

Nordic System Operation Agreement (SOA) – Annex Capacity Allocation & Capacity Management (CACM)

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1 Introduction

1.1 Interaction with other agreements

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

- Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity calculation and congestion management (hereinafter referred to as "CACM");
- Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereinafter referred to as "SOGL");
- "Cooperation Agreement regarding Regional Security Coordination in the Nordic region, Nordic RCC" (hereinafter referred to as "Nordic RCC Agreement");
- Multilateral Agreement on Participation in Regional Security Coordination Initiatives" (hereinafter referred to as "MLA");
- Day-Ahead operational agreement between ENTSO-E TSOs and NEMOs (hereinafter referred to as "Day-Ahead Operational Agreement")
- Intraday operational agreement between ENTSO-E TSOs and NEMOs (hereinafter referred to as "Intraday Operational Agreement");
- All TSOs' of the Nordic Capacity Calculation Region proposal for capacity calculation methodology in accordance with Article 20(2) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereinafter referred to as "CCM");
- All TSOs' of the Nordic Capacity Calculation Region for a coordinated redispatching and countertrading methodology in accordance with Article 35 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereinafter referred to as "CRC Methodology")¹;
- All TSOs' of the Nordic Capacity Calculation Region for a coordinated redispatching and countertrading cost sharing methodology in accordance with Article 74 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereinafter referred to as "CRCCS Methodology")².

1.2 Background

The guideline on Capacity Allocation and Capacity Management (hereinafter referred to as "CACM") lays down detailed requirements on cross-zonal capacity allocation and congestion management in the day-ahead and intraday markets, including the requirements for the establishment of common methodologies for determining the volumes of capacity simultaneously available between bidding zones, criteria to assess efficiency and a review process for defining bidding zones.

In this Annex the Nordic TSOs agree upon the main principles and requirements for ensuring a coordinated preparation of system operation of the Nordic TSO's transmission systems.

¹ Name of the proposal

² Name of the proposal

1.3 This Annex

This Annex shall be considered in addition to the principles, requirements and conditions included in the CACM.

The Annex is also in addition to the methodologies that have been approved by the NRAs in accordance with articles 9(6), 9(7) and 9(8) of CACM. This Annex includes references to these methodologies. Where NRAs approved an implementation date in future, this Annex describes the existing situation.

The Nordic TSOs anticipate regular updates in order to keep the agreements and methodologies in this Annex up-to-date. Consequently, this Annex includes mainly the agreements between the Nordic TSOs related to the existing situation and already provides requirements for near future. Changes shall be first approved by all Nordic TSOs, before the change will be implemented in the SOA at the latest when the change enters into force. The SOA maintenance group will follow the change agreed.

1.4 Geographic area

The geographical area to which the SOA/OP annex applies is the Nordic Capacity Calculation Region (hereafter referred to as "Nordic CCR").

1.5 Structure of this Annex

This Annex is structured as following:

- Chapter 2: Capacity Calculation
- Chapter 3: Redispatching and Countertrading
- Chapter 4: Single day-ahead coupling
- Chapter 5: Single intraday coupling
- Chapter 6: Redispatching and countertrading cost sharing

1.6 Definitions

For the purpose of this Annex, the terms used shall have the meaning of the definitions included in article 2 of CACM, article 3 of SOGL and the other items of legislation referenced therein.

2 Capacity Calculation

2.1 General requirements

2.1.1 Objective

To implement single day-ahead and intraday coupling, the available cross-border capacity needs to be calculated in a coordinated manner by the TSOs. For this purpose, they should establish a common grid model including estimates on generation, load and network status for each hour. The available cross-border capacity should be one of the key inputs into the further calculation process, in which all bids and offers, collected by power exchanges, are matched, taking into account available cross-border capacity in an economically optimal manner.

Capacity calculation for the day-ahead and intraday market timeframes should be coordinated at least at regional level to ensure that capacity calculation is reliable, and that optimal capacity is made available to the market. Common regional capacity calculation methodologies is established to define inputs, calculation approach and validation requirements. Information on available capacity should be updated in a timely manner based on latest information through an efficient capacity calculation process.

2.1.2 Rules & Methodologies

The document *"All TSOs' proposal for Capacity Calculation Regions (CCRs) in accordance with Article 15(1) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management"* is approved according to article 9(6)(b) of CACM.

According CCR decision the Nordic capacity calculation region (Nordic CCR) is defined by the following bidding zone borders:

- a) Denmark 1 - Sweden 3 (DK1-SE3);
- b) Denmark 2 - Sweden 4 (DK2-SE4);
- c) Denmark 1 - Denmark 2 (DK1-DK2);
- d) Sweden 4 - Sweden 3 (SE4-SE3);
- e) Sweden 3 - Sweden 2 (SE3-SE2);
- f) Sweden 2 - Sweden 1 (SE2-SE1);
- g) Sweden 3 - Finland (SE3-FI); and
- h) Sweden 1 - Finland (SE1-FI)
- i) Denmark 1 - Norway 2 (DK1-NO2);
- j) Sweden 3 - Norway (SE3-NO1);
- k) Sweden 2 - Norway 3 (SE2-NO3);
- l) Sweden 2 - Norway 4 (SE2-NO4);
- m) Sweden 1 - Norway 4 (SE1-NO4);
- n) Norway 3 - Norway 4 (NO3-NO4);
- o) Norway 3 – Norway 5 (NO3-NO5);
- p) Norway 1 - Norway 3 (NO1-NO3);
- q) Norway 1 - Norway 5 (NO1-NO5);
- r) Norway 1 - Norway 2 (NO1-NO2);
- s) Norway 2 - Norway 5 (NO2-NO5); and
- t) Norway 4 – Finland (NO4-FI)³

2.2 The common grid model

2.2.1 Objective

A common grid model for single day-ahead and intraday coupling purposes representing the European interconnected system should be established to calculate cross-zonal capacity in a coordinated way. The common grid model should include a model of the transmission system with the location of generation units and loads relevant to calculating cross-zonal capacity. The provision

³ The NO4-FI bidding zone border shall be included in the market coupling and capacity calculation process from the go-live of flow-based capacity calculation in CCR Nordic onwards.

of accurate and timely information by each TSO is essential to the creation of the common grid model.

Each TSO should be required to prepare an individual grid model of its system and send it to TSOs responsible for merging them into a common grid model. The individual grid models should include information from generation and load units.

Nordic TSOs have delegated the task of building the Nordic common grid model to Nordic RCC.

2.2.2 Roles & Responsibilities

The roles and responsibilities are described in the MLA. The detailed roles and responsibilities are described in Nordic RCC Agreement, Appendix 2: Service Level Agreement.

2.2.3 Rules & Methodologies

The document *"All TSOs' proposal for a generation and load data provision methodology in accordance with Article 16 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management"* was approved by all NRAs according to Article 9(6)(c) of CACM.

The document *"All TSOs' proposal for a common grid model methodology in accordance with Article 17 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management"* was approved by all NRAs according to Article 9(6)(d) of CACM.

2.2.4 Operational Procedures

The operational procedures are described in the MLA. The detailed operational procedures are described in Nordic RCC Agreement, Appendix 2.

2.3 Capacity calculation methodology

2.3.1 Objective

TSOs apply the flow-based capacity calculation approach. Since the intraday market is not yet able to support the allocation of cross-zonal capacities based on the flow-based approach, the flow-based parameters are converted into NTC capacities for the intraday market as a transitional solution.

The flow-based approach will be applied by the TSOs in accordance with the Nordic capacity calculation methodology (CCM) referred to in chapter 2.3.3 of this Annex.

TSOs should use a common set of remedial actions such as countertrading or redispatching to deal with both internal and cross-zonal congestion. In order to facilitate more efficient capacity allocation and to avoid unnecessary curtailments of cross-border capacities, TSOs should coordinate the use of remedial actions in capacity calculation.

Redispatching and countertrading shall be applied by the TSOs in accordance with the Nordic redispatching and countertrading methodology (CRC Methodology) referred to in chapter 3.3 of this Annex.

Redispatching and countertrading cost sharing shall be applied by the TSOs in accordance with the Nordic redispatching and countertrading cost sharing methodology (CRCCS Methodology) referred to in chapter 6.2 of this Annex.

2.3.2 Roles & Responsibilities

The roles and responsibilities are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.

2.3.3 Rules & Methodologies

The document *"All TSOs' of the Nordic Capacity Calculation Region proposal for capacity calculation methodology in accordance with Article 20(2) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CCM)"* was approved by Nordic CCR NRAs according to Article 9(7)(a) of CACM.

2.3.4 Operational Procedures

The operational procedures are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.

2.4 Capacity calculation process

2.4.1 Objective

The TSOs shall establish for each capacity calculation timeframe the individual grid model in order to merge the individual grid models into a common Nordic grid model.

For each capacity calculation timeframe, TSOs provide the coordinated capacity calculator (Nordic RCC) with data such as operational security limits, generation shift keys, remedial actions, reliability margins, allocation constraints and previously allocated cross-zonal capacity. The coordinated capacity calculator performs security analysis and calculates cross-zonal capacities and submits the results of the analysis and the cross-zonal capacities to TSOs. TSOs validate the results of the capacity calculation and send capacity validation and allocation constraints to the relevant coordinated capacity calculators and to the other TSOs of the relevant capacity calculation regions.

2.4.2 Roles & Responsibilities

The roles and responsibilities are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.

2.4.3 Operational Procedures

The operational procedures are described in the MLA. The detailed operational procedures are described in Nordic RCC Agreement, Appendix 2.

3 Redispatching and Countertrading

3.1 Objective

The methodology for coordinated redispatching and countertrading shall include actions of cross-border relevance and shall enable the TSOs in the capacity calculation region to effectively relieve physical congestion irrespective of whether the reasons for the physical congestion fall mainly outside their control area or not. The methodology for coordinated redispatching and countertrading shall address the fact that its application may significantly influence flows outside the TSO's control area.

Redispatching and countertrading shall be applied by the TSOs in accordance with the Nordic redispatching and countertrading methodology (CRC Methodology) referred to in chapter 3.3 of this Annex

3.2 Roles & Responsibilities

The roles and responsibilities are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.

3.3 Rules & Methodologies

The document *"All TSOs' of the Nordic Capacity Calculation Region for a coordinated redispatching and countertrading methodology in accordance with Article 35 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CRC Methodology)"* was approved by Nordic CCR NRAs according to Article 9(7)(c) of CACM.

3.4 Operational Procedures

The operational procedures are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office

4 Single day-ahead coupling

4.1 Price coupling algorithm

4.1.1 Objective

The price coupling algorithm shall produce the results in a manner which:

- a) aims at maximising economic surplus for single day-ahead coupling for the price-coupled region for the next trading day;
- b) uses the marginal pricing principle according to which all accepted bids will have the same price per bidding zone per market time unit;
- c) facilitates efficient price formation;
- d) respects cross-zonal capacity and allocation constraints;
- e) is repeatable and scalable.

4.1.2 Rules & Methodologies

The document *"All TSOs' proposal for a Methodology for Calculating Scheduled Exchanges resulting from single day-ahead coupling in accordance with Article 43 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management"* was approved by all NRAs according to Article 9(7)(d) of CACM.

The document *"All TSOs' of the Nordic Capacity Calculation Region amended Proposal for fallback procedures in accordance with Article 44 of 'Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management"* was approved by Nordic CCR NRAs according to Article 9(7)(e) of CACM.

Arrangements concerning more NEMOs (Multi NEMO arrangement "MNA").⁴

- The four individual documents (respectively Energinet's, Fingrid's, Svenska kraftnät's and Statnett's) *"Arrangements concerning more than one NEMO in one bidding zone in accordance*

⁴ Both the original and amended methodologies are valid

with Article 45 and 57 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management" approved by each individual Nordic NRA on 10 April 2017.

- The four individual documents (respectively Energinet's, Fingrid's, Svenska kraftnät's and Statnett's) "amendment in accordance with Article 9(13) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management on the Arrangements concerning more than one NEMO in one bidding zone in accordance with Article 45 and 57" approved by each individual Nordic NRA on 18 December 2018

4.2 The single day-ahead coupling process

4.2.1 Relevant process steps

Each coordinated capacity calculator shall ensure that cross-zonal capacities and allocation constraints shall be provided to relevant NEMOs in time to ensure the publication of cross-zonal capacities and of allocation constraints to the market no later than 11:00 market time day-ahead. The Nordic RCC provides CZCs and ACs to Nordic NEMOs in accordance with CACM and MNAs.

Each TSO shall take the necessary steps to guarantee firmness of allocated capacities in accordance with the document "All TSOs' proposal for the day-ahead firmness deadline (DAFD) in accordance with Article 69 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management" which was approved by the Nordic NRAs respectively.

All NEMOs performing the MCO functions shall deliver the single day-ahead coupling results to all TSOs, all CCCs, and all NEMOs.

Nordic NEMOs provide the results to the Nordic TSOs and the Nordic RCC in accordance with CACM and MNAs.

Each TSO shall verify that the single day-ahead coupling results of the price coupling algorithm have been calculated in accordance with the allocation constraints and validated cross-zonal capacity. This verification has been delegated to the Nordic RCC in accordance with the amended MNAs.

4.2.2 Roles & Responsibilities

The roles and responsibilities are defined in

- the Nordic RCC Agreement Appendix 2: Service Level Agreement Joint Office.
- the Nordic Day Ahead Market Coupling Operations Agreement ("Nordic DAOA")

4.2.3 Operational Procedures

The operational procedures are defined in

- The Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.
- The Nordic Day Ahead Market Coupling Operations Agreement ("Nordic DAOA") annex 2, 3, 4, 5 and 6 – the Nordic day-ahead procedures are maintained by the Nordic Operations Committee (Nordic OPSCOM).

5 Single intraday coupling

5.1 Intraday Auctions

5.1.1 Objective

The pricing of intraday capacity shall reflect market congestion and be based on actual orders. The pricing of intraday shall be applied by the TSOs in accordance with the Methodology for pricing intraday cross-zonal capacity.

The pricing mechanism for cross-zonal capacity in the intraday timeframe shall be based on intraday auctions, which shall be part of the single intraday coupling (i.e. auction SIDC) and shall complement the continuous SIDC.

The pricing of intraday cross-zonal capacity shall be established by allocating the available cross-zonal capacity for the respective MTUs by Intraday auctions, hereafter IDA, using the marginal pricing principle.

The established price of intraday cross-zonal capacity shall reflect the market situation at the time of the allocation. The IDAs shall respect cross-zonal capacity and allocation constraints.

5.1.2 Timing of intraday auctions

1. One IDA shall be held on the day D-1 for all MTUs of the delivery day D, i.e. from the first auction MTU starting at 00:00 until the end of the delivery day D, with a deadline for bid submission at 15:00 market time D-1.
2. One IDA shall be held on the day D-1 for all MTUs of the delivery day D, i.e. from the first auction MTU starting at 00:00 until the end of the delivery day D, with a deadline for bid submission at 22:00 market time D-1.
3. One IDA shall be held on the delivery day D for all remaining MTUs of the delivery day D, i.e. from the first auction MTU starting at 12:00 until the end of the delivery day D, with a deadline for bid submission at 10:00 market time D.

5.2 Continuous trading matching algorithm

5.2.1 Objective

From the intraday cross-zonal gate opening time until the intraday cross-zonal gate closure time, the continuous trading matching algorithm shall determine which orders to select for matching such that matching:

- a) aims at maximising economic surplus for single intraday coupling per trade for the intraday market timeframe by allocating capacity to orders for which it is feasible to match in accordance with the price and time of submission;
- b) respects the allocation constraints;
- c) respects the cross-zonal capacity;
- d) respects the requirements for the delivery of results;
- e) is repeatable and scalable.

5.2.2 Rules & Methodologies

The document *"The all TSOs' proposal for calculating scheduled exchanges resulting from single intraday coupling in accordance with Article 56(1) of the Commission Regulation (EU) 2015/1222 of*

24 July 2015 establishing a guideline on capacity allocation and congestion management" was approved by all NRAs according to Article 9(7)(d) of CACM.

The document *"All TSOs' proposal for intraday cross-zonal gate opening and gate closure times in accordance with Article 59 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management"* was approved by all NRAs according to Article 9(6)(k) of CACM.

Arrangements concerning more NEMOs (Multi NEMO arrangement "MNA")⁵

- The four individual documents (respectively Energinet's, Fingrid's, Svenska kraftnät's and Statnett's) *"Arrangements concerning more than one NEMO in one bidding zone in accordance with Article 45 and 57 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management"* approved by each individual Nordic NRA on 10 April 2017.
- The four individual documents (respectively Energinet's, Fingrid's, Svenska kraftnät's and Statnett's) *"amendment in accordance with Article 9(13) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management on the Arrangements concerning more than one NEMO in one bidding zone in accordance with Article 45 and 57"* approved by each individual Nordic NRA on 18 December 2018

The document *"Decision No 01/2019 of the Agency for the Cooperation of Energy Regulators of 24 January 2019 establishing a single methodology for pricing intraday cross-zonal capacity"* was approved by ACER on 24 January 2019 according to Article 9(11) of CACM.

5.3 The single intraday coupling process

5.3.1 Objective

Each coordinated capacity calculator shall ensure that cross-zonal capacity and allocation constraints are provided to the relevant NEMOs no later than 15 minutes before the intraday cross-zonal gate opening time.

If updates to cross-zonal capacity and allocation constraints are required, due to operational changes on the transmission system, each TSO shall notify the coordinated capacity calculators in its capacity calculation region. The coordinated capacity calculators shall then notify the relevant NEMOs.

Cross-zonal capacity shall not be allocated to an IDA and continuous trading at the same time. For this purpose, the cross-zonal trade and cross-zonal capacity allocation within the continuous SIDC shall be temporarily suspended and during this suspension all the available cross-zonal capacity shall be allocated through the IDA. The suspension period shall be limited to the time needed to transfer cross-zonal capacity between the continuous SIDC and IDAs (including, if necessary, to combine it with additional cross-zonal capacity from the capacity re-calculation), to run the IDA algorithm and to verify the results for allocated cross-zonal capacities. IDAs shall not have an impact on the continuous SIDC within bidding zones, for at least those bidding zones where more than one NEMO operates.

⁵ Both the original and amended methodologies are valid

5.3.2 Roles & Responsibilities

The roles and responsibilities are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.

5.3.3 Operational Procedures

The operational procedures are defined in the Nordic RCC Agreement, Appendix 2: Service Level Agreement Joint Office.

6 Redispatching and countertrading cost sharing

6.1 Objective

The redispatching and countertrading cost sharing methodology shall include cost-sharing solutions for actions of cross-border relevance.

Redispatching and countertrading costs eligible for cost sharing between relevant TSOs shall be determined in a transparent and auditable manner.

Redispatching and countertrading cost sharing shall be applied by the TSOs in accordance with the Nordic redispatching and countertrading cost sharing methodology (CRCCS Methodology) referred to in chapter 6.2 of this Annex. CACM 74(2)

6.2 Rules & Methodologies

The document *"All TSOs' of the Nordic Capacity Calculation Region for a coordinated redispatching and countertrading cost sharing methodology in accordance with Article 74 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CRCCS Methodology)"* was by Nordic CCR NRAs according to Article 9(7)(h) of CACM.