Amended Nordic synchronous area methodology for the dimensioning rules for FCR in accordance with Article 153 of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

3 Feb 2023

All TSOs of the Nordic synchronous area, taking into account the following:

Whereas

(1) This document is the common methodology developed by all Transmission System Operators within the Nordic synchronous area (hereafter referred to as "**TSOs**") for the dimensioning rules for FCR in accordance with Article 153 of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as "**SO Regulation**"). This methodology is hereafter referred to as "**Methodology**". The Methodology is an amended version of the methodology dated 10 September 2018 that was approved by the Nordic regulators in March 2019.

(2) This Methodology is subject to approval in accordance with Article 6(3) of the SO Regulation.

(3) The Methodology takes into account the general principles and goals set in SO Regulation as well as Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (hereafter referred to as "Regulation (EU) No 2019/943"). The goal of the SO Regulation and Regulation (EU) No 2019/943 is the safeguarding of operational security, frequency quality and the efficient use of the interconnected system and resources. Article 118(1)(a) of the SO Regulation sets for this purpose requirements for the TSOs to "*jointly develop common proposals for: […] the dimensioning rules for FCR in accordance with Article 153;"*

(4) Article 153(2) of the SO Regulation describes the scope of this Methodology:
"2. All TSOs of each synchronous area shall specify dimensioning rules in the synchronous area operational agreement [..]". Article 153(1) of the SO Regulation stipulates how these dimensioning rules shall be applied: *"1. All TSOs of each synchronous area shall determine, at least annually, the reserve capacity for FCR required for the synchronous area and the initial FCR obligation of each TSO in accordance with paragraph 2".*

(5) Article 153(2) of the SO Regulation further states that the "*dimensioning rules"* shall be specified "*in accordance with the following criteria:*
(a) the reserve capacity for FCR required for the synchronous area shall cover at least the reference incident and [..] the results of the probabilistic dimensioning approach for FCR carried out pursuant to point (c);
(b) the size of the reference incident shall be determined in accordance with the following conditions:
[..]
(ii) [..] the reference incident shall be the largest imbalance that may result from an instantaneous change of active power such as that of a single power generating module, single demand facility, or single HVDC interconnector or from a tripping of an AC line, or it shall be the maximum instantaneous loss of active power consumption due to the tripping of one or two connection points. The reference incident shall be determined separately for positive and negative direction;
(c) for the CE and Nordic synchronous areas, all TSOs of the synchronous area shall have the right to define a probabilistic dimensioning approach for FCR taking into account the pattern of load, generation and inertia, including synthetic inertia as well as the available means to deploy minimum inertia in real-time in accordance with the methodology referred to in Article 39, with the aim of reducing the probability of insufficient FCR to below or equal to once in 20 years; and

(d) the shares of the reserve capacity on FCR required for each TSO as initial FCR obligation shall be based on the sum of the net generation and consumption of its control area divided by the sum of net generation and consumption of the synchronous area over a period of 1 year.

(6) The TSOs concluded that *"the maximum instantaneous loss of active power consumption due to the tripping of [..] two connection points"* that is suggested in Article 153(2)(b)(ii) of the SO Regulation shall not set the 'reference incident' for the Nordic synchronous area. The reason for this is that the TSOs do not consider the probability for two simultaneous outages of demand facilities significant.

(7) In addition to the types of *'instantaneous change of active power'* that may set the reference incident as suggested by Article 153(2)(b)(ii) of the SO Regulation, the TSOs consider that tripping of one busbar may be evaluated as a reasonable N-1 disturbance. This may be relevant during especially longer outages on a busbar.

(8) The Nordic Frequency Containment Process (FCP) applies two types of Frequency Containment Reserves (FCR). FCR for normal operation (FCR-N) is used for continuous imbalances to keep the frequency within the ± 100mHz range. For this reason, the purpose of FCR-N is not to mitigate the consequences of a disturbance such as a reference incident. The purpose of FCR-D is to mitigate the impact of incidental disturbances, including the reference incident. The criteria that are specified in Article 153(2)(a)-(c) of the SO Regulation refer to (reference) incidents and can therefore only be applied to FCR-D. With respect to the dimensioning rules for FCR, the scope of this Methodology shall therefore be limited to the dimensioning rules for FCR-D.

(9) Article 153(2)(d) of the SO Regulation about the initial distribution of FCR does not make an explicit differentiation between FCR-N and FCR-D. However, in contradiction to Article 153(2)(a)-(c), Article 153(2)(d) can be applied to both FCR-N and FCR-D. The TSOs therefore consider Article 153(2)(d) of the SO Regulation applicable to both FCR-N and FCR-D.

(10) The Nordic Methodology for additional properties of FCR in accordance with Article 154(2) of the SO regulation in general requires that the response from FCR-N and/or FCR-D providing units and groups shall be dynamic and continuously follow the changes in the system frequency. The Methodology for additional properties of FCR however allow for a limited amount of FCR-D with only a static response. This Methodology contains additional rules for the minimum dimensioning of Dynamic FCR-D.

(11) The TSOs have discussed a probabilistic methodology that can be used for a probabilistic dimensioning approach for FCR-D as mentioned in Article 153(2) of the SO Regulation. The TSOs decided on not using this methodology at the moment because the process for how to translate a certain risk level, inertia level and actual probability for incidents and other inputs to suitable measures, including FCR-D dimensioning needs to be further defined. For this reason, the TSOs do not use *"the right to define a probabilistic dimensioning approach for FCR"* in accordance with Article 153(2)(c) of the SO Regulation.

(12) In regard to regulatory approval, Article 6(3) 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: […]

(d) methodologies, conditions and values included in the synchronous area operational agreements in Article 118 concerning:
(ii) the dimensioning rules for FCR in accordance with Article 153;

(13) According to Article 6(6) of the SO Regulation the expected impact of the Methodology on the objectives of the SO Regulation has to be described and is presented below.

(14) The Methodology 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 Methodology serves the objectives to (1)(c) determining common load-frequency control processes and control structures, (1)(d) ensuring the conditions for maintaining operational security throughout the Union, (1)(e) ensuring the conditions for maintaining a frequency quality level of all synchronous areas throughout the Union and (1)(h) contributing to the efficient operation and development of the electricity transmission system and electricity sector in the Union. The Methodology contributes to these objectives by specifying the dimensioning rules for FCR-D, which is one of the key reserves that is used in the common Nordic load-frequency control processes. Sufficient FCR-D guarantees the operational security by reducing the risk for automatic Low Frequency Demand Disconnection (LFDD), automatic reduction of generation and for system blackouts due to under or over frequency. The dimensioning rules balance the impact of both cost for FCR-D and outage risk and therefore ensure efficient operation of the electricity transmission system.

(15) The TSOs together operate the Nordic synchronous system. Consequently, the TSOs and all the power consumers, generators, balance service providers and networks directly or indirectly connected to the TSOs' networks, influence the frequency quality level and experience the same frequency level. The dimensioning of FCR-D in this Methodology has been analysed, discussed and agreed by the TSOs and will only be effective if all providers of FCR-D will provide the contracted amounts in accordance with their specifications.

(16) In conclusion, the Methodology contributes to the general objectives of the SO Regulation to the benefit of all market participants and electricity end consumers.

SUBMIT THE FOLLOWING AMENDED METHODOLOGY FOR THE DIMENSIONING RULES FOR FCR TO ALL REGULATORY AUTHORITIES OF THE NORDIC SYNCHRONOUS AREA:

Article 1 - Subject matter and scope

1. The dimensioning rules for FCR described in this Methodology are the common methodology of TSOs in accordance with article 153 of the SO Regulation. The Methodology applies solely to the Nordic synchronous area.

   The Nordic synchronous area covers transmission systems of East-Denmark (DK2), Finland, Sweden and Norway.

   This Methodology has been developed by Energinet, Fingrid Oyj, Kraftnät Åland AB, Svenska kraftnät and Statnett SF.

2. The Methodology covers the dimensioning of FCR for the Nordic synchronous area (only) and shall be applied by the Nordic TSOs (only).

Article 2 - Definitions and interpretation

1. For the purposes of the Methodology, the terms used shall have the meaning of the definitions included in Article 3 of the SO Regulation.

2. For the purposes of this Methodology, the definitions in the methodology for additional properties of FCR in accordance with Article 154(2) of the SO regulation shall apply, regarding FCR-N, and static and dynamic FCR-D.

3. In this Methodology, unless the context requires otherwise:
   a. the singular indicates the plural and vice versa;
   b. the headings are inserted for convenience only and do not affect the interpretation of the Methodology; and
   c. any reference to legislation, regulations, directives, orders, instruments, codes or any other enactment shall include any modification, extension or re-enactment of it when in force.

Article 3 – Dimensioning rules for FCR-D

1. Following the dimensioning rules in this article, the Nordic TSOs will dimension FCR-D daily, separately for FCR-D upwards and FCR-D downwards.

2. The input to the dimensioning process of FCR-D shall be:
   a. Planned network topology, considering maintenance of relevant network components;
   b. Estimated (gross) generation of large generation modules;
   c. Estimated demand of large connected consumers;
   d. Estimated flows on HVDC interconnectors;

3. The total reserve capacity for FCR-D upwards required for the Nordic synchronous area shall be dimensioned to be at least equal to the imbalance caused by the reference incident in the negative direction. Dynamic FCR-D upwards shall make up at least a certain share of the system level FCR-D upwards response. The share shall be determined based on the dynamic properties of the power system, mainly system inertia. The share shall be reviewed at least annually.

4. The total reserve capacity for FCR-D downwards required for the Nordic synchronous area shall be dimensioned to be at least equal to the imbalance caused by the reference incident in the positive direction. Dynamic FCR-D downwards shall make up at least a certain share of the system level FCR-D downwards response. The share shall be determined based on the dynamic properties of the power system, mainly the system inertia. The share shall be reviewed at least annually.

5. The reference incident shall be defined as the largest imbalance that may result from an instantaneous change of active power of:
    a. *A single power generating module;*
    b. *A single demand facility;*
    c. *A single HVDC interconnector;*
    d. *Tripping of an AC-line:* This may result in i) system protection scheme (SPS) activation which may trip one or more power generating units or ii) loss of a regional part of the system.
    e. A single failure on a busbar tripping more than one generation module or demand facility.

6. The imbalance volume of the 'instantaneous change of active power' mentioned in item 5 of this article shall be determined by the net loss of active power as seen from the grid. I.e., it should be taken into account that auxiliary load of the generation module may still consume power in the case that the unit generator breaker is tripped. Furthermore, the imbalance volume of the reference incident is determined by the maximum production, import, consumption or export that has been scheduled for the period for which the reference incident is determined.

Article 4 – Calculation of the initial distribution per TSO

1. In accordance with article 153(2)(d) of the SO Regulation, FCR-D and FCR-N shall be distributed to the TSOs pro-rata to the shares defined below.
2. The inputs to the calculation of the initial distribution are:
    a. net generation per control area for calendar year *y-2* in which the net generation of a unit is defined as the gross power generation minus the internal auxiliary power consumption of the unit;
    b. net consumption per control area for calendar year *y-2* in which 'net' means that the consumption of power plants' auxiliaries is excluded, but network losses are included.
3. The shares of the reserve capacity on FCR required for each TSO as initial FCR obligation shall be based on the sum of the net generation and consumption of its control area divided by the sum of net generation and consumption of the synchronous area over a period of one year.
4. The shares shall be revised each year before 1 October of year *y-1* and the new shares will enter into force on 1 January of year *y*.

Article 5 – Publication and implementation

1. The relevant TSOs shall publish (in accordance with Article 8 of the SO Regulation) the Methodology without undue delay after the competent NRAs have approved the Methodology or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 6 of the SO Regulation.

2. The TSOs have already implemented the dimensioning rules for FCR-D (article 3 of this Methodology) and the rules for the initial distribution of FCR (article 4 of this Methodology), apart from the requirements on Dynamic FCR-D volumes in article 3. The dimensioning rules of Dynamic FCR-D shall be implemented no later than 2.5 years after the approval of this Methodology.

Article 6 - Language

The reference language for this Methodology shall be English. For the avoidance of doubt, where the TSOs needs to translate this Methodology into national language(s), in the event of inconsistencies between the English version published by TSOs in Nordic Synchronous Area in accordance with Article 8(1) of the SO Regulation and any version in another language the relevant TSOs shall, in accordance with national legislation, provide the relevant national regulatory authority with an updated translation of the Methodology.