# Explanatory document to the Energinet, Fingrid, Statnett and Svenska kraftnäts proposal for the establishment of common and harmonised rules and processes for the exchange and procurement of balancing capacity, for an exception to disallow balancing service providers from transferring their obligations to provide mFRR capacity across bidding zone borders, and for the amendment of the application of a market-based allocation process

in accordance with Article 33(1), Article 34(1) and Article 38(1) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

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# Contents

# 1. Introduction

This document gives background information and the rationale for Energinet, Fingrid, Statnett and Svenska kraftnät's proposal for the establishment of common and harmonized rules and processes for the exchange and procurement of mFRR balancing capacity in accordance with Article 33(1), for an exception to disallow balancing service providers from transferring their obligations to provide mFRR capacity across bidding zone borders in accordance with Article 34(1), and for the amendment of application of a market-based allocation process in accordance with Article 38(1) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (hereinafter referred to as "EB GL").

## 1.1. Purpose of the Nordic mFRR capacity market

The purpose of the common Nordic mFRR capacity market is to ensure the availability of mFRR reserves in accordance with the Nordic LFC block dimensioning rules and the rules of the LFC area of Western Denmark (DK1) and thereby ensure operational security.

The purpose of the establishment of a common Nordic market for mFRR capacity is to increase socioeconomic welfare on a Nordic level and to increase operational security in the most efficient way. This is done by enabling cross-zonal procurement of mFRR capacity for use balancing the Nordic Synchronous Area and LFC area of DK1 whilst taking into account network constraints.

## 1.2. Background

The Nordic TSOs Energinet, Fingrid, Statnett and Svenska kraftnät (hereinafter referred to as "TSOs") have mutually agreed to propose common markets for aFRR and mFRR capacity.

The Nordic aFRR capacity market is expected to go-live in Q4 2022, and has already gone live on a national level in Norway, Finland and Sweden. The methodologies for the aFRR capacity market were approved in ACER decision 19/2020, 20/2020 and 21/2020. The Nordic mFRR capacity market is based on same principles as the Nordic aFRR capacity market, and the already approved methodologies.

The Nordic mFRR capacity market is accompanied by an automated Nordic mFRR energy activation market (mFRR EAM) which, in line with EB GL, shall integrate with European balancing market via the establishment of European balancing market platforms (developed under the European project MARI).

The regional balancing capacity market is based on the FRR dimensioning process, which will result in FRR volumes per LFC area (equal to a bidding zone). This initial LFC area reserve requirement can then be procured in another LFC area provided that there are available cross-zonal capacities (hereinafter "CZC") that can accommodate the exchange.

The Nordic TSOs will use the market-based capacity procurement optimisation function for the allocation of CZC for the common mFRR capacity market. The methodology for the market-based allocation is developed according to Article 41 of the EB GL, and approved by ACER in decision 22/2020. The 22/2020 is approved for the entire Nordic CCR and for both the aFRR and mFRR capacity market.

## 1.3. Legal basis

Regional capacity markets are not mandatory under European legislation, but they are regulated. Title III Chapter 2 of the EB GL, and Article 33 in particular, are relevant for the Nordic mFRR capacity market.

Furthermore, the Nordic TSOs have agreed to allocate CZC for the exchange of mFRR capacity; consequently Title IV Chapter 1 of EB GL and, in particular, Articles 38 and 41 are of relevance.

According to Article 5(3) of the EB GL:

*"The proposals for the following terms and conditions or methodologies shall be subject to approval by all regulatory authorities of the concerned region:*

*(b) for the geographical area concerning two or more TSOs exchanging or mutually willing to exchange balancing capacity, the establishment of common and harmonized rules and process for the exchange and procurement of balancing capacity pursuant to Article 33(1);*

*(g) in a geographical area comprising two or more TSOs, the application of the allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves pursuant to Article 38(1);*

*(h) for each capacity calculation region, the methodology for a market-based allocation process of cross-zonal capacity pursuant to Article 41(1);*

In accordance with EB GL Article 34(1), the TSOs shall allow BSPs to transfer their obligations to provide balancing capacity within the geographical area in which the procurement of balancing capacity has taken place.

In case the transfer of balancing capacity requires the use of cross-zonal capacity, the transfer is conditional on the requirement that the cross-zonal capacity is already available in the previous allocation process or via the probabilistic approach in outlined in EB GL Article 33(6).

The concerned TSOs may, however, propose an exemption from the obligation to allow transfers of balancing capacity in cases where the contracting period for balancing capacity pursuant to Article 32(2)(b) is strictly less than one week. The proposed Nordic mFRR capacity market fulfills this requirement and therefore the TSOs are entitled to request an exemption from the obligation to allow transfers for the proposed mFRR capacity market.

From the perspective of the EB GL, it should be stated that since the Nordic mFRR capacity market is based on a voluntary agreement between the Nordic TSOs, the Proposals is consequently not legally bound by a stipulated timeline.

## 1.4. Definitions

Generally, the definition of terms found in the EB GL, the SO GL and the CACM regulation shall apply in the proposals and in the explanatory document. In order to ease the reading of this document, the definitions of the main terms used are as follows:

(1) *'balancing service provider* or *'BSP'* means a market participant with reserve-providing units or reserve-providing groups able to provide balancing services to TSOs;

(2) *'capacity calculation region* or *'CCR'* means the geographic area in which coordinated capacity calculation is applied;

(3) *'capacity procurement optimisation function'* means the function of operating the algorithm applied for the optimisation of the procurement of balancing capacity for TSOs exchanging balancing capacity;

(4) *'common merit order list'* means a list of balancing energy bids sorted in order of their bid prices, used for the activation of those bids;

(5) *'connecting TSO'* means the TSO that operates the scheduling area in which balancing service providers and balance responsible parties shall be compliant with the terms and conditions related to balancing;

(6) *'divisibility'* means the possibility for a TSO to use only part of the balancing energy bids or balancing capacity bids offered by the balancing service provider, either in terms of power activation or time duration;

(7) *'exchange of balancing capacity'* means the provision of balancing capacity to a TSO in a different scheduling area than the one in which the procured balancing service provider is connected;

(8) *'FRR dimensioning rules'* means the specifications of the FRR dimensioning process of an LFC block;

(9) *'full activation time'* means the period between the activation request by the connecting TSO in the TSO-TSO model or by the contracting TSO in the TSO-BSP model and the corresponding full delivery of the concerned product;

(10) *'load-frequency control area'* or *'LFC area'* means a part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other LFC areas, operated by one or more TSOs fulfilling the obligations of load-frequency control;

(11) *'load-frequency control block'* or *'LFC block'* means a part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other LFC blocks, consisting of one or more LFC areas, operated by one or more TSOs fulfilling the obligations of load-frequency control;

(12) *'operational security limits'* means the acceptable operating boundaries for secure grid operation such as thermal limits, voltage limits, short-circuit current limits, frequency and dynamic stability limits;

(13) *'standard product'* means a harmonised balancing product defined by all TSOs for the exchange of balancing services;

(14) *'TSO-TSO model'* means a model for the exchange of balancing services where the balancing service provider provides balancing services to its connecting TSO, which then provides these balancing services to the requesting TSO;

(15) *'transfer of balancing capacity'* means a transfer of balancing capacity from the initially contracted balancing service provider (hereinafter referred to as "BSP") to another BSP.

# 2. The proposal

## 2.1. Application of the TSO-TSO model

The Nordic TSOs will exchange mFRR capacity based on a TSO-TSO model. This implies that each Balancing Service Provider (hereinafter "BSP") provides balancing capacity to its connecting TSO, which has also prequalified the BSP. There shall only be contractual arrangements between the TSOs and, separately, between BSPs and their connecting TSO.

The Nordic TSOs shall strive to establish national requirements (BSP terms and conditions) that are as similar as possible to those of their Nordic counterparts in order to ensure a level playing field for BSPs and to facilitate the functioning of the Nordic mFRR capacity market. Revised BSP terms and conditions are currently being developed in all the Nordic countries. The BSP terms and conditions is regulated by Article 18 of the EB GL.

## 2.2. Product definition and bid characteristics

### 2.2.1. Pre-qualification of mFRR capacity

Only a BSP with prequalified mFRR resources can submit bids to the mFRR capacity market. Each of the Nordic TSOs are responsible for the pre-qualification process and for monitoring delivery from the BSPs in their own control area.

The mFRR capacity bids must fulfill the requirements of the standard product definition for mFRR energy bid[1].

### 2.2.2. Bid formats

From the start of mFRR capacity market, capacity bids will conform to the following requirements:

- The minimum bid quantity shall be 1 MW and bid granularity shall be in 1 MW steps.
- A bid shall include the bidding zone it belongs to. This implies that portfolio bids for units within a bidding zone are allowed.
- Single bids can be marked as indivisible. This means that either the bid must be accepted as a whole or rejected. Indivisible bids give BSPs greater flexibility when pricing bids and this flexibility can support higher bid volumes and help lower bid prices. On the other hand, indivisible bids make it harder for the optimisation function to find an efficient solution. A maximum bid size of 50 MW applies to indivisible bids to reduce the probability of potentially problems and will help disincentivise strategic bidding that might result in a loss of efficiency.
- Bids may be linked across several balancing market time units ("block bids").
- Bids may be linked exclusive. This allows the linking of one or more bid timeseries with an exclusivity constraint, so that the bid selection can only select bids from one of the exclusively linked bid timeseries in the same market time unit. Bids in the same exclusive group must belong to the same bidding zone.

[1] ACER Decision SPBC Annex I.pdf (europa.eu)

- Bids may be linked exclusive between markets. This means that bids within in the same exclusive group across markets, that are selected in one market will not be offered to the bid selection of the other market and can thus not be selected there in the same market time unit. Exclusive bid groups therefore allows BSPs to send in bids on both aFRR and mFRR capacity. The markets will then be cleared sequentially, and only one bid in one market will be chosen per MTU.

A predefined volume of mFRR capacity will be procured daily for a predetermined set of balancing market time units (hereinafter "MTU"). When the mFRR capacity market goes live, the MTU will be one hour.

A detailed explanation of bid formats and how bids can be linked can be found in the BSP implementation guide for the Nordic mFRR capacity market[2].

## 2.3. Geographical scope

The geographical scope of the mFRR capacity market is limited to all bidding zones in the Nordic synchronous area and the bidding zone of Western Denmark (DK1). According to the current bidding zone configuration, this includes the following bidding zones: DK1, DK2, NO1, NO2, NO3 NO4, NO5, SE1, SE2, SE3,SE4 and FI.

While being a part of the Nordic Balancing Model, Kraftnät Åland does not employ mFRR resources and does not take active part in the Nordic mFRR capacity market.

### 2.3.1. Dimensioning rules for FRR in the Nordic LFC–block and for LFC area of DK1

The dimensioning rules for the Nordic LFC block and the LFC area of Western Denmark (DK1) are out of scope of article 33 in the EB GL. The dimensioning rules will take into account both mFRR and aFRR and the rules will set a volume for the whole LFC-block and the LFC area of DK1 and an obligation per TSO within the LFC-block. The volume for the LFC-block represents the FRR (both aFRR and mFRR) volume needed to secure system operations in real time balancing. The dimensioning volume may differ from the procured volume in the FRR capacity markets if TSO responsible for an LFC area assess that there will be enough voluntary FRR bids within the energy activation markets to secure the TSO obligations and real time balancing needs.

### 2.3.2. The procurement volume of mFRR capacity

The procurement volume and how it is distributed between the bidding zones shall follow the prevailing rules for dimensioning in the Nordic LFC block and for the LFC area of DK1. Each TSO is responsible for procuring the TSO demand for mFRR capacity for its bidding zone(s) necessary to fulfil the requirements.

The demand of each TSO can be procured partly on the Nordic market, and partly on a national procurement market. The individual Nordic TSOs decides whether the mFRR capacity needed should be procured in the Nordic mFRR capacity market, on national markets capacity market or secured otherwise.

The Nordic mFRR capacity market only will be used for reserves that fulfill the requirements of the standard product definition[3]. National mFRR capacity markets can be used for reserves that e.g. do not fulfill the requirements of the standard product definition.

[2] Implementation guides – nordicbalancingmodel
[3] ACER Decision SPBC Annex I.pdf (europa.eu)

## 2.4. The procurement rules

### 2.4.1. The market process

The gate opening time (GOT) and gate closure time (GCT) is set to the same as for the approved aFRR capacity market. The gate opening time (GOT) is set to 00:00 (CET) in D-7 and the gate closure time (GCT) is set to 7:30 (CET) in D-1. Article 6(9) of Regulation (EU) 2019/943 on the internal market for electricity (recast), stipulates that "Contracts for balancing capacity shall not be concluded more than one day before the provision of the balancing capacity". Setting the gate closure time to 7:30 (CET) in D-1 complies with this requirement.

Between the gate closure time and the deadline for the TSO approval of the market result, the TSOs will be able to review the bids of their control area. An overview of the timeline for the market process is shown in Figure 1.

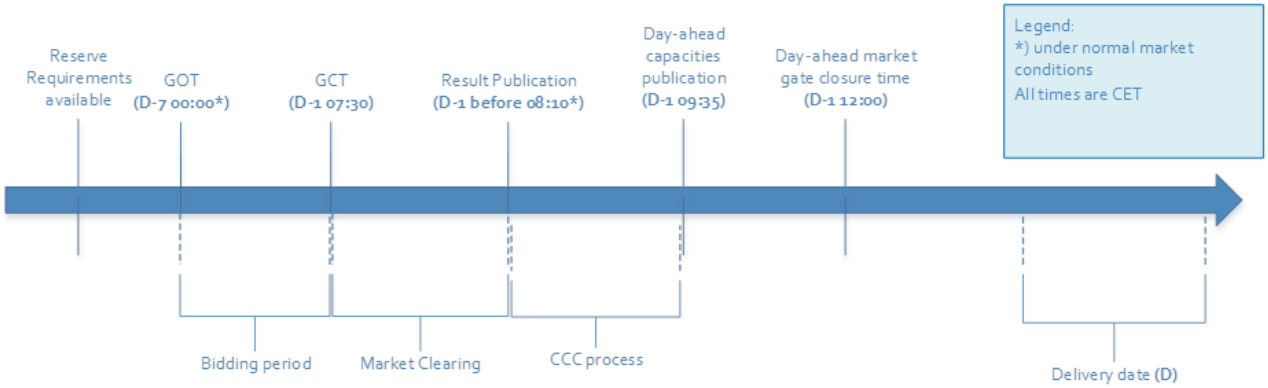


*Figure 1. Overview of the market timeline*

### 2.4.2. The overall process of bid submission and bid selection

A schematic illustration of the bid submission, optimisation and selection process is shown in Figure 2. The information can also be found in the BSP implementation guide – mFRR capacity market[4].

[4] Implementation guides – nordicbalancingmodel

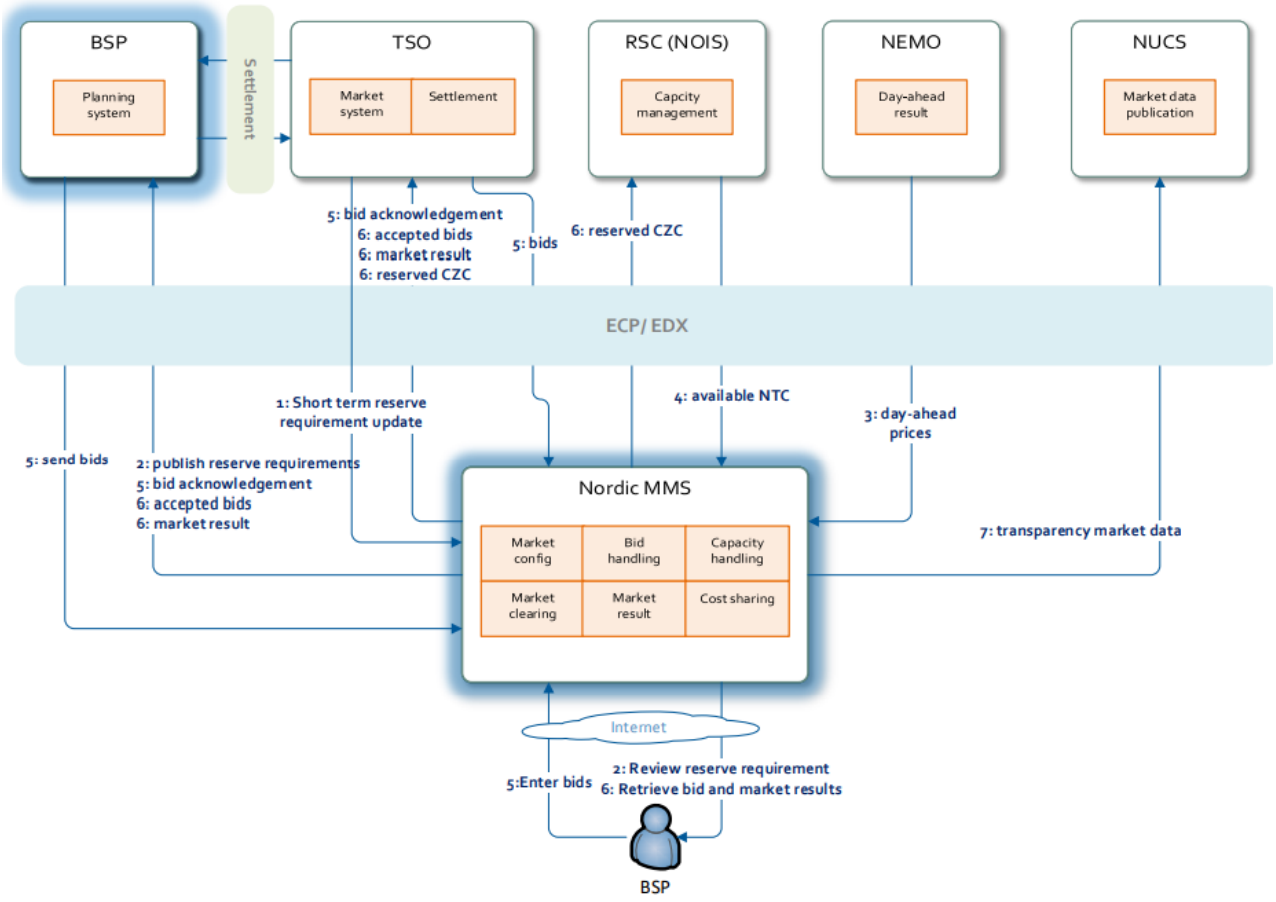


*Figure 2. Bid submission, optimisation and bid selection in the Nordic mFRR capacity market*

### 2.4.3. The procurement optimisation function

The objective of the algorithm for the capacity procurement optimisation function is to minimise the provision costs of BSPs given the constraint summing across directions d (up-/down-regulation), day ahead market time units of the trading day t and mFRR capacity bids i,'

$$\sum_{d}\sum_{t}\sum_{i}\left(bidcost_i \times bidvolume_i \times selected_i\right)_{td} \qquad \textit{(Equation 1)}$$

Where:

$bidcost_i$ is the mFRR capacity bid cost of mFRR capacity bid i;

$bidvolume_i$ is a valid increment of mFRR capacity bid i;

$selected_i$ is boolean denoting whether or not the mFRR capacity bid increment is accepted.

*The constraints of the optimisation*

- All demand in each bidding zone, hour and direction must be met either by local or imported balancing capacity bids.

- Between all bidding zones there is defined a maximum CZC which represents the maximum volume of balancing capacity that can be transferred between the bidding zones. By default the maximum CZC will equal 10 % of the expected NTC, but it can be set lower for operational security reasons in accordance with Article 165(g) of the SOGL. According to ACER decision 22/2020, the maximum CZC volume that can be transferred between bidding zones can be increased to 20 % if the demand in one bidding zone cannot be met within the 10 %.

- Divisible bids can only be selected in 1 MW steps.

- A bidding zone or a predefined set of adjacent bidding zones may have a pre-determined restriction on minimum volume and/or maximum volume that must be procured in the respective bidding zone or set of bidding zones.

- The restrictions entailed in bids, including links to other bids, minimum volume, maximum volume and price must be respected.

**Maximum and minimum procurement volumes for a bidding zone or for a set of bidding zones**

The maximum procurement volume can be applied as a constraint to prevent too large a share of the overall balancing capacity volume being located in a small part of the Nordic synchronous area and thereby reducing operational security in accordance with Article 165(g) of SOGL. This restriction will only be used if it is considered necessary based on experience with how the procured bids are distributed in the Nordic region.

The minimum procurement volume can be used if the dimensioning process according to Article 157(3)(g) requires such limitations in order to ensure that dimensioning requirements are fulfilled.

Minimum and maximum constraints for procurement volumes can be applied to specific bidding zones, a set of bidding zones or an area within a bidding zone. The constraints must be made public before they are applied in the algorithm.

### 2.4.4.Settlement of contracted capacity

Accepted mFFR bids will be settled at the clearing price prevailing in the relevant bidding zone, for the relevant mFRR direction and MTU. The rules used to determine the clearing price are set out in Paragraphs 2 and 3 of Article 8 of the *Methodology on the common and harmonised rules and process for the exchange and procurement of mFRR balancing capacity*. Essentially, these rules amount to the following:

1. Each connecting TSO shall settle with each BSP each accepted mFRR capacity bid volume for each day-ahead market time unit and for each direction.

2. The settlement shall be equal to the accepted balancing capacity bid volume multiplied with the respective balancing capacity clearing price(s) as defined in paragraph 3.

3. The balancing capacity price shall be a cross zonal marginal price calculated by the capacity procurement optimisation function for each standard balancing capacity product, for each direction and for each day-ahead market time unit in each uncongested area in accordance with the following principles:
    a. the cross zonal marginal price of an uncongested area shall be the marginal price of the marginal accepted bid in this uncongested area and the imported cross zonal marginal price; or

b. linked bids of the types described in Article 4, paragraph 2 in the *Methodology on the common and harmonised rules and processes for the exchange and procurement of mFRR* shall by default not set the cross-zonal marginal price in the uncongested area. However, such a linked bid can lead to setting a higher cross-zonal marginal price in one or more day ahead market time units to allow the linked bid to exactly recover its overall bid costs.

The chosen pricing rule is designed to provide a clear and efficient price (and investment) signal to potential BSP providers. Specifically, if the clearing price were lower than the highest locally accepted bid, it would not signal to a potential investor with a lower supply cost, the potential ability to efficiently displace the high cost bid. Similarly, if the clearing price were lower than the cost of imported capacity including the cost of CZC, it would not signal the potential ability to free up valuable CZC by investing locally. Such investment would reduce the need to procure both mFRR in the neighbouring zone and to reserve CZC for the exchange of mFRR and, as such, the value of both is reflected in the price.

The rule covering the need to have the same price across uncongested bidding zones is intended to ensure that, where there is a group of uncongested bidding zones, the price in each zone reflects the potential value of investment in additional mFRR in each zone as a means of meeting the demand of the other zones in the group. Without this rule, one might get price splitting within the uncongested group of bidding zone due to local variations in accepted bid prices that doesn't really reflect the potential value of new investment in the group of uncongested bidding zones.

## 2.5. Activation of balancing energy bids

Balancing energy bids will be activated on the Nordic mFRR energy activation platform until the Nordic TSOs enter the common European energy balancing platform, MARI.

The mFRR capacity that is procured in the mFRR capacity market must be available with the same total volume in the mFRR energy market for the entire MTU of the mFRR capacity market. The mFRR energy activation bids resulting from the capacity procurement must all be direct activatable the entire MTU of the mFRR capacity market.

## 2.6. Publication of market information

The market results will be sent for publication to the ENTSO-E transparency platform in accordance with Article 12(3) of EB GL and Article 17 of Reg EU 543/2013 (Transparency Regulation).

## 2.7. Allocation of cross-zonal capacity

Pursuant to Article 33(4)(b) of the EB GL, the Nordic TSOs exchanging balancing capacity shall ensure both the availability of CZC and that the operational requirements established in European regulation are met through the use of the market-based allocation process for CZC described in the ACER decision 22/2020 pursuant to Article 41 of the EB GL.

## 2.8. Allocation of available cross-zonal capacity between capacity markets

The allocation of cross-zonal capacity will be assigned to the aFRR capacity market first for the available cross zonal capacity allocated to the exchange of balancing capacity in accordance with the methodology applied pursuant to Article 38(1) of the EB Regulation. The allocation of cross-zonal capacity to the mFRR capacity will be assigned secondly and use the remaining cross zonal capacity.

The reasoning for running the algorithm for the capacity procurement optimisation function for the aFRR capacity market first is, that the Nordic TSOS expects the aFRR capacity market to have the highest prices, and therefore the value of reserving cross-zonal capacity to this market is greatest.

An additional reasoning for having the algorithm for the capacity procurement optimisation function for the aFRR capacity market first is, that the procured aFRR capacity volumes is not expected to take up the entire allocated cross-zonal capacity due to a smaller total volume of aFRR procured. The total volume of procured mFRR capacity is higher, and therefore the mFRR capacity procurement is expected to take up a higher amount of the total allocated cross-zonal capacity.

The remaining cross-zonal capacity after allocation the necessary capacity to the aFRR capacity market will be giving to the mFRR market.

The total cross-zonal capacity allocated to the aFRR and mFRR market will be maximum 10 %, according to ACER decision 22/2020.

If the mFRR capacity prices will increase to a general level that is higher than the aFRR capacity prices, or if there is an operational reason to have Nordic mFRR capacity market run first, the order of which the algorithms for the capacity procurement optimisation function runs, will be changed.

The Nordic TSOs expects that the algorithm for the capacity procurement optimisation function could be further developed in the future, such that the aFRR and mFRR capacity market can be co-optimized in order to obtain the highest possible welfare effect of reserving cross-zonal capacity.

## 2.9. TSO-TSO settlement

As described in Article 9 of the *Methodology on the common and harmonised rules and processes for the exchange and procurement of mFRR*, TSOs shall pay for the volume of mFRR capacity required by their bidding zones.

As this volume requirement can be met by mFRR procured in other bidding zones, including zones with the control area of a different TSO, there is a need to settle transfers of mFRR capacity. Where capacity is traded across a bidding zone border that separates two TSO control areas, the TSO importing mFRR capacity will pay the TSO exporting mFRR capacity an amount equal to the volume of mFRR capacity transferred multiplied by the clearing price for the relevant mFRR capacity product in the exporting bidding zone.

As clearing prices account for CZC reservations costs, this arrangement entails that the importing TSO pays the implied congestion rent. The congestion rent for the exchange of balancing capacity between bidding zone A and B is calculated as the product of the exchanged balancing capacity and the price differential (Clearing Price A – Clearing Price B) per border direction, regulation direction and market time unit. The rent is split 50/50 between the TSOs on the relevant border.

## 2.10. Market time unit (MTU)

The MTU for the balancing capacity market will be the same as that for the day-ahead market (at Nordic mFRR capacity market go-live 60 minutes) and this implies that when the Nordic day-ahead market shift to a shorter MTU, this change will also be applied in the mFRR capacity market.

# 3. Exception to disallow balance service providers from transfering their obligations to provide mFFR capacity across bidding zone

The TSOs' proposes that, transfer of an obligation to provide mFRR balancing capacity (i.e. mFRR capacity bids) will not be permitted *across bidding zone borders*. However, transfers among prequalified BSPs within a bidding zone will be permitted.

Accommodating cross-zonal transfers while maintaining operational security would impose a real cost on TSOs but would be unlikely to realise any significant improvement in market efficiency.

The specific concern with cross-zonal transfers is that mFRR capacity may be moved to a bidding zone where there is insufficient cross-zonal capacity available to accommodate the activation of the mFRR capacity. To enable cross-zonal transfers safely, cross-zonal capacity allocations would either have to be amended to support the transfer, or TSOs would have to establish a process through which transfers with unacceptable security impacts could be prevented.

The TSOs believe that amending the cross-zonal capacity allocations determined through the proposed market clearing process to accommodate the later transfer of bids does not make sense. In particular, because BSPs transferring bids across bidding zone borders are not faced with the cost of any changes in the use of CZC, they may well end up substituting bids in different bidding zones that the market clearing process, which does account for CZC costs, had explicitly rejected on the grounds that it would entail a net reduction in social welfare, for example because the change restricts the quantity of cross-zonal capacity that can safely be made available to the energy market.

Alternatively, to facilitate the safe transfer of bids across zones without impacting the energy market, the TSOs would have to develop a process for assessing whether a proposed transfer would harm operational security unacceptably and a process for receiving and approving transfers in line with these assessments.

In our estimation, the possible gains from supporting cross-zonal transfers will be small, owing both to the fact that within zone transfers will anyway be allowed and the short duration transfer window under the proposed D-1 mFRR market design. The limited scope of the proposed exemption still allows BSPs to reoptimise the allocation of mFRR capacity provision amongst themselves within a bidding zone in response to changing market conditions following the clearing of the mFRR capacity market. However, the transfer window is so short, lasting less than 24 hours, that the value of this reoptimisation is likely to be relatively small and not substantially increased by allowing cross-zonal trade.

## 3.1. Consequences if exemption is not granted

If the proposed exemption is not granted, the Nordic TSOs would need to develop additional processes and procedures to support such transfers and make suitable revisions and additions to the legal framework and IT system being developed to support the mFRR capacity market. This would impose additional costs for the TSOs and BSPs and would potentially delay the implementation of the mFRR capacity market, delaying both the efficiency gains and improvements to operational security that it is expected to bring.

Accommodating cross-zonal transfers would be particularly challenging, since this would necessitate the development of processes to approve or reject proposed transfers based on the operational security impact within the tight window available for such transfers.