

Nordic System Operation Agreement (SOA) – Annex Electricity Balancing (EB)



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V1	4/03/2020	4/03/2020	SOA Annex Electricity Balancing (EB) – Initial version
V2	27/4/2023	27/4/2023	Inclusion of Nordic aFRR CM, updated terminology
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1 Introduction

1.1 Interaction with other Agreements

This Annex is part of the Nordic System Operation Agreement (SOA). This Annex makes references to the requirements set up in:

- Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (hereinafter referred to as "EBGL");
- Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereinafter referred to as "SOGL").
- Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereinafter referred to as "CACM").

The Parties have signed the Cooperation Agreement – Nordic balancing cooperation of 8 March 2018 establishing a basis for the LFC structure (as required by SOGL art 141(2)) and for the future cooperation on design, development and operation of balancing in the Nordic region.

The Parties have also signed bilateral settlement agreements regulating among other procedures for settlement.

1.2 Background

EBGL establishes an EU-wide set of technical, operational and market rules to govern the functioning of electricity balancing markets. It sets out rules for the procurement of balancing capacity, the activation of balancing energy and the financial settlement of balance responsible parties. It also requires the development of harmonised methodologies for the allocation of cross-zonal transmission capacity for balancing purposes. Such rules will increase the liquidity of short-term markets by allowing for more cross-border trade and for a more efficient use of the existing grid for the purposes of balancing energy. As balancing energy bids will compete on EU-wide balancing platforms, it will also have positive effects on competition.

EBGL, whereas (5)

EBGL pursues the objective of ensuring the optimal management and coordinated operation of the European electricity transmission system, while supporting the achievement of the Union's targets for penetration of renewable generation, as well as providing benefits for customers. TSOs, working with DSOs where relevant, should be responsible for organising European balancing markets and should strive for their integration, keeping the system in balance in the most efficient manner. To do so, TSOs should work in close cooperation with one another and with DSOs, coordinating their activities as much as possible to deliver an efficient electricity system, across all regions and voltage levels, without prejudice to competition law.

EBGL, whereas (6)

EBGL has a close relationship with SOGL part IV on Load-Frequency Control and Reserves (hereinafter referred to as "LFCR") which aims at setting out clear, objective and harmonised requirements for TSOs, reserve connecting DSOs, providers' power generating modules and providers' demand facilities in order to ensure system security and to contribute to non-discrimination, effective competition and the efficient functioning of the internal electricity market. The provisions on LFC and reserves provide the technical framework necessary for the development of cross-border balancing markets.

EBGL also has a relation to CACM, where CACM regulates the area of cost sharing for countertrade and redispatch, in case of use of balancing energy bids for such purposes. This is covered by chapter 6 in the CACM Annex to the SOA.

Since EBGL strives for European integration of balancing markets, many methodologies need to be agreed between all European TSOs.

1.3 This Annex

In this Annex the Nordic TSOs agree upon the main principles and requirements on electricity balancing. This Annex includes the Nordic methodologies related to electricity balancing with the focus on balancing market related issues, or references to NRA approved methodologies. There is a link between this Annex and the LFCR and CACM Annexes to the SOA.

In addition, this Annex refers to the methodologies required by the EBGL on a European and Nordic level. The purpose of the included references is purely for information.

The principles and requirements on electricity balancing, as set out in this Annex, shall be detailed in Nordic Operational instructions. These Operational instructions shall align with this Annex while providing practical guidance for day-to-day use by the TSOs. Consequently, by this Annex the Nordic TSOs will agree on the high-level principles and requirements only.

Terms and Conditions and Methodologies required by the EBGL on a national level are not included in this Annex since they are part of national legislation.

Bilateral or multilateral agreements between TSOs on sharing and exchange of reserves are covered by the SOA annex Load Frequency and Control. See also the LFCR annex chapter 7.4 for relations between capacity markets and dimensioning of FRR.

Descriptions of FRR capacity markets are handled in methodologies for the Nordic aFRR capacity market and the trilateral mFRR capacity market. Norway is not part of the trilateral mFRR capacity market.

1.4 Geographic area

The geographical area to which the SOA/EB annex applies is the Nordic Synchronous area for aFRR and the interconnected Nordic power system for mFRR. It is noted that Western Denmark (hereafter: DK1) is not part of the Nordic Synchronous area while DK1 is included in the interconnected Nordic power system.

1.5 Structure of this Annex

This Annex includes the Nordic methodologies that relate to electricity balancing in chapter 3 and an overview of the European methodologies in chapter 4.

1.6 Definitions

For the purpose of this Annex, the terms used shall have the meaning of the definitions included in Article 2 of EBGL, Article 3 of SOGL and the other items of legislation referenced therein. In addition, the following definitions are applied in this Annex:

- *'activation for balancing purpose' see definition in article 3(2) of the activation purpose methodology in accordance with EB GL article 29(3).*
- *'activation for system constraints' see definition in article 3(3) of the activation purpose methodology in accordance with EB GL article 29(3).*
- *'agreed supportive power' means an agreed change to earlier plans for energy exchange on interconnections between TSOs.*
- *'intended exchange mFRR SA' means volumes cleared by the AOF for exchange between bidding zones.*
- *'mFRR balancing energy price' means marginal price for activation of balancing energy bids according to common or local merit order lists, defined for both upward and downward direction.*
- *'pricing period' means the time period (e.g. hour or quarter) for which the mFRR prices and uncongested areas are defined.*
- *'scheduled commercial exchange' means a resulting electricity transfer from the day-ahead and intraday energy markets between bidding zones for each market time unit.*
- *'uncongested area' consisting of one or more bidding zones with the same mFRR price for a given pricing period. The mFRR price will be the same across bidding zones if there is no physical or market based congestion on borders between the relevant bidding zones in the specific pricing period.*

2 Roles and responsibilities

The roles and responsibilities with respect to electricity balancing in the Nordic system are detailed in the LFCR Annex to the SOA, and in the Agreement for operation of common service aFRR Capacity Market, and the Agreement for operation of common service mFRR Capacity Market.

3 Nordic TSOs methodologies

3.1 Nordic Balancing and pricing principles

The TSOs balance their LFC block with manual Frequency Restoration Reserves (mFRR), automatic Frequency Restoration Reserves (aFRR) and Frequency Containment Reserves (FCR).

For mFRR, each TSO receives mFRR balancing energy bids in their control area. A common merit order list of mFRR balancing energy bids for scheduled activation for each 15 min is compiled, in the order of price, containing bids from both the Nordic synchronous area and DK1.

During the operation, activation of mFRR is carried out for system constraints and to balance the bidding zones in the interconnected Nordic area. Activation carried out for system constraints can take place on one or both sides of a congestion.

The aFRR product shall be seen as an automatic and faster complement to mFRR in the frequency restoration process and will only be used for frequency control in the Nordic synchronous area until all Nordic TSOs have connected to the European activation platforms. Each TSO procures aFRR reserve capacity in accordance with the amount of aFRR resulting from the aFRR dimensioning process in accordance with the rules in chapter 7 of the LFCR annex. In December 2022 a Nordic aFRR capacity market was implemented and all the TSOs procure their share of the agreed Nordic aFRR capacity in the market in accordance with the harmonised rules described in the methodology on aFRR capacity market referred to in section 3.3.

The FCR products are used for automatic frequency control in the frequency containment process. Each TSO procures FCR reserve capacity in accordance with the amount of FCR resulting from the FCR dimensioning process in accordance with the rules in chapter 6 of the LFCR annex.

Balancing energy, as a net result of BRP imbalances, the Frequency Containment Process and the Frequency Restoration Process, will be exchanged between the bidding zones within the Nordic synchronous areas as long as this does not cause congestions between bidding zones or other unacceptable conditions for the adjacent areas. Exchange of mFRR for scheduled activation in the interconnected Nordic area is a result of bid selection in a common automatic optimisation function named Nordic Libra. A planned flow of mFRR for scheduled activation per bidding zone border is determined.

3.1.1 Balancing and frequency control

The Nordic TSOs cooperate in balancing through the process of scheduled activation by netting imbalances and utilizing the most efficient balancing resources i.e. using available mFRR balancing energy bids in price order on the common Nordic merit order list. Each TSO defines the mFRR demand of its own bidding zones.

Activation of mFRR is carried out for every 15 min as scheduled or at any time as direct activation. Scheduled activation is a common Nordic process applying only standard products and is used pro-actively based on forecasted imbalance. Direct activation is a national process applying also non-standard products and is used re-actively following unexpected events or needs for balancing.

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 to the TSOs' shares. Consequently, each Nordic TSO distributes the requests to the contracted aFRR providers in its control area.

For each pricing period, the mFRR balancing energy prices (up and down) are determined for all bidding zones. The mFRR balancing energy prices are set at the marginal price of activated mFRR balancing energy bids in either common merit order list or national merit order list. When physical or market-based congestion do not occur (i.e. if there is only one uncongested area), the prices in all bidding zones will be equal. In case of direct activation or fallback (market-based congestions), prices will be set by national bid selections only. In case of no activation of mFRR in one or both directions, the respective mFRR price is set to the day-ahead price of the bidding zone. The methods to define balancing energy prices for aFRR are defined nationally.

The pricing period for mFRR balancing energy prices is 60 min before the introduction of cross-border intraday trade with 15 min products, when it is changed to 15 min.

All activations respecting merit order regardless of activation purpose may set the mFRR prices.

3.1.2 Activation for system constraints

For activations for system constraint reasons due to internal constraints within a bidding zone, bids are used in the control areas which rectify the network problem.

Bids chosen for a specific location will not set the mFRR prices.

3.1.3 Exchange of mFRR balancing energy with TSOs outside the common mFRR activation market

Bids can be traded from a power system outside the common Nordic mFRR activation market to support or balance any Nordic bidding zone.

Bids can be activated in Nordic Libra or in local activation markets to support or balance a power system outside the common Nordic mFRR activation market. Such activations respecting merit order may set the mFRR prices.

3.2 Pricing of energy exchanged between TSOs

3.2.1 Exchange of mFRR for scheduled activation between TSOs within the Nordic synchronous area

The volume of mFRR for scheduled activation between TSOs within the Nordic synchronous area will be settled through the FSKAR settlement at the mid-price of the mFRR prices in the dominating direction

3.2.2 Exchange of mFRR for scheduled activation between the Nordic synchronous area and DK1

The volume of mFRR for scheduled activation between TSOs between the Nordic synchronous area and DK1 will be settled as a separate TSO-TSO product (intended exchange mFRR SA) at the mid-price of the mFRR prices in the dominating direction.

3.2.3 Settlement of unintended exchange, FCR and ramping (FSKAR) in the Nordic synchronous area

This settlement is regulated by the common Nordic methodology in accordance with EB GL 50(3) and 51(1).

3.2.4 Settlement of unintended exchange, FCR and ramping (FSKAR) between the Nordic synchronous area and DK1

This settlement is regulated by the common methodologies for all asynchronously connected TSOs in accordance with EB GL 50(4) and 51(2).

3.2.5 Pricing of Agreed supportive power within the Nordic synchronous area and between the Nordic synchronous area and DK1

There are three categories of Agreed supportive power (ASP) between the Nordic TSOs:

- Balance (support for balancing needs)
- Special (support for system or grid constraints of a given TSO)
- Disturbance (support for common grid constraints)

ASP Balance will be priced to ensure at least cost coverage for the supporting TSO.

ASP Special will be priced based on cost coverage for the supporting TSO in accordance with the methodology given by CACM article 74.

ASP Disturbance will be priced based on cost sharing between the TSOs in accordance with the methodology given by CACM article 74.

The TSOs have agreed that the mFRR price in dominating direction can be used as a reference price in the settlement of ASP.

3.2.6 Pricing of Fallback level 1 within the Nordic synchronous area and between the Nordic synchronous area and DK1

The Nordic TSOs have agreed to an automatic fallback solution to Nordic Libra, so-called fallback level 1.

Exchange in fallback level 1 will be priced and settled in the same way as mFRR for scheduled activation in accordance with chapter 3.2.1 and 3.2.2 above.

3.2.7 Predefined loop flows

In the event of congestion situations, it may be appropriate to schedule predefined loop flows between TSOs to relieve the congestion. This will not affect the LFC area balances and the price of the exchange will be set at 0 EUR. Intended exchange mFRR SA has priority over predefined loop flows.

3.3 Methodologies related to the Nordic Synchronous Area and the Nordic Capacity Calculation Region (CCR)

Table 1 includes references to the methodologies, related to the Nordic Synchronous Area and the Nordic Capacity Calculation Region (CCR).

EBGL

Table 1: Methodologies required by EBGL, related to the Nordic Synchronous Area.

article in EBGL	Methodology	section in this Annex
33(1)	Amendment to the methodology on the common and harmonised rules and processes for the exchange and procurement of aFRR balancing capacity for the Nordic LFC Block	1.3
33(1)	Amendment to the methodology on the common and harmonised rules and processes for the exchange and procurement of mFRR balancing capacity for the bidding zones of Denmark, Finland and Sweden	1.3
34	Energinet, Fingrid, Statnett and Svenska kraftnät proposal for exemption for not allowing balance service providers to transfer their obligations to provide aFRR capacity in accordance with Article 34(1) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing	
38(1)	Amendment to the methodology on the application of the Nordic CCR market-based allocation process of cross-zonal capacity for the exchange of aFRR balancing capacity for the Nordic LFC Block	1.3
38(1)	Amendment to the methodology on the application of the Nordic CCR market-based allocation process of cross-zonal capacity for the exchange of manual Frequency Restoration Reserve capacity for the bidding zones of Denmark, Finland and Sweden	1.3
41	All TSOs' of CCR Nordic proposal for a methodology for a market-based allocation process of cross-zonal capacity for the exchange of balancing capacity in accordance with Article 41(1) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing	
50(3) and 51 (1)	All TSOs of the Nordic synchronous area proposal for common settlement rules applicable to intended exchange of energy as a result of frequency containment process and ramping period and to all unintended exchange in accordance with Article 50(3)	3.2

	and 51(1) of Commission Regulation (EU) 2017/2195 of 23 November 2017	
50(4)	All asynchronously connected TSOs' proposal for common settlement rules for intended exchanges of energy between synchronous areas as a result of the frequency containment process and of ramping restrictions in accordance with the Article 50(4) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing	3.2
51(2)	All asynchronously connected TSOs' proposal for common settlement rules for all unintended exchanges of energy between synchronous areas in accordance with the Article 51(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing	3.2

4 All European TSOs methodologies

The all-European TSO methodologies, including the NRA approval dates and explanatory documents are published on the ENTSO-E website: https://www.entsoe.eu/network_codes/eb/

EBGL