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Biennial Report on Balancing

2020- 2021

System Operation Division

June 2022

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Index

1 Executive Summary

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 in order to adapt the Spanish system to Guideline on Electricity Balancing, in the period 2020-2021 (previous biennial report is provided at link *https://api.esios.ree.es/documents/577/download?locale=es*).

The main achievements accomplished along 2020 and 2021 regarding EB Regulation at the Spanish system are described next.

From a technical/implementation point of view, these have been the main developments along 2020 and 2021:

- Spanish system joined Replacement Reserves (RR) European platform (TERRE) on 3/3/2020. Spanish system was the first country in the Southwest Region to connect to TERRE. This product 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).
- Spanish system joined IGCC platform, which carries out aFRR Imbalance Netting IN process at Continental Europe, on 21/10/2020. Full connection took place one year later, with the aggregation of a second communication line between REE and TNG (TSO that manages IN process). The economic estimated savings for the Spanish system due to IN process amount to 8,7 M€ in 2021 due to less aFRR energy activation, besides increasing security through a higher aFRR reserves availability. Moreover, IGCC go-live constitutes a very important previous experience before joining future PICASSO platform.
- Spanish system joined FSkar process (financial settlement of unintended exchanges, ramps, and bias-frequency contribution) on 1/06/2021.
- IT changes on-going (since 2020) to adapt Spanish System towards 15´ resolution at all balancing markets processes (RR energy, mFRR energy and reserve/energy aFRR) and real time processes. This project is quite linked to necessary local adaptations in the Spanish system for its integration at future MARI mFRR activation platform, and future change towards 15' Market Time Unit (MTU) in energy markets. These IT changes were implemented at national level on 24th May 2022.
- IT changes currently on-going (since 2021) to adapt Spanish aFRR activation market towards future PICASSO European platform (European activation based on a Common Merit Order list, CMOL). Among others, 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 linearized real time market schedule baseline. d) 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 at Q2 2023.
- Spanish system connection to mFRR MARI platform is foreseen in September 2023, while connection to PICASSO platform is foreseen in April 2024.
- IT system changes to adapt Spanish current aFRR capacity product, in particular: a) Portfolio bidding, b) Separation of upward and downward aFRR balancing capacity procurement.
- IT system changes for implementation of Imbalance Settlement Period (ISP) of 15 minutes has already started in 2021.

From a regulatory point of view, these have been the main developments along 2020 ad 2021:

- Since 26/1/2021 demand (other than pumping hydro units, which participate as BSP since the beginning of the market, in 1998) can participate at different balancing markets (RR platform, and local mFRR and aFRR markets) after approval of national regulatory changes in Terms and Conditions and Operating

Procedures in 2019-2020. New figure of independent aggregator envisaged to be implemented by the middle of 2023.

- National regulatory changes (Operating Procedures) were approved in 2019-2020 by the Regulator to accomplish the already described connections to: a) Connection to the European RR Platform (TERRE), b) Connection to the European imbalance netting platform (IGCC), and c) Implementing 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 of [+ 99.999 €/MWh and -99.999 €/MWh] is possible for RR balancing energies (since Spanish TERRE go-live), while a price range of [+9.999,99 €/MWh and -9.999,99 €/MWh] is possible for FRR energies since the entry into force in January 2021 of the corresponding Spanish Operating Procedures, adapted to already approved Spanish Terms and Conditions.
- Regarding imbalance settlement harmonization (ISH), 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 on December 2021. Spanish system is now calculating the imbalance for each BRP with one single position, that 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 Imbalance Settlement Period (ISP) of 15 minutes has already started in 2021. Previously, in 2020, maximum derogation for implementation of ISP 15 minutes (until December 2024) was granted by the Regulator, encouraging the TSO to make the best effort to accomplish this milestone before regulatory deadline, in October 2023.
- Regarding connection to FRR European platforms, in January 2022 was granted by the CNMC:
  - Derogation for connection to mFRR Platform until 24th July 2022. However, REE is urged to make its best effort to connect before 24th December 2023 (i.e., 17 months after the legal date of implementation).
  - Derogation for connection to aFRR Platform until 24th July 2022 (i.e., 24 months after the legal date of implementation).
- In March 2022, national regulatory adaptations for 15' granularity at different balancing processes: RR, mFRR and aFRR reserve/balancing energy and technical changes regarding aFRR future energy market were approved.

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

- Geographical scope of 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 reserve procurement follows a market (local) scheme.

Next, general information about the market size (number of BSP(s), BRP(s), information about historical/new market players, DSR/RES/Batteries participation) is provided:

- Number of prequalified mFRR BSPs: 19 mFRR BSPs in April 2022.
- Number of prequalified aFRR BSPs: 18 aFRR BSPs in April 2022.
- Number and type of prequalified RR BSPs: 19 RR BSPs in April 2022.
- Number of BRPs (April 2022): 521.

Next tables summarize progress, timeline towards joining the European platforms:

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 granted until 15th October 2020 (i.e., 9 months after the legal date of implementation)
aFRR Platform	Q2 2024	Deep IT/regulatory adaptations currently going on at Spanish system for future transition towards PI-CASSO platform. Derogation has been granted by CNMC until 24th July 2022 (i.e., 24 months after the legal date of implementation)
mFRR Platform	Q3 2023	Deep IT/regulatory adaptations currently going on at Spanish system for future transition towards MARI platform. Derogation has been granted by CNMC until 24th July 2022. However, REE is urged to make its best effort to connect before 24th December 2023 (i.e., 17 months after the legal date of implementation)
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
If response in Q1 is "no", why?	
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. Currently, demand BSP´s participation is still low although is expected that will increase in the future. Independent aggregator figure yet to come at [Q4 2022 - Q1 2023] (regulatory changes on going). RES units are already active at all RR/mFRR/aFRR processes all along 2020 and 2021 (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 yet to come alone or hybridized, (composed of generation, demand and/or storage) to participate at balancing services.

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?	Yes
If response in Q2 is "no", why?	
If response in Q2 is "yes", what were the main results?	Regulatory and IT adaptation for Spanish system go-live at IGCC and TERRE processes along 2020. On-going deep Regulatory and IT adaptations for future MARI and PICASSO go-lives.
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.
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 hourly contracting periods. Procurement of upward and downward aFRR balancing capacity is not carried out separately (same marginal price upward/downward applies).
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 full focused on IT/Regulatory adaptation towards all balancing energy platforms implementation.
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

Next tables show the evolution of the terms and conditions for BRPs and BSPs related to the EB regulation implementation during the last 2 calendar years and further evolutions foreseen for the Future:

Evolution of the terms and conditions for BSP	
Content	Spanish Terms and Conditions on balancing (T&C), according to article 18 of EB Regulation, were approved by the National Regulatory Authority (CNMC) on December 11th, 2019. Foreseen revision T&C in 2022 mainly to include next connections to the European FRR platforms and aggregation conditions in case of hybrid technologies and independent aggregator as BSP.
Evolution of the terms and conditions for BRP	
Content	Spanish Terms and Conditions on balancing (T&C), according to article 18 of EB Regulation, were approved by the National Regulatory Authority (CNMC) on December 11th, 2019. Foreseen revision T&C in 2022 mainly to include next connections to the European FRR platforms and aggregation conditions in case of hybrid technologies and independent aggregator as BSP.

Next table depicts the evolution of the terms and conditions for BRP in the Spanish system (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 2022?	**Derogation**
1.1. If response in Q1 is "derogation" or "exemption", until when was this derogation/exemption granted?	Date: December 2024
Q2. Has your TSO made use of additional components pursuant ISH Methodology Art 9(6) as per 1 January 2022?	**No**
2.1. Scarcity component?	Not considered
2.2. Incentivizing component?	Considered but not implemented by now*
2.3. Component related to financial neutrality of the TSO?	Considered but not implemented by now*
Q3. Has your TSO made use of dual pricing as per 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 Spanish TSO to assess the need for using this additional component one year after the entry into force of the new imbalance settlement mechanism.

2 Adaptation of the Spanish System to EB Regulation

Spanish Terms and Conditions on balancing (T&C), according to article 4 and 18 of EB Regulation, were approved by CNMC on December 11th, 2019, and officially published on December 23rd, 2019, at the following official web site (in Spanish):

https://api.esios.ree.es/documents/560/download?locale=es

At the following link, all the set of Operational Procedures can be found:

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

The general REE web site with the state of development of Network Codes in the Spanish system is the following:

https://www.esios.ree.es/en/page/information-about-implementatio-of-market-network-codes

The Spanish Roadmap is available at the following link publicly available:

https://api.esios.ree.es/documents/654/download?locale=es.

2.1 Terms and Conditions for BSPs

The main actions that are being adopted to align Spanish T&C (including Operating Procedures) with EB Regulation roadmap in the period 2020-2021 are the following:

- **Regulatory changes to allow participation of Demand and Storage on Balancing services and increase flexibility in the balancing prequalification processes**

Adaptation of corresponding Spanish Operating Procedures, including balancing prequalification processes, were carried out to allow demand facilities and storage to participate at balancing markets (RR, mFRR and aFRR), and to fit approved Spanish Terms and Conditions.

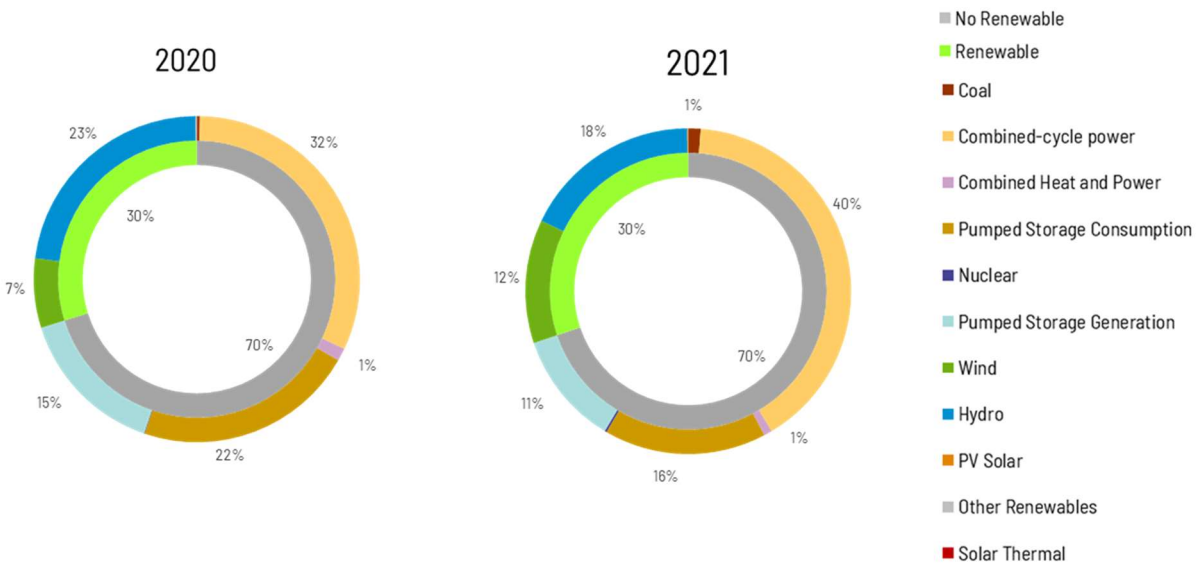
These adapted Operating Procedures entered into force January 26th, 2021 (after a previous public consultation handled between March and April 2020). Thus, concrete regulatory changes to promote participation at balancing services of demand facilities on balancing, are the following:

- 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 preexistent BSP-unit (aggregated participation)

These changes have also a positive impact, not only for demand and storage, but for RES energy.

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).

The following charts show the RR and local mFRR activation in 2020 and 2021:



After regulatory approval, on 5th November 2021 the participation on RR and mFRR processes of the first demand facility was granted in the Spanish system after having fulfilled the qualification process.

The introduction in the Spanish system of demand independent aggregator as BSPs is yet to come from a regulatory point of view in the Spanish system, as the participation of hybrid technologies in balancing services (expected in 2023).

The following table summarizes the prequalified RR, mFRR, aFRR capacity for RES and demand units, updated on May 1st, 2022:

	Prequalified RR and mFRR (MW)	Prequalified aFRR (MW)	% Prequalified (RR/mFRR) / installed	% Prequalified (aFRR) / installed	Installed Capacity
Wind	15.904	1.135	56,7%	4,0%	28.033
CHP	273	232	4,9%	4,1%	5.589
Mini-hydro	255	226	11,7%	10,4%	2.182
Solar thermal	329	0	14,3%	0,0%	2.304
PV Solar	398	1.213	2,6%	8,0%	15.176
Biomass & biogas	84	267	7,8%	24,6%	1.087
Demand	7	0	0,3%	-	25

- ## Balancing energies negative pricing

A price range of [+ 99.999,00 €/MWh and -99.999,00 €/MWh] is possible for RR balancing energies (since TERRE go-live), while a price range of [+9.999,99 €/MWh and -9.999,99 €/MWh] is possible for FRR energies since the entry into force in January 2021 of the corresponding Spanish Operating Procedures, adapted to already approved Spanish Terms and Conditions.

These price limits will be further adapted for the respective processes (starting with RR on July 1st 2022) following amended Pricing Methodology approved by ACER on 25/2/2022

- ## Adaptation to Balancing Platforms

As described in next chapter 4, Operating Procedures have been adapted to allow participation of BSP in RR Platform and the connection to IN Platform and FSkar.

2.2 Terms and Conditions for BRPs

The 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 February 6th, 2020, the possible positions of BRPs in the Spanish system have been reduced from 3 positions (a) Generation out of the aFRR portfolio, b) Generation inside the aFRR portfolio, and c) Demand) to 2 positions (a) Generation and b) Demand). In 2022, with the implementation of the Imbalance Settlement Harmonization Methodology (ISH), Spanish system is calculating the imbalance for each BRP with one single position.
- 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=15 minutes until December 31st, 2024. Notwithstanding the REE implementation plan foresees the implementation of ISP=15 minutes by October 1st, 2023.

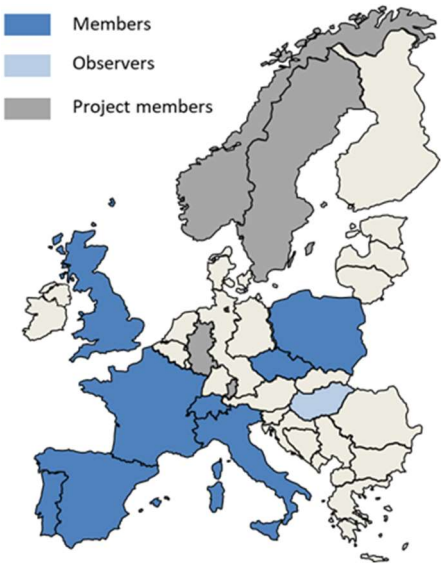
3 Adaptation of Spanish System to European balancing platforms

3.1 Replacement Reserves platform (TERRE Project)

3.1.1 REE participation at TERRE governance structure

REE 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.

In 2021, an Amendment to the Cooperation Agreement was signed between the TERRE members (ČEPS, NG ESO, PSE, REE, REN, RTE, Terna and Swissgrid) and the project members (Amprion, Statnett and Svenskä Kraftnät). Project members joined the TERRE project for the sole purpose of participating in the development operation and management of the IT solution (LIBRA) and obtaining the intellectual property rights of the IT solution to make use of and continue to develop it as part of a regional project in the case of the Nordics TSO, or as part of the MARI project.



In 2021, an Agreement on the Transfer and co-ownership of the Intellectual Property Rights (IPRs) relating to "LIBRA Software" was finalized. This agreement sets out the framework and governance mechanisms for the transfer of the LIBRA IPRs from the TERRE Members and the Project Members to the MARI Members and Nordics TSOs. The signature process of this agreement will be finalized in Q2 2022.

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

The Replacement Reserves Implementation Framework (RRIF) was approved by RR NRAs on January 15th, 2019. Thus, RR TSOs had to implement and make operational the RR platform (LIBRA platform developed within TERRE project) before January 15th, 2020. Indeed, RR platform went live on January 6th, 2020 with the connection of CEPS. A derogation of 9 months for joining RR platform was granted by CNMC to REE (i.e. until October 15th 2020) although effective connection of Spanish system to RR platform took place on March 3rd 2020.

The integration of REE at RR platform implied the transition from a local RR balancing energy market towards a European market, with all associated advantages of synergies between TSOs due to netting of TSO´s RR needs possibility and a more liquid/competitive market. It also implied the substitution of BALIT platform (based on bilateral balancing energy exchanges between REE and REN, and REE and RTE) by the RR platform.

The adapted Spanish Operating Procedures (officially published last December 30th, 2019) due to integration of Spanish System at LIBRA platform are the following:

- New Operating Procedure *P.O. 3.3 "Procedimiento de operación para la aplicación del proceso europeo de activación e intercambio de energías de balance del producto RR en el sistema eléctrico peninsular español".* This operating procedure constitutes the transit from local RR Energy Market towards European RR Market.
- Adapted 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) for pricing both BSP´s and BRP´s according to new RR processes.
- Adapted Operating Procedure *P.O. 14.6 "Liquidación de intercambios internacionales no realizados por sujetos del mercado"* in order to incorporate RR process at TSO-TSO settlement processes.
- Adapted Operating Procedure *P.O. 3.1 "Programación de la generación"*

These operating procedures entered into force on March 3rd 2020, date when REE started using RR platform.

Afterwards, other modifications in Spanish Operating Procedures were needed to include further developments and functionalities of LIBRA platform:

- Updated *Operating Procedure P.O. 3.3* to allow the use of elastic need in the Spanish electrical system. This operating procedure entered into force on January 17th, 2021.
- Updated *Operating Procedures P.O. 3.3 and P.O. 14.4* to incorporate a safeguard mechanism in case of anomalies in the information systems that may affect the prices resulting from the activation of offers in RR Platform. These operating procedures entered into force on September 25th, 2021.

3.1.3 IT changes due to integration at RR Platform

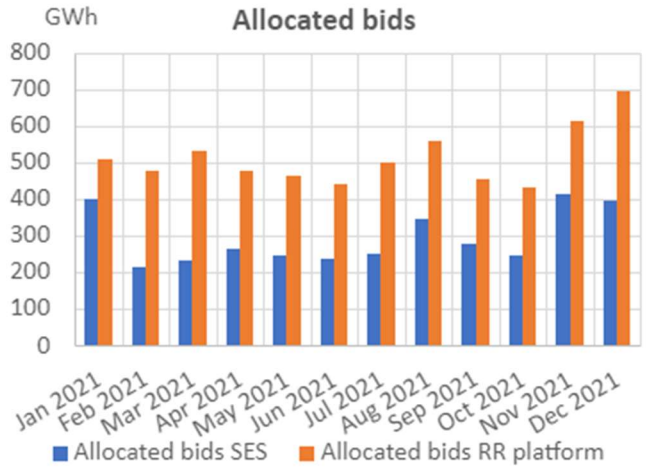
- IT REE/Market Participant systems were adapted for RR standard product. In a first stage, Spanish BSPs were only allowed to submit hourly bids. Once 15 minutes scheduling is implemented at the Spanish electricity system, since May 24th 2022, 15-minute bids, divisible bids and complex bids (such as exclusive, multi-part, linked in time) are allowed at RR allocation.
- REE IT systems are prepared for Spanish system disconnection from RR platform in case of platform unavailability. Under this scenario, RR balancing product would be substituted by dispatching mFRR and aFRR products.
- At REE go-live in TERRE, only inelastic RR needs were used. Later on, as from January 26th, 2021, elastic needs started to be used according to the adapted Operating Procedure P.O. 3.3.
- Safeguard mechanism in case of anomalies in the information systems that may affect the prices resulting from the activation of offers in RR Platform was also implemented in IT systems.

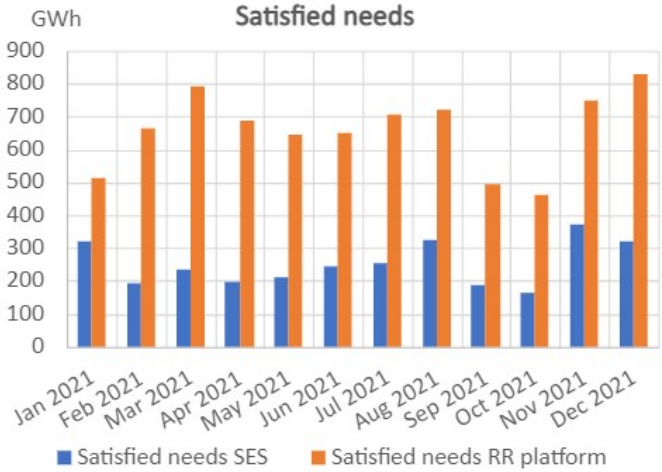
3.1.4 Main results since the Spanish system go-live in RR Platform

The RR product plays a very important role in the balancing energies used in the Spanish electrical system, representing 35% of the total balancing energies in 2020 and 29% in 2021.

As shown in the tables below, the Spanish electrical system (SES) has a very important participation in the European RR platform[1]:

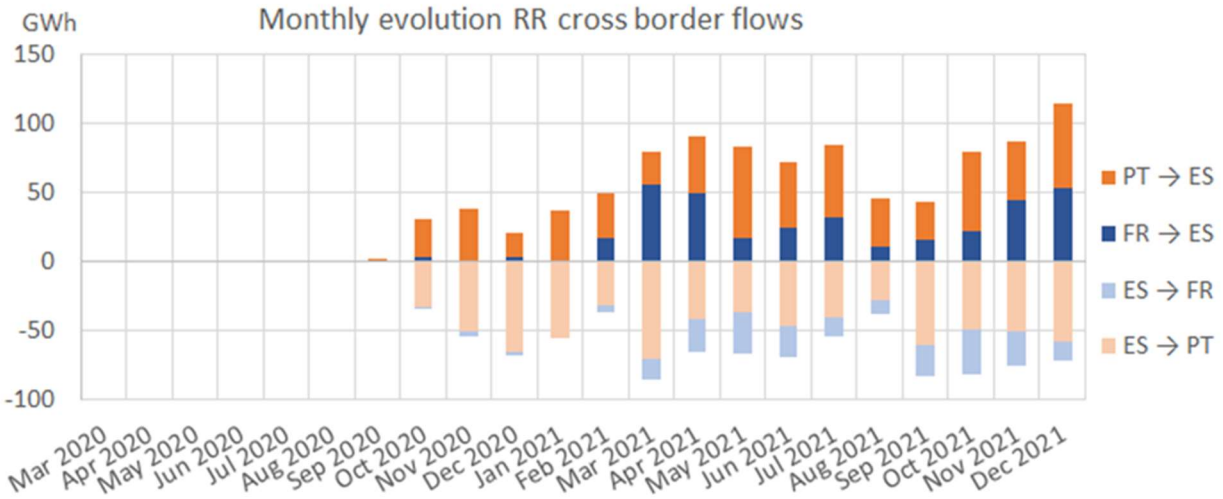
	Requested needs (GWh)	Satisfied needs (GWh)	Total bids (GWh)	Allocated bids (GWh)
Total RR Platform	10.056	9.409	269.682	7.168
Spanish system	3.616	3.488	120.436	4.073
% participation	**36%**	**37%**	**45%**	**57%**



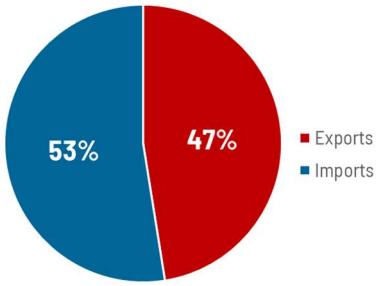


[1] Only data from 2021 is included because year 2021 was the first full year of operation with all the RR TSOs connected to TERRE Region 1 (REE, REN, RTE, Swissgrid and TERNA)

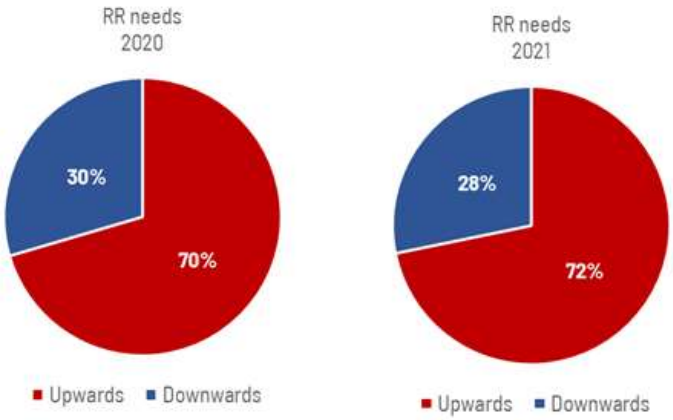
Although REE connected to the RR platform in March 2020, exchanges on the interconnection between Spain and Portugal did not start until the end of September 2020 and on the interconnection between Spain and France until the beginning of October 2020. In the table below, the evolution of RR cross-border flows in each of the interconnections and directions[2] is shown:



During 2021, the volume of imports and exports has remained very similar, with imports being slightly higher:

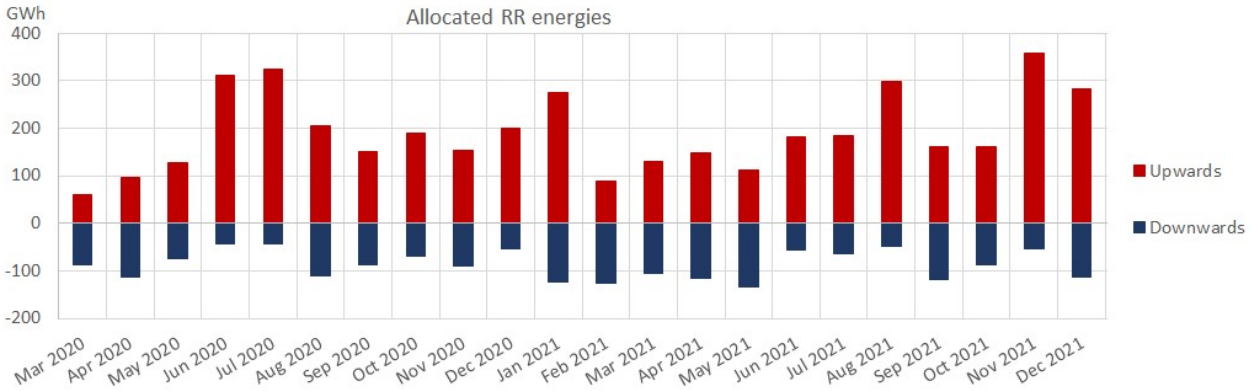


In both 2020 and 2021, the Spanish electrical system has mostly used the RR platform to cover its upwards needs:

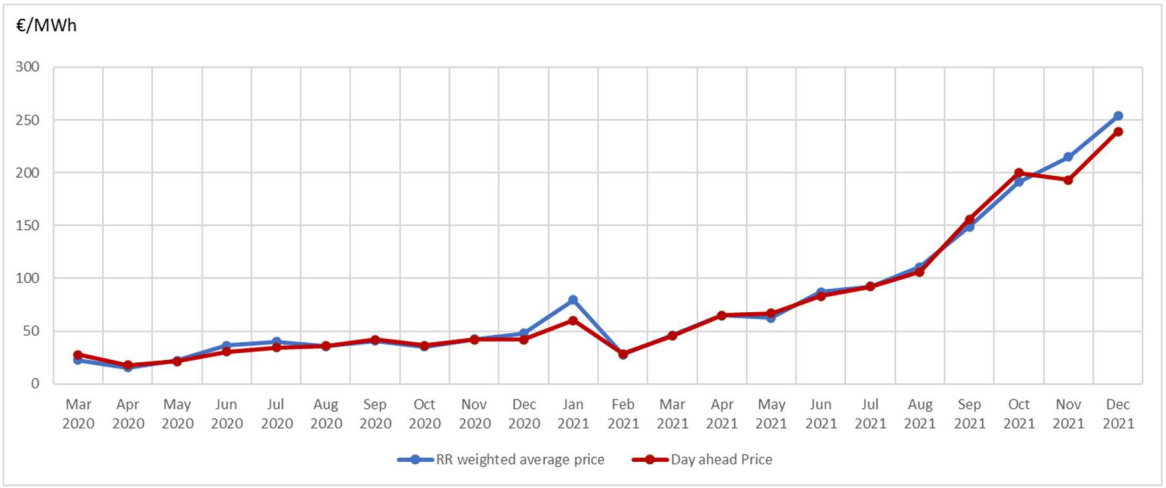


[2] The maximum RR flow on the France-Spain border is limited by RTE to maintain Power System reliability. Until 20th September 2021, the flows were limited to 300MW. As of that date, RR flows are limited to a maximum of 300MW in the direction of the scheduled flows and to a maximum of 500MW in the opposite direction of the scheduled flows

The same happens with the total allocated energy where we can also observe a higher volume of upwards activated energy than downwards activated energy:



Finally, in the graph below it can be seen the evolution of the RR weighted average price since REE's go-live in the RR platform and its correlation with the day-ahead price:



3.2 Imbalance Netting process (IGCC Project)

3.2.1 REE participation at IGCC governance structure

IGCC Cooperation Agreement was signed by REE 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 May 2022):

3.2.2 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:

- Updating *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:
- Updating of *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) were adapted in Q1 2021 in order not to consider Imbalance Netting at Imbalance Price computation, according to Imbalance Settlement Harmonization Methodology.
- Updating *Spanish Operating Procedure P.O. 14.6. "Liquidación de intercambios internacionales no realizados por sujetos del mercado"* adapted in order to incorporate Imbalance Netting process at TSO-TSO settlement processes.

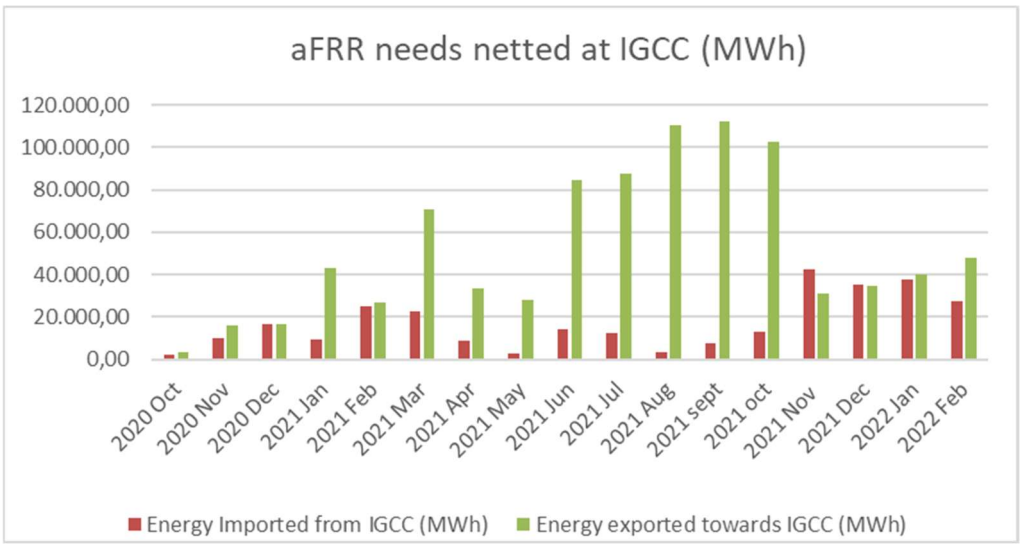
3.2.3 IT changes due to integration at IGCC

These are the main IT changes accomplished by REE 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.
- Matching process for IGCC energies between REE 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.
- Comunication of aFRR Opportunity prices to TNG at 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.
- Network security assessment to detect eventual security limits which fall below ATC, in order to communicate them to IGCC algorithm.
- Communication from SCADA system to scheduling IT system of IGCC energies matched for datawarehouse purposes (for publication towards stakeholders and internal data management).

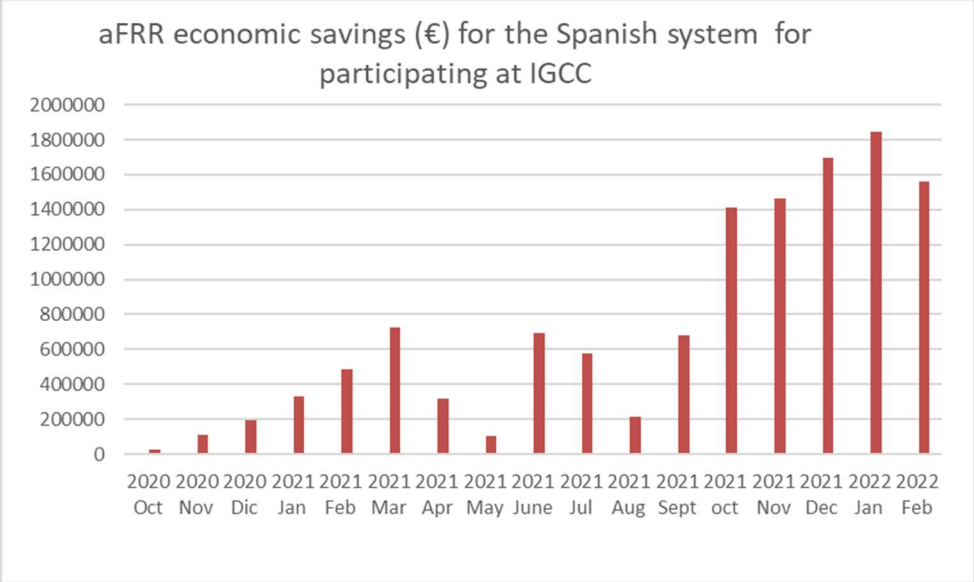
3.2.4 Main results since the Spanish system go-live in IN Platform

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



In the above graphic several factors have had an influence in such import/export energies profile evolution; among others: a) increasing trend of import/export limits applied from the beginning once gained adequate experience with IGCC platform (removal of permanent REE-IGCC limits has taken place since Q2 2022), b) stopping of REE participation at IGCC from mid-April 2021 until mid-May 2021, due to failure of single communication line linking REE with TNG, TSO managing IGCC (since October 2021, two redundant communication lines REE-TNG are in operation), c) change in flows patterns at Spanish-French interconnection occurred on November 2021 that reduce the capacity to export energy towards IGCC.

Next, the savings achieved by Spanish system due to aFRR less energy activated are shown below (the economic savings are determined by comparing the determined IGCC settlement price with respect to opportunity prices for both upward/downward energies):



Economic saving follows similar patterns that energies REE-IGCC interchanged.

3.3 FSkar mechanism

3.3.1 FSkar go-live on June 1st, 2021

The new mechanism to settle 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) started on June 1st, 2021.

3.3.2 Committed regulatory changes related to FSkar

NRAs from all continental European TSOs' approved the proposals for common settlement rules required by the Articles 50.3 (CCFR) and 51.1 (CCU) of the Regulation EB in June 2020.

Following National Regulation was approved on May 20th, 2021:

- Operating Procedure P.O. 4.0 *"Gestión de las conexiones internacionales*": adapted for the new european mechanism.
- Operating Procedure P.O. 14.4 *"Derechos de cobro y obligaciones de pago por los servicios de ajuste del sistema":* adapted for common settlement rules CCFR and CCU.
- Operating Procedure P.O. 14.6 "*Liquidación de intercambios internacionales no realizados por sujetos del mercado*": adapted for common settlement rules CCFR and CCU.

3.3.3 IT changes due to FSkar process

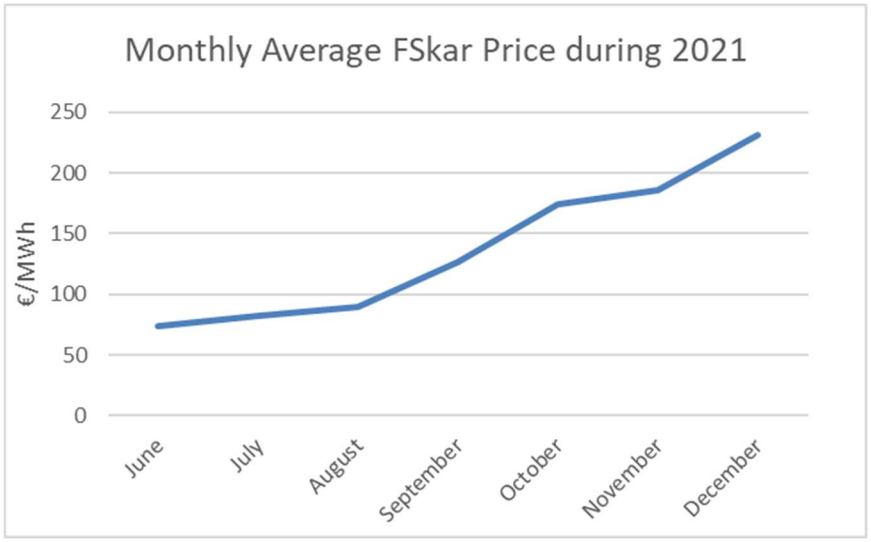
IT systems at REE have already been adapted for:

- The unbundling of the unintended exchanges of energy as the area control error (ACE) while the exchanges resulting from the frequency containment process energy (FCP) and the unintended exchanges of energy ramping period energy (RP) as 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 new exchanges with the relevant coordination centers from the synchronous area Continental Europe (Coordination Center South).
- The elimination of the in-kind compensation schedules with Portugal and France for the imbalance compensation.

3.3.4 Main results since the Spanish system go-live in FSkar process in June 2021

The total net deviation value of the Control Block Spain reached 17,6 GWh, in the direction Spanish Control Block ES => Continental Europe.

The average FSkar price of the intended exchanges of energy as a result of the frequency containment process and unintended exchanges of energy was 137,8 €/MWh. The evolution of this price has been affected by the increasing day-ahead market prices trend. The FSkar price for the deviation energy associated to the ramping period is 0 €/MWh.



The FSkar settlement for the Control Block Spain was 6,9 M€ (payment to the TSO).

3.4 Manual Frequency Restoration Reserve Platform (MARI Project)

3.4.1 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, notwithstanding, REE is urged to perform the best effort to connect to MARI platform no later than 17 months after the legal deadline according to IF (being December 24th 2023).

3.4.2 REE participation at MARI governance structure

REE 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.

3.4.3 Adaptation of Spanish system to 15 minutes scheduling

As a previous step towards implementation of balancing standard products, Spanish system has been carrying out for over 2 years a project together Market Participants and CNMC to establish scheduling processes, information exchanges and data publications according 15 min resolution.

REE sent a proposal on July 5th, 2021, for adapting the Spanish Operating Procedures (after a previous public consultation conducted between April 5th and May 7th, 2021) to the 15 minutes scheduling for all balancing processes. Approval of this set of Spanish Operating Procedures was formally communicated by CNMC on March 17th, 2022. Finally, the go-live of this implementation was successfully achieved on May 24th, 2022.

Main objectives of this internal project were to keep flexibility between hourly and quarterly processes and maintain IT systems and information exchanges ready for next challenges foreseen in the roadmap: connection to mFRR/aFRR Platforms, quarterly cross-border balancing exchanges, Imbalance Settlement Period ISP = 15 min and Market Time Unit (MTU) = 15 min in energy markets.

Although interconnections will be temporary kept in 1-hour resolution, several changes have already been implemented on May 24th:

- 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.
- 15/30/45/60 minute RR offers are accepted for submission to RR platform. Before May 24th, Spanish BSP were only allowed to send 60-minute bids.
- Secondary (aFRR) reserve market has changed to 15-minute offers, although for the moment same value across the full hour will be forced.
- Secondary (aFRR) energy is priced on a quarterly hour basis.

3.4.4 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 in the future are the following:

- Adaptation of mFRR energy bidding process to IT price limits defined in the Pricing Methodology approved by ACER last 25/2/2022.
- Adaptation of Full Activation Time (FAT). From 15 min (current situation) to 12,5 min (standard mFRR product).
- 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
- Currently under assessment:
  - Implementation of power profiles for BSP to incentivize 10 minutes ramps response
  - Use of elastic need for mFRR: assessment for elastic need use in mFRR scheduled activations ongoing.

3.5 Automatic Frequency Restoration Reserve Platform (PICASSO Project)

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

After ACER approval of aFRR Implementation Framework (IF) last January 24th, 2020, the deadline for aFRR platform go-live is July 2022 (30 months after IF). On February 9th, 2022, Spanish system was granted by Spanish Regulator with a derogation of two years to join PICASSO platform, due to the current characteristics of Spanish aFRR service that will imply deep technical and regulatory changes. Among others:

- A new aFRR energy market is required (currently no aFRR energy bids exist in the Spanish system).
- aFRR activation methodology: change from the pro-rata scheme to the merit order activation scheme.
- The settlement approach must be adapted to an optimization cycle granularity.

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.

3.5.2 REE participation at PICASSO governance structure

REE 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.

3.5.3 Future SCADA and IT changes

An internal project in the Spanish system has been already launched to carry out the necessary IT and regulatory developments with the following objectives:

- Build up a new secondary energy market to change the BSP´s aFRR request from pro-rata based towards market-based activation (regulatory/IT changes).
- Changing the technical characteristics (SCADA/IT changes) of the Spanish aFRR system accordingly to market-based approach.
- Splitting of aFRR reserve market at a) upward and b) downward reserve markets (currently, there is a single upward/downward market with a single price for both types of reserves).
- Design of fallback mechanisms in case of PICASSO platform unavailability.

Market Participants and national Regulator are actively involved in this local project, expected to finish along 2023.

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 mid-2024. 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 Volumes of available, procured and used specific products

No specific products are envisaged by now in the Spanish system. Nevertheless, approved national Terms and Conditions (T&C) allow the establishment of specific products in the system if needed.

4.2 Summary analysis of the dimensioning of 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.

- 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/sites/default/files/01_ACTIVIDADES/Documentos/ProcedimientosOperacion/BOE-A-2022-4969_PO1-5.pdf
- 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 Analysis of the opportunities for the exchange of balancing capacity and sharing of reserves

REE is participating in the drafting project team related to the "*All TSOs' proposal for a methodology for a co-optimized allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves*". Impact Assessment of Co-optimization was submitted to ACER on December 2021 and currently, the definition of high-level design requirement is being finalized to be submitted to NEMOs and ACER in June 2022.

Regarding regional methodologies investigated in the previous years, the Spanish French interconnection was congested up to 65,2% of the hours in 2021; meaning that implementing these methodologies for exchange/sharing reserves with our neighboring system will be challenging due to the current interconnection capacity levels between both systems. On the other hand, the Portugal-Spain interconnection was congested up to 2,6% of the hours in 2021. In this case, interconnection capacity could be used for the exchange of balancing capacity and sharing of reserves. Taking into account that the Portuguese and the Spanish systems are quite similar in terms of renewable energy penetration and climate, deviations for wind and solar forecasted production, these factors can affect simultaneously to both Iberian systems.

Nevertheless, 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. REE is willing to continue both on further designing balancing capacity markets and studying the opportunities and benefits of sharing such reserves according to regional methodologies, after enough experience will be gained after different balancing energy platforms go-live.

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