Explanatory Note on Elia's methodology to determine the required balancing capacity

October 9, 2020

TABLE OF CONTENTS

INTRODUCTION

This document determines the the methodology to determine for each of the balancing services, the balancing capacity that has to be reserved within the Elia LFC block, in line with Article 228 §3 of the Federal Grid code (hereafter referred to as "FGC").

WHEREAS

Article 228 §3 of the Federal Grid Code specifies that the transmission system operator shall submit, after a public consultation, a proposal for approval (hereafter referred to as "LFC Means") containing the methodology to determine for each of the balancing services, the balancing capacity that has to be reserved within the Elia LFC block.

This proposal has to be read together with the LFC block operational agreement (hereafter referred to as LFCBOA) as specified in Article 6(3)e of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as "SOGL").

The LFCBOA determines the methodology to determine the needs for reserve capacity other than FCR. It is developed by the Transmission System Operator of the LFC block in accordance with Article 119 of the SOGL. The LFCBOA is submitted by Elia Transmission Belgium (hereafter referred to as "ELIA") for approval in accordance with Articles 6(3)e and 119(2) of the SOGL.

The methodology in this proposal shall be based on an analysis of the optimal provision as specified in Article 32(1) of Commission Regulation (EU)2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (hereafter referred to as "EBGL"). This article specifies that *"all TSOs of the LFC block shall regularly and at least once a year review and define the reserve capacity requirements for the LFC block or scheduling areas of the LFC block pursuant to dimensioning rules as referred in Articles 127, 157 and 160 of Regulation (EU) 2017/1485. Each TSO shall perform an analysis on optimal provision of reserve capacity aiming at minimisation of costs associated with the provision of reserve capacity. This analysis shall take into account the following options for the provision of reserve capacity:*

> *(a) procurement of balancing capacity within control area and exchange of balancing capacity with neighbouring TSOs, when applicable;*
>
> *(b) sharing of reserves, when applicable;*
>
> *(c) the volume of non-contracted balancing energy bids which are expected to be available both within their control area and within the European platforms taking into account the available cross-zonal capacity."*

The balancing capacity for FCR to be reserved by Elia is determined by all TSOs of the synchronous zone in application of the provisions of Article 153 of the European guidelines SOGL for which the methodology specified in the Synchronous Area Operational Agreement (hereafter referred to as

SAOA)[1]. The balancing capacity for FCR to be reserved by Elia is notified to the CREG as soon as communicated by ENTSO-E.

Pursuant Article 228 §3 of the FGC, Elia will immediately notify to the CREG the volumes of mFRR balancing capacity following the application of the dimensioning rules and allocation methodology specified respectively in the LFCBOA and the LFC Means. The mFRR balancing capacity is, identically to the FRR and mFRR needs, calculated every day and the results for the next day are published on the website of Elia, before 7 AM.

In contrast to mFRR, the aFRR balancing capacity is still based on a proposal for a fixed 'static' volume following the application of the dimensioning rules and allocation methodology specified respectively in the LFCBOA and the LFC Means, approved by CREG. Note that Elia published on September 30, 2020 a study[2] presenting a new 'dynamic' aFRR dimensioning methodology, together with a planning for implementation. Such method would require a modification of the LFCBOA which is foreseen to be consulted in Q2 2021. However, where possible, formulations in the LFC Means have already been updated to support implementation of this dynamic method, after approval of the proposed modifications in the LFCBAO.

1. Introduction

Pursuant to Article 228 §3 of the FGC, this document is a proposal developed by Elia regarding the methodology for determining the volumes of balancing capacity for aFRR and mFRR for the Elia LFC block. The calculation of the volumes of balancing capacity takes into account the volume of reserve sharing and non-contracted balancing energy bids.

This document describes how the required aFRR/ mFRR needs, determined for each period of 4 hours of the next day, are covered with a volume of aFRR / mFRR balancing capacity to be procured by Elia for each period of 4 hours of the next day.

2. General provisions

By determining the balancing capacity to be reserved, the LFC Means contributes to the general objectives as defined in Article 3 of the EBGL.

For the purposes of this LFC Means, the terms used have the meaning of the definitions included in Article 3 of the SOGL and in Article 2 of the EBGL. All references to other legislation is explicitly defined. All articles without explicit reference to other legislation concern articles in this LFC Means.

[1] When drafting the SAOA for RG CE, the TSOs considered that it was advantageous to extend the minimum content of the SAOA required by the SOGL with additional content based on the previous operational handbook of ENTSO-E, the Network Code on Electricity Emergency and Restoration and EBGL. The extended SAOA, as described above, shall be referred to as the Synchronous Area Framework Agreement (SAFA). https://transparency.entsoe.eu/system-operations-domain/operational-agreements-of-synchronous-areas/show

[2] https://www.elia.be/en/public-consultation/20200602_public-consultation-on-the-methodology-for-the-dimensioning-of-the-afrr-needs

3. Methodologies

3.1. Dimensioning of reserve capacity

Each day, Elia determines the value for positive and negative reserve capacity for FRR needs for the next day following the dynamic dimensioning methodology specified in the LFCBOA. This reserve capacity is determined for 6 periods of 4 hours. Elia thereafter determines the value for positive and negative reserve capacity for aFRR and mFRR following the methodologies specified in Article 8 and Article 9 of the LFCBOA:

- Elia determines in this document the positive and negative aFRR needs based on the dimensioning methodology specified in the LFCBOA.
- Elia determines the methodology to calculate for each of the 6 periods of 4 hours of the next day a value for positive and negative mFRR needs based on the dynamic dimensioning methodology specified in the LFCBOA.

Next sections will describe the methodology to determine the volume of aFRR and mFRR balancing capacity needed to ensure that the aFRR and mFRR needs will be covered, taking into account reserve sharing and non-contracted balancing energy bids.

3.2. Sharing of reserve capacity

In line with Article 32(1) of the EBGL and Article 10 of the LFCBOA, Elia takes into account the sharing of reserve capacity with neighbouring TSOs in the dimensioning of its balancing capacity. This only concerns sharing agreements on mFRR as Elia does not have sharing agreements on aFRR. Elia already disposes of agreements with RTE, TENNET and NGESO that facilitate the sharing of mFRR. Each of these agreements is operational in 2020 and facilitates a positive and negative shared capacity of 350 MW. Furthermore, a fourth sharing agreement with AMPRION is foreseen to be operational in 2021, also facilitating a positive and negative shared capacity of 350 MW. It is however to be stressed that these contracts are voluntary, and can be subject to modifications on request of the counter-party.

Pursuant to Article 157(2)g of the SOGL, and Article 10(3) of the LFCBOA, Elia takes into account the restrictions defined in the mFRR sharing agreements due to possible violations of operational security and the mFRR availability requirements as specified in Article 157(2)b:

- these reserves may only be activated under exceptional conditions described in the operational agreements governing the sharing of the mFRR reserve to maintain the balance in the LFC block for a limited number of hours and thus cover part of the mFRR needs. They are generally activated after using all the other available balancing services (the non-contracted balancing energy bids and the contracted balancing capacity);
- these reserves are never guaranteed as the availability of cross-border capacity is not ensured and are therefore subject to the operational availability of interconnection capacity at borders, as well as internal network operating constraints such as congestions;
- these reserves are subject to service availability. The service availability observed and reported in 2019 was 94.8% (RTE), 100.0% (Tennet) and 99.3% (NGESO). At this stage, no data is yet available on the service availability of AMPRION.

The maximum shared volume for positive and negative reserve on mFRR that can be taken into account is calculated pursuant Article 10(1) of the LFC BOA, in accordance with Article 157(2) of the SOGL. Following this methodology, the maximum capacity which can be taken into account in the calculation of the mFRR balancing capacity to be procured is:

- for positive reserve capacity : 312 MW, i.e. 30% of the positive dimensioning incident;
- for negative reserve capacity : 560 MW (if Nemo Link is predicted to be scheduled in export or if the prediction is inconclusive) or 0 MW (if Nemo Llink is predicted to be scheduled in import or foreseen to be in maintenance).

However, taking into account the above-mentioned constraints, and following a reduction in the reliability rate (as specified in Article 8 of the LFCBOA) from 99.9% (in 2018) to 99.0% (in 2019), Elia determines as an act of prudence and in order to limit the planned activations, as the activation of the sharing reserves must remain an exceptional measure:

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

The positive sharing capacity included in the dimensioning is increased from 50 MW to 250 MW in the latest proposal of the LFC Means due to the observation of an increasing available transmission capacity after the latest intra-day gate closure (Figure 1). This is an important indicator towards the availability of the capacity that can be activated through the sharing agreements. An analysis of the 99.0%-percentiles shows that over a period between July 2019 to June 2020, 250 MW of remaining transmission capacity after the latest intra-day gate closure was observed to be available during at least 99.0% of the time.

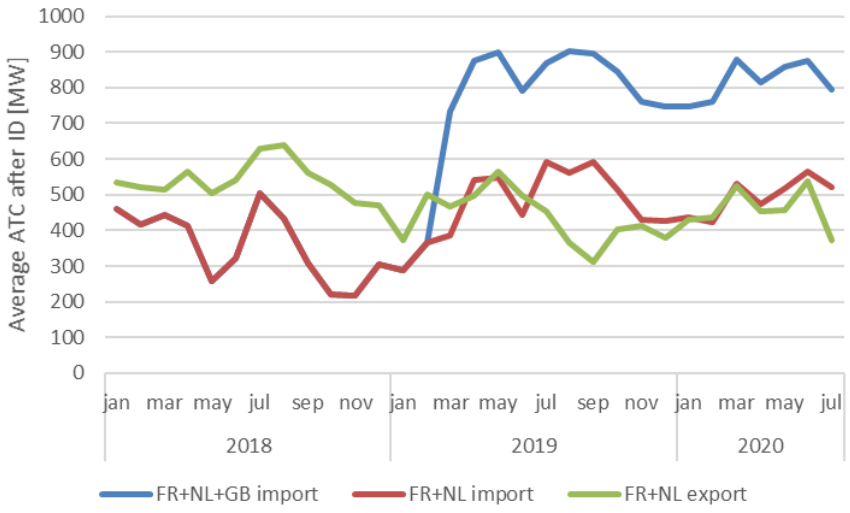

Figure 1 : evolution of the monthly average of *the available cross-border transmission capacity after the last intra-day gate with a cap of 350 MW per border (standard contractual values)*

3.3. Non-contracted balancing energy bids

Elia determines the volume of non-contracted balancing energy bids that can be taken into account to cover the required reserve capacity for FRR based on an analysis of the historical availability of these non-contracted balancing energy bids for a period of 2 years (July 1, 2018 to June 30, 2020).

The available energy bids are only based on the local market as ELIA has currently no access to the European platforms for the exchange of non-contracted balancing energy bids for aFRR or mFRR (the platforms are still under developments).

Elia determines the availability of all non-contracted balancing energy bids for aFRR (Figure 2). Over the period studied, the availability of such bids was equal to 0 MW for 61% (for incremental aFRR bids) or 20% (for decremental aFRR bids) of the observed quarter-hours. These results show that no volumes can be considered as sufficiently firm to be accounted in the dimensioning of the aFRR means.

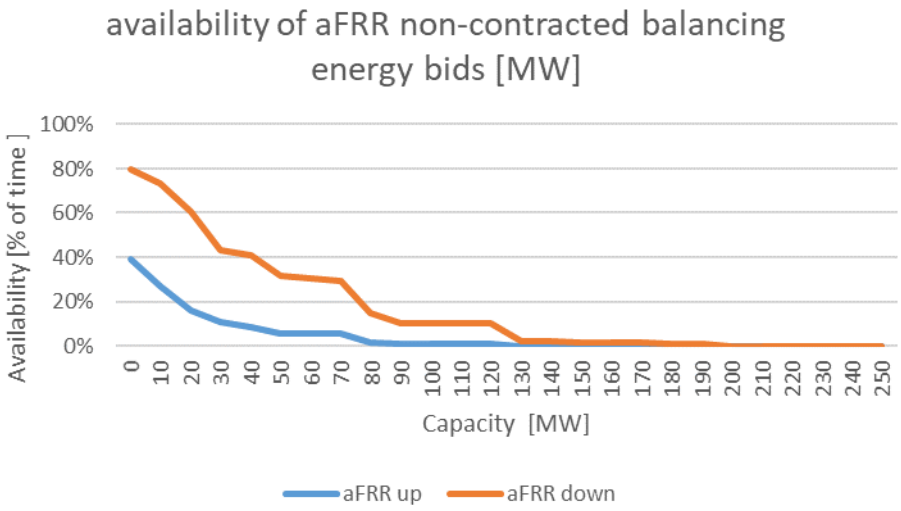

Figure 2 : available incremental (aFRR+) and decremental (aFRR-) non-contracted balancing energy bids

Elia determines the availability of all non-contracted balancing energy bids for mFRR. However, ELIA will only take into account non-contracted balancing energy bids for mFRR in the dimensioning if the volume of non-contracted balancing energy bids for mFRR can, together with the volume of reserve sharing for mFRR, entirely cover the entire mFRR needs. As illustrated in Elia's study on daily procurement[3], Elia explains that those resources could only be taken into account to reduce the mFRR balancing capacity when there are enough non-contracted balancing energy bids to cover the complete mFRR needs. This is explained as the resources that are expected to provide these bids will also participate to the mFRR auctions and will not be there as free bids. This is the main reason a partial procurement will not guarantee an adequate coverage of the mFRR needs.

3.3.1. Positive non contracted balancing energy bids

The total available upward non-contracted reserve capacity is calculated by means of a summation of available upward capacity of non-contracted balancing energy bids in each quarter-hour. A first category taken into account are 'coordinable' power plants[4] : this category excludes units with a 'limited coordinability' (e.g. nuclear generation units, combined-heat and power). An additional filter is applied to remove units providing contracted mFRR balancing capacity to take into account that

[3] https://www.elia.be/en/electricity-market-and-system/document-library

[4] Coordinable' refers to characteristic of a Delivery Point DP_{SU} which is technically capable of modifying its power injection on the Elia Grid upon request by ELIA, within 15 minutes.

these units might leave the balancing market when losing their remuneration for contracting mFRR as explained in Elia's study on daily procurement[1].

Pumped-hydro storage is taken into account but only between 4 AM and 8 AM due to operational and technical constraints which can limit their availability in real-time. These units with energy limitations are not taken into account as there is currently no view on the availability of the energy in the energy reservoir. Increasing generation or reducing off-take may furthermore not be acceptable for BRPs as such an activation may prevent the BRP from following its program the rest of the day. Elia will investigate a methodology to determine and publish the available capacity. However, available upward capacity following bids conducted on 'Bidladder' are taken into account in the analysis[5].

This results in a time series depicted by means of a duration curve in Figure 3. In order to take into account possible correlations between the availability of non-contracted balancing energy bids and mFRR sharing service, the available ATC after intra-day for each quarter-hour is added. This concerns the Dutch, French and British borders where the maximum capacity shared is:

- 350 MW for each border individually (standard contractual values of each mFRR sharing agreement) as explained in Section 3.2;
- 250 MW for the total shared capacity as explained in Section 3.2.

Note that next analyses should allow to take into account the border with Germany. Indeed, currently, no data is available to draw any conclusions on availability.

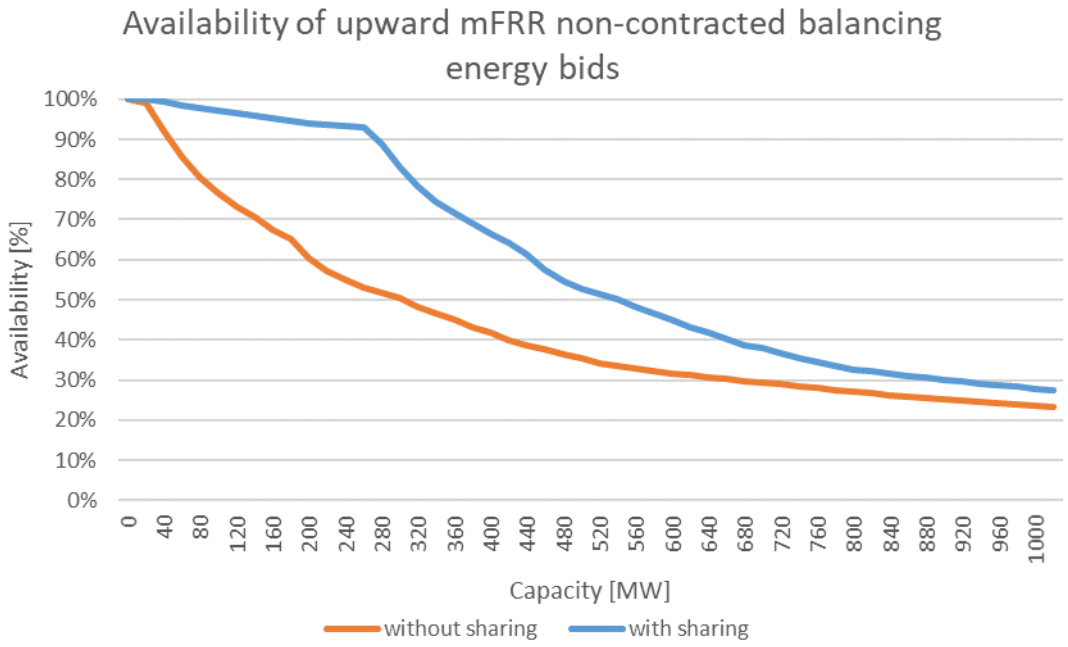

Figure 3 : available positive mFRR non-contracted balancing energy bids with and without mFRR sharing

[5] 'Bidladder' refers to non-contracted balancing energy bids on delivery points without bidding obligation as specified in Article 226 of the FGC;

It can be seen in Figure 3 that no substantial volume can be considered sufficiently firm and can be taken into account as available capacity. As this is far below the mFRR needs, and a partial procurement is not feasible, no volume of non-contracted energy bids is taken into account as available capacity. Note that this figure 3 is based on figures data observations from July 1, 2018 to June 30, 2020, which also takes into account periods before the commissioning of Nemo Link. This explains why the 250 MW of positive sharing capacity put forward in Section 3.2 is not yet available at a reliability level of 99%.

3.3.2. Negative non contracted energy bids

The total available downward non-contracted reserve capacity is calculated by means of a summation of available decremental non-contracted energy balancing bids on 'coordinable' power plants per quarter-hour. This includes the bids from bids from pump hydro storage units. Such bids are taken into account unless they relate to the period 04h00– 08h00. It is found that during these hours, BRPs face energy reservoirs which are full, or are filling the energy reservoirs resulting in energy limitations. It is assumed that besides this period, it is acceptable for BRPs to increase off-take or decrease injections. Similar to incremental capacity, units with 'limited coordinability' (e.g. nuclear generation units, combined-heat and power) are not taken into account except from the expected downward bids from wind power in 2021 are taken into account based on current production nominations, taking into account the incremental wind power capacity installed between 2018-2020 and 2021 (based on the figures published in the Elia's adequacy and flexibility study 2019).

This results in a final time series depicted by means of a duration curve in Figure 4. Again, the available mFRR sharing is accounted by means of adding the hourly available ATC after intra-day (similar as calculated as in Section 3.3.1), taking into account:

- 350 MW for each border individually (standard contractual values of each mFRR sharing agreement) as explained in Section 3.2;
- 350 MW for the total shared capacity as explained in Section 3.2.

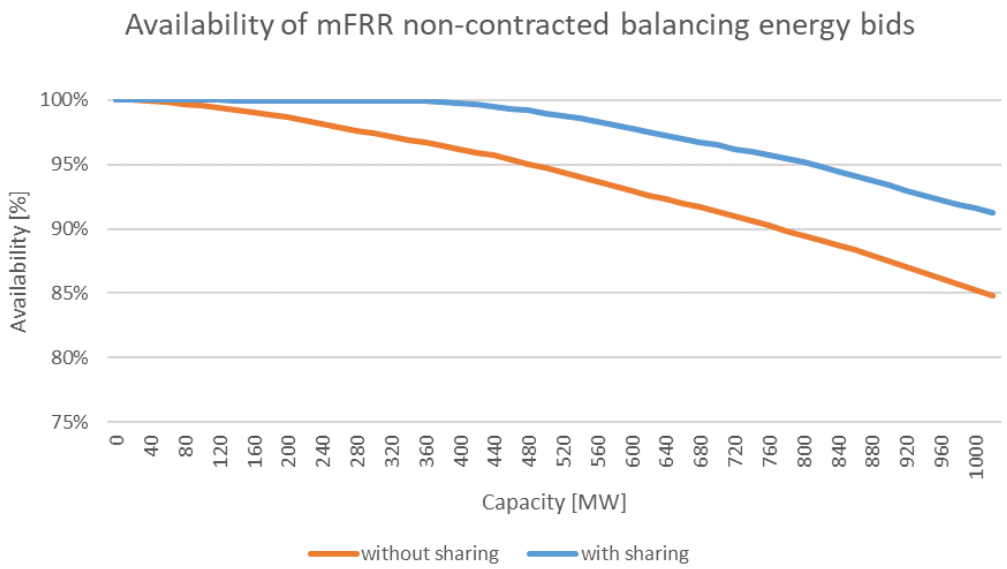

Figure 4 : available negative non-contracted balancing energy bids with and without mFRR sharing

It can be seen that substantial decremental volumes are expected to be available: 800 MW - 900 MW were available 94.8 % - 93.0% of the time, which availability is expected to further increase, particularly following the implementation of the reserve sharing agreement with AMPRION.

3.4. Balancing capacity

Elia does not dispose of reserve sharing for aFRR and the availability of non-contracted balancing energy bids for aFRR has not been sufficient to cover part of the required reserve capacity. Therefore, the volume of "aFRR balancing capacity is determined equal to the value of required aFRR reserve capacity needs, i.e. 145 MW. The daily procurement process and product requirements are specified in the T&C BSP aFRR. This contracted capacity will be available in up- and downward direction.

Elia will cover the required remaining positive reserve capacity for mFRR (after taking into account reserve sharing and non-contracted balancing energy bids if applicable) by contracting a volume of "mFRR balancing capacity / tertiary reserve" equal to the value of remaining required reserve capacity. The procurement process and product requirements are specified in T&C BSP mFRR. The mFRR balancing capacity can be provided with two products:

- "mFRR Standard" the mFRR Capacity Product characterized by an unlimited activation time and no neutralization time;
- "mFRR Flex" the mFRR Capacity Product characterized by a limited activation time and a neutralization time between two successive activations.

Elia has currently no mechanisms for the exchange of balancing capacity for aFRR or mFRR with neighboring TSOs. ELIA considers all contracted aFRR and mFRR balancing capacity products to have a 100% guaranteed availability.

3.4.1. Positive FRR balancing capacity

As no substantial volumes of non-contracted balancing energy bids are available for positive mFRR, Elia will only cover the mFRR needs with mFRR reserve sharing and mFRR balancing capacity. Elia will cover the required positive reserve capacity for mFRR with a minimum capacity of the "mFRR Standard" product determined by the minimum of a threshold of 640 MW (as from July 1, 2020) and the required mFRR balancing capacity. This means that if the total required mFRR balancing capacity would be lower as 640 MW, this minimum level is adapted accordingly in order to never contract more mFRR balancing capacity than the required mFRR balancing capacity. This minimum level is determined by means of an interpolation in two steps from the minimum level in 2019, i.e. 314 MW and the total contracted mFRR balancing capacity in that same year, i.e. 844 MW.

The remaining required positive reserve capacity, if positive, is procured by means of "mFRR Standard" or "mFRR Flex" products in proportions that will depend on the offered prices of the products. Elia will evaluate the liquidity of the contracted mFRR products since the launch of the "mFRR flex" product. This analysis will be conducted in Q1 2021 and based on the results, Elia will propose further steps in a potential phase out of the "mFRR flex" product.

Table 1 provides an example of the aFRR and positive mFRR balancing capacity to be contracted where the FRR needs are determined based on the dimensioning incident, i.e. 1039 MW (installed maximum capacity the largest nuclear generation unit). Of course, these values are subject to daily changes, with a resolution of 4 hours, depending on the results of dynamic dimensioning.

Table 1 : illustration of positive FRR needs and positive FRR means where FRR needs are determined by the dimensioning incident

FRR needs = 1039 MW (dimensioning incident)	FRR means = 1039 MW
aFRR needs = 145 MW	aFRR balancing capacity = 145 MW
mFRR needs = 894 MW	FRR reserve sharing = 250 MW
	mFRR balancing capacity = 644 MW

3.4.2. Negative FRR balancing capacity

Elia will not procure any negative balancing capacity other than aFRR. The required negative reserve capacity for mFRR is expected to be covered with reserve sharing and non-contracted balancing energy bids with an acceptable probability. Given the recent improvements in the balancing market and the implementation of a new reserve sharing agreement for the German border begin 2021, it is expected that the capacity on mFRR reserve sharing and non-contracted balancing energy will be sufficient, i.e. available with an acceptable probability. As it cannot currently be demonstrated that it is necessary to contract balancing capacity from mFRR downwards, Elia proposes to set the balancing capacity contracted in mFRR downwards at 0 MW.

Table 2 provides illustrative figures of the negative aFRR and mFRR balancing capacity to be contracted where the FRR needs are determined based on the dimensioning incident (DET N-1 method specified in the LFCBOA), when Nemo Link is predicted to be scheduled in export, or if the prediction of the schedule is uncertain, or the historic and expected LFC block imbalances (HIST99 and PROB99 as specified in the LFCBOA) when Nemo Link is predicted to be scheduled in import, or if the interconnector is scheduled in maintenance. Of course, these values are subject to daily changes, with a resolution of 4 hours, depending on the results of dynamic dimensioning.

Note that between February 1, 2019 and January 31, 2020, the result of DET N-1 method was determined by maximum export power of Nemo Link, which never exceeded 1046 MW, at least if Nemo Link was expected to be scheduled in export (or if the prediction is uncertain). In all other cases, the result of the DET N-1 method was equal to 0 MW. Over the same period, when Nemo Link was expected to be in import (or maintenance), the result of the PROB99 and HIST99 never exceeded 535 MW.

Table 2 : illustration of negative FRR needs and negative FRR means in situations where Nemo Link is expected to be scheduled in import, export, maintenance or if the prediction is uncertain

[MW]	Nemo Link in export (or undefined)	Nemo Link in import (or maintenance)
FRR needs	1046	535
aFRR needs	145	145
mFRR needs	901	381
aFRR balancing capacity	145	145
Available mFRR reserve sharing and mFRR non contracted balancing energy bids	≥ 901	≥ 381

Elia will carry out a yearly ex-post analysis in the first quarter of the year based on historical data from the precedent year on and assess whether FRR needs have been sufficiently covered by the resources available. For the purposes of this analysis, Elia will compare the results of the FRR needs based on the methodology in the LFCBOA with the available resources of aFRR and mFRR (non-contracted balancing energy offers and sharing of FRR reserves), based on the methodology to determine the mFRR sharing capacity (Section 3.2) and non-contracted balancing energy bids (Section 3.3). The results of the latest analyses were presented in the Working Group Balancing of June 19, 2020[6].

4. Final Provisions

The new version of the LFC Means will enter into force after being approved by the national regulatory authority, i.e. CREG. However, the LFC Means will not enter into force before January 6, 2021, the date of calculation of the balancing capacity for January 7, 2021.

The LFC means is published in English, Dutch and French. In case of discussion on interpretation of the methodologies presented in the LFCBOA, the French and Dutch versions prevail over the English version.

[6] https://www.elia.be/en/users-group/wg-balancing/20200619-meeting