
**Explanatory document for the amended Nordic synchronous area
proposal for the FRR dimensioning rules in accordance with Article
157(1) of the Commission Regulation (EU) 2017/1485 of 2 August
2017 establishing a guideline on electricity transmission system
operation**

1. Introduction

The Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereinafter “**SO Regulation**”) sets out rules on relevant subjects that should be coordinated between Transmission System Operators, as well as between TSOs and Distribution System Operators and with significant grid users, where applicable. The goal of the SO Regulation is to ensure provision of an efficient functioning of the interconnected transmission systems to support all market activities. In order to deliver these objectives, a number of steps are required.

One of these steps is to define the FRR dimensioning rules. Pursuant to Article 119(1)(h) of the SO Regulation, all Transmission System Operators in the Nordic LFC Block shall jointly develop common proposals for the FRR dimensioning rules defined in accordance with Article 157(1).

According to Article 6(3)(e)(iv) of the SO Regulation the proposal for FRR dimensioning defined in accordance with Article 157(1) shall be submitted for approval by the relevant national regulatory authorities (hereinafter “NRAs”) no later than 14 September, 2018. The proposal is submitted for regulatory approval to all NRAs in the Nordic LFC block by 14 September 2018. According to Article 6(6) of the SO Regulation the proposal needs to be submitted to ACER as well, who may issue an opinion on the Proposal if requested by the NRAs.

On 14 March 2019, the Nordic NRAs sent a Request for Amendment (RfA). In this RfA the NRAs concluded that the proposal that was sent by 14 September 2018 does not comply with the requirements in article 157. In order to allow for the approval of the FRR dimensioning rules Proposal, this issue needs to be resolved. Accordingly, the TSOs shall submit an amended Proposal (hereafter referred to as “**Proposal**”) for approval by the relevant national regulatory authorities (hereinafter “NRAs”) no later than 14 May, 2019. The Proposal is submitted for regulatory approval to all NRAs in the Nordic LFC block.

This document contains an explanation of the Proposal from all TSOs of the Nordic synchronous area (hereinafter “**TSOs**”). It is structured as follows. The legal requirements for the Proposal are presented in Chapter 2. Chapter 3 starts with describing the objective of the FRR dimensioning rules. Chapter 4 provides an overview of the existing situation. The proposed FRR dimensioning rules are described and explained in Chapter 5. Chapter 6 describes the expected impact on the relevant objectives of the SO Regulation. Finally, Chapter 7 provides the timeline for implementation and Chapter 8 describes the public consultation.

2. Legal requirements and interpretation

2.1 Legal references and requirements

Several articles in the SO Regulation set out requirements which the Proposal must take into account. These are cited below.

- (1) Article 119(1)(h) and (2) of the SO Regulation constitutes the legal basis that the Proposal should take into account. Article 119 has the following content:

“1. By 12 months after entry into force of this Regulation, all TSOs of each LFC block shall jointly develop common proposals for: [...]

(h) the FRR dimensioning rules defined in accordance with Article 157(1); [...]

2. All TSOs of each LFC block shall submit the methodologies and conditions listed in Article 6(3)(e) for approval by all the regulatory authorities of the concerned LFC block. Within 1 month after the approval of these methodologies and conditions, all TSOs of each LFC block shall conclude an LFC block operational agreement which shall enter into force within 3 months after the approval of the methodologies and conditions;”

(2) Article 157 of the SO Regulation has the following content:

“1. All TSOs of a LFC Block shall set out FRR dimensioning rules in the LFC Block operational agreement.

2. The FRR dimensioning rules shall include at least the following:

(a) all TSOs of a LFC block in the CE and Nordic synchronous areas shall determine the required reserve capacity of FRR of the LFC block based on consecutive historical records comprising at least the historical LFC block imbalance values. The sampling of those historical records shall cover at least the time to restore frequency. The time period considered for those records shall be representative and include at least one full year period ending not earlier than 6 months before the calculation date;

(b) all TSOs of a LFC block in the CE and Nordic synchronous areas shall determine the reserve capacity on FRR of the LFC block sufficient to respect the current FRCE target parameters in Article 128 for the time period referred to in point (a) based at least on a probabilistic methodology. In using that probabilistic methodology, the TSOs shall take into account the restrictions defined in the agreements for the sharing or exchange of reserves due to possible violations of operational security and the FRR availability requirements. All TSOs of a LFC block shall take into account any expected significant changes to the distribution of LFC block imbalances or take into account other relevant influencing factors relative to the time period considered;

(c) all TSOs of a LFC block shall determine the ratio of automatic FRR, manual FRR, the automatic FRR full activation time and manual FRR full activation time in order to comply with the requirement of paragraph (b). For that purpose, the automatic FRR full activation time of a LFC block and the manual FRR full activation time of the LFC block shall not be more than the time to restore frequency;

(d) the TSOs of a LFC block shall determine the size of the reference incident which shall be the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, or single HVDC interconnector or from a tripping of an AC line within the LFC block;

(e) all TSOs of a LFC block shall determine the positive reserve capacity on FRR, which shall not be less than the positive dimensioning incident of the LFC block;

(f) all TSOs of a LFC block shall determine the negative reserve capacity on FRR, which shall not be less than the negative dimensioning incident of the LFC block;

(g) all TSOs of a LFC block shall determine the reserve capacity on FRR of a LFC block, any possible geographical limitations for its distribution within the LFC block and any possible geographical limitations for any exchange of reserves or sharing of reserves with other LFC blocks to comply with the operational security limits;

(h) all TSOs of a LFC block shall ensure that the positive reserve capacity on FRR or a combination of reserve capacity on FRR and RR is sufficient to cover the positive LFC block imbalances for at least 99 % of the time, based on the historical records referred to in point (a);

(i) all TSOs of a LFC block shall ensure that the negative reserve capacity on FRR or a combination of reserve capacity on FRR and RR is sufficient to cover the negative LFC block imbalances for at least 99 % of the time, based on the historical record referred to in point (a);

(j) all TSOs of a LFC block may reduce the positive reserve capacity on FRR of the LFC block resulting from the FRR dimensioning process by concluding a FRR sharing agreement with other LFC blocks in accordance with provisions in Title 8. The following requirements shall apply to that sharing agreement:

(i) for the CE and Nordic synchronous areas, 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 % of the time, based on the historical records referred to in point (a). The reduction of the positive reserve capacity shall not exceed 30 % of the size of the positive dimensioning incident;

(ii) for the GB and IE/NI synchronous areas, the positive reserve capacity on FRR and the risk of non-delivery due to sharing shall be assessed continually by the TSOs of the LFC block;

(k) all TSOs of a LFC block may reduce the negative reserve capacity on FRR of the LFC block, resulting from the FRR dimensioning process by concluding a FRR sharing agreement with other LFC blocks in accordance with the provisions of Title 8. The following requirements shall apply to that sharing agreement:

(i) for the CE and Nordic synchronous areas, 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 % of the time, based on the historical records referred to in point (a);

(ii) for the GB and IE/NI synchronous areas, the negative reserve capacity on FRR and the risk of non-delivery due to sharing shall be assessed continually by the TSOs of the LFC block.

3. All TSOs of a LFC block where the LFC block comprises more than one TSO shall set out, in the LFC block operational agreement, the specific allocation of responsibilities between the TSOs of the LFC areas for the implementation of the obligations established in paragraph 2.

4. All TSOs of a LFC block shall have sufficient reserve capacity on FRR at any time in accordance with the FRR dimensioning rules. The TSOs of a LFC block shall specify in the LFC block operational agreement an escalation procedure for cases of severe risk of insufficient reserve capacity on FRR in the LFC block.”

(3) Article 6(3)(e)(iv) of the SO Regulation states:

“The proposals for the following terms and conditions or methodologies shall be subject to approval by all regulatory authorities of the concerned region, on which a Member State may provide an opinion to the concerned regulatory authority: [...]

(e) methodologies and conditions included in the LFC block operational agreements in Article 119, concerning: [...]

(iv) the FRR dimensioning rules in accordance with Article 157(1);

2.2 Interpretation and scope of the Proposal

The SO Regulation requires NRA approval for the FRR dimensioning rules in accordance with Article 157(1). Article 157(1) requires that all TSOs of a LFC block shall set out FRR dimensioning rules in the LFC block operational agreement. Article 157(2) further specifies the minimum requirements to the FRR dimensioning rules. The TSOs therefore consider that Article 157(1) and (2) of the SO Regulation set out the scope for this Proposal. These articles can however not be seen completely separate from Article 152(1) which requires each TSO to operate its control area with sufficient upward and downward FRR, which may include shared and exchanged reserves, to face imbalances between demand and supply within its control area. In accordance with Article 157(1) and (2) of the SO Regulation, the scope of this Proposal shall include the dimensioning of both manual FRR (mFRR) and automatic FRR (aFRR) for the Nordic LFC Block. The result of the dimensioning are the required amounts of upward and downward mFRR and aFRR for the Nordic LFC Block, including the geographical distribution.

Article 157(2)(k) and (l) refer to reducing the result of the FRR dimensioning by sharing of FRR with other LFC blocks. The TSOs consider that this reduction will take place after FRR dimensioning and shall therefore

be outside the scope of this proposal. The conditions specified in article 157(2)(k) and (l) are taken into account in the TSOs' proposal for the methodology to determine limits on the amount of exchange of FRR between synchronous areas in accordance with article 118(1)(z) of the SO Regulation.

In accordance with article 157(2)(d) the 'reference incident' shall be determined. However, the determination of the 'reference incident' does not seem to be meaningful because it is not used anywhere else in article 157. It would be logical though to apply the determined 'reference incident' in article 157(2)(e) and (f) instead of the 'dimensioning incident' which is not referred to before. In this proposal the TSOs therefore interpret the term 'dimensioning incident' in article 157(2) as the 'reference incident' that shall be determined in accordance with article 157(2)(d).

Although Articles 119(1)(j)/157(3) and 119(1)(k)/157(4) require proposals that need to be included in the LFC block operational agreement, these proposals do not require NRA approval and are not part of the scope of this proposal. Similarly, outside the scope of this Proposal is how the TSOs of the Nordic LFC block will ensure that sufficient FRR will be available in practice as referred to in article 157(4) of the SO Regulation. Consequently, outside the scope of this proposal are issues like exchange of FRR, FRR sharing with TSOs in other LFC blocks, procurement, pricing, acceptance of bids, settlement and (other) issues regulated in the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (EBGL).

3. Objective of FRR dimensioning

The main purpose of FRR is restoring FRCE in the Nordic LFC block and consequently replace activations of FCR. mFRR can also be pro-actively activated to prevent for FRCE deviations, e.g. in case of (expected) deterministic frequency deviations. FRR shall be sufficiently available to maintain the FRCE quality, and to be within system security limits. The objective of FRR dimensioning is to determine a volume of aFRR and mFRR that shall be available in the Nordic LFC block. As the Nordic LFC block experiences frequent congestions in the grid, the dimensioning shall take the geographical requirements for distribution of FRR into account.

4. The existing situation

In this chapter, the existing FRR dimensioning rules are described. As aFRR is a process under development in the Nordics and the current total Nordic determined volume of aFRR is a fixed and limited volume (300 MW) in about 1/5 of the hours of the week, the current Nordic FRR dimensioning is strongly dominated by mFRR (at least 15 times the aFRR capacity). Section 4.1 describes mFRR dimensioning, while section 4.2 elaborates on aFRR.

4.1 mFRR dimensioning

mFRR shall exist in order to restore the faster reserves FCR-N, FCR-D and aFRR when these reserves have been activated and to control flows in the grid within applicable limits. mFRR can also be pro-actively activated to prevent for frequency deviations, e.g. in case of (expected) deterministic frequency deviations. The mFRR shall in normal operation exist and be localized to the extent that the synchronous system can be balanced at any time. mFRR is dimensioned by the individual TSOs based on their control area assessment of local requirements. Bottlenecks on the network, dimensioning faults and similar are included when assessing this.

The requirements for mFRR volumes in upward direction are currently defined by large national N-1 incidents: Each control area shall have mFRR volumes available equivalent to or greater than the dimensioning fault in the subsystem. The 'dimensioning fault' is defined as '*faults which entail the loss of individual major components (production units, lines, transformers, bus bars, consumption etc.) and entail the greatest impact upon the power system from all fault events that have been taken into account.*'

In addition, the TSOs must also have reserves or other measures available to handle other imbalances which are correlated with N-1 incidents or two or more simultaneous faults which may occur within the TSOs control area and on the borders to other control areas.

In practice, all four TSOs dimension the mFRR volumes for their control area and determine the required distribution within the control area. The mFRR volumes are based on the dimensioning fault in the control area, as described above. However, some mFRR capacity is shared between Sweden and Denmark. mFRR that shall be available for handling of ‘normal’ BRP imbalances are not explicitly dimensioned for in Denmark East, Finland and Sweden. For this, these TSOs rely on voluntary mFRR energy bids that are available in the Nordic Regulating Power market. Also Statnett relies on voluntary mFRR energy bids for most of the time. However, if the probability for availability of sufficient mFRR is too low, Statnett contracts upward mFRR. This is normally an issue in winter.

There are currently no explicit Nordic arrangements for dimensioning nor contracting of downwards mFRR since historically availability of downward mFRR bids have been sufficient. However, the TSOs see a trend that the amounts of downward mFRR bids are reducing and the need for capacity is increasing. Due to this, the Nordic TSOs will now establish arrangements to secure downward mFRR capacity.

4.2 aFRR dimensioning

aFRR was introduced in the Nordic synchronous area in January 2013. The background for implementing and developing aFRR in the Nordics was the deteriorating frequency quality and aFRR was identified and agreed as one of the main measures to stop the weakening of the frequency quality.

The aFRR product shall be seen as an automatic “complement” to mFRR in the Frequency Restoration process.

The Nordic LFC block centrally activates aFRR from a single Load Frequency Controller (LFC). Based on the measured frequency, this LFC calculates the required activation of aFRR and distributes the activation requests to the Nordic TSOs pro-rata. Consequently, each Nordic TSO distributes the requests to the contracted aFRR providers in its control area.

Currently, only procured aFRR capacity can be activated and therefore the complete dimensioned amount shall be procured. The TSOs procure aFRR in the morning and evening hours where the frequency variations are most challenging.

Each quarter of a year, all Nordic TSOs determine the hours for which aFRR shall be dimensioned. These hours include the hours where the frequency variations are most challenging.

The TSOs expect that future challenges will require more automated balancing. The Nordic TSOs will increase the number of aFRR contracting hours to all hours. After that, the aFRR volume will gradually be increased from today’s level of 300 MW to a tentative target volume of 600MW.

5. Proposal for FRR dimensioning rules

On a high level, the goal for the FRR dimensioning rules is to have access to sufficient FRR in the LFC block to handle imbalances in all LFC areas in at least 99% of time and respect the FRCE targets for the LFC block. In addition, each TSO is responsible for being able to handle potential disturbances in their LFC areas. Different measures may be used to handle disturbances, but each TSO shall have access to sufficient FRR to handle the Control area Reference Incident as a minimum.

The proposal reflects this goal as it will be applied in the new Nordic Balancing Model. Below, the articles in the proposal have been explained individually.

5.1 Article 2(2): Definitions

For the purpose of the Proposal, the TSOs distinguish two types of imbalances: normal imbalances (defined in section 5.1.1) and disturbances (defined in section 5.1.2). Article 2(2) provides the definitions.

5.1.1 Normal imbalances

Normal imbalances are the imbalances that continuously happen in power systems. They are caused by stochastic deviations in load and generation, deterministic events at given times (e.g. shifts of hours) and forecast errors. Usually, normal imbalances consist of many small and large imbalances which partly compensate for each other since they are in the opposite direction. The aggregated normal imbalances changes continuously and result in a frequency deviation. The challenge for the TSO is to keep the frequency within the standard frequency range (± 100 mHz).

5.1.2 Disturbances

Imbalances can be caused by disturbances including faults in single power generating module, single demand facility, single HVDC interconnector or from a tripping of an AC line. Different from normal imbalances, these trips happen occasionally and result in an instantaneous (within seconds) imbalance. Disturbances therefore result in an instantaneous frequency deviation, and may result in a frequency outside the standard frequency range. In these situations, the TSOs shall restore the frequency to the frequency restoration range (± 100 mHz) within time to restore frequency (15 minutes).

5.1.3 Reference incident

Article 3(1)(58) of the SO Regulation defines the term reference incident as “*the maximum positive or negative power deviation occurring instantaneously between generation and demand in a synchronous area, considered in the FCR dimensioning*”. In a Nordic terminology this is the maximum N-1 disturbance in the LFC block that can occur in the time period for which the FRR dimensioning applies.

5.1.4 Dimensioning incident

Article 3(1)(109) of the SO Regulation defines the term dimensioning incident as “*the highest expected instantaneously occurring active power imbalance within a LFC block in both positive and negative direction*”. In a Nordic terminology this would be the maximum imbalance for LFC Block, regardless of what is the cause(s) of the imbalance. This definition must not be mixed up with the term dimensioning fault (see section 4.1) which more resembles the new term reference incident.

5.2 Article 3: FRR dimensioning for the LFC block

The rules in this Proposal will result in the dimensioning of the products that are defined in paragraph 1. All together, the ratio of aFRR and mFRR as referred to in article 157(2)(c) results from these individual components, as explained in paragraph 2 of this article. The rules on the determination of this ratio are implicitly explained in article 6(5), 6(6) and 7(7).

Paragraph 4 of this article describes the general objective of FRR dimensioning which tries to find the optimal balance between efficiency and security of supply. I.e. the amount of FRR shall be sufficient to meet the rules that ensure a sufficient level of security of supply, but not more than that. The dimensioning shall have the objective to minimise the total amount of reserve capacity on FRR for the LFC block, within the geographical constraints (see Textbox 1) and without breaching the rules referred to in paragraph 4.

Textbox 1: FRR dimensioning in constrained Nordic LFC block

The Nordic LFC block consists of 11 LFC areas which are equal to the 11 bidding zones. Since cross zonal capacity (CZC) is limited, day-ahead and intraday trading between the LFC areas/bidding zones is only possible up to a certain limit. The CZC that is used by the day-ahead and intraday markets, cannot be used by FRR. Consequently, in case of these constraints in the Nordic system, TSOs shall make sure that FRR shall be distributed to the LFC areas in a way that supports FRR activation without breaching these constraints. In order to safeguard these conditions, the TSOs start the FRR dimensioning process by determining the required FRR for each LFC area. Based on the available grid capacity, the TSOs will accordingly share reserves and/or aggregate the requirements to the required amount for the LFC block.

5.3 Article 4: Input to FRR dimensioning methodology

FRR dimensioning of the LFC block shall take into account the constrained Nordic LFC block and therefore also the FRR dimensioning per LFC area shall be considered. This is further clarified in Textbox 1. Consequently, the input that is specified in paragraph 1(a)-(e) includes both data for the LFC block and for the LFC area. Historical imbalances (paragraph 1(a)-(b)), are calculated as the difference between the schedules and the measurements, corrected for the activation of reserves.

5.4 Article 5 – Rules for dimensioning the total amount of reserve capacity on FRR for the LFC block

FRR dimensioning will in principle take place separately for FRR for normal imbalances (see section 5.5) and FRR for disturbances (see section 5.6). However, article 157(2)(b),(h) and (i) of the SO Regulation include several requirements that can only be applied to the total amount of reserve capacity on FRR. These requirements shall be taken into account by the TSOs in the dimensioning process and are included in article 5.

Paragraph 3 refers to the FRCE target parameters for the LFC block which are defined in the synchronous area operational agreement. For the determination of these FRCE target parameters (which is not part of this Proposal), the TSO take into consideration that the Nordic LFC block is in principle the same as the Nordic synchronous area. Consequently, the quality criteria should not be different. The FRCE target parameters therefore mirror the frequency quality target parameter that has been proposed in the frequency quality proposal¹.

Paragraphs 4(a)-(c) refer to the conditions in the second and third sentence article 157(2)(b) which have been literally taken into account in the FRR dimensioning rules.

5.5 Article 6 – Rules for dimensioning FRR for normal imbalances

As explained in Textbox 1, FRR dimensioning shall take the constraints between the LFC areas into account and therefore also consider the dimensioning of the LFC areas separately. Accordingly, paragraph 2 and 4 include a number of rules related to the FRR requirements for LFC areas. Constraints will be taken into account by considering both historical data on free transmission capacity and information on known outages in future. This should provide the best indication of the probability that sufficient transmission capacity will be available. In addition, possible transmission capacity withheld from the market for exchange of FRR (such as for the Nordic FRR capacity market) shall be taken into account.

Paragraphs 2(a) and 4(a) refer to a target that shall be subject to a regular evaluation, that will take place at least once a year. If the target would have been fixed in the Proposal, FRR dimensioning could result in either over dimensioning or insufficient FRR to safeguard security of supply. A regular evaluation addresses these issues by applying the evaluation criteria as discussed in Textbox 2.

¹ “Nordic synchronous area proposal for the frequency quality defining parameters and the frequency quality target parameter in accordance with Article 127 of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation”, dated 10 September 2018.

Textbox 2: Evaluation criteria for dimensioning

The dimensioning process will be regularly evaluated and possibly adjusted based on experiences from real time operation. Relevant evaluation criteria may include:

- a) Saturation of aFRR;
- b) Access to resources for Reference Incidents for each LFC area;
- c) Statistics for time with flows exceeding TTC on lines/cuts between LFC areas;
- d) Yearly frequency quality target, distributed per quarter or shorter (related to seasonal variations in inertia) ;
- e) FRCE target levels (ACE quality target levels);
- f) Unnecessary large volumes of unused FRR capacity;
- g) Costs for capacity procurement over time.

Paragraph 5 explains the rules for the minimum reserve capacity on automatic FRR for normal imbalances per LFC area which will be based on the short-term imbalance per LFC area (see Textbox 3 for the definition). These short-term imbalances represent the nature of the imbalances that are to be handled by aFRR. The required minimum volumes of aFRR shall be based on an appropriate confidence interval on the probability distribution of the short-term imbalances. This will result in individual volumes for each LFC area based on its particular challenges. This feels natural as fractions of the total imbalances are considered.

Textbox 3: Definition of short-term imbalance

Short-term imbalances represent imbalances that are intended to be handled with automatic FRR. The determination of short-term imbalances shall take into account the automatic FRR and the manual FRR full activation times. The short-term imbalances are extracted/calculated after the netting/aggregation process is performed.

It shall be noted that FRR for normal imbalances is "implicitly shared" between TSOs of the LFC block in the optimisation process for dimensioning and cannot be shared further.

5.6 Article 7 – Rules for dimensioning FRR for disturbances

Similar to what is discussed in the previous section and Textbox 1, also dimensioning FRR for disturbances in the Nordic LFC block requires that congestion shall be taken into account. To safeguard this, paragraph 2 and 5 specify the initial requirement for FRR dimensioning for disturbances on a control area level.

The choice for dimensioning FRR for disturbances per 'control area' relates to the requirement in article 152(1) of the SO Regulation that states that *'each TSO shall operate its control area with sufficient upward and downward active power reserve, which may include shared or exchanged reserves, to face imbalances between demand and supply within its control area [...]'*. TSOs operating more than one LFC area will further make sure that each of their LFC areas has access to sufficient FRR for disturbances to cover the reference incidents for all LFC areas individually.

This first sentence of article 7(2) states that *'the required capacity on positive FRR for disturbances shall cover at least the positive reference incident for the control area'*. This does not mean that the control area shall be self-sufficient or that the reserves shall be located in the control area itself. However, the TSO shall make sure that the control area has sufficient access to FRR to cover the requirement for its control area. Sharing of FRR with other control areas is one of the possibilities to achieve this. Article 7(3) explains that sharing between control areas will reduce the required FRR for the LFC block.

Since disturbances only require occasional FRR activation and it is unlikely that disturbances take place at the same time, it may well be feasible to share FRR for disturbances over more than one area. This is described in paragraph 3 and 6, including the rules for sharing. Sharing of FRR requires the availability of free

transmission capacity. The availability of free transmission capacity will be assessed by considering both historical data on free transmission capacity and information on known outages in future. This should provide the best indication of the probability that border capacity is available for sharing.

As bigger disturbances will occur rarely compared to normal imbalances, and FRCE in these cases shall be restored within Time to restore frequency, it is not necessary to dimension automatic FRR for this purpose but this part of total FRR volume can be covered by manual FRR. For this reason, paragraph 7 indicates that the minimum reserve capacity on automatic FRR for disturbances per control area / LFC areas is 0 MW.

5.7 Article 8 – Process for FRR dimensioning

Based on the rules in the Proposal, the TSOs develop the detailed FRR dimensioning methodology which will be regularly evaluated and updated as shown in article 8 and illustrated by Figure 1. In this article, the process of FRR dimensioning – together with provisioning and operation – includes a continuous optimisation cycle based on regular evaluations. This will allow improving the detailed FRR dimensioning methodology continuously, which will be essential considering the near future changes in the Nordic LFC block including (but not limited to) the implementation of the New Nordic Balancing Model, the introduction of the 15 minute ISP, new HVDC interconnectors and more intermittent generation. The TSOs can only respond swiftly if the TSOs have sufficient flexibility in improving their methodologies. Including a detailed methodology in the proposal would therefore not be preferable. Because the detailed methodology shall be compliant with the rules in the Proposal, the objectives and the requirements for the methodology are safeguarded.

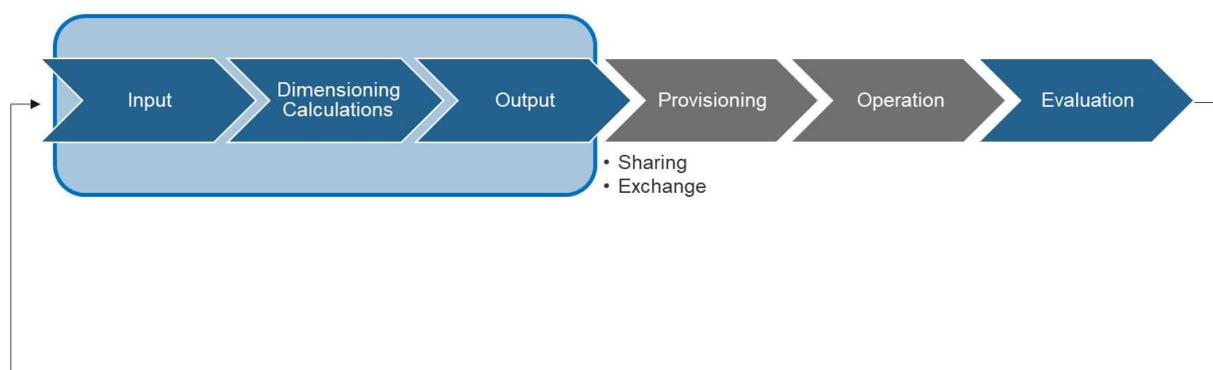


Figure 1: FRR process overview

6. Expected impact of the Proposal on the relevant objectives of the SO Regulation

The Proposal generally contributes to and does not in any way hamper the achievement of the objectives of Article 4 of the SO Regulation. In particular, the Proposal serves the objectives to:

- Article 4(1)(c) determining common load-frequency control processes and control structures;
- Article 4(1)(d) ensuring the conditions for maintaining operational security throughout the Union;
- Article 4(1)(e) ensuring the conditions for maintaining a frequency quality level of all synchronous areas throughout the Union; and

The Proposal contributes to these objectives by specifying the dimensioning rules for mFRR and aFRR, which are key reserves that are used in the common Nordic load-frequency control processes. Sufficient mFRR and aFRR guarantee the right FRCE and frequency quality level and consequently maintain the operational

security by reducing the risk for automatic Under Frequency Load Shedding (UFLS), automatic reduction of generation and for system blackouts due to under or over frequency.

7. Timescale for the implementation

The implementation of the FRR dimensioning rules will be one task within the Nordic Balancing Model project and will consist of many sub tasks including IT development, implementation in control centres and education. One important precondition for the implementation is that sufficient input data needs to be available that reflects the situation for which the FRR dimensioning rules will be used. Since the current situation will change from balancing the entire LFC block collectively to balancing each LFC area individually, the situation changes significantly. For this reason, the FRR dimensioning rules can only be fully implemented after the implementation of the new balancing concept per LFC area.

A dedicated website for this project² explains and shows the high level roadmap of the Nordic Balancing Model project. According to this roadmap, FRR dimensioning is scheduled to be implemented in the second half of 2021. Consequently, the TSOs included in article 8 that the dimensioning rules for FRR shall be implemented by 2022.

The TSOs will start with implementing the long-term FRR dimensioning process based on the rules that are specified in this proposal. It is anticipated that the TSOs will implement also a short-term process (e.g. on d-2).

8. Public consultation, transparency and stakeholder involvement

Article 11 of the SO Regulation states that: *“TSOs responsible for submitting proposals for terms and conditions or methodologies or their amendments in accordance with this Regulation shall consult stakeholders, including the relevant authorities of each Member State, on the draft proposals for terms and conditions or methodologies listed in Article 6(2) and (3). The consultation shall last for a period of not less than one month.”*

Although this requirement is not applicable to this amended Proposal, the TSOs consider the significant changes and the importance of this topic a good reason to invite their stakeholders for sharing their views. For this reason, the TSOs publish the Proposal for consultation from 1 April 2019 to 1 May 2019. The TSOs received four responses. Appendix 1 includes their individual comments. The appendix also includes if and how the response is taken into account.

The TSOs currently develop the new Nordic Balancing Model, including the detailed methodology for dimensioning FRR. In this process, the TSOs very much welcome stakeholders' views. The TSOs inform and involve stakeholders via a dedicated website for this project², webinars, presentations and consultations.

² <http://nordicbalancingmodel.net>