red eléctrica
Una empresa de Redeia

Biennial Report on Balancing

2022-2024

System Operation Division

September 2024

red eléctrica

Índice

1 Executive Summary

1.1 Introduction

In accordance with Article 60 of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a Guideline on Electricity Balancing (hereinafter referred to as "EB Regulation"), at least once every two years, each TSO shall publish a report on balancing covering the previous two calendar years. Thus, this Spanish EB Regulation report describes the main actions that are being taken to adapt the Spanish electrical system to Guideline on Electricity Balancing, in the period May 2022- July 2024.

The main achievements accomplished in the period 2022-2024 regarding EB Regulation at the Spanish system are described next:

- IT changes to adapt Spanish System towards 15 minutes resolution at all balancing markets processes (RR energy, mFRR energy and aFRR reserve/energy) and real time scheduling processes. This project called QH (Programación QH) is linked to necessary local adaptations in the Spanish system for its integration to European mFRR platform (MARI) and the change towards 15 minutes Market Time Unit (MTU) in energy markets. These IT changes were implemented at national level on 24th May 2022.
- A new specific upward mFRR product for demand has been introduced in the Spanish system in 2022 to encourage demand units to become balancing service providers ("*Servicio de Respuesta Activa de la Demanda*" - SRAD). Reserve from SRAD has been allocated in two auctions covering the periods [1/11/2022-31/10/2023] and [1/1/2024-31/12/2024], respectively. This demand response service is used to address situations of insufficient upward tertiary regulation energy.
- IT changes on going to adapt current aFRR market towards European aFRR platform (PICASSO). This project called SRS (*Servicio de Regulación Secundaria*) focuses on local implementation of an aFRR activation market as a previous step towards PICASSO platform connection. The main ongoing changes that are currently being accomplished are the following:
    a) New local aFRR energy market is being implemented.
    b) Adaptation of the local load-frequency controller to an activation approach based on aFRR energy bids instead of prorrata activation.
    c) Real time calculation of the aFRR energy delivered based on a linearized real time market schedule baseline (so called "*Programa de Tiempo Real*, PTR"), key aspect to allow smooth transition of aFRR Balancing Service Providers (BSPs) and thus mitigating deterministic frequency deviations.
    d) New settlement module to implement the European methodology for pricing the aFRR energy at local level (and also future Cross Border PICASSO energies).
    e) Revision of the aFRR reserve (D-1) local market whose aim is to separate it into 2 independent upward/downward reserve auctions, in order to be harmonized with the standard reserve product. Besides this, a price tolerance will be introduced in the reserve market to avoid sharp marginal reserve prices increase.
- Spanish system connection to European mFRR platform (MARI) is under development. An adaptation of Full Activation Time (FAT) from 15 minutes towards standard mFRR FAT of 12.5 minutes will be done at the go live of SRS project (scheduled for November 2024).
- Connection to European aFRR platform (PICASSO) will be implemented after SRS and MARI go-live. Since then, two correction signals coming from both PICASSO and IGCC platforms will coexist (IGCC correction signal will remain, as long as other TSOs will continue operating connected to IGCC platform while not participating in PICASSO).
- On going IT developments in Red Eléctrica to join Capacity Management IT (CM IT, also known as CMM) platform in the second half of 2024, limited to the management of RR process.

- Evolution of Imbalance Settlement Period (ISP) from 1 hour towards 15 minutes is ongoing. Derogation from CNMC is granted until 31/12/2024.

In parallel, a review of the regulations applicable to the balance services of the Spanish electrical system has being carried out regarding the following topics:

- New operating procedure 7.5 defining the already mentioned SRAD service has been approved on October 19th, 2023 by the national regulatory authority (NRA) CNMC.
- Adaptation of Spanish Terms & Conditions for BSPs and BRPs according to article 18 of EB Regulation and Spanish Operating Procedures for the implementation of SRS and connection to MARI and PICASSO were sent to CNMC on 31st October 2023 and approved on 25th April 2024.
- Adaptation of the operating procedures to change the imbalance settlement period (ISP) and the metering system from 1 hour to 15 minutes were respectively sent to CNMC and Ministry on 13th October 2023. The adaptation of the ISP is currently being submitted to public consultation by CNMC, from 29th July to 9th September 2024. The CNMC consultation goes beyond the TSO procedures, it requests the opinion of the stakeholders in order to find out the best national approach to change the ISP, as Spanish MTU will not change to 15 minutes until March 2025, at the earliest.

Stakeholders engagement:

Periodically, Red Eléctrica updates the implementation dates of all the EB Regulation projects in the Spanish Roadmap for MIE (Mercado Interior de Energía) projects[1].

Moreover, several webinars were organized by Red Eléctrica in the period 2022-2024 to engage Spanish Stakeholders in the EB regulation Roadmap.

For the implementation of SRS and future connection to both PICASSO and MARI platforms, several tests with Spanish BSPs are being carried out since 2023 to ensure their readiness for the new implementations.

Next, some characteristics of the Spanish system are provided below:

- **Geographical scope of Spanish system:**
  - Synchronous area(s) of the Spanish system is Continental Europe
  - For the Spanish case, the following concepts are fully equivalent: LFC Spanish control block = Spanish Scheduling area = Spanish imbalance area= Spanish bidding zone = Spanish imbalance price area.
- **General information about market design and reserve dimensioning:**
  - Spanish system follows a self-dispatch model.
  - Types of reserve used to balance the system and dimensioning: currently, only aFRR reserve procurement.
- **General information about the market size: number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation.**
  - Number of prequalified standard mFRR BSPs: 24 BSPs in Q1 2024.
  - Number of prequalified aFRR BSPs: 22 BSPs in Q1 2024.
  - Number of prequalified RR BSPs: 27 BSPs in Q1 2024.
  - Number of prequalified specific mFRR BSPs (SRAD product): 15 BSPs in Q1 2024.

[1] *INFORMACION SOBRE IMPLEMENTACIÓN DE LOS CÓDIGOS DE RED DE MERCADOS | ESIOS electricidad · datos · transparencia (ree.es)*

- Number of BRPs: 518 in Q1 2024.

Beside this, next table shows the participation of RES units in Balancing (information updated in January 2024)

	Installed power of licensed units for RR or mFRR (MW)	Power licensed for aFRR (MW)	Total installed power (MW)
Wind	17.614	2.412	30.069
CHP	261	220	5.582
Minihidro	255	255	2.181
Thermosolar	567	0	2.304
Fotovoltaic	4.394	1.763	24.184
Bio-mass y bio-gas	84	317	1.087
Demand	609	0	

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

European balancing platform for the activation of balancing energy	Accession timeline and status of accession	Reasoning for derogation and status of the derogation (granted or not)
RR Platform	3/3/2020	Derogation granted until 15th October 2020 (i.e., 9 months after the legal date of implementation)
aFRR Platform	Expected May 2025	IT adaptations currently on going at Spanish system for future connection to PICASSO platform. Implementation of SRS Project (go-live scheduled in November 2024) is required previously to the connection to aFRR platform. Derogation granted by CNMC until 24th July 2024.
mFRR Platform	Expected February 2025	IT adaptations currently on going at Spanish system for future connection to MARI platform. Implementation of SRS Project (go-live scheduled in November 2024) is required previously to the connection to mFRR platform. Derogation granted by CNMC until 24th July 2024
IN Platform	21/10/2020	

Question:	Please select an option:
Q1: Did you carry out regulatory and IT developments for allowing Demand, RES and Storage to participate at European balancing platforms	**Yes**
1.1. If response in Q1 is "no", why?	
1.2. If response in Q1 is "yes", what were the main results"?	Demand scheduling units can participate since January 2021 at different RR/mFRR/aFRR processes, subject to previous prequalification. A new specific upward mFRR product (called SRAD) for demand BSPs units has been introduced in the Spanish system in 2022 to encourage demand units to become balancing service providers. Independent aggregator figure yet to come, expected in 2025 (regulatory changes still under development, national public consultation of high level principles for independent aggregator launched on July 31th 2024). RES units are already active at RR/mFRR/aFRR processes as BSPs (very important RES contribution to balancing services according to RES high penetration in the Spanish system). Storage units provision is currently mainly focused on hydro pump storage units; rest of storage technologies are being implemented alone or hybridized[2] (composed of generation, demand and/or storage) to participate at 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**
1.1. If response in Q2 is "no", why?	
1.2. If response in Q2 is "yes", what were the main results?	Regulatory changes approved on 25/4/2024 for on going connection of Red Eléctrica to both MARI and PICASSO. IT adaptations, internal and external tests with the BSPs and European balancing platforms are currently in progress.
Q4: Do you procure a standard product for balancing capacity?	**No**
Q5: What are the main characteristics?	There is one balancing capacity product referred to aFRR. Adaptation towards the aFRR reserve standard product requires separation of upward and downward procurement. It is expected at the SRS go-live, next November 2024.

[2] Hybrid technologies units are implemented in June 2024.

	Capacity from the specific product SRAD is also procured. Only associated to demand units and procured from upward energy.
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 Spanish TSO is focused on all balancing energy platforms implementation. Beside this, interconnection reinforcement is judged as a prerequisite for future sharing/exchange of reserves.
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**

1.3 Evolutions of the terms and conditions for BRPs and BSPs related to the EB regulation implementation

During the last calendar years, the terms and conditions for BRPs and BSPs have been adapted as explained below:

Evolution of the terms and conditions for BSP	
Content	A proposal to modify the Spanish Terms and Conditions on balancing (T&C), according to article 18 of EB Regulation, was sent by Red Eléctrica to the Spanish NRA (CNMC) on 31st October 2023. Approval took place on 25/4/2024 (entry into force on 18/7/2024). Its main objective is to adapt the T&C to the participation of the Spanish electrical system on the European platforms MARI and PICASSO and evolve the aFRR reserve market according to EB Regulation.
Evolution of the terms and conditions for BRP	
Content (see below)	A proposal to modify the Spanish Terms and Conditions on balancing (T&C), according to article 18 of EB Regulation, was sent by Red Eléctrica to the Spanish NRA (CNMC) on 31st October 2023. Approval took place on 25/4/2024 (entry into force 18/7/2024). Its main objective is to adapt the T&C to the participation of the Spanish electrical system on the European platforms MARI and PICASSO and to the change of the imbalance settlement period (ISP) from 1 hour to 15 minutes.

Next evolution of the terms and conditions for BRPs and BSPs related to the EB regulation is foreseen and will be focused on the implementation of the independent aggregator figure as a BSP and BRP in the Spanish system.

1.4 Evolution of the terms and conditions for BRP related Articles 52, 53, 54 and 55 in the EB Regulation:

Question:	Please select an option:
Q1. Was 15-min Imbalance Settlement Period (ISP) implemented by 1 January 2024?	**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 pursuant ISH Methodology Art 9(6) as per 1 January 2024?	**No**
2.1. Scarcity component?	**Not considered**
2.2. Incentivizing component?	**Not considered**
2.3. Component related to financial neutrality of the TSO?	**Not considered**
Q3. Has your TSO made use of dual pricing as per 1 January 2024?	**Yes**
3.1. Condition (a)	**Implemented**
3.2. Condition (b)	**Not considered**
3.3. Condition (c)	**Not considered**
3.4. Condition (d)	**Not considered**
3.4. Condition (e)	**Not considered**

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

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

  Regarding reserve dimensioning, Spanish system follows SOGL dimensioning requirements; further details can be found at Spanish Operating procedure 1.5[3].

- **Assessment of sharing/exchange of reserves**

  Analysis of opportunities for the exchange of balancing capacity and sharing of reserves with other TSOs will be evaluated once Spanish system will join all European balancing energy platforms. Red Eléctrica is willing to continue both on further designing balancing capacity markets and studying the opportunities and benefits of sharing such reserves according to regional methodologies, after enough experience will be gained after different balancing energy platforms go-lives. Red Eléctrica currently participates at the project team HCZCA following on-going regulatory developments and amendments proposals on the HCZCA Methodology submitted to ACER in July 2024.

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

  A new mFRR specific product ("*Servicio de Respuesta Activa de la Demanda*" SRAD) was introduced in 2022, focused on demand BSPs. In this sense, a new operating procedure 7.5 was approved by CNMC Resolution of October 19th, 2023. The aim of this service is to obtain flexibility for balancing from demand side, not participating in standard balancing markets so far. This initiative approaches the aggregated participation of demand through its supplier as balancing service providers (instead of previous schemes of individual demand response by consumer).

[3] Last version available *here*.

2 Adaptation of the Spanish System to EB Regulation

A first version of Spanish Terms and Conditions (T&C) on balancing for BSPs and BRPs according to article 18 of EB Regulation were approved by CNMC on December 11th, 2019.

A modification of these T&C was approved by the Spanish NRA (CNMC) on April 25th, 2024 and entered into force on July 18th, 2024. Its main objective is to adapt this regulation to the participation of the Spanish electrical system to the European platforms MARI and PICASSO and evolve the aFRR reserve market according to EB Regulation. Last version of T&C could be found *here*.

Red Eléctrica publishes on its website[4] the Operational Procedures, of a technical and instrumental nature, necessary to carry out adequate technical management of balancing services. These procedures were also modified for Red Eléctrica's connection to MARI and PICASSO and currently two of them have being submitted to public consultation by CNMC for ISP15 adaptation.

Additionally, the TSO website includes information on the latest developments regarding network codes[5] and the roadmap for their implementation[6].

2.1 Terms and Conditions for BSPs

The main actions that are being adopted to align Spanish T&C and Operational Procedures with EB Regulation roadmap in the period 2022-2024 are described next.

Adapted Operating Procedures for the connection of Spanish system to mFRR European platform (MARI) and to aFRR European platform (PICASSO) were approved by CNMC on 25th April 2024 after a previous public consultation handled between February and March 2024.

Other regulatory changes to promote flexibility and participation of renewable technologies and demand as BSPs:

- Adaptation of corresponding Spanish Operating Procedures, including balancing prequalification processes were approved to allow hybridation facilities and non-hydro storage to participate at balancing markets (RR, mFRR and aFRR), and to fit approved Spanish Terms and Conditions. In this sense, regulatory steps towards hybridation of technologies (allowing different technologies RES, demand, storage to coexist under the same scheduling unit) have been approved on 6th March 2024, with entry into force on 26th June 2024.
- A new mFRR specific product ("*Servicio de Respuesta Activa de la Demanda*" - SRAD) was introduced in 2022 to encourage demand units to become balancing service providers for standard products and is still in operation to address situations of insufficient upward tertiary regulation energy. In this sense, a new operating procedure 7.5 was approved by CNMC on October 19th, 2023. Reserve from SRAD has been allocated in two auctions covering the periods [1/11/2022-31/10/2023] and [1/1/2024-31/12/2024], respectively[7].
- Previous regulatory changes (before 2022) to promote participation at balancing services of demand facilities on balancing, were the following:
  - Possibility of participation of (individual or aggregated) demand and storage facilities.
  - Minimum bid capacity at qualification tests ≥ 1 MW (instead of previous value =10 MW).
  - More flexibility in conditions applicable to prequalification processes to include a new item in a pre-existent BSP-unit (aggregated participation)

[4] *https://www.ree.es/es/actividades/operacion-del-sistema-electrico/procedimientos-de-operacion*

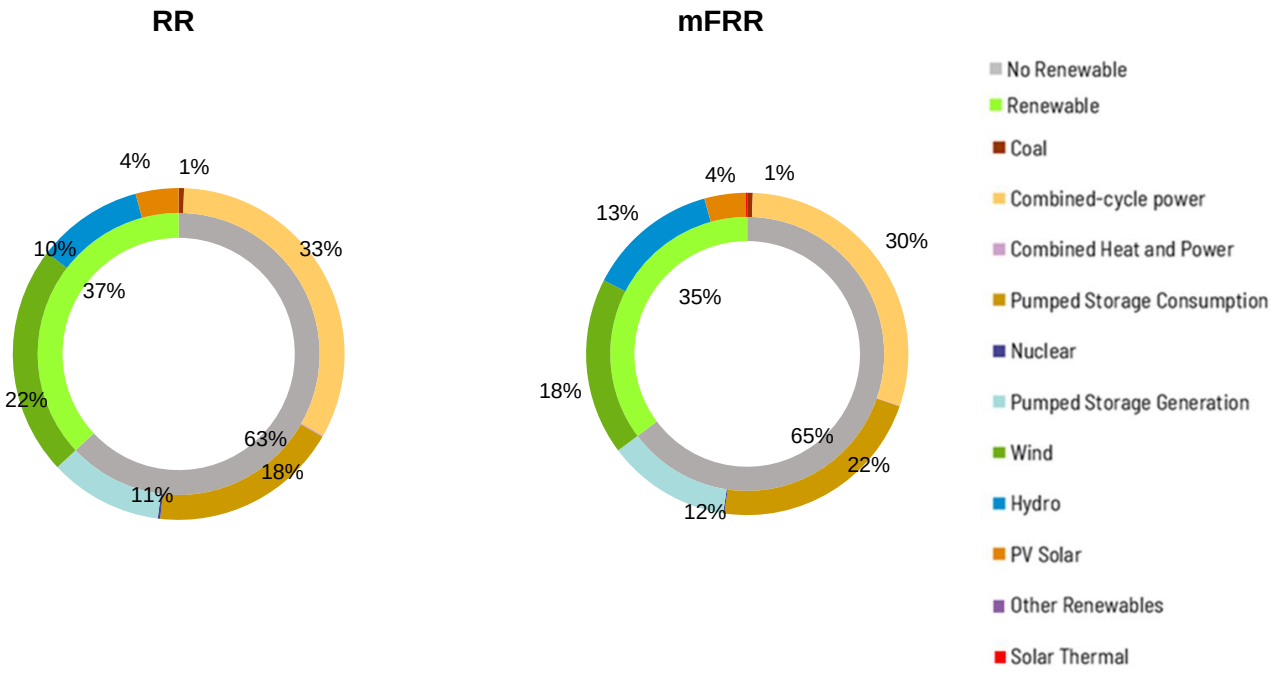
[5] *Information about implementation of market network codes | ESIOS electricity · data · transparency (ree.es)*

[6] *https://www.esios.ree.es/es/pagina/informacion-sobre-implementacion-de-los-codigos-de-red-de-mercados*

[7] Results could be found *here*

Since 2015, RES units are already active at all RR/mFRR/aFRR processes (very important RES contribution to balancing services according to RES high penetration in the Spanish system).

As an example, the following charts show the RR and local mFRR activation in 2023 aggregated by technology where it can be observed the important contribution to balancing regulation of RES units:



The following table summarizes the prequalified RR, mFRR, aFRR capacity for RES and demand units, updated on January 1st 2024:

	Installed capacity prequalified in RR/mFRR (MW)	Installed capacity prequalified in aFRR (MW)	Total Installed capacity (MW)
Wind	17.614	2.412	30.069
CHP	261	220	5.582
Non-manageable hydro units	255	255	2.181
Solar Thermal	567	0	2.304
PV Solar	4.394	1.763	24.184
Biomass and biogas	84	317	1.087
Hybrid units*			
Demand	609	0	

Even though this report corresponds to data for 2023, it is noteworthy to mention the increase of installed capacity of renewable sources in the first seven months of 2024 that also are been prequalified in the balancing (data up to 31/07/2024):

	Installed capacity prequalified in RR/mFRR (MW)	Installed capacity prequalified in aFRR (MW)	Total Installed capacity (MW)
Wind	18.781	3.250	30.742
CHP	327	294	5.535
Non-manageable hydro units	255	255	2.177

Solar Thermal	446	0	2.304
PV Solar	7.125	5.889	26.584
Biomass and biogas	84	317	1.090
Hybrid units*	234	-	387
Demand	609	-	

*Since 26/06/2024 generation units from different sources can be aggregated in a hybrid production unit that it is prequalified in the ancillary services. In this case, the installed capacity corresponds the sum capacity prequalified in each balancing market.

Common pricing methodology:

- A price range of [+15000,00 €/MWh and -15000,00 €/MWh] is possible for RR, mFRR and aFRR balancing energies products since July 1st 2022, once implemented Pricing Methodology Amendment approved in February 2022.
- On 5th July, 2024, ACER published its decision on the second amendment to the Pricing Methodology and the aFRR Implementation Framework, with the aim to mitigate price incidents occurred at European balancing platforms. It establishes a Harmonised Maximum and Minimum Balancing Energy Prices (HMMBEP), aFRR elastic demand and an improvement on the definition of the aFRR cross-border marginal price (CBMP) which better reflects local aFRR activations.

2.2 Terms and Conditions for BRPs

The previous and ongoing changes to adapt Spanish BRPs treatment to EB Regulation are the following:

Spanish Terms and Conditions on balancing (T&C) approved on December 11th, 2019, allow BRPs to carry out re-schedules among them complementing intraday trades, to minimize the imbalance price exposure. The conditions under which changes in the internal commercial schedules among BRPs in the Spanish system are regulated in Spanish Terms & Conditions and Spanish Operating Procedure 3.1.

Since April 2022, with the implementation of the Imbalance Settlement Harmonization Methodology (ISH), Spanish system is calculating the imbalance for each BRP with one single position (integrating respective generation and demand scheduling units under each single BRP).

The adapted Operating Procedures entered into force January 26th, 2021, to fit Spanish Terms and Conditions, including the European figure of the Balancing Responsible Party (BRP) established in the Regulation EB, into the national regulation and introducing the possibility to delegate contractually the balance responsibility to other BRP.

The National Regulatory Authority (CNMC) granted the application of dual-price pricing for specific ISPs according to Article 11(a) of ISH Methodology and adapted the national regulation accordingly in December 2021. 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.

Regarding evolution from Imbalance Settlement Period (ISP)=60 minutes towards ISP=15 minutes, a public consultation was carried out (from January 15th, 2020, until February 29th, 2020) to get stakeholders feedback and determine the most suitable timing scenarios to carry out the transition from ISP=60 towards ISP=15 minutes.

Finally, on October 15th, 2020, CNMC granted a temporal exception regarding the implementation of ISP of 15 minutes until December 31st, 2024. Final date for the ISP adaptation in the Spanish electrical system is included in the Roadmap for MIE.

3 Adaptation of Spanish System to EB Regulation Roadmap

3.1 Capacity Management Module (CMM)

3.1.1 CMM go-live in October 2023

CMM is an IT system for management of CZCL (cross-zonal capacity limits) among all European platforms (TERRE, MARI, PICASSO) and TSOs for the exchange of balancing energy developed in line with the requirements of the European platforms (respecting relevant implementation frameworks and their legal deadline), while respecting availability and performance requirements. No interaction between CMM and market participants is envisaged.

The CMM process is based on continuous update and provision of capacity to balancing platforms based on the most updated capacity data provided by TSOs as well as the results of cross-border flows determined by each balancing platform for a given timeframe.

After ACER approval of mFRR and aFRR Implementation Frameworks (IFs) on January 24th, 2020, the deadline for CMM platform (also known as Capacity Management IT solution) go-live is July 2024 (2 years after the deadline for the implementation of the mFRR and aFRR platforms).

The technical go-live of the version 1 of CMM was confirmed last 4th October 2023, and the business go-live was successfully executed on 24th October 2023 with the connection of the two first TSOs. Version 2 of CMM went live on 30th July 2024.

Red Eléctrica plans its connection to CMM in September 2024 limited to the management of RR process. Once Red Eléctrica joins MARI and PICASSO platforms, Red Eléctrica connection to CMM will be extended to also cover mFRR and aFRR processes on Spanish interconnectors.

3.1.2 Red Eléctrica participation at CMM governance structure

Red Eléctrica has been participating in the CMM WG since its creation back in May 2020. Since then, Red Eléctrica has collaborated, among other tasks, in the identification of relevant functionalities for the CMM and the preparation of Implementation Guide and Operational Handbook.

Red Eléctrica signed the Accession Letter to the CMM Service Provider Agreement agreeing to become a CMM Member TSO in November 2021.

3.1.3 IT changes due to connection to CMM

This is the main IT change that Red Eléctrica is addressing for the CMM connection:

- **Communication via Webservices to the CMM platform**

  Preparation of Red Eléctrica IT systems to submit the necessary data (NTC and AAC) to CMM, as well as additional voluntary data such as maximum cross-border capacity subject to allocation for balancing processes or net profile limits for mFRR and aFRR, while keeping the direct communication with TERRE, MARI and PICASSO platforms. No use of Affected TSO Procedure tool is expected to be performed by Red Eléctrica for any of the borders covered in the scope of CMM.

3.2 Replacement Reserves platform (TERRE Project)

3.2.1 Red Eléctrica participation at TERRE governance structure

Red Eléctrica signed in October 2019 a Cooperation Agreement with other RR TSOs to establish rights and obligations for the closing of the Implementation phase and the establishment of the operational phase of the European RR Platform. Since then, agreements have been made among TERRE TSOs, MARI

TSOs and Nordic TSOs for the transfer and co-ownership of the intellectual property rights of the LIBRA solution.

As the Single Intraday Coupling evolves to 96 daily gates, the TERRE project assessed the need to also evolve to 96 daily gates. After months of continuous exchanges with RR NRAs, TERRE TSOs decided not to implement 96 clearings in the TERRE platform and to decommission the platform at the end of 2025. The main reason behind it is the new disposal in Electricity Market Design Regulation (EMDR) regarding intraday cross-zonal gate closure time. In this text, there is a change which is highly impacting TERRE: "*By 1 January 2026, the intraday cross-zonal gate closure time shall be at the earliest 30 minutes ahead of real time*". This new intraday cross-zonal gate closure time of 30 minutes is not compatible with the RR product and process, forcing the end of the project.

In this situation, TERRE TSOs will use LIBRA platform as long as it is feasible and adequate for system operation, while respecting legal and operational conditions and, afterwards, will disconnect in a coordinated manner. Once RR European platform is phased out, all TERRE TSOs will stop being considered as "RR TSOs" and will no longer be subject to the obligation of art. 19 of EBGL.

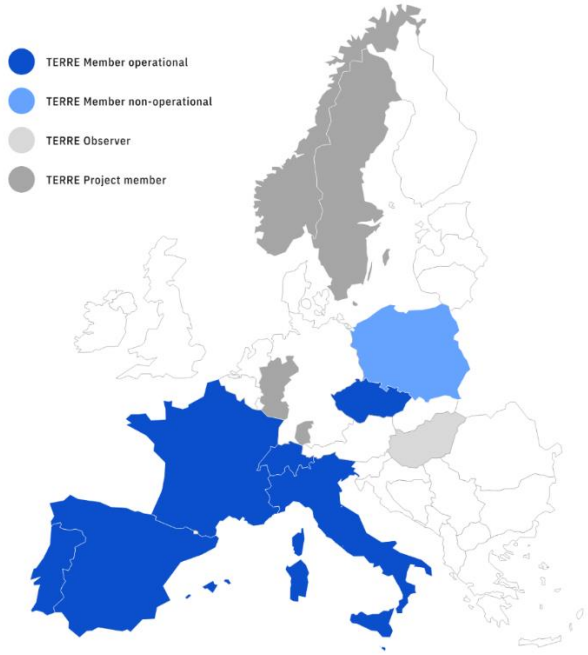


Figure 1 - RR platform: TSOs part of the TERRE project (as of July 2024)

3.2.2 Committed regulatory changes related to participation of Spanish System at RR platform

In May 2022 an update of the *Operating Procedure P.O. 3.3* was made to allow the use of 15-minute bids, divisible bids, and complex bids (such as exclusive, multi-part and linked in time).

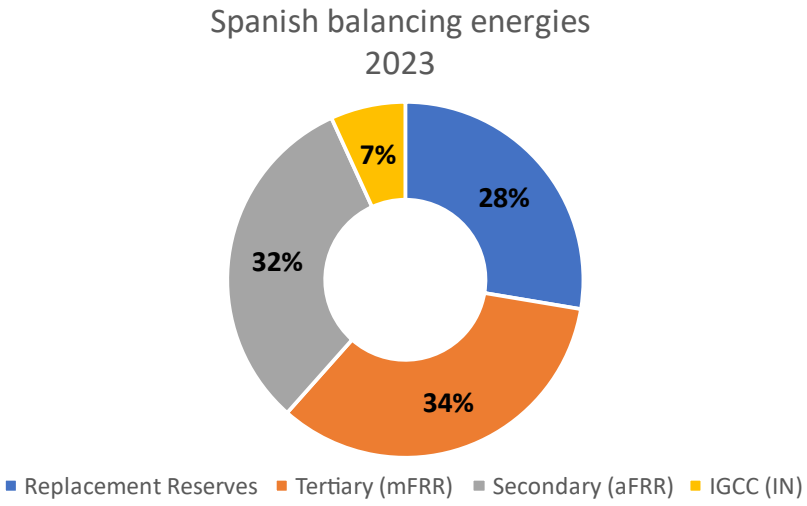
An amendment to the Replacement Reserves Implementation Framework (RRIF) was approved by RR NRAs in August 2023, allowing the no limitation of counteractivations but requiring the monitoring to be continued. Further monitoring improvements were also included in this new version.

3.2.3 IT changes due to integration at RR Platform

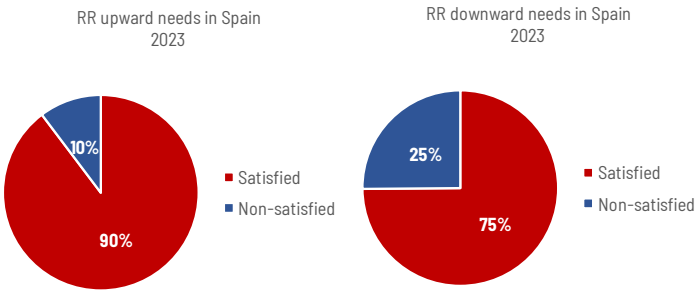
Red Eléctrica /Market Participants IT systems were adapted for RR standard product. In a first stage, Spanish BSPs were only allowed to submit hourly bids. Once 15 minutes scheduling was implemented at the Spanish electricity system, on May 24th 2022, 15-minute bids, divisible bids and complex bids (such as exclusive, multi-part and linked in time) were allowed at RR allocation.

3.2.4 Main results during 2023 in the Spanish system and the RR Platform

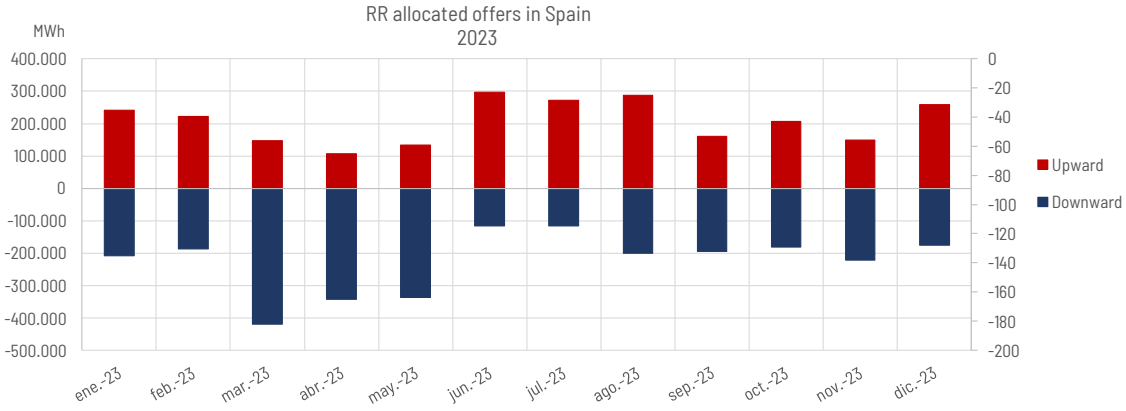
The RR product plays a very important role in the balancing energies used in the Spanish electrical system, representing 28% of the total balancing energies in 2023.



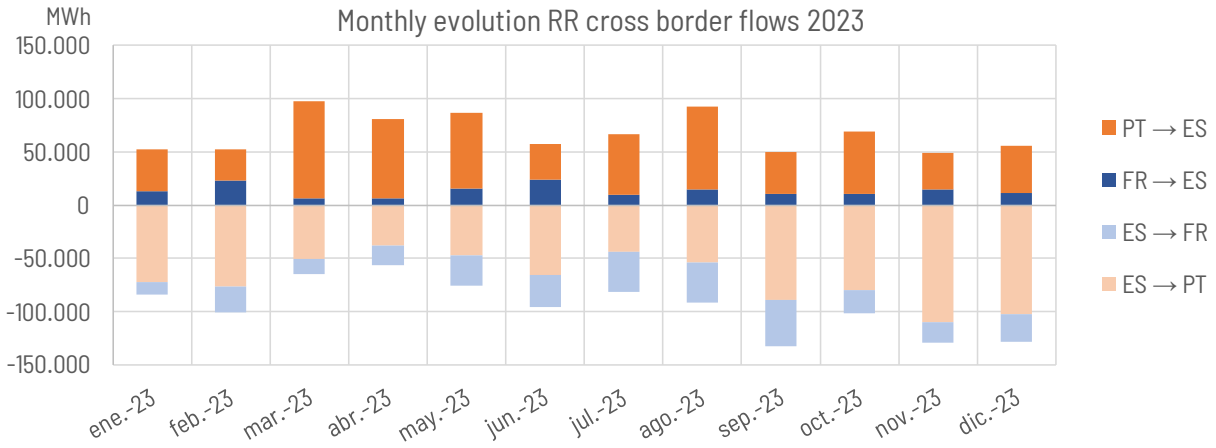
In 2023, the Spanish electrical system has requested 1,906 GWh of upward RR needs and 3,014 GWh of downward RR needs.



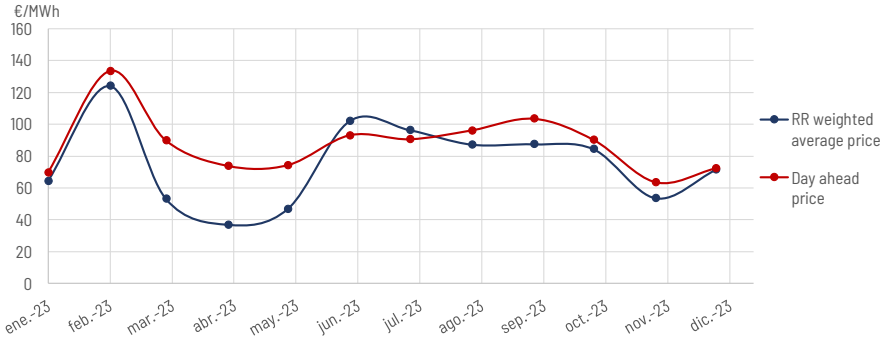
Regarding total allocated energy, we can also observe a higher volume of downward activated energy than upward activated energy. In total, Spanish BSPs have activated 2,483 GWh of upward energy and 2,704 GWh of downward energy.



In the table below, the evolution of RR cross-border flows across 2023 and in each of the interconnections and directions[8] is shown:



Finally, in the graph below it can be seen the evolution of the RR weighted average price in the RR platform and its correlation with the day-ahead price for 2023:



3.3 Imbalance Netting process (IGCC Project)

3.3.1 Red Eléctrica participation at IGCC governance structure

IGCC Cooperation Agreement was signed by Red Eléctrica in September 2019. REE go-live at IGCC was carried out on October 21st, 2020. The following map shows the current TSO´s participating in the project (by June 2024):

[8] The maximum RR flow on the France-Spain border is limited by RTE to maintain Power System reliability. RR flows are limited to a maximum of 300 MW in the direction of the scheduled flows and to a maximum of 500 MW in the opposite direction of the scheduled flows.

The next graph shows the chronogram of adhesions of different TSO´s to IGCC platform:

3.3.2 Committed regulatory changes related to participation of Spanish System at Imbalance Netting Platform

The following set of Spanish Operating Procedures were adapted previously (on 19/9/2019) to join Imbalance Netting platform:

- *Spanish Operating Procedure P.O. 7.2. "Regulación secundaria"* (aFRR): includes annex 5 focused on Imbalance Netting process and its technical and remuneratory implications at the Spanish system
- *Spanish Operating Procedure P.O. 14.4. "Derechos de cobro y obligaciones de pago por los servicios de ajuste del sistema*" (focused on TSO-BSP/BRP´s settlement) to not consider Imbalance Netting at Imbalance Price computation, according to Imbalance Settlement Harmonization Methodology.
- *Spanish Operating Procedure P.O. 14.6. "Liquidación de intercambios internacionales no realizados por sujetos del mercado"* to incorporate Imbalance Netting process at TSO-TSO settlement processes.

Beside this, further regulatory changes have been recently accomplished, in concrete, the amendment of Spanish operating procedure P.O. 7.2 approved on 25th April 2024 with expected entry into force in November 2024. This amended operating procedure addresses the computation of Spanish IGCC opportunity prices facing different upcoming and subsequent scenarios:

a) Scenario 1: SRS project expected go-live on November 2024 (local aFRR energy market)

b) Scenario 2: Red Eléctrica connection to PICASSO (expected in May 2025)

c) Scenario 3: back-up IGCC opportunity prices computation in case of failure of aFRR local market and potential come back again to pro-rrata activation.

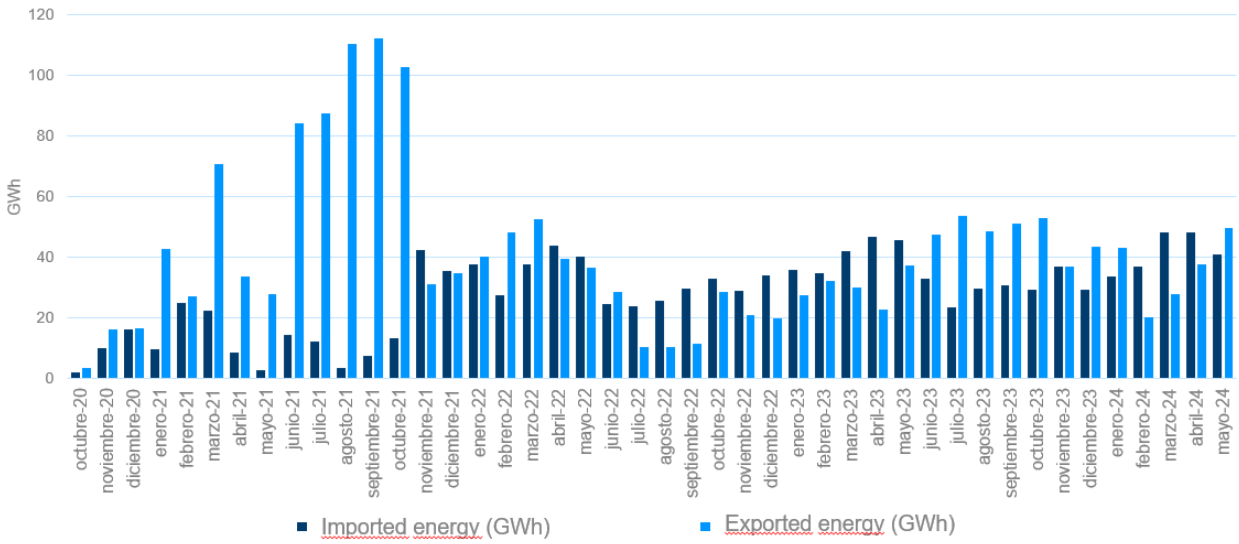
3.3.3 IT changes due to integration at IGCC

These are the main IT changes accomplished by Red Eléctrica for the IGCC project go-live:

- Updates of the LFC controller to exchange real time signals with TNG and include them in the control process. 2 separated correction control signals, one for IGCC and the future PICASSO correction signal are being considered at LFC control loop.
- Matching process for IGCC energies between Red Eléctrica and TNG that is carried out at D+1, necessary for a) settlement of IGCC energies, and b) virtual tie-line IGCC metering information that is transmitted to Swissgrid (in his role as Coordinating Center) necessary to compute unintended deviations. A parallel matching process will be implemented with XB PICASSO interchanged energies.
- Communication of aFRR Opportunity prices to TNG at month (M+1) to compute IGCC QH settlement prices (based on all IGCC TSO´s Opportunity prices).
- Communication from scheduling IT system to SCADA system of NTC/ATC values that will be taken into account by IGCC algorithm. On going adaptations are taking place in order to connect Red Eléctrica to CMM platform regarding IGCC/PICASSO processes.
- Network security assessment to detect eventual security limits, in order to communicate them to IGCC algorithm.
- Communication from SCADA system to scheduling IT system of IGCC energies matched for data warehouse purposes (for publication towards stakeholders and internal data management).
- Future developments to adapt opportunity price calculation towards new SRS/PICASSO environment and adaptation of future SOMA files (with both IGCC and PICASSO QH energies at the same file) will be accomplished.

3.3.4 Main results since the Spanish system go-live in IN Platform

The next graphic shows the evolution of Spanish Control block netted aFRR energies (import/export from/to IGCC):



3.4 FSkar mechanism

The FSkar mechanism settles the intended exchanges of energy as a result of the frequency containment process and ramping period (Art. 50.3 – Regulation EB) and the unintended exchanges of energy (Art. 51.1 – Regulation EB).

The TSOs' Common Settlement rules require that the Continental-Europe TSOs review the pricing methodology in a periodical manner. This first revision was focused on a further analysis and evaluation of the impact and design of the frequency dependent component (FDC). After having studied several different scenarios, it was concluded that the results of the FDC Analysis do not lead to a required change of today's usage of the FDC.

The pricing methodology topic will be reopened during the next review cycle which is expected roughly by May 2026 and will revisit the usage of balancing prices.

3.4.1 IT changes due to FSkar process

IT systems at Red Eléctrica as of 2021 have been adapted for:

- The unbundling of the unintended exchanges of energy as the area control error (ACE) from the exchanges resulting from the frequency containment process energy (FCP) and the unintended exchanges of energy ramping period energy (RP) which are considered intended exchanges.
- The establishment TSO-TSO settlement period of 15-minute, requiring computation of the accounting of exchanges with the same resolution.
- The establishment of exchanges with the relevant coordination centres from the synchronous area Continental Europe (Coordination Centre South).
- New IT systems under development:
- Inclusion of intended and unintended exchanges coming from MARI and PICASSO.

3.4.2 Results of FSkar process during 2022-2023 in Spain Control Block

The total net deviation value of the Spain Control Block reached 7,2 GWh, in the direction Control Block ES=> Continental Europe in 2022 and 50,4 GWh in the direction Continental Europe=> Control Block ES in 2023.

The average monthly FSkar price of the intended exchanges of energy as a result of the frequency containment process and unintended exchanges of energy can be found in the graph below. The evolution of this price has been affected by the increased day-ahead market prices trend during 2022. During 2023, the FSkar price is moderate compared to the previous year. The FSkar price for the deviation energy associated to the ramping period is 0 €/MWh for both 2022 and 2023.

The FSkar settlement for the Control Block Spain was 9,1 M€ (income) in 2022 and 1,9 M€ (cost) in 2023.

3.5 Manual Frequency Restoration Reserve Platform (MARI Project)

3.5.1 Ongoing regulatory changes related to participation of Spanish System at mFRR platform

After ACER approval of mFRR Implementation Framework (IF) last January 24th, 2020, the deadline for mFRR platform go-live is July 2022 (30 months after IF). On July 29th, 2021, Spanish system requested a derogation of 2 years to join MARI platform which was granted by CNMC on February 9th, 2022.

As already mentioned above, Spanish regulatory changes needed for the connection of Red Eléctrica to MARI were already approved by CNMC on 25th April 2024.

3.5.2 Red Eléctrica participation at MARI governance structure

Red Eléctrica signed three agreements to formalize the contractual framework with all the TSOs participating in the project.

- Principal Agreement: overriding principles for all platforms, to enable the incorporation of cross-platform functions and future flexibility.
- On July 10th, 2020, MARI Cooperation Agreement: complements the Principal Agreement and sets out the mutual rights and obligations of the Parties with respect to the operation and the governance of the Platform.
- On July 10th, 2020, MARI Common Service Provider Agreement: sets forth the mutual rights and obligations of the Parties regarding the development, hosting and monitoring of the IT solution.

3.5.3 Adaptation of Spanish system to 15 minutes scheduling

As a previous step towards implementation of balancing standard products, Spanish system adapted the mFRR local balancing process to the 15 minutes scheduling (Programación QH Project). The go-live of this national 15-minute process was successfully achieved on May 24th, 2022.

Several changes were already implemented in 2022:

- The national mFRR market before its integration in MARI is based on 15-minute resolution. It has been designed to use same IT scheme of MARI´s simple bids (divisible, indivisible and fully divisible, including technical and conditional linked bids between quarters) and same type of activation: scheduled and direct. Thus, this local solution will be used as back up of European mFRR Platform after the connection to MARI platform.

The changes that are expected on mFRR process for the connection to MARI are:

- Full activation time will be moved to 12,5 minutes at the SRS go-live.
- Implementation a tool for the reutilization, under some circumstances, of non-activated mFRR bids as potential aFRR bids.
- Inclusion of additional bid types (i.e., exclusive and multipart bids) once Red Eléctrica goes live in the European platform.

3.5.4 Future SCADA and IT changes

After adaptation of IT scheduling systems to 15-minute scheduling time and the implementation of the local solution as future back-up mechanism in case of MARI platform unavailability (key steps to deal with future MARI mFRR bids scheme), further developments to join MARI platform have been achieved:

- Adaptation of mFRR energy bidding process to IT price limits defined in the Pricing Methodology approved by ACER last July 5th 2024.
- IT developments related to the connection with mFRR Platform.

- IT changes to the connection with the Capacity Management Module (CMM)
- IT changes agreed with neighboring TSOs to establish 15' cross border schedules for mFRR balancing exchanges.

3.6 Automatic Frequency Restoration Reserve Platform (PICASSO Project)

3.6.1 Ongoing regulatory changes related to participation of Spanish System at aFRR Platform

After ACER approval of aFRR Implementation Framework (IF[9]) last January 24th, 2020, the aFRR platform went live on July 2022 (30 months after IF decision).

On February 9th, 2022, Spanish system was granted with a derogation of 2 years to join the PICASSO platform by CNMC, due to the current characteristics of Spanish aFRR service that will imply deep technical and regulatory changes. Among others:

- A new local aFRR energy market is required, as a previous step towards joining PICASSO platform. It is expected that the new local aFRR energy market will be in operation next November 2024. Therefore, aFRR activation processes will change from the pro-rata scheme to a merit order activation scheme.
- The settlement approach must be adapted to an optimization cycle granularity (marginal pricing every 4 seconds).

Beside this, BSPs that will participate at new aFRR Spanish scheme should follow a linearized baseline, considering their closest-to-real-time schedules. The impact of linearized base line on BRP where each BSP belongs is also considered from the BRPs imbalance settlement perspective. This linearized program yields important advantages to the Power system by mitigating the so-called deterministic frequency deviations and reducing aFRR real time needs.

Apart from that, it is remarkable that the current Full Activation Time (FAT) for aFRR in the Spanish System is already compliant with target value of 5 minutes.

As already mentioned above, Spanish regulatory changes needed for the connection of Red Eléctrica to MARI were already approved by CNMC on 25th April 2024.

3.6.2 Red Eléctrica participation at PICASSO governance structure

Red Eléctrica signed three agreements to formalize the contractual framework with all the TSOs in the platform.

- Principal Agreement: overriding principles for all platforms, to enable the incorporation of cross-platform functions and future flexibility.
- On July 10th, 2020, PICASSO Cooperation Agreement: complements the Principal Agreement and sets out the mutual rights and obligations of the Parties with respect to the operation and the governance of the Platform.
- On July 10th, 2020, PICASSO Common Service Provider Agreement: sets forth the mutual rights and obligations of the Parties regarding the development, hosting, and monitoring of the IT solution.

3.6.3 Future SCADA and IT changes

The necessary IT changes have the following objectives at both TSO and BSP´s level:

[9] On 5th July, 2024, ACER published its decision on the second amendment to aFRR Implementation Framework, with the aim to mitigate price incidents occurred at European balancing platforms.

- Build up a new aFRR energy market to change the BSPs aFRR request from pro-rata based towards market-based activation.
- Changing the technical characteristics of the Spanish aFRR system accordingly to market-based approach.
- Splitting of aFRR reserve market at upward and downward reserve markets as the current aFRR reserve market consists on a single upward/downward market with a single price for both types of reserves. The new upward/downward aFRR reserve markets have been designed with a new mechanism to mitigate sharp price increases.
- Design of fallback mechanisms in case of PICASSO platform unavailability.

Market Participants and national Regulator are actively involved in implementing the new local aFRR market, called SRS project which is expected to go live in November 2024 as a necessary step to connect to PICASSO platform in May 2025.

Following the strategy previously used for the connection to the mFRR Platform, IT changes for the connection to the aFRR Platform will be completed in a second step, before May 2025. Among these changes:

- Implementation of real time signals in the SCADA system.
- Implementation of the processes for exchanging the aFRR Local Merit Order List with the aFRR platform.

4 TSO report on balancing according to EB Regulation Art. 60

Article 60 defines the following information to be included in the TSO report on balancing that TSOs shall publish at least every two years covering the previous two calendar years:

4.1 Specific products

As required by article 60.2a of EB Regulation, the data on volumes of available, procured and used specific products is included below.

As already mentioned in chapter 2.1, a mFRR specific product (*Servicio de Respuesta Activa de la Demanda* - SRAD) is currently implemented in the Spanish system.

Reserve capacity from SRAD has been allocated in two auctions covering the periods [1/11/2022-31/10/2023] and [1/1/2024-31/12/2024], respectively:

- For the first auction, a power of 497 MW was assigned to be provided in 2.714 hours and with a marginal price of 69,97 €/MW.
- For the second auction, a power of 609 MW was assigned to be provided in 5.745 hours and with a marginal price of 40,82 €/MW.

The activations of this service that have taken place after its implementation are listed in the following table:

Activation	***Date***	***Activated Power (MW)***	***Energy (MWh)***	***Weighted Average Price (€/MWh)***
1	04/09/2023 22:08:00	497	1424.7	133,19
2	22/05/2024 21:14:00	609	1684.9	63.29
3	10/07/2024 22:01:00	609	1816.9	114.42

Since January 26, 2021, demand participation in RR, mFRR and aFRR balancing services is allowed. However, after more than 3 years since the demand can participate in balancing services, there has only been one programming unit qualified in the RR and mFRR balancing services, with a power of 7 MW. This unit has contributed with a total balance energy of 2 MWh, in two hourly periods.

This fact demonstrates that some potentially flexible resources of the Spanish electrical system cannot participate in the balancing market through standard products, even though they are necessary to maintain system security in a system with a high renewable integration rate and poorly interconnected with the rest of Europe.

For this reason, the specific product is defined exclusively for the demand units. This product tries to resemble the standard balancing products as much as possible but eliminating the barriers that prevent demand from participating in them. Therefore, the participation of generation, conventional or renewable, or storage in the SRAD is not possible. Demand units have the possibility of participating in both standard and specific products. To avoid arbitrations by these units that could interfere or distort the markets, it is established that the demand units that participate in SRAD cannot participate in the standard balancing services or in the process of solving technical constraints.

In order to minimize the use of specific products compared to the standard ones, SRAD is only activated in exceptional cases in which insufficient mFRR reserve is identified. Therefore, its use is minimal compared to standard products.

Regarding activation, SRAD has no impact on standard energy bids since it is not activated based on a merit order but in rotating shifts.

4.2 Reserve capacity

Dimensioning of reserve capacity is carried out with the following principles:

- aFRR reserve dimensioning:
  The following aspects are considered: a) demand gradient between 2 consecutive hourly periods, and b) RES forecast production versus demand evolution. Recently, the aFRR requirement has been increased in order to take into account the ramps of the solar PV generation, and the gradients of wind energy, in such a way that for the ramps of the morning/afternoon is set to 1200 MW, and for the rest of the day to 800 MW.

- mFRR reserve dimensioning:
  The following aspects are considered: a) demand and RES error forecast and b) unplanned outage of biggest thermal units.

More information on dimensioning of reserve capacity can be found at:

- Spanish Operating Procedure 1.5 “Establecimiento de la reserva para la regulación frecuencia-potencia”

  https://www.ree.es/es/actividades/operacion-del-sistema-electrico/procedimientos-de-operacion

- Technical guideline already approved by Spanish NRA *“Propuesta del Operador del Sistema de metodología y condiciones incluidas en los acuerdos operativos de bloque de Control Frecuencia Potencia en el sistema eléctrico peninsular español.”*

  https://www.cnmc.es/sites/default/files/2711779_2.pdf

4.3 Exchange of balancing capacity and sharing of reserves

Analysis of opportunities for the exchange of balancing capacity and sharing of reserves with other TSOs will be evaluated once Spanish system will join all European balancing energy processes. Red Eléctrica is willing to continue both on further designing balancing capacity markets and studying the opportunities and benefits of sharing such reserves according to regional methodologies, after enough experience will be gained after different balancing energy platforms go-live.

4.4 Efficiency of the activation optimisation functions

According to article 60.2g the efficiency of the activation optimisation functions (AOF) for the balancing energy from frequency restoration reserves and, if applicable, for the balancing energy from replacement reserves should be analysed.

For the Spanish system, only an analysis on the RR AOF is included since the connection to both mFRR and aFRR platforms is still pending.

Since its deployment in January 2020, the LIBRA platform, as the common European platform for the exchange of the RR balancing product, has been available for 35,050 hours, with only 14 hours of unavailability (0,04 %).

Furthermore, it has successfully allowed the satisfaction of inelastic and elastic needs. In 2023, 7,116,530 MWh of needs were satisfied by the platform (more than 91 % of the total needs sent by the TSOs). It is relevant to note that inelastic need unsatisfactions are mainly due to specific periods of scarcity with not enough offers available for its activation. Similarly, elastic demands were unsatisfied due to the price stablished by the respective TSO as a mechanism to prevent high prices.

red eléctrica

Una empresa de Redeia