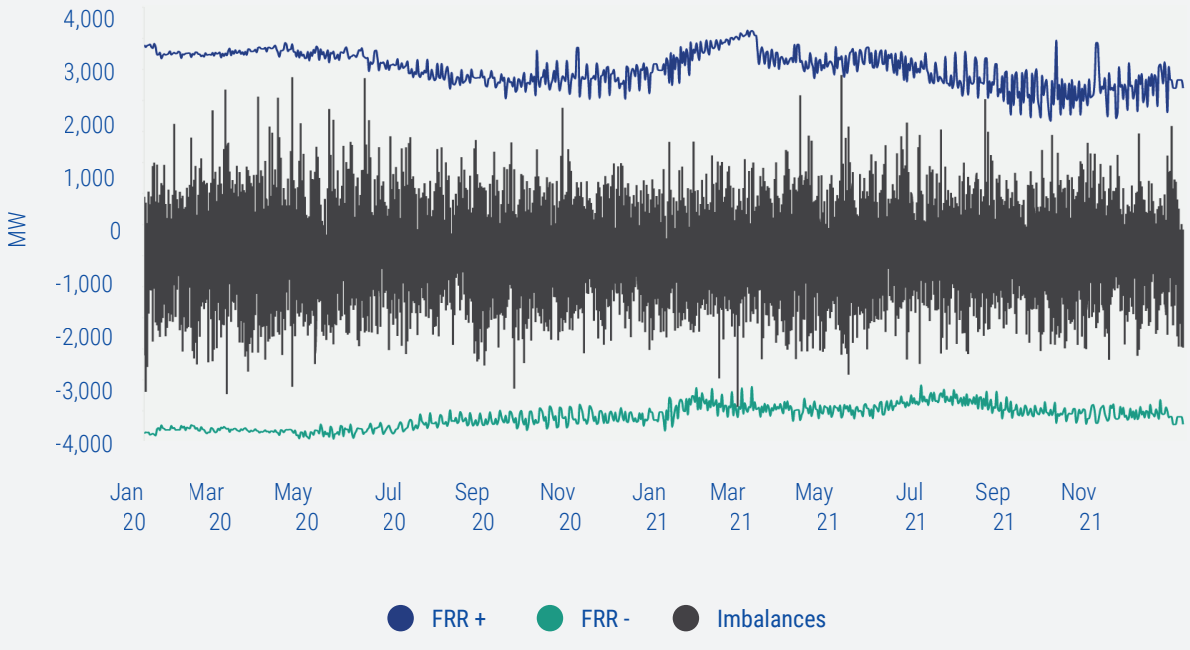


Figure 81 – Dimensioned FRR capacity and imbalances in Germany, 2020–2021

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. The possibilities for further cooperation with other TSOs regarding balancing capacity will be considered after the implementation of the European platforms.

The evaluation of the demands and bid surpluses on the balancing capacity market shows that, for all types of procured reserves, the supply always surpassed the demand. Additionally, there was a clear bid surplus with varying demand. On average, the offered balancing capacity in 2020 and 2021 was approximately 2.5 times the demand for FCR and positive and negative FRR capacity respectively. The market for 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 2020 and 2021, the energy bids for aFRR were on average around just 10% above the demand for both directions. For mFRR energy bids, the surpluses were on average 25% above the demand for negative and less than 10% above the demand for positive balancing energy. Therefore, German TSOs conclude that currently there are not sufficient non-contracted balancing energy bids continuously available within the LFC block.

- **Specific products in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d) of the EB Regulation**

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

6.12. Greece (Independent Power Transmission Operator SA)

Introduction[78]

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Greece is an LFC block and area, as part of the Continental Europe Synchronous Area. IPTO operates this LFC area by fulfilling the obligations of LFC. More details are presented here:

Country	Greece
TSO	IPTO
Scheduling area / LFC area / LFC block	HETS (Hellenic transmission system)
Number of bidding zones/scheduling areas/imbalance areas	1

The dispatch model for the IPTO balancing market is central dispatch. The balancing market includes the integrated scheduling process, the balancing energy market (mFRR and aFRR processes) and the balancing market settlement procedure.

Market name	Execution / time resolution	Product
Integrated scheduling process	Three scheduled executions after each scheduled complementary regional intraday auction (CRIDA) session and ad hoc executions if necessary: (ISP1, ISP2, ISP3)/30 minutes	The integrated scheduling process is a mixed integer linear programming algorithm, which co-optimises balancing energy and balancing capacity, while considering the technical constraints of balancing entities and network constraints, as well as ensuring operational security. Its results include: balancing capacity procurement (upward and downward FCR, aFRR, mFRR), commitment schedule of Balancing Service Entities (BSEs).
mFRR balancing energy market	Scheduled every 15 minutes, direct activation between scheduled sessions/15 minutes	Activation of mFRR balancing energy offers by issuing real-time dispatch instructions to the BSEs.
AFRR balancing energy market	Every 4 seconds/4 seconds	Activation of aFRR balancing energy offers by issuing automatic generation control instructions to the BSEs.

78 According to the NRA's Decision of 14.12.2020, the rules for the operation of the system and the rules for the settlement of the electricity market related to the period before the entry into force of the new balancing market, as of 1 November 2020, are defined in the previous HETS management grid code issued by Decision No. 57/2012 of the NRA (GG B' 103/31.1.2012) [Link]. Therefore, the rules described in the national executive summary relate only to the new balancing market, as of 1.11.2020.

Market name	Execution / time resolution	Product
Balancing market settlement procedure	Weekly/15 minutes	Metering Calculation of energy supplied, imbalances, prices, etc. Settlement of energy and capacity

General provisions

To become a BSE, the interested entity must successfully complete the prequalification process[79], which includes control tests to certify that the minimum technical requirements for the supply of FCR and FRR are fulfilled. The parties that are entitled to become a BSP, provided that they have an entity that has successfully completed the prequalification process, are producers with a power generating unit of installed capacity of over 5 MW, auto-producers, RES producers, RES aggregators, demand-response aggregators and consumers. The parties that can be registered as BRPs are producers, auto-producers, RES producers, RES aggregators, demand-response aggregators, consumers, suppliers and traders.

In the event that the operation of the balancing market is not possible, in particular due to an emergency situation, or failure of the balancing market system, or of the other electronic systems, IPTO applies the rules that are 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 2021, in the Greek balancing market, there were eight active BSPs and they represented 40 BSEs. There were 64 active BRPs, of which 16 were RES aggregators.

Integrated scheduling process

BSPs that represent generating units are obliged to submit balancing energy and capacity bids on the 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 (maximum 10 steps) balancing energy offers and balancing capacity offers per balancing capacity product for each dispatch day between 14:00 and 16:45 Eastern European Time on the day preceding the dispatch day.

The balancing capacity (reserve) requirements, namely upward and downward FCR, aFRR and mFRR, are contracted daily in the integrated scheduling process.

Balancing energy market

In the balancing energy market, two products are used:

- upward and downward mFRR balancing energy, which is activated by executing the mFRR process every 15 minutes,
- upward and downward aFRR balancing energy, which is activated through the operation of automatic generation control. The BSPs can submit updated balancing energy offers for mFRR and aFRR 15 minutes before the deadline.

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). The debits or credits to the BSPs, per ISP, for activated balancing energy are determined for each direction according to the following table:

Market Name	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 are determined by 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, as of November 2020, the ISP is 15 minutes. IPTO uses single imbalance pricing for all imbalances. The balancing market settlement is implemented weekly. The correction for settlement week 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 the generation schedules of power generating facilities or the consumption schedules of demand facilities. The imbalance of a BSE is equal to the difference between the entity's certified measurement energy data and the entity's market schedule, taking into consideration

79 *Methodologies and Technical Decisions* - [Link].

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

Market Name	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 and timeline towards joining the European platforms and/or BCC

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	July 2024	Granted
mFRR platform	July 2024	Granted
IN platform	June 2021	N/A

In more detail:

- RR platform: not participating because the RR product is not used in Greece.
- aFRR and mFRR platform: following the provisions of Article 62 of the EB Regulation, IPTO has requested a derogation from the provisions of Articles 20(6) and 21(6) of the EB Regulation concerning the implementation of the European platforms for the exchange of balancing energy from mFRR and aFRR, MARI and PICASSO. The requested derogation period is 2 years, thus until 24 July 2024. Participation in the European platforms MARI and PICASSO is targeted for Q3 2024, as they are both challenging projects that require significant and extensive modifications and adaptations to systems, infrastructures, and procedures related to the mFRR and aFRR and the T&Cs of BSPs and BRPs, as well as other regulatory framework changes.
- IN platform: already participating as of June 2021.

Regarding the participation of demand, RES and storage in European balancing platforms, the necessary regulatory developments for demand and RES have already been implemented. The necessary regulatory developments for storage will be implemented during 2022.

There is no planned exchange of balancing capacity or sharing of reserves. There seem to be few opportunities for cooperation, since the capacity for interconnection with other member states is not very large and, in most cases, most of the capacity has already been used in the previous markets (day-ahead and intraday).

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution 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 the EB Regulation, and apply to BSPs and BRPs within the control area of IPTO.

No significant changes were implemented, as of November 2020, regarding the T&Cs for BRPs and BSPs. However, quite enough changes are expected during the following years, taking into account the evolution envisaged by the approved Greek market reform plan and IPTO's participation in the European platforms.

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**No**
2.1. Scarcity component?	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 of 1 January 2022?	**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 uses local balancing energy products. IPTO does not use standard products, nor specific products. Moreover, IPTO does not exchange balancing capacity, nor shares reserves through national interconnections.

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

- *Volumes of available reserves*

The technical capability of a unit to provide FCR, aFRR, or mFRR is a parameter registered in its technical operating characteristics for the provision of balancing services. The total volumes of available FCR, aFRR, mFRR for 2020 and 2021 can be seen in the following table and are calculated as the summation of the corresponding registered characteristics per unit.

Balancing capacity	Total up (MW)	Total down (MW)
FCR	1 059	1 059
aFRR	3 898	3 906
mFRR	4 717	4 657

- *Volumes of procured reserves*

The volumes of procured FCR, aFRR and mFRR during January 2020 to December 2021 can be seen in the table below. It should be noted that, since November 2020, participants are compensated for procured mFRR volumes. The values for the first period (January to October 2020) are the hourly average of the procured reserves, while for the rest periods the values equal the average of the 30 minute procured reserves per product.

Years	Average volume of procured reserves, 2020–2021					
	FCR up (MW)	FCR down (MW)	aFRR up (MW)	aFRR down (MW)	mFRR up (MW)	mFRR down (MW)
2020 (January–October)	60		508	127	880	
2020 (November–December)	39	39	492	120	657	156
2021	47	47	482	119	513	174

- *Volumes of balancing energy used*

January to October 2020: During this period there was no balancing energy market. Balancing energy volumes are estimated as the difference between the dispatch instruction and the DAM quantity per hour and unit.

November to December 2020: The total annual volumes of used balancing energy (MWh) can be seen in the following table.

Years	Total (MWh)			
	BE up		BE down	
	aFRR up	mFRR up	aFRR down	mFRR down
2020 (January–October)	3 514 761		2 226 849	
2020 (November–December)	62 354	574 707	248 061	420 989
2021	1 416 237	2 565 958	1 075 833	2 637 985

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*[80], approved by NRA.

IPTO as a TSO of the Continental Europe Synchronous Area follows the dimensioning rules for FCR described by System Operation Guidance Article 153. The balancing capacity for FCR required for the synchronous area shall cover at least the reference incident (3 000 MW in positive and negative directions). 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 synchronous area 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 way it is activated; automatic (aFRR) and manual (mFRR).

aFRR upwards and downwards needs are calculated for each 30 minutes of the day, taking into consideration the following:

- maximum system load,
- the largest possible imbalance deficit due to one outage,

80 *Methodologies and Technical Decisions* - [Link].

- the minimum stable generation of the largest unit that is currently starting up,
- the need to cover operational imbalances due to interconnector schedules,
- the need to cover very fast load increases/decreases.
- mFRR upwards and downwards needs are calculated for each 30 minutes of the day, taking into consideration the following:
- the aFRR need for the same period,
- the RES generation,
- the need to cover operational imbalance due to demand deficit,
- the need to cover operational imbalances due to interconnector schedules,
- the need to cover extreme conditions.

6.13. Hungary (Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság/ MAVIR Hungarian Independent Transmission Operator Ltd)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

The Hungarian electricity system consists of one scheduling area and one LFC area, of which the TSO is MAVIR.

The T&Cs related to balancing following Article 18 of the EB Regulation were submitted to the Hungarian NRA by 18 June 2018 and approved by 18 September 2018, with the entry coming into force on 1 January 2019. It is part of the Hungarian International Network Code (Section 3.1) and defines the T&Cs for both BSPs and BRPs, in Hungarian and in 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 three types of reserves: FCR, aFRR and mFRR. The dimensioning of reserves is based on the requirements of the System Operation Guideline. The procurement of balancing capacity consists of a pre-selection process, which concludes in a framework agreement, and then daily bidding based on that agreement. In the case of balancing capacity from FCR, there is no separate procurement for positive and negative directions and only balancing capacity is settled between the BSP and TSO. In the case of balancing capacity from FRR, there is separate procurement for positive and negative directions.

The pre-selection process in 2020 until the end of Q2 was completed in quarterly and daily tenders, and from June 2020 in monthly and daily tenders. In the latter case, the rules (i.e. the product resolution) were slightly different, but the basic rules were defined in the tender rules and in the T&Cs related to balancing.

In 2020, the balancing energy market is organised on the daily bidding procedure. BSPs during the daily bidding of balancing services have to provide their bids in an hourly resolution; however, there is a quarter-hourly settlement applied after all. During the daily bidding, any qualified BSP can submit bids for balancing services, and, if the already-procured amount of balancing capacity is not available, or there is a need for more reserves, additional procurement takes place during this bid submission process.

The intraday balancing energy market was introduced on 1 January 2021. BSPs were allowed to submit their balancing energy bids closer to real time, with a 1-hour gate closure time (GCT), even within a day, 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 criteria 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 positive and negative directions and also for balancing energy bids from mFRR in positive and negative directions. The pricing of the balancing services market is pay-as-bid. MAVIR has participated in the common IN process, the IGCC, from 10 March 2020, with the purpose of avoiding simultaneous activation of FRR in opposite directions for the region of the three TSOs.

The T&Cs for balancing include every requirement related to the BRPs and 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 on 1 January 2019 as the first step in a continuous approach towards the completion of the requirements defined by the EB Regulation and the ISH rules. Following a public consultation and approval from the NRA during the business year 2020, MAVIR has fully implemented the ISH Methodology, according to the requirements stipulated by Article 52(2) of the EB Regulation establishing a guideline on electricity balancing and ISH Methodology) with the effective date of 1 January 2021. The new methodology must fully conform with the harmonisation requirements, implementing a single imbalance price calculation system for BRP imbalances in Hungary.

According to the EB Regulation, all TSOs of a synchronous area shall develop within 18 months of entry into force. This is 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 EB Regulation, and a proposal for common settlement rules applicable to all unintended exchanges of energy, according to Article 51(1) of the EB Regulation. 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 perform this settlement financially and replace the compensation programme. The go-live date of FSkar was 1 June 2021.

As the Hungarian system is based on a self-dispatch model and there is no specific product introduced, there is no information available in any cost-benefit analysis and on such volumes.

Progress and timeline towards joining the European platforms and/or BCC

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	N/A
aFRR platform	24.6.2024	Market development and system upgrade (granted)
mFRR platform	24.6.2024	Market development and system upgrade (granted)
IN platform	Already participates in IGCC	

Balancing capacity cooperation	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation		
Austria-Germany-Czechia-Hungary aFRR BCC	Observer	To be defined after joining PICASSO platform

The following content can be included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**Yes**
If response in Q1 is 'no', why?	N/A
If response in Q1 is 'yes', what were the main results?	Introduction of intraday balancing energy market, which allows for BSPs to submit their balancing energy bids closer to real time, could facilitate the participation of RES-based BSPs in the balancing energy market. However, they have limited use for the intraday market. A temporary solution for independent aggregators (based on proportionate distribution of requested balancing energy in the imbalance settlement) has been implemented for aFRR and mFRR balancing markets as of 1.1.2022 and 1.3.2022 respectively. Target solutions (based on real-time distribution data) shall be implemented in 2024. The temporary solution currently allows demand and RES participation in the balancing markets. The handling of storage will be applied at the end of 2022 or the beginning of 2023. First results are being evaluated.

Question:	Please select an option:
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	**No**
If response in Q2 is 'no', why?	Derogation granted until 2024
If response in Q2 is 'yes', what were the main results?	Open response
Q4: Do you procure a standard product for balancing capacity?	**No**
Q5: What are the main characteristics?	**Local products: aFRR with 15-minute full activation time (FAT) mFRR with 12.5-minute and 15-minute FAT, direct activation**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**Yes**
6.1. If response in Q6 is 'no', why?	N/A
6.2. If response in Q6 is 'yes', what were the main results?	MAVIR wants to take advantage of exchanges 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 June 2024 (derogation granted).
Q7: Are you already involved in a BCC as a member or as an observer?	**Observer in Austria-Germany-Czechia-Hungary BCC**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Introduction of intraday balancing energy market The Hungarian NRA initiated a significant market power procedure, which resulted in a market concentration-based (Herfindahl-Hirschman Index) limit price introduction in the balancing energy market. If the value of the Herfindahl-Hirschman Index exceeds the threshold value (1 800), a marginal cost-based price is applied to the balancing energy bids. A temporary solution for independent aggregators (based on proportionate distribution of requested balancing energy in the imbalance settlement) has been implemented for aFRR and mFRR balancing markets as of 1.1.2022 and 1.3.2022 respectively. The target solution (based on real-time distribution data) shall be implemented in 2024. The temporary solution currently allows demand and RES participation in the balancing markets. The handling of storage is planned for the end of 2022 or the beginning of 2023. First results are being evaluated.	Status (not submitted, submitted, approved) and timeline Approved, entry into force: 1.1.2021 Approved, entry into force: 1.11.2021 Approved, entry into force: 1.1.2022 and 1.3.2022

Evolution of the T&Cs for BRPs	
Content (see below)	Status (not submitted, submitted, approved) and timeline

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Date
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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):

- The implementation phase of standard and specific products has not yet finished in Hungary. We were able to use only aFRR/mFRR local products in 2020 and in 2021. There was no significant change in the amount of available, procured and used products in the last 2 years.
- Dimensioning of reserve capacities is based on the principles of the System Operation Guideline, also taking into consideration the special characteristics of the Hungarian electrical system.
- Reserve capacities were procured via long-term (quarterly, until Q2 2020) and monthly and short-term (daily) tenders. Taking into account 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 participate in BCC in the next 2 years as the implementation of standard products is planned for the middle of 2024.

6.14. Ireland (EirGrid PLC and System Operator for Northern Ireland [SONI] Ltd)

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 synchronous area, which operates a single electricity market (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 and timeline towards joining the European platforms and/or BCC

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 platforms, such as TERRE and MARI, which is expected to take longer to complete. Because the exit of the United Kingdom 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 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 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.

6.15. Italy (Terna Rete Elettrica Nazionale SpA)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here. At this link the version of the report covering the period from 18 December 2017 to 17 December 2019 can be consulted. The updated version covering the period from 18 December 2019 to 17 December 2021 will be published in the coming months.

(a) *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).*

- Synchronous area: Continental Europe
- LFC block/LFC area = Italy
- Scheduling areas/bidding zones = Nord, Centro Nord, Centro Sud, Sud, Calabria, Sicilia, Sardegna (current bidding zones configuration)
- Two imbalance price areas:
  - macro-area composed by the Nord bidding zone,
  - macro-area composed by all other Italian bidding zones.

(b) *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 BSPs/BRPs according to Articles 18(5–7) (information or requirements on unused capacity, requirements with regard to the BRP position, etc.).*

- 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 Rette Elettrica Nazionale S.p.A. (Terna) procures the dispatching resources needed for the secure operation of the Italian electric power system. Particularly during the scheduling phase of the Italian ancillary services market, upward and downward integrated scheduling process bids are selected with the aim of relieving congestions within bidding zones 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 bidding zones and ensuring or restoring FRR and, if needed, RR margins.
- 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 the islands, the regulating 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. It also takes 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.
- With reference to specific requirements, defined in the T&Cs for BSPs/BRPs according to Articles 18(5–7) of the EB Regulation, please find the current version of T&Cs here.

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

- In 2020 the number of BRPs was 265, and 28 of these were also BSPs. In 2021 the number of BRPs was 270, and 27 of these were also BSPs. There were also other BSPs (21 in 2020 and 32 in 2021) that participated in the ancillary services market by means of pilot projects described later in this report.
- DSR, RES and batteries participation in the ancillary services market was allowed through pilot projects (Decision 300/2017/R/eel) aimed at collecting useful elements for an overall reform of this market,

opening them to new participants also through aggregators (mixed enabled virtual units [UVAM[81]]). 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 them 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 and timeline towards joining the European platforms and/or BCC

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 13.1.2021	N/A
aFRR platform	By 24.7.2023	Reasoning: implementation of all the needed changes (regulatory, market, IT, etc.) for the coordination between national processes and aFRR platform. Derogation granted (Italian NRA Resolution 46/2022)
mFRR platform	By 24.7.2024	Reasoning: implementation of all the needed changes (regulatory, market, IT, etc.) for the coordination between national processes and mFRR platform. Derogation granted (Italian NRA Resolution 46/2022)
IN platform	Participating since 27.1.2020	N/A

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content Rules for integrated scheduling process bids conversion into RR standard product	Status (not submitted, submitted, approved) and timeline Approved (Autorità di Regolazione per Energia Reti e Ambiente [ARERA] Resolution 535/2018 and Resolution 344/2020) and implemented from 13.1.2021
Evolution of the T&Cs for BRPs	
Content (see below)	Status (not submitted, submitted, approved) and timeline

81 See *Progetto Pilota per Unità Virtuali Abilitate Miste – UVAM –* [Link].

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation (ARERA Resolution 474/2020)**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	31.12.2024
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**Yes, since 1.4.2022**
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Implemented (since 1.4.2022)
2.3. Component related to financial neutrality of the TSO?	Not considered
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**No, since 1.4.2022**
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), (c), (e) and (f)

- With reference to Article 60(2)(b), please see the second bullet point under paragraph (b) of Terna's executive summary in this report above here. 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 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 way (e.g. congestion relief, FRR and RR margins setting and balancing). For this reason, EB Regulation Articles(60)(2)(c), (e) and (f) are not applicable to the Italian case.

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

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

6.16. Netherlands (TenneT BV)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

The calendar years covered in the 2022 national report are 2020 and 2021; previous years are covered in the 2020 national report. The full 2022 national report will be published here.

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[82] and mFRR[83] is used, after reducing balancing energy demand by IN[84]. 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.

- The ISP is 15 minutes.
- All imbalance prices comply with Articles 55(4–6) of the EB Regulation.
- 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.
- Non-contracted balancing energy bids aFRR are allowed.
- The value of avoided activation is defined at mid-price merit order list FRR.
- Balancing energy prices are uniform per ISP, for all FRR balancing energy.
- BRPs are allowed to notify position changes after intraday GCT.
- Finalisation of imbalance settlement within 10 working days, including procedure for BRPs and BSPs to challenge settlement volumes.
- 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 (including grid losses) is around 118 TWh/y; visibility of consumption is increasingly obscured by embedded generation of solar photovoltaic systems. There are currently around 25 BSPs accredited, and around 100 BRPs, of which around 40 serve connections. The sharp increase in wholesale prices in Q4 2021 was reflected in an increase in balancing capacity, balancing energy and imbalance prices. A few bankruptcies of BRPs and of retail suppliers resulted, because of these high energy prices on the wholesale market, that prevented them from closing their positions satisfactorily, in view of their retail commitments. There is considerable and increasing interest from market participants with variable renewable energy (VRE) (mainly windfarms) batteries to participate in FCR and aFRR markets.

Progress and timeline towards joining the European platforms and/or BCC

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR platform	No RR process in place	N/A
aFRR platform	January 2022: Request for derogation from the connection to MARI and PICASSO until 24.7.2024 was sent.	Replacement of current EMS/SCADA is prerequisite to implement adaptations to connect to European platforms for aFRR and mFRR.

82 *TenneT afRR Documents* – [Link].
83 *TenneT mFRRda Documents* – [Link].
84 *ENTSO-E – Imbalance netting* – [Link].

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
mFRR platform	January 2022: Request for derogation until 24.7.2024 from the connection to MARI and PICASSO was sent.	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

BCC	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation		
FCR cooperation, platform for procurement and exchange of FCRs[85]	Member	April 2015

The following content is included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**No**
1.1 If response in Q1 is 'no', why?	TSO-TSO model. Standard product by definition eligible for European platforms.
1.2 If response in 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?	**Yes**
2.2 If response in Q2 is 'no', why?	N/A
2.3 If response in Q2 is 'yes', what were the main results?	A non-standard product mFRR (SA) was abolished by September 2021.
Q4: Do you procure a standard product for balancing capacity?	**No**
Q5: What are the main characteristics?	**N/A**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**Yes, sharing of reserves with neighbouring TSOs within the Continental Europe Regional Group**
6.1. If response in Q6 is 'no', why?	N/A

85 TenneT NL participates in FCR cooperation. See *ENTSO-E – Frequency containment reserves* – [Link].

Question:	Please select an option:
6.2. If response in Q6 is 'yes', what were the main results?	Sharing of capacity is possible since deterministic dimensioning parameter for FRR capacity > stochastic or probabilistic dimensioning parameter. Unavailability of remaining CZC in flow-based CZC allocation prevents utilisation of this sharing potential, and consequently there is no reduction of balancing capacity procurement.
Q7: Are you already involved in a BCC as a member or as an observer?	**Not for the frequency restoration process.**

Evolution of the T&Cs for BRPs and BSPs

Evolution of the T&Cs for BSPs	
Content	Approved since 18.12.2018.
Evolution of the T&Cs for BRPs	
Content	Approved since 18.12.2018. Updated and approved by NRA on market suspension and restoration rules, and on settlement rules in case of market suspension per 8 December 2021. No separate imbalance settlement rules are foreseen during market suspension.

The evolution of the T&Cs for BRPs related to the EB Regulation implementation the following content as per Articles 52, 53, 54 and 55 of the EB Regulation on settlement rules:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented, since 1 January 2021**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**Yes**
3.1. Condition (a)	Implemented; formal approval by relevant NRA on 2.3.2022
3.2. Condition (b)	Not considered

Question:	Please select an option:
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Not considered

The national grid code[86] was updated and approved by the NRA on low frequency demand disconnect according to Reg 2017/2196 NCER per 24.9.2020.

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), (c), (e) and (f):

For the calendar years covered by this report, the deterministic criterion exceeded the stochastic and probabilistic criteria for the minimally required volumes of FRR, allowing reserve sharing. Due to increasing volumes of VRE, the stochastic/probabilistic criterion is expected to overtake the deterministic criterion shortly, thus effectively rendering sharing of reserves impossible.

The introduction of flow-based market coupling in May 2015 eventually resulted in both borders being congested after intraday GCT, in both directions for a significant time, thus removing this opportunity to use reserve sharing under normal operating conditions to fulfil FRR dimensioning requirements, without reservation of CZC.

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 concise numerical overview for TenneT NL and its connected BRPs and BSPs is given below:

Metric/Indicator	2019	2020	2021	Unit
Demand Netherlands	118.7	117.5	118.2	TWh/a
∑Total balancing energy BSP	0.55	0.54	0.63	TWh/a
∑Net imbalance BRP	1.4	1.5	1.6	TWh/a
∑Net balancing energy	0.54	0.52	0.61	TWh/a
∑Net IN	0.62	0.74	0.73	TWh/a
∑Perfect ACE	0.24	0.24	0.24	TWh/a
∑Actual ACE	0.34	0.33	0.37	TWh/a
TSO-BRP imbalance	-70.0	-95.0	-153.9	M EUR/a
TSO-BSP balancing energy	40.0	44.8	86.4	M EUR/a
TSO-TSO IN	0.85	.3.4	1.2	M EUR/a

86 Source for the national grid code: https://wetten.overheid.nl/BWBR0037940/2020-04-04.

Metric/Indicator	2019	2020	2021	Unit
TSO-TSO compensation unintended exchange	0.63	-1.14	-1.01	M EUR/a
TSO-BSP balancing capacity	85.2	80.2	302	M EUR/a
Percentile net imbalance (1 / 99)	(-0.54, 0.49)	(-0.58, 0.55)	(-0.62, 0.58)	GW
Largest incidents (-/-, +/+)	(-1.07, 1.3)	(-1.07, 1.3)	(-1.07, 1.3)	GW
Scaled balancing energy cost	0.34	0.38	0.73	EUR/MWh
Scaled balancing capacity cost	0.72	0.68	2.56	EUR/MWh
Incidence imbalance price (dual)	7.3	9.3	7.8	% ISPs
Incidence imbalance price (value of avoided activation)	12.7	13.4	12.7	% ISPs
Price BRP short / system short	60.0	62.2	160.5	EUR/MWh
Price BRP short / all ISP	42.6	36.3	103.5	EUR/MWh
Price BRP long / all ISP	40.4	32.8	96.3	EUR/MWh
Price BRP long / system long	20.1	4.4	44.5	EUR/MWh
Incidence system short	45.7	47.0	48.0	% ISPs
mFRR Up	285.9	374.9	410	EUR/MWh
aFRR Up	63.6	71.1	174.3	EUR/MWh
aFRR Down	18.6	3.6	40	EUR/MWh
mFRR Down	x	-278.1	-286	EUR/MWh
Day-ahead wholesale	41.23	32.4	102.9	EUR/MWh

6.17. Norway (Statnett SF)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Statnett is the Norwegian TSO. It is within the Nordic synchronous area and, as a participant, the LFC block is shared with the other Nordic TSOs (Svenska kraftnät, Fingrid, Energinet). Regarding the LFC areas, scheduling areas and monitoring areas, these are equal to the five bidding zones NO1, NO2, NO3, NO4 and NO5.

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[87].

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[88].

Article 26(1) of the EB Regulation requires that, following the approval of the IFs for the European platforms following Articles 19, 20 and 21, each TSO may develop a proposal for defining and using specific products for balancing energy and balancing capacity.

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.

Statnett uses balance fees and grid tariffs to cover the procurement costs of balancing capacity.

Procurement of balancing capacity within the control area and exchange of balancing capacity with neighbouring TSOs

Article 32(1) of the EB Regulation states that each TSO shall perform an analysis on optimal provision of reserve capacity aiming at minimisation of costs associated with the provision of reserve capacity. This analysis shall take into account the procurement of balancing capacity within the control area and exchange of balancing capacity with neighbouring TSOs, when applicable.

In the reporting period, Statnett has procured balancing capacity within its control areas, in the following ways.

aFRR	**aFRR balancing capacity is now procured weekly in a national market. aFRR balancing capacity is procured to cope with imbalances in the control area.**
mFRR	mFRR balancing capacity for upward regulation 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.

The Nordic TSOs plan to establish 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. According to the NBM roadmap[89], that design will be implemented in Q4 2022 at the earliest. The reason for the uncertainty of the go-live date is the need to await results of a flow-based external parallel run. According to the NBM roadmap, a common Nordic mFRR capacity market will be implemented in Q4 2023.

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

Sharing of reserves, when applicable

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 volume of non-contracted balancing energy bids, which are expected to be available, both within their control area and within the European platforms, considering the available CZC

The European platforms are currently not in operation in the Nordic countries. However, the Nordic TSOs operate a common regulation power market, the mFRR EAM, which, to a substantial extent, is based on non-contracted balancing energy bids. A national balancing capacity procurement

87 For the T&Cs for BSPs, see *Reservemarkeder* – [Link].
88 For the T&Cs for BRPs, see *Balanseavregning* – [Link].
89 *Nordic Balancing Model – Roadmap* – [Link].

complements non-contracted balancing energy bids during periods where the non-contracted balancing energy bid volumes are expected to be too low to meet reserve requirements.

Opportunities for the exchange of balancing capacity and sharing of reserves

The Nordic TSOs (Svenska kraftnät, Statnett, Fingrid and Energinet) intend to establish regional balancing capacity markets for aFRR and mFRR balancing capacity. The purpose of the establishment of a common Nordic market for aFRR and mFRR capacity is to increase socio-economic welfare on a Nordic level and to increase operational security in the most efficient way.

The regional balancing capacity market is based on the FRR dimensioning process, which will result in FRR volumes per LFC area (equal to a bidding zone). This initial LFC area reserve requirement can then be procured in another LFC area, provided there are available CZCs that can accommodate the exchange.

According to Article 33(4) in the EB Regulation, all TSOs can either decide to ensure CZC for the exchange of balancing capacity based on a probabilistic approach, or in accordance with one of the three alternative methodologies specified in Article 40 'Co-optimised', Article 41 'Market-based' and Article 42 'Economic efficiency', of the EB Regulation.

Based on both theoretical assessments and practical experience, the Nordic TSOs consider that the application of a market-based CZC allocation methodology will lead to a more socio-economically beneficial use of the CZC in the Nordic region overall.

The approved methodology for the market-based allocation of CZC in accordance with Article 41 of the EB Regulation can be used for both aFRR and mFRR. The details of the market design for an mFRR capacity market are, however, not yet decided.

Progress and timeline towards joining the European platforms and/or BCC

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	Q2 2024	Lack of technical solutions in the Nordic TSOs. Derogation (not granted) until 24 July.
mFRR platform	Q4 2023/Q1 2024	Lack of technical solutions in the Nordic TSOs. Derogation (not granted) until 24 July.
IN platform	N/A	N/A

BCC	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation		
Nordic aFRR capacity market	Target go-live date for Nordic market is uncertain, due to dependency on flow-based external parallel run and the NRA processes on mark-up method.	Earliest Q4 2022
Nordic mFRR capacity market	Ongoing development of national plans. Stepwise implementation of national markets, before Nordic market.	Q4 2023

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	Still an ongoing regulatory process.
Evolution of the T&Cs for BRPs	
Content (see below)	Still an ongoing regulatory process.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	22.5.2023
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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

6.18. Poland (Polskie Sieci Elektroenergetyczne SA)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

- *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).*

- PSE is the sole TSO in Poland responsible for the Polish balancing market, launched in September 2001. Geographically, the Polish LFC block, LFC area, scheduling areas and bidding zones overlap with the Polish borders. The Polish LFC area is part of the Continental Europe Synchronous 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 T&Cs for BSPs/BRPs according to Articles 18(5-7) (information or requirements 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:

  (a) FCR

  (b) aFRR

  (c) RR

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

  (a) FCR: + 170 MW / - 170 MW

  (b) aFRR: + 500 MW / - 500 MW

  (c) 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 BSPs and TSOs, e.g. to activate the balancing energy. BSPs provide balancing services through the scheduling units. Only the scheduling unit representing a generation unit with appropriate technical capabilities can provide FCR and FRR. The replacement reserve can be provided by generation, storage and load units.

- Each integrated scheduling process bid submitted by a 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 provision of balancing services following Article 18(5) (f) of the EB Regulation is performed based on the real-time measurements.

- PSE uses neither standard nor specific products, as defined by the EB Regulation. Because PSE has not yet joined any of the platforms for the exchange of balancing energy, currently it 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 way 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 a 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 on the energy contracts concluded at 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 time frame, and the integrated scheduling process bids are submitted by BSPs no later than 14.30 the day before the electricity supply. Submission of integrated scheduling process bids for the whole available capacity is mandatory for all centrally dispatched generation units. Integrated scheduling process bids submitted in the day-ahead market horizon may be corrected in the intraday balancing process until H-45.

- The settlements of balancing services and imbalance energy are performed for each day of the month. Preliminary settlement data are available in D1, while final data in D4. Settlement correction is possible in the months M2, M4 and M15.

- *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 2020	Number of market participants in 2021
BSP	24 entities 103 scheduling units	26 entities 111 scheduling units
BRP	121	120
DSR	1	1
Storage	N/A	2 entities 18 scheduling units
RES	N/A	N/A

Progress and timeline towards joining the European platforms and/or BCC

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR platform	2023	Changes in internal balancing market process
aFRR platform	2024	Changes in internal balancing market process
mFRR platform	2024	Changes in internal balancing market process
IN platform	Already connected	N/A

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content (see below) **Changes in internal balancing market process**	Not submitted
Evolution of the T&Cs for BRPs	
Content (see below) **Changes in internal balancing market process**	Not submitted

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**

Question:	Please select an option:
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	The 15-minute ISP will be implemented with the modification of the internal balancing market.
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**No**
2.1. Scarcity component?	Not used
2.2. Incentivising component?	Not used
2.3. Component related to financial neutrality of the TSO?	Not used
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**No**
3.1. Condition (a)	Not used
3.2. Condition (b)	Not used
3.3. Condition (c)	Not used
3.4. Condition (d)	Not used
3.4. Condition (e)	Not used

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), (c), (e) and (f)

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 the EB Regulation.

- The reserves dimensioning is based on the probability of a generation unit's outage, demand forecast uncertainty, historically required reserve volumes and maximum generation unit's size. Availability of reserves is monitored constantly, looking 10 days in advance. The required level is expressed as a percentage of forecast demand, and it lowers as it approaches real time. Currently required values are as follows:
  - (a) daily coordination plan (9%)
  - (b) from D2 to D9 (14%)
  - (c) from D10 (18%)
- The total required reserve capacity consists of 170 MW FCR and 500 MW aFRR, and is pegged to the total required value by RR.

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 real time, when the uncertainties decrease, which ensures that the level is optimal and also ensures systems security, while avoiding oversizing. Moreover, because energy and reserves are acquired jointly, as part of the integrated scheduling process taking place after the closing of the SDAC market, the reserve volume is not excluded from the day-ahead market. This way provision of reserve capacity does not negatively influence the wholesale energy market.
- Joint provision of balancing energy and reserves as part of the co-optimisation process ensures optimal use of available resources to obtain both energy and reserves, while safeguarding system security.

An explanation and 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 by the integrated scheduling process.

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 for exchange. Sharing reserves 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 continental Europe region. Unscheduled power flows, 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, since PSE acquires reserves in the day-ahead time frame within the integrated scheduling process, while neighbouring TSOs do it in a longer time horizon, the possibility of reserve sharing is limited. However, even without sharing reserves, in case of urgent need PSE may provide energy to neighbouring TSOs using operational measures like agreed supportive power or emergency deliveries.

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

PSE uses neither standard nor specific products, as defined by the EB Regulation. Because PSE has not yet joined any of the platforms for the exchange of balancing energy, at present it only uses local products based on the integrated scheduling process bids submitted by BSPs.

6.19. Portugal (Rede Eléctrica Nacional SA)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Rede Eléctrica Nacional SA (REN) is the Portuguese TSO for continental Portugal, which is within the Continental Europe Synchronous Area. REN is in charge of the LFC block, which is equal to the LFC area, scheduling area, imbalance areas, bidding zone, imbalance price area and monitoring area covering the entire country.

REN is a self-dispatch TSO. Portugal forms the LFC area controlled by REN, thus all balancing reserves are valid for this control area.

Portugal maintains a legal document, *Manual de Procedimentos de Adesão ao Gestão Global de Sistema* (MPGGS), which defines all the rules for operating as a market agent in Portugal, namely the type of reserves, rules for pricing, evaluation of balancing reserve bids and settlement.

Furthermore, the T&Cs defined in Article 18 of the EB Regulation have not been approved by the Portuguese regulatory authority.

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.

All BSPs need to sign a contract with REN, submit to a prequalification test and test the connection to the REN control system to be able to participate in the balancing markets.

The MPGGS defines the technical requirements for balancing services and the possibilities and conditions of aggregation. The consequences of non-compliance are also described. If the BSP fails to provide the contracted balancing reserves (aFRR), 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 mFRR), the BSP will be subject to imbalance. If the BSP does not provide the balancing services, according to the technical requirements established in the MPGGS, the BSP might be suspended from 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 over the cost associated with 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.

In relation to the types of reserve used to balance the system and dimensioning, in Portugal there is a national market scheme for aFRR reserve procurement.

In relation to the market size, there are 20 BSPs that could provide ancillary services, namely 5 producers and 15 consumers.

Given that the standard products were still in definition or implementation, and since the go-live of balancing platforms in accordance with Articles 19(5), 20(6) and 21(6) of the EB Regulation has not occurred, there was no usage of specific products in 2020 and 2021, therefore no information on procured or used specific product volumes is available. Until the balancing platforms go live, REN cannot provide any justification that standard products are not sufficient to ensure operational security to maintain the system balance efficiently, as there is no usage of specific or standard products.

Progress and timeline towards joining the European platforms and/or BCC

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR platform	September 2020	N/A
aFRR platform	Q2 2024	Derogation; waiting for NRA approval
mFRR platform	Q3 2023	Derogation; waiting for NRA approval

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
IN platform	December 2020	N/A

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	Portuguese T&Cs on balancing, according to Art. 18 of the EB Regulation, were submitted for approval from the Portuguese NRA, but approval is still pending.
Evolution of the T&Cs for BRPs	
Content (see below)	Portuguese T&Cs on balancing, according to Art. 18 of EB Regulation, were submitted for approval of the Portuguese NRA, but approval is still pending.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	Derogation was granted until December 2024. However, REN is urged to make its best effort to implement until October 2023.
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**Yes**
3.1. Condition (a)	Proposed
3.2. Condition (b)	Proposed
3.3. Condition (c)	Not considered
3.4. Condition (d)	Not considered
3.4. Condition (e)	Proposed

6.20. Republic of North Macedonia (Electricity Transmission System Operator of the Republic of North Macedonia)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

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).

- Electricity Transmission System Operator of the Republic of North Macedonia (MEPSO) is the sole TSO in the Republic of North Macedonia and the owner of the entire Macedonian transmission network. MEPSO is solely responsible for:
  - (a) the Macedonian LFC area
  - (b) the scheduling area
  - (c) the monitoring area that covers the entire country
- The Macedonian LFC area is a part of the Continental Europe Synchronous Area. Together with the Serbian (EMS) and Montenegrin (Crnogorski elektroprenosni sistem [CGES]) areas, they form the Serbia, Montenegro and Macedonia LFC block (SMM LFC block).

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 BSPs/BRPs according to Articles 18(5–7) (information or requirements on unused capacity, requirements with regard to the BRP position, etc.).

- For balancing the power system in 2020 and 2021, MEPSO used a self-dispatch model for the following reserves:
  - (a) FCR
  - (b) aFRR

mFRR

- Total amount of FCR reserves for the Macedonian LFC area was 5 MW for 2020 and 6 MW for 2021.
- In accordance with the Macedonian grid code (*Mrezni pravila za prenos na elektricna energija – Sluzben vesnik 165/2020*) the provision of an FCR power reserve is mandatory for all electricity producers connected to the transmission network.
- The procedure for dimensioning the aFRR and mFRR for the Macedonian LFC area is performed in accordance with the provisions of the System Operation Guideline, Macedonian Grid Code, national and balancing rules (*Official Gazette* No. 179/19, 242/19, 49/20, 7/21, 146/21, 263/21 and 289/21).

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

- Since the implementation of the balancing mechanism on 1 January 2020, MEPSO has organised the prequalification process for becoming a registered BSP. After the successful fulfilment of the qualification process, the BSP is qualified for the supply of balancing capacity and balancing energy. If the BSP meets the requirements defined in the procurement rules of the aFRR balancing capacity and balancing energy, and the procurement rules of the mFRR balancing capacity and balancing energy, the BSP acquires the right to participate in auctions and submit bids for balancing capacity and balancing energy within the capacity of its balancing units.
- Currently in the Republic of North Macedonia, there are two BSPs qualified for providing aFRR and mFRR balancing services. Those are AD ESM Skopje, the largest state-owned production company, and CCPP TE-TO AD Skopje. There are 43 registered BRPs on the national balancing market. At this point in time there are no DSR/RES/batteries registered as BSPs on the balancing market.

Progress and timeline towards joining the European platforms and/or BCC

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	MEPSO is currently an observer to the platform

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
mFRR platform	N/A	MEPSO is currently an observer to the platform
IN platform	N/A	MEPSO is currently an observer to the platform

BCC	Status (MoU, project, member, observer…)	Accession timeline
Sharing reserves within SMM LFC block	Project	In accordance with the Operational Agreement of the SMM LFC block, there is currently an ongoing study for SMM dimensioning reserves.
Exchange of cross-border mFRR	Project	MEPSO and EMS have signed an agreement for cross-border exchange of mFRR.

The following content can be included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**No**
If response in Q1 is 'no', why?	At this point in time, there are no DSR, RES or storage facilities that participated in the balancing market. However, considering the continuous rise in the number of requests, MEPSO is currently assessing the requirements for connection to the transmission grid of these units. Consequently, MEPSO is going over the regulatory requirements to ease their connection and looking at possible IT solutions for their participation in the balancing market.
If response in 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?	**Yes**
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	Introduced a minimal bid quantity for mFRR (1 MW). Conducted a public procurement of a new market management system to better support the standard products in line with the aFRR/mFRR platforms.
Q4: Do you procure a standard product for balancing capacity?	**Yes**

Question:	Please select an option:
Q5: What are the main characteristics?	**The standard product for aFRR capacity includes a symmetrical quantity per hour. The auctions are conducted on a monthly basis and procured per blocks H1–H7 and H8–H24. The standard product for mFRR capacity includes an hourly quantity in separate directions. The auctions are conducted on a monthly basis. Both aFRR and mFRR balancing capacity are portfolio-based bids.**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**Yes**
6.1. If response in Q6 is 'no', why?	N/A
6.2. If response in Q6 is 'yes', what were the main results?	In Q3 and Q4 2021, MEPSO and EMS started the procedure of testing and reviewing contractual agreements for cross-border exchange of mFRR.
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	With the implementation of the new market management system, MEPSO has foreseen multiple changes regarding the bids by the BSP. MEPSO is considering the following changes: divisibility of bids, portfolio-based day-ahead auctions and intraday changes. The main reason MEPSO intends to implement these changes is to provide a more flexible approach to the balancing market. Additionally, with the growing number of applications and interest in battery storage units, there are changes that need to be made in the energy law, market and balancing rules to provide access to the balancing market.
Evolution of the T&Cs for BRPs	
Content (see below)	MEPSO does not currently foresee any changes regarding the BRPs.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**No**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	MEPSO currently uses a 60-minute ISP. However, the process for implementing a 15-minute ISP is now being reviewed

Question:	Please select an option:
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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), (c), (e) and (f)

- Regarding FCR, every year ENTSO-E evaluates and publishes the value for the primary reserve for different control subnetworks (system frequency subgroup) according to Policy 1 of the ENTSO-E *Operation Handbook*. MEPSO has the responsibility to provide the primary reserve for the relevant calendar year. 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. According to the Macedonian grid rules, the balancing capacity and balancing energy from FCR units are not the subject of financial settlement between the BSP and the TSO.

- As for the aFRR capacity reserves, for now, they are dimensioned in accordance with Policy 1 (Load-frequency control and performance), as well as the Macedonian grid code, using the deterministic approach, as a function of system size (empirical factors a = 10, b = 150):

- The mFRR reserve is calculated as the difference between planned generated power from the largest production unit and sum of the aFRR reserve and reserve energy within each 1-hour interval of the day. The mFRR reserve assessment is based on monthly planned value for the aFRR reserve.

- Additionally, the SMM block dimensioning is under way, by conducting a study which started in 2021 with the participation of all three areas of the SMM block (EMS, MEPSO and CGES). After finalising the results of the study, the SMM block will start the exchange and sharing of reserves within the newly dimensioned quantities.

- **Specific products in accordance with Articles 26(1)(a–f) and 60(2)(a) and (d)**

- MEPSO does not use specific products.

6.21. Romania (National Power Grid Company Transelectrica SA)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

- *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).*

The Romanian TSO is Transelectrica. The Romanian electricity system is part of the Continental Europe Synchronous Area and consists of one LFC area, one scheduling area and one bidding zone.

The market design is based on the self-dispatch model. As of September 2020, the procurement of balancing products is done per direction and, starting in October 2022, all balancing products will be in line with the EB Regulation. All balancing reserves are valid for our control area.

The T&Cs for BSPs and BRPs have been approved by the NRA and will enter into force on 1 October 2022. The T&Cs can be reviewed here.

Until the T&Cs are approved:

- BSPs are covered by Order No. 61/2020 of the president of the regulatory authority, where the balancing market is a centralised market mandatory for all market participants.
  - (a) TSO receives payments from BSPs for:
    - upward balancing energy for frequency restoration process with negative price;
    - downward balancing energy for frequency restoration process with positive price;
    - penalties for partial delivery of energy.
  - (b) TSO sends payments to BSPs for:
    - upward balancing energy for frequency restoration process with positive price;
    - downward balancing energy for frequency restoration process with negative price.
- BRPs are covered by Order No. 213/2020 of the president of the regulatory authority, where each licence holder must assume balancing responsibility towards the TSO for its entire production, acquisition, consumption, sale, import and export of electricity, to participate on the national market for electricity. Licence holders can transfer their responsibility to another BRP, but during this time the agreement with the TSO is suspended.
  - (a) TSO receives payments from BRPs for:
    - positive imbalances with negative price;
    - negative imbalances with positive price.
  - (b) TSO sends payments to BRPs for:
    - positive imbalances with positive price;
    - negative imbalances with positive price.
- Transelectrica uses system tariffs to cover costs with balancing capacity.

Progress and timeline towards joining the European platforms and/or BCC

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 (isolated RR TSO)	N/A
aFRR platform	1.12.2022	Development of new EMS/SCADA, new balancing model local system, technical updates/replacement of unit controllers.
mFRR platform	1.12.2022	Development of new balancing model local system.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
IN platform	In function	N/A

BCC	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation	N/A	N/A

The following content can be included in Section 2 on a voluntary basis:

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**Yes**
If response in Q1 is 'no', why?	N/A
If response in Q1 is 'yes', what were the main results?	RES 4 500 MW installed power Request for RES – 2 500 MW for connection notice Storage facilities are in various stages of connection in the system
Q2: Did you carry out regulatory and IT developments for adopting standard energy products (aFRR, mFRR, RR balancing energy products) in your system?	**Yes**
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	The prequalification process for production units has been started. A new balancing model platform adapted for standard energy products is being developed. The go-live using standard products is on 1.10.2022.
Q4: Do you procure a standard product for balancing capacity?	**Yes**
Q5: What are the main characteristics?	**According to ACER Decision No. 11/2020**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**No**
6.1. If response in Q6 is 'no', why?	The system adequacy is positive for all types of outage scenarios. No request from neighbouring TSOs.
6.2. If response in Q6 is 'yes', what were the main results?	N/A
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	Approved 1.10.2022
Evolution of the T&Cs for BRPs	
Content (see below)	Approved 1.10.2022

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**Yes**
3.1. Condition (a)	Not considered
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):

Transelectrica will start using standard products on 1 October 2022, when the T&Cs for BSPs and BRPs will enter into force.

Transelectrica does plan on using any specific products for the time being.

6.22. Serbia (Elektromreža Srbije)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

- *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).*

Geographical scope:

- LFC block: Serbia, Montenegro, and North Macedonia
- LFC area: Serbia
- scheduling area / bidding zone / imbalance price area: Serbia
- TSO: EMS

General information about market design and reserve dimensioning:

- self-dispatch model,
- types of reserve used to balance the system: FCR, aFRR and mFRR,
- dimensioning:
  - (a) FCR: ± 36 MW symmetrical product
  - (b) aFRR: ± 80 MW separated per positive and negative direction
  - (c) FRR: 300 MW positive direction, 150 MW negative direction

Specific requirements defined in the T&Cs for BSPs/BRPs according to Articles 18(5–7) (information or requirements on unused capacity, requirements with regard to the BRP position, etc.): N/A

General information about the market size:

- number of BSP(s): 1 for FCR, aFRR and mFRR
- number of BRP(s): approximately 42
- information about historical/new market players: N/A
- DSR/RES/batteries participation: N/A

Progress and timeline towards joining the European platforms and/or BCC

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	N/A	N/A
mFRR platform	N/A	EMS is currently an observer to the platform.
IN platform	June 2022	EMS is currently a non-participating member.

BCC	Status (MoU, project, member, observer…)	Accession timeline
Sharing reserves within SMM LFC block	Project	In accordance with the SMM LFC block Operational Agreement, currently there is an ongoing study for SMM dimensioning reserves.

BCC	Status (MoU, project, member, observer…)	Accession timeline
Exchange of cross-border mFRR	Project	EMS and CGES, EMS and NOSBiH have signed an agreement for cross-border exchange of mFRR bilaterally.

The IN cooperation in the SMM control block was established in 2021. Currently, EMS and CGES are participating in energy exchange.

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	EMS had changed the market code in Serbia in the past 2 years, but did not fully align with the EB Regulation. Currently, EMS is waiting for the adaptation of EB guidelines in the energy community and is actively preparing changes that will align Serbia's market code to the EB Regulation.
Evolution of the T&Cs for BRPs	
Content (see below)	EMS had changed the market code in Serbia in the past 2 years, but did not fully align with EB Regulations. Currently, EMS is waiting for adaptation of EB guidelines in the energy community and is actively preparing changes that will align Serbia's market code to the EB Regulation. Currently, the ISP is 60 minutes, and it is expected to implement the 15-minute resolution until the end of 2023.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**No**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	EMS currently uses a 60-minute ISP. However, the process for implementing a 15-minute ISP is now being reviewed.
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**No**
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Not considered
2.3. Component related to financial neutrality of the TSO?	Implemented

Question:	Please select an option:
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**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), (c), (e) and (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 statistical analysis of the average values of LFC area imbalance over the past 12 months and a deterministic process of dimensioning of aFRR, it was concluded that the required amount of aFRR for Serbia was ± 80 MW.
- The dimensioning of mFRR is considered both a reference incident of the SMM LFC control block, at + 600 MW and - 280 MW, and the SMM LFC block agreement. Thus, the amount of mFRR for Serbia was + 300 MW and - 150 MW, for the years 2020 and 2021 respectively.

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

- No specific products are defined which would distort competition or have a negative impact on integration of balancing markets or side effects on other markets. While the balancing entities have their own characteristics, but only mFRR and aFRR are used.

6.23. Slovak Republic (Slovenská elektrizačná prenosová sústava AS)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Slovakia consists of one LFC area controlled by SEPS. All balancing reserves are valid for this control area. 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[90]. (available here).

Progress and timeline towards joining the European platforms and/or BCC

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	24.7.2024	Derogation granted, with reasoning provided to the NR.
mFRR platform	24.7.2024	Derogation granted, with reasoning provided to the NR.
IN platform	Ongoing	N/A

BCC	Status (MoU, project, member, observer…)	Accession timeline
Name and objective of the cooperation	N/A	N/A

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	T&Cs for BSPs were modified, to be in line with Arts. 18(4) and (5) of the EB Regulation.
Evolution of the T&Cs for BRPs	
Content (see below)	T&Cs for BRPs were modified to be in line with the ISH Methodology.

90 *Schválené Znenie Dokumentu – "Prevádzkový poriadok organizátora krátkodobého trhu s elektrinou OKTE, a.s." –* [Link].

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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):

SEPS did not use standard or specific products in years 2020 and 2021, therefore no information on volumes is available. However, SEPS launched a product standardisation process in 2020, which will be fully completed by the time of accession to the platforms for the exchange of balancing capacity during 2024, but no later than 24 July 2024. SEPS has used specific products from 1 January 2022 (after the period covered by this report).

The procurement of balancing capacity with the exchange of balancing capacity or sharing of FRR was not used. The barrier to the earlier accession to the platforms is a time-consuming public procurement process aimed at fundamental modification of the TSO's trading system – requiring a conceptual change in bidding and transition to a 15-minute trading interval – and management information system.

SEPS performs weekly, daily, and intraday operational planning. The BSPs are obliged to provide the data for the operational planning according to the procedure set by the T&Cs for BSPs.

The dimensioning of reserve capacity is based on the calculation of historical data following requirements determined by the System Operation Guideline, establishing a guideline on electricity transmission system operation. It is further specified in the SAFA for the Continental Europe Regional Group.

At setting the optimal volume of the ancillary services, the principle of time breakdown and seasonality is applied. The calculated capacity requirements of FRR were the following:

Year	aFRR±	aFRR+	aFRR-	mFRR3+	mFRR3-	mFRR10+	mFRR10-	mFRR15+	mFRR15-
2020	143	-	-	255	135	215	100	120	120
2020*	-	143	143	255	135	215	100	120	120
2021	143	143	143	255	135	215	100	120	120

** Since October 2020*

In 2020 and 2021, a high quality of regulation was achieved with a very low number of limit overruns, well below the maximum permitted levels. The high quality of regulation results directly from the optimisation of the activation of balancing energy from FRR.

6.24. Slovenia (Electricity Transmission System Operator Ltd)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here; please see: *Poročila OPS o izravnavi v skladu s 60. členom uredbe EBGL*.

- *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).*
  - LFC block: Slovenia, Croatia, and Bosnia and Herzegovina
  - LFC area: Slovenia
  - Scheduling area / bidding zone / imbalance price area: Slovenia
  - TSO: ELES
- *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 BSPs/BRPs according to Articles 18(5-7) (information or requirements on unused capacity, requirements with regard to the BRP position, etc.).*
- *General information about market design and reserve dimensioning:*
  - Self-dispatch model
  - Types of reserve used to balance the system: FCR, aFRR and mFRR
  - Dimensioning:
    (a) FCR: ± 15 MW symmetrical product
    (b) aFRR: ± 60 MW separated per positive and negative directions
    (c) mFRR: ± 250 MW positive direction, 71 MW negative direction
  - *Specific requirements defined in the T&Cs for BSPs/ BRPs according to Articles 18(5–7) (information or requirement on unused capacity, requirements with regard to the BRP position, etc.):* N/A.
- *General information about the market size:*
  - number of BSP(s): two for FCR, two for aFRR, five for mFRR;
  - number of BRP(s): approximately 41;
  - information about historical/new market players: N/A;
  - DSR/RES/batteries participation: provide aFRR and/ or mFRR reserves.

Progress and timeline towards joining the European platforms and/or BCC

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	ELES asked for derogation	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. ELES asked for a derogation on 24.1.2022. NRA is processing the proposal now.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
mFRR Platform	ELES asked for derogation	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. ELES asked for a derogation on 24.1.2022. NRA is processing the proposal now.
IN Platform	Connected 1.2.2019	N/A

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
In December 2020, ELES published an updated T&Cs for BSPs, which were first published on 6 February 2019.	Approved by NRA on 10.12.2020. Currently valid T&Cs for BSPs.
In March 2022, ELES prepared updated T&Cs for BSPs. This version implements requirements necessary to connect to balancing platforms, such as: • Standard products for aFRR and mFRR • GCT, GOT for balancing energy bids • Fallback procedures • Balancing energy settlement procedures Provisions regarding balancing platforms will enter into force at time of ELES's accession to one of the balancing platforms, e.g. MARI or PICASSO.	Submitted for approval to NRA on 18.3.2022

Evolution of the T&Cs for BRPs

According to Slovenian legislation, imbalance settlement responsibility is awarded to the market operator company Borzen, which is responsible for the development of T&Cs for BRPs. Through this process, the financial neutrality of a TSO regarding procurement of balancing energy is guaranteed by reimbursing all types of reported balancing-related energy costs/income for ELES, e.g. aFRR, mFRR, RR, IN and costs related to unintentional deviations.

Requirements of ISH Methodology are not implemented; expected implementation by 1 January 2023. The ISP is 15 minutes.

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), (c), (e) and (f)

Dimensioning of reserve capacity is done commonly within the SHB LFC control block. Reserve capacity requirements are dimensioned, based on the operational experiences, where technical requirements defined in the ENTSO-E operational handbook for continental Europe, the SAFA, the System Operation Guideline, the ER Regulation and the provisions defined in the Operational Agreement of the SHB LFC block, where, among others, T&Cs for common dimensioning of reserves are defined.

Based on statistical analysis of open-loop LFC area imbalances, over a period of 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 2020 and 2021.

Dimensioning of mFRR considered both a reference incident of LFC control block SHB, which are 696 MW (both for years 2020 and 2021) and 185 MW or 220 MW (for years 2020 or 2021) respectively for positive and negative direction, and for the LFC block SHB agreement. Thus, the amount of mFRR for Slovenia was 250 MW in the positive direction and 71 MW in the negative direction for the years 2020 and 2021 respectively.

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

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) (a–f) and 60(2)(a) and (d)

There was no usage of specific products in years 2020 and 2021, therefore no information on procured or used specific product volumes is available. Until the go-live of balancing platforms, in accordance with EB Regulation Articles 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 the T&Cs for BSPs, demand response and RES participate in the balancing market on an equal basis to other sources. No specific products are defined, which would distort the competition or would have a negative impact on 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 and yearly and monthly auctions.

6.25. Spain (Red Eléctrica de España SAU)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

The previous 2-yearly report is provided here.

From a technical/implementation point of view, these have been the main developments between 2020 and 2021:

- The Spanish system joined the RR European platform TERRE on 3 March 2020. Spain was the first country in the South West Europe region to connect to TERRE. This represented 35% of the total balancing energies in the Spanish system in 2020 and 29% in 2021. The RR platform, the first European platform for activating balancing energies in operation, has allowed the exchange of 1 651.6 GWh in the Spanish system in 2021 (784.2 GWh of exports and 867.6 GWh of imports).

- The Spanish system joined the IGCC platform, which carries out the aFRR IN process for continental Europe, on 21 October 2021. Full connection took place one year later, with the aggregation of a second communication line between REE and Transnet BW (the TSO that manages the IN process). The estimated economic savings for the Spanish system due to the IN process amount to EUR 8.7 million in 2021, thanks to less aFRR energy activation, besides increasing security through higher aFRR availability. Moreover, the IGCC go-live constitutes a very important previous experience before joining the future PICASSO platform.

- The Spanish system joined the FSkar process on 1 June 2021.

- There have been ongoing IT changes (since 2020) to adapt the Spanish system towards 15-minute resolution for all balancing markets processes (RR energy, mFRR energy and reserve/energy aFRR) and real-time processes. This project is linked to necessary local adaptations in the Spanish system for its integration into the future MARI mFRR activation platform, and future change towards 15-minute MTU in energy markets. These IT changes are expected to be implemented at national level at Q2 2022.

- Ongoing IT changes (since 2021) to adapt the Spanish aFRR EAM towards joining the PICASSO European platform include:

  (a) a new local aFRR energy market;

  (b) adaptation of the local load-frequency controller to an activation approach based on aFRR energy bids (currently based on aFRR balancing D-1 capacity market share prorate activation);

  (c) real-time calculation of the aFRR energy delivery based on a linearised real-time market schedule baseline;

  (d) a new settlement module to implement the European target methodology for pricing the aFRR energy at local level.

  These IT changes are expected to be implemented at national level in Q2 2023.

- The Spanish system connection to the mFRR MARI platform is foreseen in September 2023, while connection to the PICASSO platform is foreseen in April 2024.

- IT system changes to adapt the current Spanish aFRR capacity product include, in particular, portfolio bidding and separation of upward and downward aFRR balancing capacity procurement.

- IT system changes for the implementation of a 15-minute ISP has already started in 2021.

From a regulatory point of view, these have been the main developments in 2020 and 2021:

- Since 26 January 2021, demand (other than pumping hydroelectricity units, which have participated as BSPs since the beginning of the market in 1998) can participate in different balancing markets (RR platform, and local mFRR and aFRR markets) after the approval of national regulatory changes in T&Cs and operating procedures in 2019–2020. New figures for the independent aggregator are envisaged to be implemented by mid-2023.

- National regulatory changes (operating procedures) were approved by the regulator in 2019–2020, to accomplish the connections to the European RR Platform (TERRE) and the European IN platform (IGCC), and in implementing the FSkar new settlement process.

- Further modifications related to the RR platform were needed in the Spanish operating procedures 3.3 and 14.4, to include the use of elastic need in the Spanish electrical system and to incorporate a safeguard mechanism in case of anomalies in the IT systems that may affect the prices resulting from the activation of offers in this platform.

- A price range from +99 999 EUR/MWh to -99 999 EUR MWh has been possible for RR balancing energies since the Spanish TERRE went live, while a price range of +9 999.99 EUR/MWh and -9 999.99 EUR/MWh] is possible for FRR energies, since the entry of the corresponding Spanish operating procedures, adapted to the already approved Spanish T&Cs, came into force in January 2021.

- Regarding ISH, the Comisión Nacional de los Mercados y la Competencia (CNMC) granted the application of dual pricing for specific ISPs according to Article 11(a) of the ISH Methodology and adapted the national regulation in December 2021. The Spanish system is now calculating the imbalance for each BRP with one single position, which includes its generation position and its demand position. Beside this, the implementation of a single imbalance price per ISP has also been achieved, coexisting in some scenarios of significant upward and downward balancing energy activation with a dual-pricing scheme. This dual price has changed and is calculated according to ISH Methodology.

- IT system changes for implementation of an ISP of 15 minutes have already started in 2021. Previously, in 2020, maximum derogation for the implementation of an ISP of 15 minutes (until December 2024) was granted by the regulator, encouraging the TSO to make the best effort to accomplish this milestone before the regulatory deadline of October 2023.

- Regarding connection to FRR European platforms, in January 2022 CNMC granted:

  (a) derogation for connection to mFRR Platform until 24 July 2022. However, REE is urged to make its best effort to connect before 24 December 2023 (i.e. 17 months after the legal date of implementation).

  (b) derogation for connection to aFRR Platform until 24 July 2022 (i.e. 24 months after the legal date of implementation).

- In March 2022, national regulatory adaptations for 15-minute granularity of different balancing processes – RR, mFRR and aFRR reserve/balancing energy and technical changes regarding the aFRR future energy market – were approved.

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).

- Geographical scope of the Spanish system: synchronous area(s): continental Europe; LFC Spanish control block(s) = Spanish scheduling area(s) = Spanish imbalance area(s) = Spanish bidding zone(s) = Spanish imbalance price area(s).

- Self-dispatch model.

- Types of reserve used to balance the system and dimensioning: currently, only aFRR procurement follows a market (local) scheme.

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 licensed to provide mFRR services in April 2022: 19 mFRR BSPs.

- Number of BSPs licensed to provide aFRR services in April 2022: 18 aFRR BSPs.

- Number and type of BSPs licensed to provide RR services in April 2022: 19 RR BSPs.

- Number of BRPs in April 2022: 521.

Progress and timeline towards joining the European platforms and/or BCC

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
RR platform	3.3.2020	Derogation has been granted until 15.10.2020 (i.e. 9 months after the legal date of implementation).
aFRR platform	Q2 2024	Deep IT/regulatory adaptation is currently ongoing for future transition of Spanish system to PICASSO platform. Derogation has been granted by the CNMC until 24.07.2022 (i.e. 24 months after the legal date of implementation).

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
mFRR platform	Q3 2023	Deep IT/regulatory adaptation is currently ongoing for future transition of Spanish system to MARI platform. Derogation has been granted by the CNMC until 24.7.2022. However, REE is urged to make its best effort to connect before 24.12.2023 (i.e. 17 months after the legal date of implementation).
IN platform	21.10.2020	N/A

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**Yes**
If response in Q1 is 'no', why?	N/A
If response in Q1 is 'yes', what were the main results?	Demand scheduling units can participate since January 2021 in different RR/mFRR/aFRR processes, subject to previous prequalification. Currently, demand for BSP participation is still low, although that is expected to increase in the future. Independent aggregator figures for Q4 2022 to Q1 2023 are yet to come out (regulatory changes ongoing). RES units were already active for all RR/mFRR/aFRR processes in 2020 and 2021 (the RES contribution to balancing services is very important due to the high penetration of RES in the Spanish system). At present, storage unit provision is mainly focused on pumped storage hydropower units; other storage technologies are yet to be developed or hybridised (i.e. 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
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	Regulatory and IT adaptation for Spanish system went live for IGCC and TERRE processes in 2020. Deep regulatory and IT adaptations for when MARI and PICASSO go live are ongoing.
Q4: Do you procure a standard product for balancing capacity?	**Not yet. 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 for Q2 2023.**

Question:	Please select an option:
Q5: What are the main characteristics?	**Spanish aFRR balancing capacity has 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 aFRR balancing capacity is not carried out separately (same marginal price applies upward and downward).**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**No**
6.1. If response in Q6 is 'no', why?	Currently, the Spanish TSO is fully focused on IT/regulatory adaptation towards all balancing energy platforms implementation.
6.2. If response in Q6 is 'yes', what were the main results?	N/A
Q7: Are you already involved in a BCC as a member or as an observer?	No

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content	Spanish T&Cs on balancing, according to Art. 18 of EB Regulation, were approved by the CNMC on 11.12.2019. Foreseen revision of T&Cs in 2022 will mainly include the next connections to the European FRR platforms and aggregation conditions in case of hybrid technologies and independent aggregators acting as BSPs.
Evolution of the T&Cs for BRP	
Content	Spanish T&Cs on balancing, according to Art. 18 of the EB Regulation, were approved by the CNMC on 11.12.2019. Foreseen revision of T&Cs in 2022 will mainly include the next connections to the European FRR platforms and aggregation conditions in case of hybrid technologies and independent aggregators acting as BSPs.

Evolution of the T&Cs for BRP – should include, among other information, the following content as per the Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	December 2024

Question:	Please select an option:
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**No**
2.1. Scarcity component?	Not considered
2.2. Incentivising component?	Considered but not yet implemented*
2.3. Component related to financial neutrality of the TSO?	Considered but not yet implemented*
Q3. Has your TSO made use of dual pricing as of 1 January 2022?	**Yes**
3.1. Condition (a)	Implemented (entry into force on 1.4.2022)
3.2. Condition (b)	
3.3. Condition (c)	
3.4. Condition (d)	
3.4. Condition (e)	

**Not implemented in 2022. CNMC has asked the Spanish TSO to assess the need for using this additional component 1 year after the entry into force of the new imbalance settlement mechanism.*

6.26. Sweden (Affärsverket Svenska kraftnät)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

Svenska kraftnät is the Swedish TSO. The Swedish transmission system is a part of the Nordic synchronous area, 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 formed one common LFC block that corresponds to the Nordic synchronous area (Sweden, Finland, East Denmark and Norway). The LFC areas, scheduling areas and monitoring areas equal the four bidding zones: SE1, SE2, SE3 and SE4.

The market design is based on the self-dispatch model. The reserves used for balancing in the Nordic synchronous area 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 and FCR-D. FCR-D is used to mitigate the impact of incidental disturbances, including the reference incident, and FCR-D Up has also been used for this purpose. FCR-D Down was only recently introduced to the Nordic power system and the very first auction was held on 30 December 2021. The current Nordic FRR market is strongly dominated by mFRR, but aFRR is a process under development, where procured volumes and contracted numbers of hours are constantly increasing. In addition to this, a Nordic aFRR capacity market is planned to be launched in 2022.

The market sizes for the different products can be seen in the following, 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.

Currently, the main power source for ancillary services in Sweden is hydroelectricity, but there is an increasing interest from market participants to participate with (other) kinds of RES. On the mFRR downregulation market, there is a substantial contribution from wind power producers. For FCR-D Down, there is a great interest from wind, but also solar power, to prequalify and participate in a pilot project. Regarding batteries, there is a small, prequalified volume for FCR-D Up, but an increasing interest from the market can be seen. DSR is currently not very common, even though 5% of prequalified FCR-D Up volumes come from DSR and some volumes participate on the mFRR market as well.

Reserve product	Nordic volume	National share	National requirement	Number of BRPs
FCR-N	600 MW	38.33%	230 MW	8
FCR-D Up	Up to 1 450 MW	38.33%	Up to 556 MW	10
FCR-D Down	Up to 1 400 MW	38.33%	Up to 537 MW	4
aFRR	300–400 MW	35%	105–140 MW	4
mFRR	N/A	N/A	N/A	7

Progress and timeline towards joining the European platforms and/or BCC

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	24.7.2024	Derogation (not yet granted) due to simultaneous joining of the Nordic synchronous area.

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
mFRR platform	24.7.2024	Derogation (not yet granted) due to simultaneous joining of the Nordic synchronous area.
IN platform	N/A	N/A

BCC	Status	Accession timeline
Nordic aFRR capacity market	ACER published the Decisions related to the capacity market proposals on 17.8.2020 and thus established the legal conditions for a common Nordic aFRR capacity market.	Planned implementation by Q4 2022
Nordic mFRR capacity market	The details of the market design for an mFRR capacity market are not yet decided.	Planned implementation by Q4 2023

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BRPs	
Balance Agreement	Approved, valid as of 1.1.2022
Appendix 1: Definitions	Approved, valid as of 1.1.2022
Appendix 2: General T&Cs for BSPs	Approved, valid as of 1.1.2022
Appendix 3: T&Cs for providers of FCR	Approved, valid as of 1.1.2022
Appendix 4: T&Cs for providers of aFRR	Approved, valid as of 1.1.2022
Appendix 5: T&Cs for providers of mFRR	Approved, valid as of 1.1.2022

Evolution of the T&Cs for BSPs	
Not implemented	Submitted

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per the Articles 52, 53, 54 and 55 of the EB Regulation:

	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Derogation**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	22.5.2023
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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 38.33% corresponding to 230 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 38.33%, corresponding to up to 556 MW and 537 MW respectively.

The mFRR is dimensioned by the individual TSOs, based on their control area assessment of local requirements, such as bottlenecks in the network, dimensioning faults and similar. The requirements for mFRR volumes in an upward direction are defined by large national N-1 incidents and each TSO shall have mFRR volume available equivalent to or greater than the dimensioning fault in the control area. There are currently no explicit Nordic arrangements for dimensioning, nor contracting of downward mFRR, since historically the availability of downward mFRR energy bids has been sufficient.

The aFRR product shall be seen as an automatic 'complement' to mFRR in the frequency restoration process. Each quarter of a year, all Nordic TSOs determine the hours for which aFRR shall be dimensioned. Currently, the Nordic TSOs procure 300–400 MW for the Nordic synchronous area, where

Svenska kraftnät's share is 35% or 105–140 MW. The volumes that were procured in the beginning of the reporting period were for the morning and evening peak hours only, where the frequency variations are most challenging. By the end of the reporting period, however, the number of contracted hours has increased to 20 per day. The TSOs expect that future challenges will require more automated balancing, which will increase the number of aFRR contracting hours to all hours. After that, the aFRR volume will gradually be increased from today's level of 300 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 System Operation Guideline, 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 following Article 32(1) of the EB Regulation.

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. 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. There is also a temporary agreement to deliver aFRR between Sweden and Finland if it is cost effective and if there is additional supply available after the Swedish volume requirement has been cleared. The Nordic TSOs also exchange FCR in bilateral agreements in cases where such exchange can be performed respecting the operational security limits.

In the coming years, the Nordic market will enable the exchange of balancing capacity and sharing of reserves even further through the joint NBM programme. According to the NBM roadmap, a common Nordic aFRR capacity market will be implemented in Q4 2022. Furthermore, the Nordic TSOs also plan to establish common procurement procedures for mFRR and, according to the NBM roadmap, a Nordic mFRR capacity market will be implemented in Q4 2023.

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. Therefore, Svenska kraftnät has not used specific products during this reporting period.

6.27. Switzerland (Swissgrid AG)

Introduction

The detailed TSO report on balancing, according to Article 60 of the EB Regulation, is available here.

With the Swiss market liberalisation at the beginning of 2009, Swissgrid took the role of TSO of Switzerland and balancing group coordinator. The Swiss territory consists mainly of one scheduling area equal to the Swiss control block and control area, even though 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 within Switzerland like distribution grids around Laufenburg, which are not included in the control block. Within ENTSO-E, the Swiss control block is part of the Continental Europe Synchronous Area. As Coordination Centre South, Swissgrid also assumes important monitoring and coordination tasks in cooperation with the Coordination Centre North, Amprion, for a stable LFC in continental Europe.

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* or 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* or StromVV). StromVV specifies the technical and economic rules for the participants in the Swiss energy markets. Thus, 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 BSPs. 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 products (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 65 TWh. For the balancing markets, there were approximately 21 BSPs and 108 BRPs by the end of 2021.

The LFC process at Swissgrid comprises the three sub-processes: FCR, FRR and RR.

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 of the System Operation Guidance establishing a guideline on the electricity transmission system operation by the dedicated group within ENTSO-E for the Continental Europe Synchronous Area. FCR are procured in cooperation with the following countries: Austria, Belgium, Germany, France, the Netherlands, Slovenia and Denmark.

The FRR process comprises the activation of the aFRR (also known as secondary FCR) and mFRR (also known as fast tertiary FCR). The 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 MTU. The aFRR at the LFC of Swissgrid is activated on a pro rata basis. This means that each BSP receives its percentage share of the total demand of the control block corresponding to its specific share of the total awarded and available aFRR. BSPs that are awarded offers of balancing capacity for mFRR or RR must subsequently provide bids for balancing energy products corresponding to the awarded balancing capacity in a different bidding process. Since 2020, Swissgrid has changed the activation time of all products, introducing ramps in the mFRR and RR balancing energy products due to the planned ramping of 10 minutes for the European balancing products like TERRE.

Progress and timeline towards joining the European platforms and/or BCC

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 10.2020	N/A
aFRR platform	June 2022	N/A
mFRR platform	July 2022	N/A

European balancing platform for the activation of balancing energy	Accession timeline	Reasoning for derogation and status of the derogation (granted or not)
IN platform	Implemented since March 2012	N/A

BCC	Status (MoU, project, member, observer…)	Accession timeline
FCR cooperation	Implemented since 2013	N/A

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing demand, RES and storage to participate in European balancing platforms?	**No**
If response in Q1 is 'no', why?	Swissgrid did nolt implement specific changes for demand, RES and storage, but they were already taking part in the market
If response in 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?	**Yes**
If response in Q2 is 'no', why?	N/A
If response in Q2 is 'yes', what were the main results?	Adoption of IT systems and of the T&Cs of the BSPs in order to adopt the standard RR balancing product and preparation for adoption of the standard aFRR and mFRR products.
Q4: Do you procure a standard product for balancing capacity?	**No**
Q5: What are the main characteristics?	**N/A**
Q6: Did you assess the potential for exchange of balancing capacities or sharing of reserve?	**No**
Q7: Are you already involved in a BCC as a member or as an observer?	**No**

Evolution of the T&Cs for BRPs and BSPs related to the EB Regulation implementation during the last 2 calendar years, and further evolution foreseen for the future

Evolution of the T&Cs for BSPs	
Content: Adoption for standard products aFRR, mFRR and RR	Entered into force for RR in 2020. The amended T&Cs for aFRR and mFRR will enter into force in June 2022.
Evolution of the T&Cs for BRPs	

Evolution of the T&Cs for BSPs	
Content (see below)	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 T&Cs for BRPs is acknowledged by the regulator.

Evolution of the T&Cs for BRPs – should include, among other information, the following content as per Articles 52, 53, 54 and 55 of the EB Regulation:

Question:	Please select an option:
Q1. Was the 15-minute ISP implemented by 1 January 2022?	**Implemented**
1.1. If response in Q1 is 'derogation' or 'exemption', until when was this derogation/exemption granted?	N/A
Q2. Has your TSO made use of additional components following ISH Methodology Art. 9(6) as of 1 January 2022?	**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 of 1 January 2022?	**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 2020 and 2021 is shown in a weekly granularity in Figure 82. It includes bids resulting from balancing capacity procurement in accordance with Articles 60(2)(b), (c), (e) and (f). Starting in October 2020, it also comprises standard RR upward/downward bids offered by Swiss market participants for the TERRE platform.

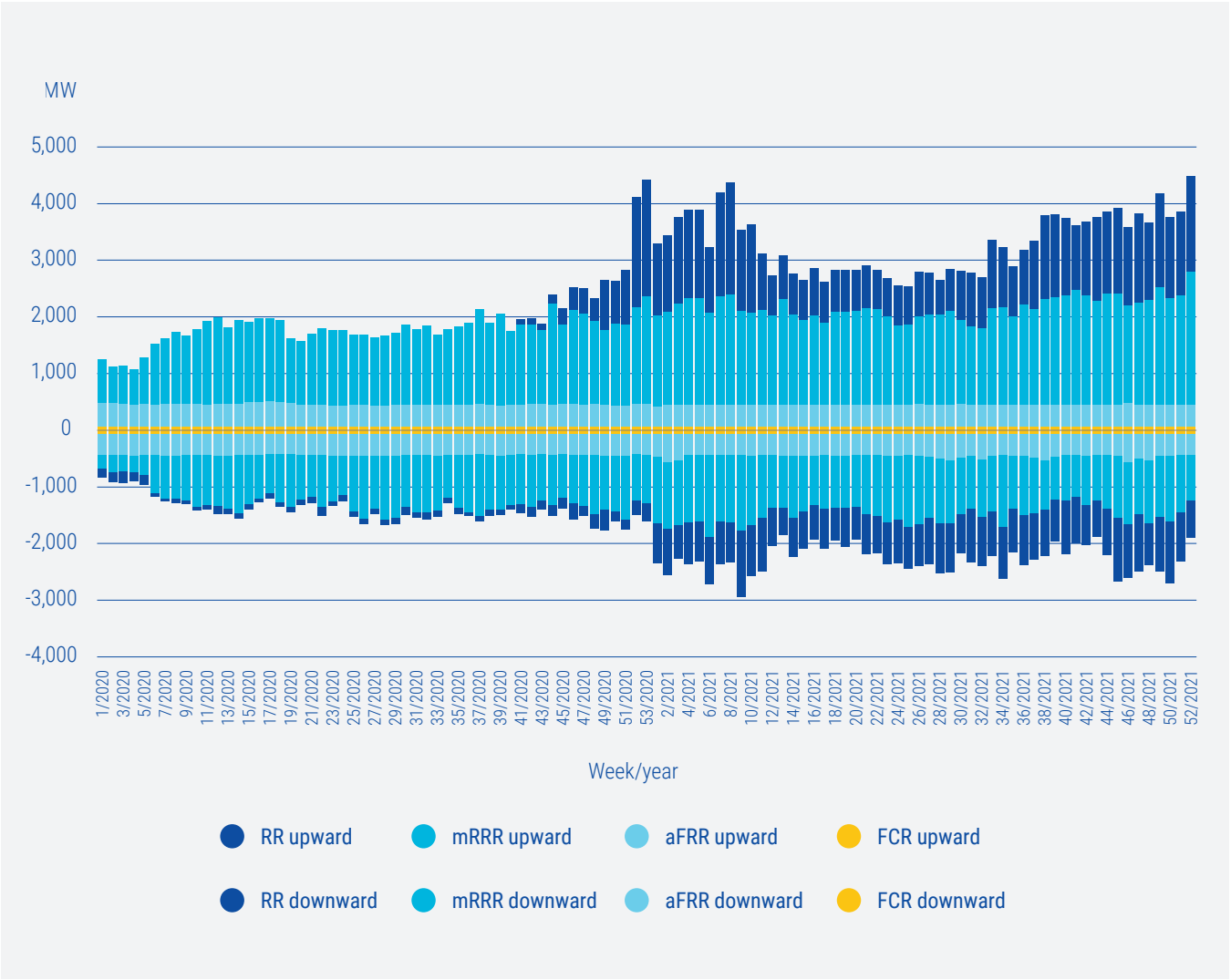


Figure 82 – Availability of balancing energy bids in Switzerland (MW)

The recent increase of the electricity wholesale market notations is reflected by a substantial rise of the prices for activated balancing and imbalance energy. The average yearly prices for each product for 2020 and 2021 can be found in Figure 83.

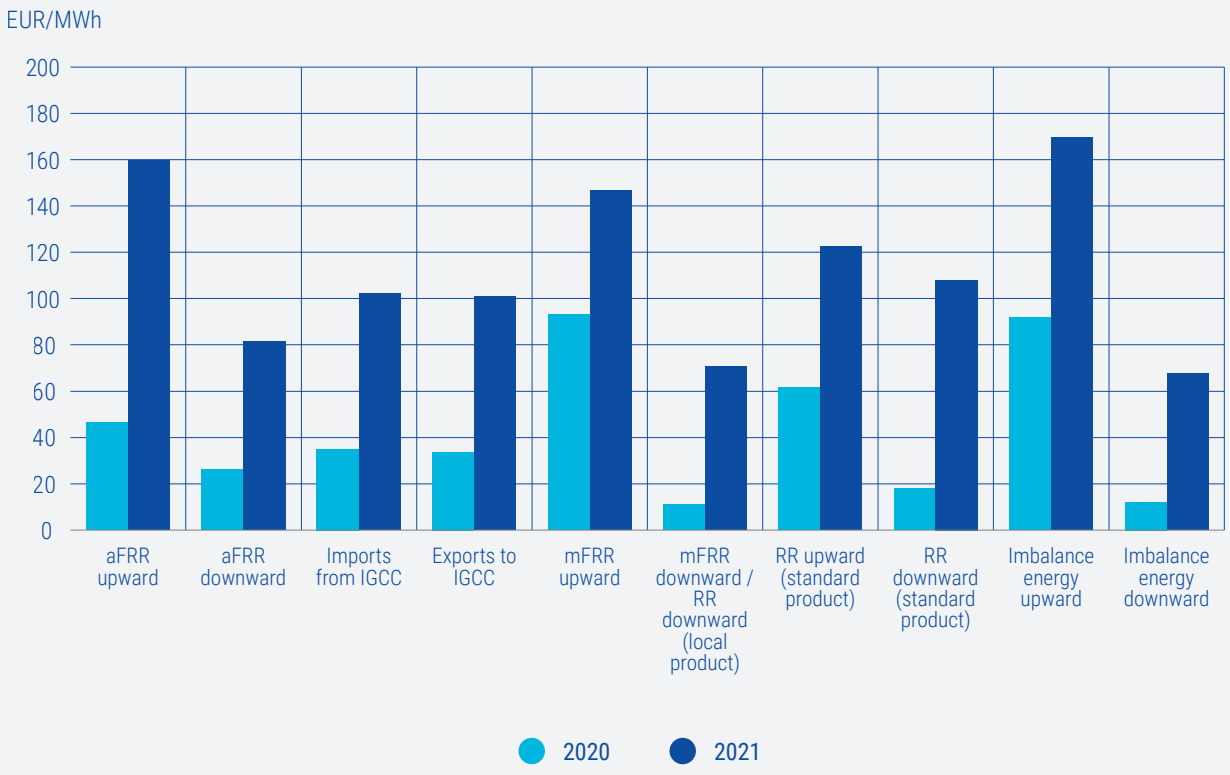


Figure 83 – Balancing and imbalance prices in Switzerland (EUR/MWh)

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[91], which are incorporated in Chapter 5 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.

91 On 9 April 2019, ENTSO-E submitted to ACER the first proposal on performance indicators. On 1 October 2019, a second version of this proposal was submitted based on the comments received from ACER.

Glossary

50Hertz	50Hertz Transmission GmbH (1 of 4 German TSOs)
AC	Alternating current
ACE	Area control error
ACER	Agency for the Cooperation of Energy Regulators
aFRR	FRR with automatic activation
AOF	Activation optimisation function
Amprion	Amprion GmbH (1 of 4 German TSOs)
APG	Austrian Power Grid AG (1 of 2 Austrian TSOs)
ARERA	Autorità di Regolazione per Energia Reti e Ambiente (Italy)
AST	Augstsprieguma tikls AS (Latvian TSO)
AT	Austria
ATC	Available transfer capability
BCC	Balancing capacity cooperation
BE	Belgium
BG	Bulgaria
BRELL	Belarus, Russia, Estonia, Latvia and Lithuania common synchronous area
BRP	Balance responsible party
BSP	Balancing service provider
BT CC	Balancing time frame capacity calculation
CBCL	Cross-border capacity limits
CBMP	Cross-border marginal price
CCR	Capacity calculation region
CEP	Clean Energy For All Europeans Package
ČEPS	Czech Transmission System Operator
CGES	Crnogorski elektroprenosni sistem AD

CH	Switzerland
CMM	Capacity management module
CNMC	Comisión Nacional de los Mercados y la Competencia (Spain)
CNTC	Coordinated net transmission capacity
CREG	Federal Commission for Electricity and Gas Regulation (Belgium)
CRIDA	Complementary regional intraday auction
CSO	Coordination of secure operation
CSP	Common service providers
CZ	Czechia
CZC	Cross-zonal capacity
DE	Germany
DK	Denmark
DSR	Demand side response
EAM	Energy activation market
EB Regulation	Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing
EE	Estonia
ELES	Elektro-Slovenija Ltd (Slovenian TSO)
Elia	Elia System Operator SA (Belgian TSO)
EMS	Elektromreža Srbije
ENTSO-E	European Network of Transmission System Operators for Electricity
ES	Spain
ESO (Bulgaria)	Electroenergien Sistemen Operator EAD
EU	European Union
EUPHEMIA	Pan-European Hybrid Electricity Market Integration Algorithm
FAT	Full activation time
FCA	Forward capacity allocation
FCR	Frequency containment reserve

FCR-D	FCR disturbance
FCR-D Down	FCR for disturbance downward
FCR-D Up	FCR for disturbance upward
FCR-N	FCR normal
FI	Finland
FR	France
FRCE	Frequency restoration control error
FRR	Frequency restoration reserves
GCT	Gate closure time
GOT	Gate opening time
GR	Greece
HERA	Croatian Energy Regulatory Agency
HETS	Hellenic Transmission System
HOPS	Croatian Transmission System Operator Ltd
HR	Croatia
HROTE	Croatian Market Operator
HU	Hungary
HVDC	High-voltage direct current
IE	Ireland
IF	Implementation framework
IGCC	International Grid Control Cooperation
IF	Implementation framework
IN	Imbalance netting
IPS/UPS	Integrated Power System/Unified Power System of Russia
IPTO	Independent Power Transmission Operator SA/ADMIE (Greek TSO)
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
LPMB	LIBRA platform management board
LU	Luxembourg
MARI	Manually Activated Reserves Initiative
MAVIR	Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság (Hungarian TSO)
ME	Montenegro
MEPSO	Macedonian Transmission System Operator AD
mFRR	FRR with manual activation
MNA	Multiple-NEMO arrangement
MPGGS	*Manual de Procedimentos de Adesão ao Gestão Global de Sistema*
MTU	Market time unit
NBM	Nordic Balancing Model
NEMO	Nominated electricity market operator of power exchange
NL	Netherlands
NO	Norway
NOSBiH	Nezavisni operator sústava u Bosni i Hercegovini
NRA	National regulatory authority
OPSCOM	Operational Committee
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
PL	Poland
PMO	Project Management Office
POUEES	*Pravila o uravnoteženju elektroenergetskog sustava*
PSE	Polskie Sieci Elektroenergetyczne

PT	Portugal
PTR	Physical Transmission Right
RA	Regulatory Authorities
REE	Red Eléctrica de España SAU
REN	Rede Eléctrica Nacional, SA
RES	Renewable energy sources
RO	Romania
RS	Serbia
RR	Replacement reserves
RTE	Réseau de Transport d'Electricité
SA	Synchronous area
SAFA	Synchronous Area Framework Agreement
SC	Steering committee
SCADA	Supervisory control and data acquisition
SDAC	Single day-ahead coupling
SE	Sweden
SEPS	Slovenská elektrizačná prenosová sústava a.s. (Slovakian TSO)
SHB	Slovenia, Croatia, and Bosnia and Herzegovina
SEE	South East Europe
SEM	Single electricity market
SERC	State Electricity Regulatory Commission (Bosnia and Herzegovina)
SI	Slovenia
SIDC	Single intraday coupling
SK	Slovakia
SMM	Serbia, Montenegro and Macedonia
SONI	System Operator for Northern Ireland Ltd
SPL	Senior project lead

Statnett	Statnett S.F. (Norwegian TSO)
Svenska kraftnät	Swedish TSO
SWE	South West Europe
Swissgrid	Swissgrid AG (Swiss TSO)
T&Cs	Terms and conditions
TenneT DE	TenneT GmbH (1 of 4 German TSOs)
TenneT NL	TenneT BV (Dutch TSO)
Terna	Rete Elettrica Nazionale Sp.A. (Italian TSO)
Transelectrica	National Power Grid Company Transelectrica SA (Romanian TSO)
TransnetBW	TransnetBW GmbH (1 of 4 German TSOs)
TERRE	Trans-European Restoration Reserves Exchange
TSO	Transmission system operator
UVAM	Mixed Enabled Virtual Units
VRE	Variable renewable energy
VUEN	Vorarlberger Übertragungsnetz GmbH (1 of 2 Austrian TSOs)
WG	Working group

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