
Proposal for amendment to Elia's LFC block operational agreement

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Version for public consultation

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THE BELGIAN TRANSMISSION SYSTEM OPERATOR, TAKING INTO ACCOUNT THE FOLLOWING,

Whereas

1. Pursuant to Article 6(3)e and Article 119(1) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereinafter "SOGL"), Elia submitted a proposal regarding the Elia LFC block operational agreement (hereinafter "LFCBOA") to the relevant regulatory authority, the Commission for the Regulation of Electricity and Gas (hereinafter "CREG") for approval. The CREG approved this initial proposal on 27 May 2019. The latest proposal for amendment has been approved by the CREG on July 14, 2022.
2. Pursuant to Article 7(4) of the SOGL, the CREG has requested Elia Transmission Belgium (hereafter referred to as "Elia") to develop a proposal to amend the aFRR dimensioning method and submit this for approval to the CREG, after consultation of the market.
3. Following this request and in accordance with Article 7(4) of the SOGL, Elia, in its capacity as responsible for drawing up a proposal for conditions or methodologies, has developed a proposal for a new methodology for the calculation of the aFRR needs.
4. This document is a proposal for amendment developed by Elia regarding the methodologies and conditions included in the LFCBOA for the Elia LFC block.
5. Elia consults the stakeholders on the draft proposal in accordance with Article 11 of the SOGL from February 24, 2023 until March 24, 2023.

SUBMITS THE FOLLOWING PROPOSAL FOR APPROVAL TO THE CREG:

Article 1. Timing for implementation

Article 2 is adapted to specify the timing of implementation of this proposal, as well as update the implementation planning of the paragraphs approved in the previous version of the LFCBOA and still subject to implementation. The article is replaced by:

1. *“The modifications in Article 8, Article 9 and Article 10 will enter into force on October 1, 2024 after the approval of the CREG.*
2. *The reduction of the full activation time of aFRR to 5 minutes specified in Article 14 of the LFCBOA will enter into force together with the entry into force of the next version of the Terms and Conditions for balancing service providers for Frequency Restoration Reserve with automatic activation (aFRR), hereafter referred to as T&C BSP aFRR, in which the full activation time of aFRR will be revised.*
3. *The modifications in Article 4, Article 7, Article 12 and Article 13 will enter into force together with the modifications approved by CREG on February 10, 2022 (Decision B2344). Article 7, Article 12, Article 13 and the reduction of the full activation time of mFRR to 12.5 minutes specified in Article 14 of the LFCBOA will enter into force together with the entry into force of the next version of the Terms and Conditions for balancing service providers for Frequency Restoration Reserve with manual activation (mFRR), hereafter referred to as T&C BSP mFRR.”*

Article 2. Subject

Article 4 is adapted to enable the participation of all types of units in the exceptional balancing measures specified in Article 7, Article 12 and Article 13¹. Article 4(5)b is replaced by:

- b. *““Units” which cannot be activated in compliance with the FRR processes may only be activated by ELIA via the following separate measures: operational procedures for exhausted FRR (cf. Article 12), an escalation procedure for FRR (cf. Article 13) and measures to reduce the FRCE (cf. Article 7).”*

Article 3. Measures to reduce the FRCE by requiring changes in the active power production or consumption of power generating modules and demand units in accordance with Article 152(16) of the SOGL

Article 7 is adapted to enable the participation of all types of units in the exceptional balancing measures specified in Article 7, Article 12 and Article 13¹. Article 7(2)c is replaced by:

- c. *“activate units subject to the Terms and Conditions Scheduling Agent, in line with Article 130 of the Code of Conduct, and that cannot be activated via the FRR processes;*

¹ Note that additional actions are needed to enable the actual use of the assets that do not offer their flexibility subject to the Terms and Conditions Scheduling Agent in the exceptional balancing measures. These steps include amending the Balancing Rules, the development of a new contractual framework for offering this flexibility to Elia and performing the necessary implementations. However, in line with the implementation plan of the 2021 study on enabling all technologies to participate to the exceptional balancing measures (available on <https://www.elia.be/en/public-consultation/20210820-public-consultation-of-the-study-on-a-technology-neutral-framework>), Elia already takes a first step by amending the LFCBOA

- d. *activate units that do not provide MW schedules in the context of the Terms and Conditions Scheduling Agent, that cannot be activated via the FRR processes and that offer their available active power on a voluntary basis.”*

For consistency of the text, part of the text of Article 7(2)c is introduced in a new Article 7(3). This new article affects the numbering of subsequent paragraphs:

3. *“For taking the measures specified in paragraphs 2(c) and 2(d), Elia will strive towards techno-economic efficiency by taking into account the maximum and minimum output, start-up time, start-up costs and other technical constraints if relevant.”*

Article 7(5) is adapted accordingly as:

6. *“At the latest 15 working days after the use of one of the measures specified in paragraph 2(b), 2(c), 2(d) or 2(e), Elia shall prepare a report containing a description and justification for this action and submit it to the CREG [...]”*

Article 4. Dimensioning rules for reserve capacity on FRR

Article 8(9) is adapted in order to take into account imbalance netting in the calculations of the minimum threshold for the dimensioning of the required reserve capacity on FRR. Article 8(9) is replaced by:

9. *“For each-quarter hour of the next day, Elia determines the required positive and negative reserve capacity on FRR in order that it is sufficient to cover at least the positive and negative historic LFC block imbalances for 99.0% of the time in line with Articles 157(2)h and 157(2)i of the SOGL. These thresholds are determined based on the consecutive historical records specified in paragraph **Error! Reference source not found.**, after correcting these values with imbalance netting, and before removal of any periods as discussed in paragraph **Error! Reference source not found.**”*

Article 5. Determination of the ratio of automatic FRR and manual FRR

Article 9 is replaced in order in order to implement a new methodology for the dimensioning of the aFRR needs. Article (9) is replaced as a whole by:

1. *“Pursuant to Article 157(2)c of the SOGL, the TSO of a LFC block shall determine the ratio of automatic FRR (hereafter referred to as aFRR), manual FRR (hereafter referred to as mFRR), the aFRR full activation time and mFRR full activation time in order to comply with the requirement of Article 157(2)b of the SOGL.*
 - a) *Elia determines the automatic FRR full activation time and manual FRR full activation time in Article 9.*
 - b) *the required reserve capacity for FRR is determined by means of the probabilistic methodology described in Article 4(2).*
2. *Elia dimensions the required reserve capacity on aFRR on a daily basis based on a **dynamic probabilistic methodology** further specified in paragraphs 3 to 7. The results of this method are adapted by means of a **feedback loop** in function of the performance of the Elia LFC block on the FRCE target parameters further specified in paragraph 8.*

3. *The probabilistic methodology is based on a forecast of the **aFRR activation risk** for every period of 5 minutes of the next day. The prediction is based on a Gradient Tree Boosting algorithm which is a type of machine learning algorithm based on an ensemble of individual decision trees. Each decision tree represent “if-else statements” that are used to predict the aFRR activation risk. The algorithm is trained on a set of **simulated aFRR activations** (calculated based on historical observations of system imbalances and imbalance netting) and corresponding system conditions. The list of system conditions used for the training and prediction of the machine learning algorithms are the same as those for the dimensioning of FRR and specified in Article 8(4)b.*
4. *A Gradient Tree Boosting based on regression is trained to forecast the aFRR activation risk, using a quantile loss function. A separate model is built for the prediction of the positive simulated aFRR activations through the 99% percentile of the probability distribution of the positive simulated aFRR activations, and another model is built for the prediction of the negative simulated aFRR activations through the 1% percentile of the probability distribution of the negative simulated aFRR activations. Nodes are split based on a classical mean squared error with improvement score by Friedman. The number of trees is set at 400, the height of each tree is specified at 4 and the learning rate is fixed at 0.1.*
5. *The **simulated aFRR activations** ($aFRR_t$) are calculated with a resolution of 5 minutes based on historical observations of system imbalances and imbalance netting for a period of two years, ending not before the last day of the second month before the month of the day for which the reserve capacity is calculated. The time series are filtered to remove periods with a forced outage of Nemo Link or generating units with a loss of power larger than 50 MW (until the end of the forced outage but limited to 8 hours after the start of the forced outage), periods with exceptional events (e.g. market decoupling) and periods with data quality problems (e.g. missing data).*
6. *The **simulated aFRR activations** ($aFRR_t$), positive (negative) values represent upward (downward) activations are calculated for every period of 5 minutes as the difference between the system imbalance (SI_t), the simulated mFRR activations ($mFRR_t$) and the IGCC activations ($IGCC_t$): $-aFRR_t = SI_t + mFRR_t + IGCC_t$:*
 - a) *the system imbalances (SI_t) are calculated as the average of the observed 1' system imbalances over each block of 5 minutes. Negative (positive) values represent system shortage (excess);*
 - b) *the simulated mFRR activations ($mFRR_t$) are calculated as the average of the 1' system imbalances over each block of 15 minutes. Positive (negative) values represent upward (downward) activations ;*
 - c) *the IGCC corrected activations ($IGCC_t$) are calculated based as the average of the 1' observed iGCC activations ($IGCC_{obs_t}$) over each block of 5 minutes where positive (negative) values represent import (export) positions. The $IGCC_t$ is corrected to zero when $IGCC_t$ and $SI_t + mFRR_t$ are found to have the same sign and*
 - i) $Min(IGCC_{obs_t}; -(SI_t + mFRR_t))$ if $SI_t + mFRR_t \leq 0$

ii) $-Min(-IGCC_obs_t ; SI_t + mFRR_t)$ if $SI_t + mFRR_t > 0$

7. *The up- and downward aFRR activation risk is determined each day before 7 AM for every period of 5 minutes of the next day based on predicted system conditions of the next day as specified in Article 8(4)b. The aFRR needs for that day are therefore determined by means of the average value of the positive (negative) reserve capacity on aFRR over all periods of 5 minutes of the corresponding period.*
8. *The feedback loop determines the final aFRR needs for the next day by multiplying the aFRR needs determined in line with paragraph 7 with:*
 - a) *The yearly FRCE performance correction which equals the FRCE performance of the previous year calculated as the maximum, corresponding to the lowest performance, of the yearly performance on the level 1 and level 2 range, calculated following Article 128(3) of the SOGL and expressed as percentage of the level 1 and level 2 target parameters specified in the same Article 128(3) of the SOGL, after taking into account a correction of 20% of the target values (i.e. to 24 % and 4% for level 1 and 2 respectively). The yearly performance correction is floored / capped at 80 % / 120%.*
 - b) *The monthly FRCE performance correction equals the FRCE performance of the previous month calculated as the maximum of the monthly performance on the level 1 and level 2 range, calculated based on the same principles as stated in Article 128(3) of the SOGL and expressed as percentage of the level 1 and level 2 target parameters specified in the same Article 128(3) of the SOGL, after taking into account a correction of 20% of the target values (i.e. to 24 % and 4% for level 1 and 2 respectively). The monthly performance correction is floored / capped at 80 % / 120%.*
9. *The daily variations are limited by flooring / capping the final aFRR needs specified in paragraph 8 at 64% / 144% of the average aFRR needs resulting from the dynamic probabilistic methodology specified in paragraph 2 and this over period of 12 months ending one month before the month of the day for which the aFRR needs are calculated.”*

Article 6. Determination of the reduction of reserve capacity on FRR following the sharing of FRR

Article 10 is adapted to facilitate the potential introduction of a dynamic calculation of the contribution of reserve sharing (which can actually only be implemented through a modification of the LFC Means). Articles 10(1)a en 10(1)b are replaced by:

- a. *“the reduction of the positive reserve capacity shall not exceed 30% of the size of the positive dimensioning incident*
- b. *“the reduction of the positive reserve capacity on FRR of a LFC block shall be limited to the difference, if positive, between the size of the positive dimensioning incident and the reserve capacity on FRR required to cover the positive LFC block imbalances during 99.0% of the time based on the historical records referred to in Article 157(2)a of the SOGL.. This corresponds to difference between the result of*

the deterministic methodology and the minimum threshold specified in Article 8(1)c.”

Similarly, Articles 10(2)a and 10(2)b are replaced by:

- c. *“in periods when Nemo Link is foreseen to be in export, or when the prediction is indecisive the reduction of the negative reserve capacity on FRR of a LFC block shall be limited to the difference, if positive, between the size of the negative dimensioning incident and the reserve capacity on FRR required to cover the negative LFC block imbalances during 99.0% of the time based on the historical records referred to in Article 157(2)a of the SOGL. This corresponds to the difference between the result of the deterministic methodology and the minimum threshold specified in Article 8(1)c.*
- d. *in periods when Nemo Link is foreseen to be in import, or in maintenance, the reduction of the negative reserve capacity on FRR of the LFC block shall be limited to 0 MW.”*

Article 7. Operational procedures in case of exhausted FRR in accordance with Article 152(8) of the SOGL

Article 12 is adapted to enable the participation of all types of units in the exceptional balancing measures specified in Article 7, Article 12 and Article 13¹. Article 12(4)b is replaced by:

- b. *“activate units which are available in line with requirements of the T&C Scheduling Agent, in line with Article 130 of the Code of Conduct, and that cannot be activated via the FRR processes;*
- c. *activate units that do not provide MW schedules in the context of the Terms and Conditions Scheduling Agent, that cannot be activated via the FRR processes and that offer their available active power on a voluntary basis.”*

For consistency of the text, part of the text of Article 12(4)b is introduced in a new Article 12(5). This new article affects the numbering of subsequent paragraphs:

- 5. *“The measures specified in paragraphs 4(b) and 4(c) will be taken at the latest point in time for Elia to take action while taking into account the latest available information following the balancing warnings. Elia will strive towards techno-economic efficiency by taking into account the duration and magnitude of the residual risk and the maximum and minimum output, start-up time, start-up costs and other technical constraints if relevant.”*

Article 12(5) and Article 12(7) are adapted accordingly to:

- 6. *“The measures specified in paragraphs 4(b) and 4(c) are effectively activated taking into account the start-up time or activation time of the selected units [...]*
- 8. *At the latest 15 working days after the activation of units following the measure described in paragraphs 4(b) and 4(c), Elia [...]*”

Article 8. Escalation Procedures in accordance with Article 157(4) of the SOGL

Article 13 is adapted to enable the participation of all types of units in the exceptional balancing measures specified in Article 7, Article 12 and Article 13¹. Article 13(4)b is replaced by:

- b. *“activate units which are available in line with requirements of the T&C Scheduling Agent, in line with Article 130 of the Code of Conduct, and that cannot be activated via the FRR processes;*
- c. *activate units that do not provide MW schedules in the context of the Terms and Conditions Scheduling Agent, that cannot be activated via the FRR processes and that offer their available active power on a voluntary basis.”*

For consistency of the text, part of the text of Article 13(4)b is introduced in a new Article 13(5). This new article affects the numbering of subsequent paragraphs:

- 5. *“the measures specified in paragraphs 4(b) and 4(c) will be taken at the latest point in time for Elia to take action while taking into account the latest available information following the balancing warnings. Elia will strive towards techno-economic efficiency by taking into account the duration and magnitude of the residual risk and the maximum and minimum output, start-up time, start-up costs and other technical constraints if relevant.”*

Article 13(5) and 13(7) are adapted accordingly to:

- 6. *“The measures specified in paragraphs 4(b) and 4(c) are effectively activated taking into account the start-up time or activation time of the selected units [...]*
- 8. *At the latest 15 working days after the activation of units following the measure described in paragraphs 4(b) and 4(c), Elia [...]*”

Article 9. FRR availability requirements and on the control quality, defined in accordance with Article 158(2) of the SOGL

Article 14 is adapted to facilitate the potential revision of the aFRR full activation time, which can actually be implemented through a modification of the T&C BSP aFRR. Article 14(2) is replaced by:

- 2. *“the maximal aFRR full activation time of the Elia LFC block and the mFRR full activation time of the Elia LFC block are defined at respectively 5 and 12.5 minutes. Therefore, the aFRR full activation time of a LFC block and the mFRR full activation time of the LFC block shall not be more than the time to restore frequency.”*