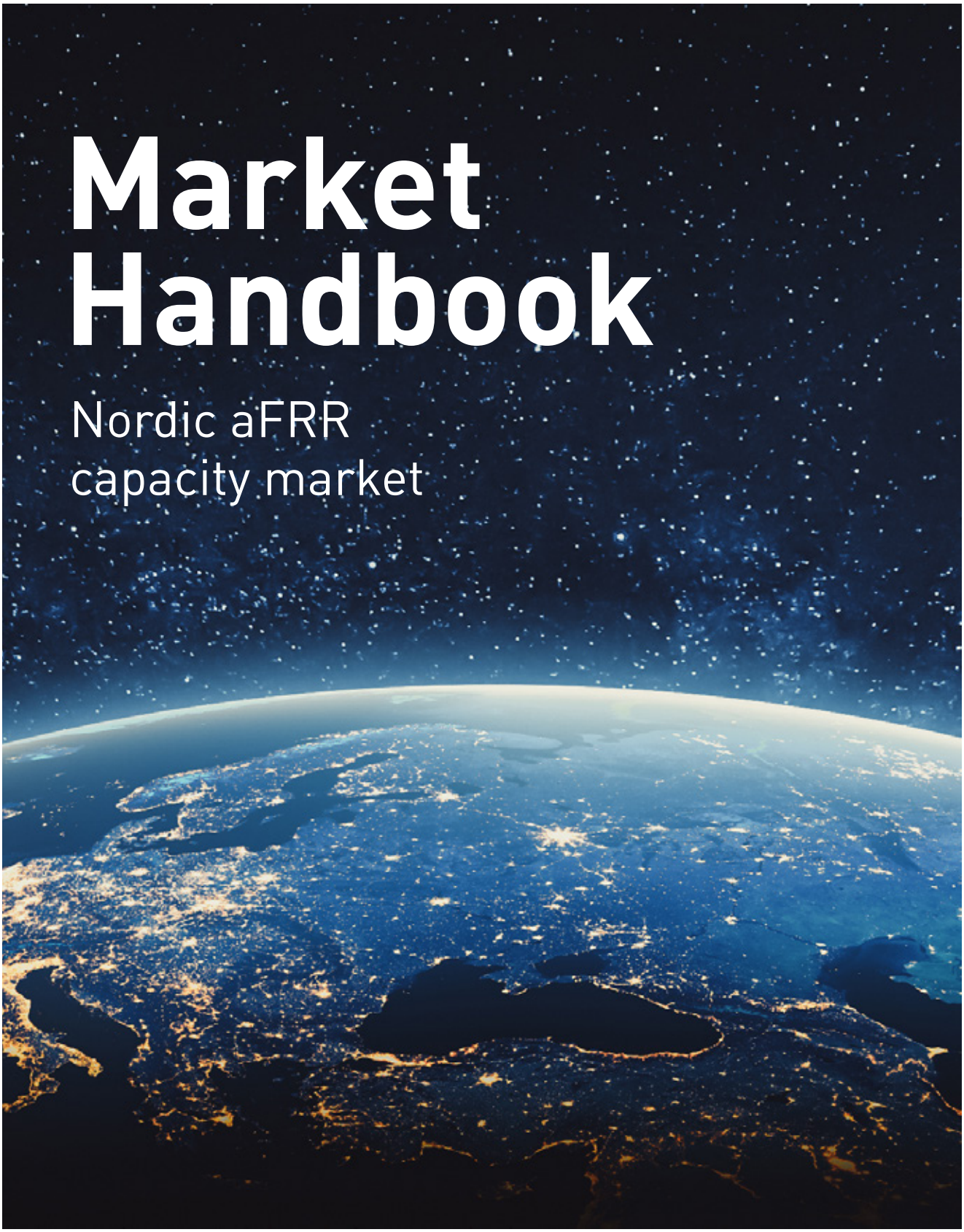
NBM
Nordic Balancing Model

Market Handbook

Nordic aFRR capacity market



Version 1.0
September 2022

SVENSKA KRAFTNÄT ENERGINET FINGRID Statnett

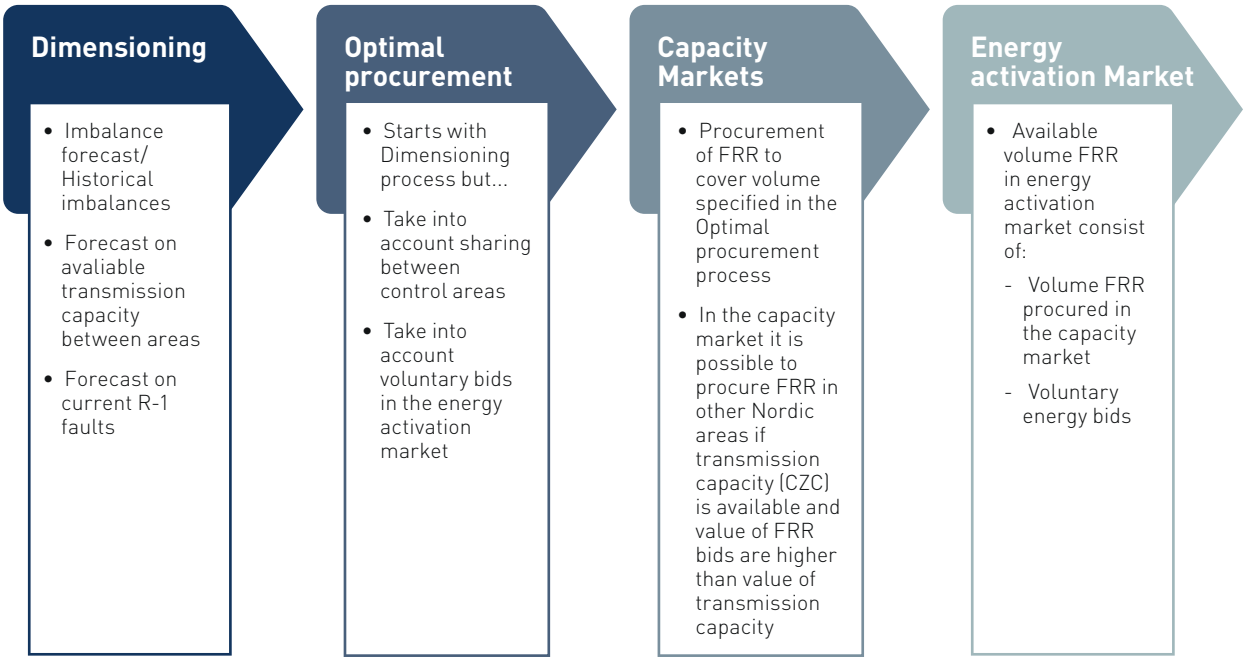
1. Introduction

The need for automatic Frequency Restoration Reserve (aFRR) is increasing and the aFRR is also the backbone of the balancing model that is being developed among the Nordic TSOs in the Nordic Balancing Model program (NBM). It is necessary to develop the capability of this reserve to be able to fully introduce the Area Control Error (ACE) based balancing and connect to the European energy exchange platform PICASSO required by the European legislation.

The Nordic LFC block consists of 11 bidding zones. This is considered advantageous as critical limitations of transmission grid is reflected in the energy prices and yields a more optimal utilisation of both available transmission capacity and resources. However, with small bidding zones and unevenly distributed balancing resources the exchange of balancing capacity with allocation of cross zonal capacity is necessary to ensure operational security in all areas.

aFRR resources are today unevenly distributed across the Nordics. Reserving cross-zonal capacity (CZC) for aFRR makes it possible to procure aFRR capacity across bidding zones and by that fulfilling the demand of aFRR per LFC area that is needed according to the FRR dimensioning process. The FRR dimensioning process is developed in accordance with the System Operational Guide Line (SO GL) Article 157 and will stipulate an aFRR demand per Load Frequency Control (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 CZC that can accommodate the exchange.

The Nordic aFRR capacity market will be followed by an aFRR energy activation market via the establishment of the European balancing market platform, PICASSO.



Picture 1: FRR dimensioning SOGL art 157 → Analysis of optimal provision EBGL art 32.1 → Capacity markets EB GL title III → Energy activation Market (Picasso) EB GL Chapter 2

2. Legal basis

The EB Regulation provides that when several TSOs exchange balancing capacity they have to develop a proposal for the establishment of common and harmonised rules and processes for the exchange and procurement of balancing capacity. These TSOs have also to develop a proposal for the principles for balancing algorithms for the procurement of balancing capacity bids[1]. The proposal shall be submitted to the concerned regulatory authorities for their approval.

The TSOs exchanging balancing capacity shall develop algorithms to be operated by the capacity procurement optimisation functions for the procurement of balancing capacity bids. This algorithm shall minimise the overall procurement costs of all jointly procured balancing capacity and if applicable, take into account the availability of cross-zonal capacity including possible costs for its provision[2]. The algorithms developed shall:

- respect operational security constraints;
- take into account technical and network constraints; and
- if applicable, take into account the available cross-zonal capacity.

The exchange of balancing capacity between TSOs shall be performed based on a TSO-TSO model taking into account the available cross-zonal capacity and the operational limits[3]. The TSOs shall submit all balancing capacity bids from standard products to the capacity procurement optimisation function. The TSOs shall not modify or withhold any balancing capacity bids and TSOs shall include them in the procurement process[4].

The TSOs shall allow balancing service providers to transfer their obligations to provide balancing capacity within the geographical area in which the procurement of balancing capacity has taken place. The transfer of balancing capacity bids shall be allowed at least until one hour before the start of the delivery day. The TSOs shall set conditions to be fulfilled when transfer of balancing capacity shall be allowed. If TSO(s) does not allow the transfer of balancing capacity, the concerned TSO(s) shall explain the reason for the rejection to the balancing service providers involved and request exemption from the concerned regulatory authorities[5].

The TSOs exchanging balancing capacity shall ensure availability cross-zonal capacity fulfilling the operational security requirement either by:

- the methodology for calculating the probability of available cross-zonal capacity after intraday cross-zonal gate closure time, or
- the methodologies for allocating cross-zonal capacity to the balancing timeframe applying co-optimised allocation process, market-based allocation process or allocation process based on economic efficiency analysis

The Nordic TSOs have chosen market-based allocation process of cross-zonal capacity for exchange balancing capacity[6]. The methodology for market-based allocation shall be developed on a capacity calculation region (CCR) level and submitted for the concerned regulatory authorities for approval. This methodology shall apply for the exchange of balancing capacity with a contracting period of not more than one day and where the contracting is done not more than one week in advance of the provision of the balancing capacity.

The requirements for such a methodology shall include:

- the notification process for the use of the market-based allocation process;
- a detailed description of how to determine the actual market value of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves, and the forecasted market value of cross-zonal capacity for the exchange of energy, and if applicable the actual market value of cross-zonal capacity for exchanges of energy and the forecasted market value of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves;

1 Articles 33 and 58 of the EB Regulation
2 Article 58 of the EB Regulation
3 Article 33 of the EB Regulation; operational limits are defined in Chapters 1 and 2 of Part IV Title VIII of the SO Regulation
4 Exception conditions are set out in Article 26 and Article 27 of the EB Regulation.
5 Article 34 of the EB Regulation
6 Article 41 of the EB Regulation

- a detailed description of the pricing method, the firmness regime and the sharing of congestion income for the cross-zonal capacity that has been allocated to bids for the exchange of balancing capacity or sharing of reserves via the market-based allocation process; and
- the process to define the maximum volume of allocated cross-zonal capacity for the exchange of balancing capacity or sharing of reserves.

The cross-zonal capacity allocated on a market-based process shall be limited to 10 % of the available capacity for the exchange of energy of the previous relevant calendar year between the respective bidding zones. The volume limitation of 10% may not apply where the contracting is done not more than two days in advance of the provision of the balancing capacity[7].

The methodology for market-based allocation is based on a comparison of the actual market value of cross-zonal capacity for the exchange of balancing capacity and the forecasted market value of cross-zonal capacity for the exchange of energy, or on a comparison of the forecasted market value of cross-zonal capacity for the exchange of balancing capacity, and the actual market value of cross-zonal capacity for the exchange of energy[8].

The actual market value of cross-zonal capacity for the exchange of balancing capacity used in a market-based allocation process shall be calculated based on balancing capacity bids submitted to the capacity procurement optimisation function[9]. The actual market value of cross-zonal capacity shall be calculated based on the avoided costs of procuring balancing capacity. Furthermore, the forecasted market value of cross-zonal capacity shall be based on one of the following alternative principles[10]:

- the use of transparent market indicators that disclose the market value of cross-zonal capacity; or
- the use of a forecasting methodology enabling the accurate and reliable assessment of the market value of cross-zonal capacity.[11]

The Nordic TSOs will use a forecasting methodology to forecast market value of cross-zonal capacity[11].

The concerned regulatory authorities have approved the Nordic TSOs methodology for the market-based allocation process. The methodology includes the bidding zone borders, the market timeframe, the duration of application and the cross-zonal allocation methodology.

The TSOs may only allocate cross-zonal capacity for the exchange of balancing capacity if cross-zonal capacity is calculated in accordance with the capacity calculation methodologies developed pursuant to Regulations (EU) 2015/1222 and (EU) 2016/1719[12]. The TSOs shall include cross-zonal capacity allocated for the exchange of balancing capacity as already allocated cross-zonal capacity in the calculations of cross-zonal capacity[13].

The legal requirements set in the EB Regulation has been included in ACER decisions No 19 – 22/2020[14].

3. Handling of bids

BSP participating in the market send their bids to the common Nordic platform (FNMMS) where market clearing is performed. Detailed description on how to connect to the platform can be found in the Implementation guide uploaded on **www.nordicbalancingmodel.net**

7 Article 41(2) of the EB Regulation
8 Article 41(3) of the EB Regulation
9 Article 39 and Article 33 of the EB Regulation
10 Article 39(5) of the EB Regulation
11 ACER decision No 22/2020
12 Article 38(5) of the EB Regulation
13 Article 38(6) of the EB Regulation
14 Microsoft Word – ACER Decision xx-2020 on the Nordic aBCM A41 (europa.eu)

4. Bid types

Single bids

A single bid is submitted for one specific Market Time Unit (MTU) and one direction. The bid includes information about the bidding zone it belongs to. The bid quantity must respect 1 MW as a minimum quantity and 1 MW granularity.

Single bids can be marked as indivisible, this means that either the bid must be accepted as a whole or rejected. Indivisible bids give Balancing Responsible Party (BSP)s more flexibility for pricing of the bids and this can both increase the bid volume and decrease bid prices. On the other hand, indivisible bids can potentially have a negative effect for the procurement optimization function to find an efficient solution. A maximum bid size of 50 MW applies to indivisible bids as this will reduce the probability for such adverse effects and also disincentivizes strategic bidding that can result in loss of efficiency.

Block bids

Block bids give an opportunity to link bids together in time. A block bid consists of a set of single bids, where each bid belongs to different MTUs, but otherwise have the same quantity, price and direction. A block bid can only be constructed for consecutive MTUs.

A block bid can be submitted as divisible or indivisible. For a divisible block bid that is accepted, the same share of the bid's volume is selected for all MTUs for which the block bid is valid.

Bid curve

A bid curve represents a set of single bids for a specific MTU and direction, where only one of the bids included in the bid curve, can be accepted. This give BSPs great flexibility in presenting their actual cost structure in their bidding. However, if the option of bid curve is used, the BSP foregoes the opportunity to use block bids.

5. Gate opening (GOT) and Gate closure (GCT)

ACER decision set requirements to aFRR capacity market gate closure time but there are no provisions for aFRR capacity market gate opening time.

The TSOs have agreed that gate opening time for aFRR capacity market will be 00:00 (D-7), i.e., one week before delivery day.

Balancing capacity market timeframe shall be between 07:00 CET (D-1) and 10:00 (D-1). The balancing capacity gate closure time shall be within this balancing capacity market timeframe.

The TSOs had considered the duration of the whole aFRR procurement process and dependencies on other processes outside aFRR market when setting the balancing capacity gate closure time.

The timings in the aFRR procurement process and the cross-zonal capacity calculation process set the latest possible timing for balancing capacity gate closure time and starting of balancing capacity market timeframe sets the earliest possible timing for balancing capacity gate closure. Thus, the earliest possible timing for exact balancing capacity gate closure time is at 7:00 CET (D-1) and the latest possible timing for balancing capacity gate closure time is 7:30 CET (D-1) in order to respect the deadline of publishing cross-zonal capacities to the market participants and sending cross-zonal capacities to the NEMOs.

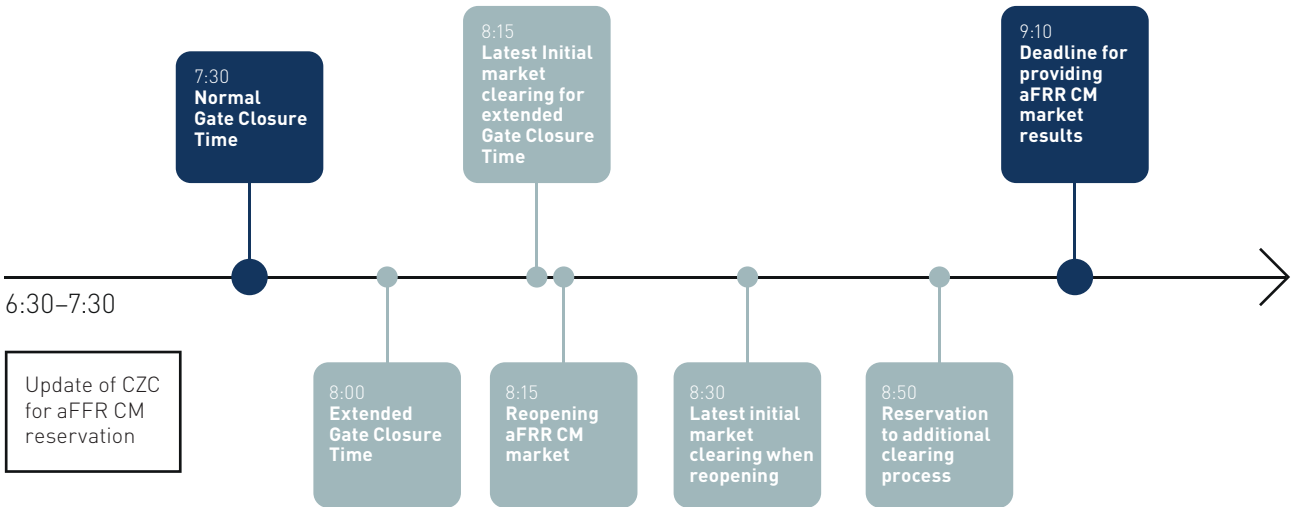
The TSOs have announced that the exact timing of the balancing capacity gate closure time is 7:30 CET (D-1). This single balancing capacity gate closure time for BSPs equals the balancing capacity bid submission gate closure time for TSOs to submit the balancing

capacity bids per bidding zone to the capacity procurement optimisation function of the Nordic aFRR capacity market.

Having gate closure time after 7:30 CET would create a risk that the results of aFRR capacity markets are not available at the latest at 9:10 CET in case mitigation measures has to be activated. These mitigation measures include extended gate closure and reopening of aFRR capacity markets. If there are problems in receiving bids from market participants caused by aFRR capacity market platform, gate closure time can be extended 30 minutes until 8:00 CET (D-1). In this case, the latest market clearing for extended gate closure time will be at 8:15 CET (D-1).

The TSOs have taken a conservative approach when aFRR capacity market is launched to ensure clearing of aFRR capacity market. This includes also a possibility to reopen aFRR capacity markets in case there are not enough bids to meet demand within a bidding zone (or bidding zones). TSOs have set the latest possible market clearing with reopening of a FRR capacity market to be at 8:30 CET (D-1). Fallback procedures will then be initiated if aFRR capacity market platform is not able to provide results by 8:45 CET (D-1)

The following figure shows an indicative timeline for the aFRR capacity market clearing process with proposed capacity gate closure at 7:30 CET (D-1):



5.1. REOPENING OF GATE CLOSURE TIME

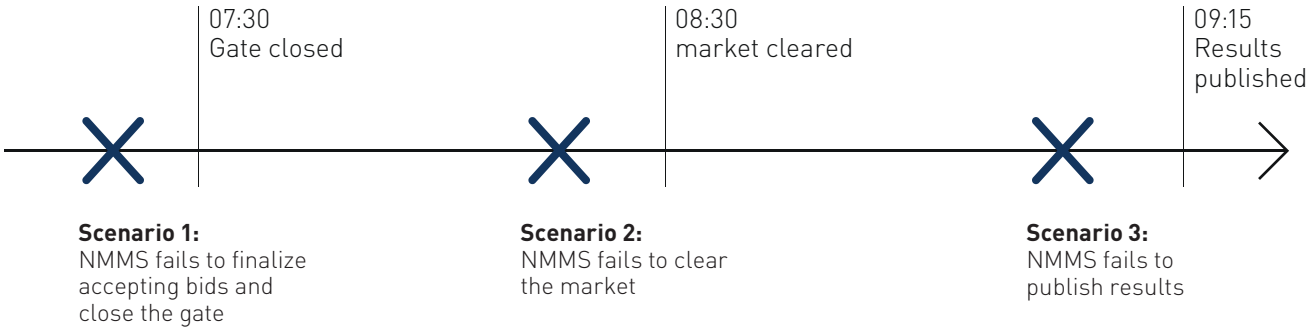
Reopening of the gate is last resort before going to fallback procedure - before reopening there is a possibility for TSO to increased CZC from 10 % to up to 20 % to make sure to get a market result/be able to clear the market.

Reopening will only be performed if TSO have tried everything else to be able to fulfil demand, thus reopening will only be a tool in a scarcity situation.

6. Fallback

Nordic TSO has identified two possible fallback scenarios where full optimization and market clearing will not be possible (Scenario 1 and 2) and one scenario where full optimization will be performed but results cannot be provided to BSPs. (Scenario 3).

FNMMs has an availability of 99,999 % so the use of fallback will be very rare. Svenska kraftnät, Energinet and Statnett will have common fallback procedures according to description below. Fingrid will have own national fallback for scenario 1 and 2.



6.1 SCENARIO 1: BEFORE GCT

If Scenario 1 occurs BSPs will not be able to submit bids to the platform/the platform will not be able to receive bids at GCT 07:30.

Fallback will be national without the possibility to optimize cross zonal capacity and bids across bidding zones.

Each TSO will contact its national BSPs and ask them to submit bids via excel/confirm bids already sent to FNMMs.

When TSOs have received bids from its BSPs a national clearing per bidding zone will be performed by each TSO. If available bids within a bidding zone is not enough to satisfy the aFRR demand for the that bidding zone, bids from adjacent bidding zones will be used and cross zonal capacity will be reserved manually. When TSO has performed national clearing BSPs will be informed about the result.

6.2 SCENARIO 2: AFTER GCT BUT BEFORE MARKET CLEARING

If scenario 2 occurs bids from BSP has been received by FNMMS but FNMMS is not able to clear the market and fallback will as in scenario 1 be performed national without the possibility to optimize cross zonal capacity and bids across bidding zones.

TSO will use national bids received from FNMMs and clear the market per bidding zone in the same way as in scenario 1

6.3 SCENARIO 3: AFTER MARKET CLEARING

Market clearing via FNMMS is possible but the FNMMS is not able to publish the market results via the platform. Each TSO will receive the market result from FNMMS and inform its BSPs about the result.

7. Market clearing rules

The following section describes the overall market clearing rules. A description on how the optimization is performed in relation to allocation of cross-zonal capacity (CZC) and in relation to bid selection. Furthermore, pricing rules and definitions affecting this is being described.

A detailed description of the algorithm can be found in the "NMMS Clearing Algorithm".

Optimization rules

The aFRR market clearing algorithm is a daily auction optimization that allocates CZC and selects bids that meets the requirements for aFRR at the lowest socio-economic cost.

The algorithm is split in several steps, but the same general rules apply for all steps:

- **Meet aFRR requirements:** the total volume selected + imports – exports gives the demand for each bidding zone, direction and hour
- **Import/export:** for each hour and between bidding zones up to a defined limit (CZC capacity)
- **Bids can be complex:** block bids, bidcurves
- **Linked CZC constraints:** possibility to limit the allocated CZC for aggregated lines

Due to the complex bid types, the optimization algorithms used in the CZC allocation and bid selection are defined as mixed integer linear programs (MILP), which by nature are hard to solve. Because of this the aFRR market clearing algorithm has a maximum time limit (user defined) which will, for some auctions, give a clearing results which is not proven to be the optimal results if this maximum time limit is reached.

The optimizations cover one day, both directions (up/down regulation) and all bidding zones. Because of CZC between bidding zones and the fact that BSPs can submit complex bids, the results can be suboptimal for individual hours (block bids), bidding zones (CZC's) and directions, but optimal for the daily market auction as a whole.

The CZC allocation (Step1) and bid selection (Step2) in the aFRR market clearing algorithm are two separate optimization processes performed in sequence. First, the CZC allocation step finds the most socio economically optimal allocation of CZC resources in the market based on complete bid information, regional specifications and requirements and CZC limits and CZC cost.

The CZC cost is defined as the market spread in the day-ahead market for the previous day added a mark-up, which is dynamic between 1 and 5 EUR/MW depending on the size of the forecast error for the previous (rolling) 30 days.

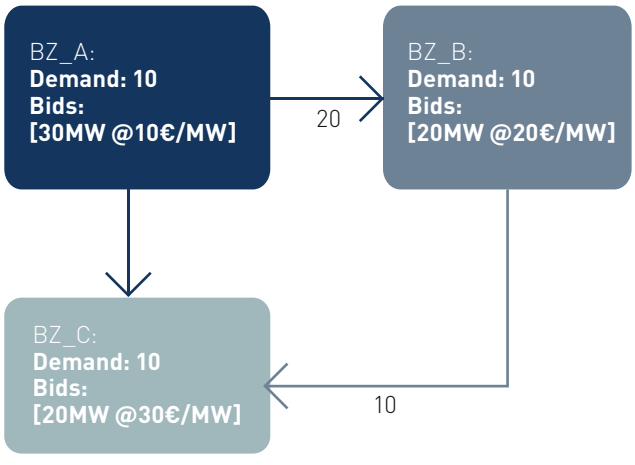
Up to 10 % of the transmission capacity on a border can be reserved for balancing capacity. In case of scarcity, reserved capacity can be increased until demand is satisfied, but to a maximum of 20 %.

The objective function includes both bid costs and CZC costs and the algorithm will minimize the sum of these two.

The bid selection step then uses the allocated CZC to find the most socio economically optimal selection of bids, i.e. minimizing the total bid costs of the selected bids that meets the aFRR requirements. Both steps use the same type of information and market rules, but the bid selection step do not use CZC costs in the objective function and the CZC is fixed using the CZC allocation results from Step1.

Step1 – CZC allocation

The CZC allocation step finds the most socio economically way of allocating CZC given the aFRR requirements by minimizing the total bid costs and CZC costs. The example below illustrates the procedure:



A->B: [20 MW @1€/MW]
B->A: [20 MW @1€/MW]
A->C: [20 MW @25€/MW]
C->A: [20 MW @25€/MW]
B->C: [20 MW @1€/MW]
C->B: [20 MW @1€/MW]

The result is to select the bid in BZ_A and send 20 MW from A to B and 10 MW from B to C. The cost of using line A-C is high and the optimal solution is therefore to send the aFRR from A to C via B.

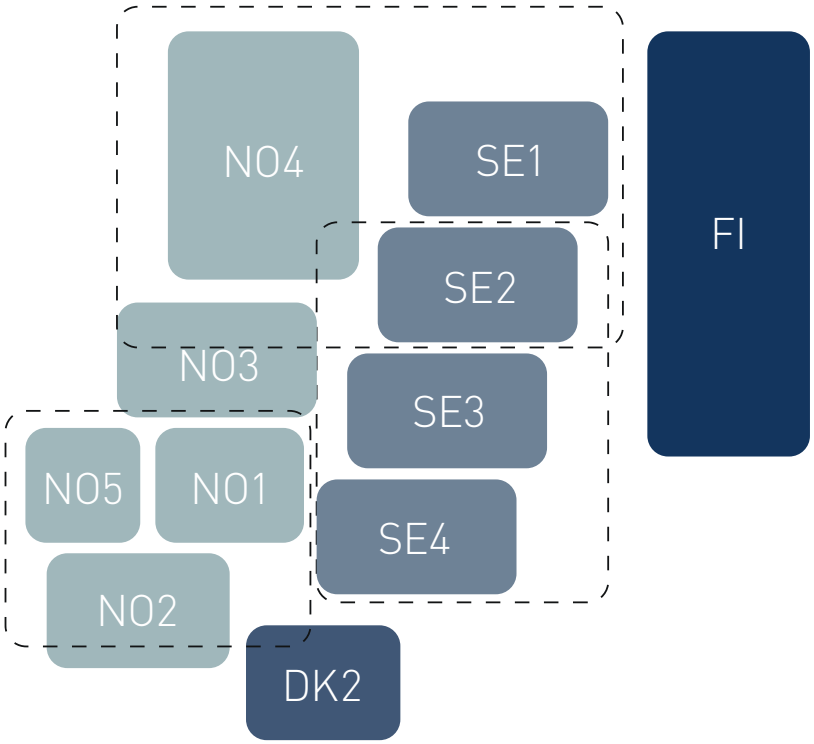
The CZC allocation step also includes a fallback mechanism if one or more bidding zones cannot meet its reserve requirements either locally or from imports. Then the algorithm moves into a Step1b which increases CZC limits until demand is satisfied or up to a maximum of 20 percent of NTC compared to 10 percent as a starting point and allocates CZC based on this new limit. Any CZC allocated above the original CZC limit will be penalized such that capacity from the closest neighbour is prioritized.

Step2 Bid selection

- The bid selection step is like the CZC allocation step, but without:
- CZC cost in the objective function
- CZC variables (i.e. they are fixed values)
- Macro area and bidding zones constraints (minimum and maximum reservation constraints)

Macro area

Bids are specified on an Elspot area level (NO1, NO2..., SE1, SE2), referred to as bidding zones. Macro areas are combinations of bidding zones. Each macro area can have one or more bidding zones, and a bidding zone can be part of one or several macro areas as shown below.



CZC limits between bidding zones within the macro area are not removed, but the macro areas functionality gives the user the possibility to control how bids are selected by using minimum and maximum reservation constraints.

As shown in the table below, demand, bids, and cross-border-capacity (CZC) are specified on a bidding zone level, as well as minimum and maximum activated reserves constraints. Macro areas can have constraints for minimum and maximum activated reserves within the area.

Input types	Bidding Zones	Macro Areas
Bids	X	
Demand	X	
CZC	X	
Minimum reservation	X	X
Maximum reservation	X	X

The difference between demand and minimum reservation is that the demand constraint allows for import and export to be used to meet the demand requirements, whilst the minimum reservation only uses selected bids. For national markets for example, the minimum reservation can be applied on macro areas to set a total demand for the country.

An additional feature of macro areas is the possibility to force the pricing algorithm to set the price equal for all bidding zones within a macro area. The macro area is then referred to as a virtual price area.

Pricing and definitions of congestions

Market players are paid based on a marginal pricing methodology, i.e. the same price for each bidding zone, hour and direction (up/down). The methodology aims at sending a price signal to the market players. The price can be interpreted as 'the maximum bid cost that would be selected'. As the general rule, the price for each bidding zone, hour and direction is based on the most expensive selected bid for that bidding zone, hour and direction such that all selected bids are profitable/in-the-money. What complicates the price setting is complex bid types and exchange between bidding zones.

For the complex bid types (block bids and linked bids), the pricing methodology only focuses on the profitability of the block bids over all hours in the block and over both pair of bids in a linked bid pair. That means that e.g., a block bid is not necessarily profitable for all hours in the block, but profitable for all hours in total.

Exchange (or the lack of exchange) of aFRR between bidding zones will result in a line (from/to bidding zones) being either congested or uncongested for each hour. If a line is congested, it means that a higher CZC limit would have resulted in more CZC allocated on the line and a better overall socio-economic solution for the auction. If a line is uncongested, it means that an increase in CZC limit for a line and hour will not change the original solution. If a line is congested, the importing bidding zone will have a price which is the maximum of the cost of the most expensive selected bid and the price in the exporting bidding zone. For uncongested bidding zones prices will be equal.

The example below shows a situation without exchange between bidding zones. Prices are set to the highest bidding cost of the selected bids for each bidding zone, i.e. 15 for A and B, and 5 for bidding zone C.

INPUT

Demand:
A: 20
B: 20
C: 20

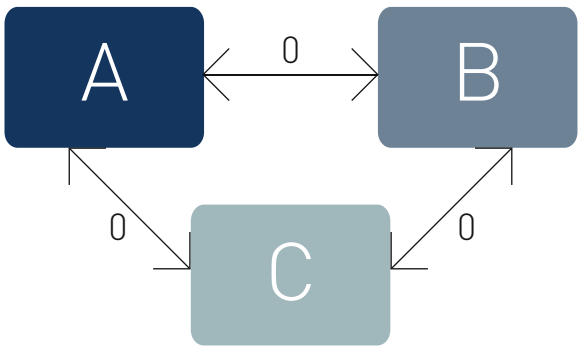
Bids:
[vol,cost]:

A:
[10,10]
[10,15]

B:
[10,10]
[10,15]

C:
[10,1]
[10,5]

CZC:
[vol,cost]
A->B: [0,1]
B->A: [0,1]
A->C: [0,1]
C->A: [0,1]
B->C: [0,1]
C->B: [0,1]



OUTPUT

Bids:

A:
[10,10]
[10,15]

B:
[10,10]
[10,15]

C:
[10,1]
[10,5]

The same example, but with different bid costs and volume and CZC limits shows how prices are affected by exchange.

INPUT

Demand:
A: 20
B: 20
C: 20

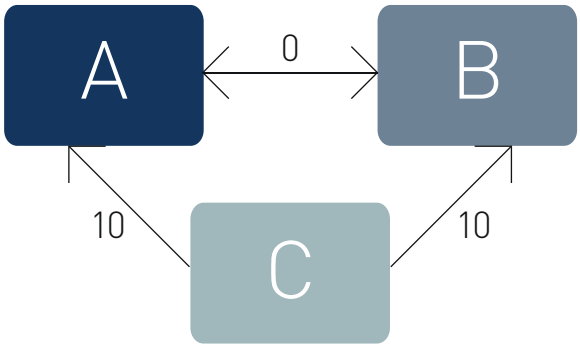
Bids:
[vol,cost]:

A:
[10,10]
[10,15]

B:
[10,11]
[10,12]

C:
[10,1]
[60,5]

CZC:
[vol,cost]
A->B: [10,1]
B->A: [10,1]
A->C: [10,1]
C->A: [10,1]
B->C: [10,1]
C->B: [10,1]



OUTPUT

Bids:

A:
[10,10]
[10,15]

B:
[10,11]
[10,12]

C:
[10,1]
[60,5]

Both bids in C are selected and 10 MW is sent to both A and B. If the CZC limit was higher, C would send even more which means that the lines between A–C and B–C are congested. The line between A and B is uncongested. As a result of this, A and B will have the same price which is the maximum of the highest selected bid cost and the price from C. C will have a price based on the highest accepted bid in C. As a result the price in A and B will be 11 €/MW and the price in C will be 5 €/MW.

8. Transfer of obligation

According to article 34 transfer of obligation is allowed within bidding zones. An exemption has been given to the Nordic LFC Block meaning that transfer cannot happen across bidding zones. BSPs should contact the national TSO to clarify how to transfer obligation is done on a national level.

9. Transparency and reporting

Information on the allocation process will be published on either the ENTSO-E transparency platform or on the Nordic Balancing Information system (NBIS) subsidiary Nordic unavailability Communication System(NUCS). The publication platform, timing and content of the data items is described in the tables below.

The colours are used to visualize on which platforms the information is published.

- Nordic Balancing Information System (NBIS) & ENTSO-E Transparency Platform (ETP)
- only Entso-e Transparency Platform (ETP)
- only Nordic Balancing Information System (NBIS) / Nordic Unavailability Communication System (NUCS)

According to the EU Transparency Regulation (543/2013) there is an obligation to report the following information on the ENTSO-E transparency platform:

Data item	Content (from aFRR capacity market perspective)	Publication time required:
Prices of procured balancing reserves	The market clearing price per bidding zone direction and hour. [€ / MW]	As soon as possible but no later than one hour after the procurement process ends
Amount of balancing reserves under contract	Aggregated contracted volumes of procured aFRR reserves per bidding zone, direction and hour. [MW]	As soon as possible but no later than two hours before the next procurement process takes place
Accepted aggregated offers	In the context of aFRR capacity market, this data item is considered redundant to the data above. The submission is mandatory, so Fifty Nordic MMS will send this data item.	As soon as possible but no later than one hour after the operating period.

According to EB GL there is an obligation to report the following information on the ENTSO-E transparency platform:

Data item	Content (from aFRR capacity market perspective)	Publication time required:
Information on offered volumes as well as offered prices of procured balancing capacity	Fifty Nordic MMS will publish the offered volumes and offered prices for procured aFRR capacity bids on an hourly basis for the bidding zones where a procurement was made.	no later than one hour after the results of the procurement have been notified to the bidders
Information on the allocation of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves	i. date and time when the decision on allocation was made ii. period of the allocation iii. volumes allocated iv. market values used as a basis for the allocation process	One hour before the single day-ahead coupling gate closure time
Information on the use of allocated cross-zonal capacity for the exchange of balancing capacity or sharing of reserves:	Fifty Nordic MMS calculates 4 data items to be reported: i. volume of allocated and used cross-zonal capacity per market time unit ii. volume of released cross-zonal capacity for subsequent timeframes per market time unit iii. estimated realised costs and benefits of the allocation process	one week after the use of allocated cross-zonal capacity
	NMMS reports socio economic benefits of the CZC reservation per bidding zone of the aFRR capacity market area.	one week after the use of allocated cross-zonal capacity

Nordic Balancing Information System (NBIS) & ENTSO-E Transparency Platform (ETP)

only Entso-e Transparency Platform (ETP)

only Nordic Balancing Information System (NBIS) / Nordic Unavailability Communication System (NUCS)

Publishing of additional information on the Nordic transparency platform (NUCS/NBIS):

Maximum transmission capacity available for the exchange of aFRR balancing capacity	The published maximum transmission capacity for the exchange of aFRR balancing capacity equals the minimum of the 10% of NTC as known D-1 06:45 and a market operator configurable reservation threshold, which can be set to restrict the capacity reservation for operational reasons	NA
The actual reservation percentage limit applied	In the case where default limits (10,12,14etc % of NTC) are used, NMMS will report the default percentage limit configured per border direction.	One hour before the single day-ahead coupling gate closure time
Updated mark-ups will be published	NMMS publishes dynamic markups per border direction and MTU. The dynamic markup is calculated based on the average forecast error of the last 30 days and is a value between 0.1 and 5€.	One hour before the single day-ahead coupling gate closure time

Nordic Balancing Information System (NBIS) & ENTSO-E Transparency Platform (ETP)

only Entso-e Transparency Platform (ETP)

only Nordic Balancing Information System (NBIS) / Nordic Unavailability Communication System (NUCS)

10. How to become an aFRR provider

BSPs need to contact the national TSO to clarify how to become an aFRR provider.

TSO	Contact
Svenska kraftnät	afrr@svk.se
Energinet	electricitymarket@energinet.dk
Statnett	BSP@statnett.no
Fingrid	reservit@fingrid.fi