



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"); CACM
- Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereinafter referred to as "SOGL"); SOGL
- "Cooperation Agreement regarding Regional Security Coordination in the Nordic region, Nordic RSC" (hereinafter referred to as "Nordic RSC 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"); CACM 20(2)
- 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; CACM 35
- 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. CACM 74

¹ Name of the proposal

² Name of the proposal

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.

1.3 This Annex

This Annex shall be considered in addition to the principles, requirements and conditions included in the CACM. 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. CACM 9(6)
CACM 9(7)
CACM 9(8)

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 hour³. 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.

CACM
Whereas (4)

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 should be 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.

CACM
Whereas (6)

2.1.2 Rules & Methodologies

The TSOs agree that 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"* that has been approved according to article 9(6)(b) of CACM by *"Decision of the Agency for the cooperation of energy regulators No 06/2016 of 17 November 2016 on the electricity Transmission System Operators' proposal for the determination of capacity calculation regions"* is accepted by all TSOs.

CACM 15

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);

³ Market time unit is currently one hour.

- 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)

The “extended” Nordic CCR includes the following additional bidding zone borders:

- a) Denmark 1 - Norway 2 (DK1-NO2);
- b) Sweden 3 - Norway (SE3-NO1);
- c) Sweden 2 - Norway 3 (SE2-NO3);
- d) Sweden 2 - Norway 4 (SE2-NO4);
- e) Sweden 1 - Norway 4 (SE1-NO4);
- f) Norway 3 - Norway 4 (NO3-NO4);
- g) Norway 1 - Norway 3 (NO1-NO3);
- h) Norway 1 - Norway 5 (NO1-NO5);
- i) Norway 1 - Norway 2 (NO1-NO2); and
- j) Norway 2 - Norway 5 (NO2-NO5)

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

CACM
Whereas (8)

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.

CACM
Whereas (9)

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

2.2.2 Roles & Responsibilities

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

2.2.3 Rules & Methodologies

The TSOs agree that 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"* that has been approved by all NRAs according to Article 9(6)(c) of CACM on 9 January 2017, is accepted by all TSOs. CACM 16

The TSOs agree that 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"* that has been approved by all NRAs according to Article 9(6)(d) of CACM on 11 May 2019, is accepted by all TSOs. CACM 17

2.2.4 Operational Procedures

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

2.3 Capacity calculation methodology

2.3.1 Objective

TSOs apply NTC in day-ahead and intraday unless otherwise implemented by the Nordic capacity calculation methodology in accordance with article 20(2) CACM.

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. CACM 20(2)
CCM

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. CACM
Whereas (10)

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. CACM 35
CRC
Methodology

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
CRCCS
Methodology

2.3.2 Roles & Responsibilities

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

2.3.3 Rules & Methodologies

The TSOs agree that 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)"* that has been approved by Nordic CCR NRAs according to Article 9(7)(a) of CACM on 16 July 2018, is accepted by all TSOs.

CACM 20/21

The TSOs agree, that any amendment to *"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)"* is binding to each TSO upon approval by all Nordic CCR NRAs.

2.3.4 Operational Procedures

The operational procedures are defined in the Nordic RSC 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 grid model.

CACM 28(3)

For each capacity calculation timeframe, TSOs provide the coordinated capacity calculator (Nordic RSC) 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.

CACM 29

2.4.2 Roles & Responsibilities

The roles and responsibilities are defined in the Nordic RSC 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 RSC 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.

CACM 35(2)

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.

CACM 35

CRC

Methodology

3.2 Roles & Responsibilities

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

3.3 Rules & Methodologies

The TSOs agree that 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)*" that has been approved by Nordic CCR NRAs according to Article 9(7)(c) of CACM on 10 January 2019, is accepted by all TSOs.

CACM 35(1)

3.4 Operational Procedures

The operational procedures are defined in the Nordic RSC 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.

CACM 38(1)

4.1.2 Rules & Methodologies

The TSOs agree that 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"* that has been approved by all NRAs according to Article 9(7)(d) of CACM on 8 February 2019, is accepted by all TSOs.

CACM 43

The TSOs agree that 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"* that has been approved by Nordic CCR NRAs on 15 March 2018 according to Article 9(7)(e) of CACM, is accepted by all TSOs.

CACM 44

4.2 The single day-ahead coupling process

4.2.1 Objective

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.

CACM 48(2)

4.2.2 Roles & Responsibilities

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

4.2.3 Operational Procedures

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

5 Single intraday coupling

5.1 Trading matching algorithm

5.1.1 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: CACM 51(1)

- 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.

5.1.2 Rules & Methodologies

The TSOs agree that 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"* that has been approved by all NRAs according to Article 9(7)(d) of CACM on 30 October 2019, is accepted by all TSOs. CACM 56(1)

The TSOs agree that 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"* that has been approved by all NRAs according to Article 9(6)(k) of CACM on 24 April 2018, is accepted by all TSOs. CACM 59(1)

5.2 The single intraday coupling process

5.2.1 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. CACM 58(1)

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. CACM 58(2)

5.2.2 Roles & Responsibilities

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

5.2.3 Operational Procedures

The operational procedures are defined in the Nordic RSC 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. CACM 74(2)

Redispatching and countertrading costs eligible for cost sharing between relevant TSOs shall be determined in a transparent and auditable manner. CACM 74(3)

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
CRCCS
Methodology

6.2 Rules & Methodologies

The TSOs agree that 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)*" that has been approved by Nordic CCR NRAs according to Article 9(7)(h) of CACM on 10 January 2019, is accepted by all TSOs. CACM 74