# All TSOs' of the Hansa Capacity Calculation Region proposal for capacity calculation methodology in accordance with Article 10(1) of Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

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16 March 2021

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All TSOs of the Hansa Capacity Calculation Region, taking into account the following:

## Whereas

1. This document describes a common methodology developed by all Transmission System Operators (hereafter referred to as “TSOs”) of the Hansa Capacity Calculation Region (hereafter referred to as “CCR Hansa”) as defined in accordance with Article 15 of Commission Regulation (EU) 2015/1222 establishing a guideline on Capacity Allocation and Congestion Management (hereafter referred to as the “CACM Regulation”) regarding a methodology for Capacity Calculation (hereafter referred to as “CCM”) in accordance with Article 10 of the Commission Regulation 2016/1719 (hereafter referred to as the “FCA Regulation”).

2. This CCM takes into account the general principles, goals and other methodologies set in the FCA Regulation, CACM Regulation, Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as "SO Regulation"), Regulation (EU) 2019/943 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity (hereafter referred to as “Regulation (EU) 2019/943”, and the Commission Decision (EU) 2020/2123 of 11 November 2020 on the derogation for Kriegers Flak Combined Grid Facility following Article 64 of Regulation (EU) 2019/943.

3. The goal of the FCA Regulation is the coordination and harmonisation of cross-zonal capacity calculation and capacity allocation in the forward markets, and it sets requirements for the TSOs to cooperate on the level of capacity calculation regions (hereinafter referred to as “CCRs”), on a Pan-European level and across bidding-zone borders. The FCA Regulation also sets rules for establishing capacity calculation methodologies based on the coordinated net transmission capacity approach (hereafter referred to as “CNTC approach”).

4. This CCM is the concrete methodology for calculating capacity up to one year ahead, so-called long-term capacity calculation (LT CC). The objective of providing LT capacity is twofold. Firstly, the calculation of LT capacity will act as input to the issuing of LT transmission rights (LTTRs) on bidding-zone borders where LTTRs are implemented. Thus, the calculation of LT capacity will also provide capacity for hedging purposes. Secondly, market participants in the power market aim at forecasting future DA pricing of the different bidding zones, acting as an input to the strategies for operation and investment decisions. The goal of LT CC is to provide the market participants with the information of expected capacity between bidding zones, as this information has an impact on demand and supply of electricity and hence the DA pricing.

5. LTTRs issued based on this CCM results and allocated via Single Allocation Platform established in accordance with Article 49 of the FCA Regulation are to be considered in the capacity calculation methodology approved under Article 21 of CACM Regulation.

6. This CCM takes into account the Common Grid Model (hereafter referred to as “CGM”) methodology established in accordance with Article 18 of the FCA Regulation and assumes that the CGM developed accordingly is available in order to execute capacity calculation for the long-term time frame. As the case may be, the availability of the IGM, to be merged into the CGM, presupposes that requirements in national legislation on information security are taken into account. Thus, the frequency of the reassessment of long-term capacity depends on the availability of the CGM for the long-term time frame. Eight scenarios shall be created within the CGM for the year-ahead capacity calculation, and two scenarios for the month-ahead capacity calculation.

7. This CCM follows the definitions for the CNTC approach according to Article 2(8) in the CACM Regulation.

8. This CCM takes into account that not all bidding-zone borders in CCR Hansa apply LTTRs, implying that a separate legal document covering the methodology for splitting of long-term cross-zonal capacity, in a coordinated manner between different long-term time frames, shall be developed by the affected TSOs. The legal status of the separate methodology for splitting of long-term cross-zonal capacity shall be distinguished from the legal status of this methodology. The methodology for splitting of long-term cross-zonal capacity only applies to the bidding-zone borders where LTTRs have been introduced.

9. The CCM for the CCR Hansa is based on a CNTC approach with a strong link to adjacent CCRs, i.e. CCR Nordic and CCR Core.

10. The CCM for the CCR Hansa ensures optimal use of the transmission capacity as it takes advantage of the capacity calculation methodologies being developed simultaneously in CCR Nordic and CCR Core in order to represent the constraints in the AC grid. The use of CCR Hansa interconnector capacity and AC grid capacity is fully integrated in this way, thereby providing a fair competition for the scarce capacities in the system and an optimal system use.

11. The CCM for the CCR Hansa treats all bidding-zone borders in the CCR Hansa and adjacent CCRs equally and provides non-discriminatory access to cross-zonal capacity. It creates a basis for a fair and orderly market and a fair and orderly price format by implementing a pragmatic CCM solution which is to be integrated with the methodologies of the adjacent CCRs.

12. The CCM for the CCR Hansa will be fully implemented in a situation when CCR Nordic and CCR Core will take into account the influences of the CCR Hansa bidding-zone borders completely (particularly AC grid restrictions) during the capacity calculation according to the respective CCMs of these two regions.

13. The CCM for the CCR Hansa foresees a stepwise implementation to the situation where both the CCR Nordic and CCR Core fully take into account the influences of the CCR Hansa bidding-zone borders (particularly AC grid restrictions). Until then, the current capacity calculation processes for the CCR Hansa bidding-zone borders will continue. This implies that the current capacity calculation processes will also continue on the CCR Hansa bidding-zone borders when the CCR Core will implement a temporary methodology in which CCR Hansa influence is taken into CCR Core calculation process as fixed. Those fixed values can be taken as provided in scenarios developed in accordance to the common grid model methodology pursuant to Article 18 of FCA Regulation or estimated solely by CCR Core but will still not be considered in CCR Hansa calculations. In such an approach, the anticipated flows on CCR Hansa bidding-zone borders are taken into account in the available margins of critical network elements in the methodology of CCR Core which is less efficient than taking fully into account the influences of the CCR Hansa during the capacity calculation process.

14. With the CCM for the CCR Hansa, the CCR Hansa TSOs are preconditioning the complete consideration of CCR Hansa influence in the adjacent CCRs Nordic and Core CCMs, and when implemented there will be no undue discrimination between cross-zonal flows within CCR Hansa and adjacent CCRs. It will also ensure no undue discrimination between bidding-zone borders within CCR Hansa.

15. The CCM for the CCR Hansa has no negative consequences on the development of CCMs in adjacent CCRs. The CCM for the CCR Hansa therefore does not hinder an efficient long-term operation in CCR Hansa and/or adjacent CCRs, and the development of the transmission system in the European Union.

16. With the CCM for the CCR Hansa being aligned with the CCMs of adjacent CCRs, the selection, inclusion and justification of relevant critical network elements and contingencies, the handling of adjustment of power flows on critical network elements due to remedial actions as well as the mathematical description for the calculation of power transfer distribution factors and the calculation of available margins on critical network elements for the adjacent AC grids are handled by the adjacent CCRs' CCMs.

17. Article 4(8) of the FCA Regulation requires that the expected impact of the CCM on the objectives of the FCA Regulation is described. The impact is presented below (points (19 to (23) of this Whereas section).

18. The CCM contributes to and does not in any way hamper the achievement of the objectives of Article 3 of the FCA Regulation. In particular, the CCM serves the objectives of optimising the calculation and allocation of long-term cross-zonal capacity (Article 3(b) of the FCA Regulation), providing non-discriminatory access to long-term cross-zonal capacity (Article 3(c) of the FCA Regulation), respecting the need for a fair and orderly forward capacity allocation and orderly price formation (Article 3(e) of the FCA Regulation), ensuring and enhancing the transparency and reliability of information on forward capacity allocation (Article 3(f) of the FCA Regulation) and contributing to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union (Article 3(g) of the FCA Regulation).

19. The CCM serves the objective of optimising the calculation and allocation of long-term cross-zonal capacity in accordance with Article 3(b) of the FCA Regulation since the CCM is using the CNTC approach to provide cross-zonal capacities that are calculated in a more coordinated manner, to market participants. Moreover, optimisation of capacity calculation is secured based on coordination between CCR Hansa TSOs and adjacent CCRs hereby applying CGM and a Coordinated Capacity Calculator (CCC).

20. The CCM serves the objective of transparency and reliability of information (Article 3(f) of the FCA Regulation) as the CCM determines the main principles and main processes for the long-term time frame. The CCM enables TSOs to provide market participants with the same reliable information on cross-zonal capacities for long-term allocation and for forecasting, and cross-zonal risk hedging purposes in a transparent way. To facilitate transparency, the TSOs should publish data to the market on a regular basis to help market participants evaluate the capacity calculation process and long-term capacity forecasts. The TSOs should engage stakeholders in dialogue to specify necessary and useful data to this effect. The publication requirements are without prejudice to confidentiality requirements pursuant to national legislation.

21. The CCM does not hinder an efficient long-term operation in CCR Hansa and adjacent CCRs and the development of the transmission system in the European Union (Article 3(g) of the FCA Regulation). The CCM, by taking most important grid constraints into consideration, will support efficient pricing in the forward markets and forecasts of long-term cross-zonal capacity, providing the right signals from a long-term perspective.

22. The CCM contributes to the objective of respecting the need for a fair and orderly forward capacity allocation and price formation (Article 3(e) of the FCA Regulation) by making available in due time the cross-zonal capacity to be released in the long-term time frame and forward markets, where appropriate.

23. The CCM contributes to non-discriminatory access to long-term cross-zonal capacity (Article 3(c) of the FCA Regulation) by not applying barriers for access to the auction of LTTRs and consequently its full compliance with Harmonised Allocation Rules for long-term transmission rights (hereafter referred to as “Harmonised Allocation Rules”).

24. Rules for avoiding undue discrimination are only relevant when allocation of cross-zonal capacity in a long-term time frame takes place, hence this is considered only relevant for TSOs allocating LTTRs.

25. Article 16 (8) of Regulation (EU) 2019/943 sets out that transmission system operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones. This shall be considered to be complied when at least 70 % of the transmission capacity respecting operational security limits after deduction of contingencies, as determined in accordance with the CACM Regulation, are available for cross-zonal trade.
    The Commission Decision (EU) 2020/2123 of 11 November 2020 on the derogation for Kriegers Flak Combined Grid Facility following article 64 of Regulation (EU) 2019/943 specifies that this minimum percentage should not apply to the overall transmission capacity respecting operational security limits after deduction of contingencies for Kriegers Flak Combined Grid Facility. Instead, it should apply only to the capacity remaining after all capacity expected to be required for the transmission of production from the wind farms connected to the Kriegers Flak Combined Grid Facility to shore has been deducted ('residual capacity'). The exception for Kriegers Flak Combined Grid Facility is addressed throughout this CCM.

**SUBMIT THE FOLLOWING CCM TO ALL REGULATORY AUTHORITIES OF THE CCR HANSA:**

# TITLE I
# General

## Article 1
## Subject matter and scope

1. The CCM is the common methodology of TSOs in CCR Hansa in accordance with Article 10(1) of the FCA Regulation.

2. This CCM applies solely to the CCR Hansa as defined in accordance with Article 15 of the CACM Regulation.

3. This CCM covers the capacity calculation methodologies for the long-term time frame, where cross-zonal capacity shall be calculated for each forward capacity allocation time frame, and at least on annual and monthly time frames.

## Article 2
## Definitions and interpretation

1. For the purposes of the Proposal, the terms used shall have the meaning given to them in Article 2 Regulation (EU) 2019/943, Article 2 of FCA Regulation, Article 2 of CACM Regulation, Article 3 of SO Regulation, Article 2 of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (hereafter referred to as “Balancing Regulation”), and Article 2 of Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council (hereafter referred to as "Transparency Regulation"), Article 2 of the capacity calculation methodology developed in CCR Hansa in accordance with Article 20(2) of the CACM Regulation, and Commission Decision (EU) 2020/2123 of 11 November 2020:.

   In addition, in this CCM the following definitions shall apply:

   a) The Net Transfer Capacity (NTC) is the maximum total exchange programme between two adjacent bidding zones complying with security standards and taking into account the technical uncertainties on future network conditions: NTC = TTC - TRM. In case the Transmission Reliability Margin (TRM) equals zero, the NTC equals the Total Transfer Capacity (TTC).
   b) The Available Transfer Capacity (ATC) is a measure of the transfer capability remaining in the physical transmission network for further commercial activity after already committed uses: ATC = NTC - AAC. In case the Already Allocated Capacity (AAC) equals zero, the ATC equals the NTC.
   c) A CCR Hansa interconnector is either a radial DC line(s) or the combination of radial AC lines between the meshed AC grids on either side of the bidding-zone border.
   d) A critical network element (CNE) is a network element which is significantly impacted by cross-zonal trades. This element can be an overhead line, an underground cable or a transformer.

2. In this CCM, unless the context requires otherwise:
   a) The singular indicates the plural and vice versa;
   b) headings are inserted for convenience only and do not affect the interpretation of this CCM; and
   c) references to an "Article" are, unless otherwise stated, referring to an article of this CCM document.
   d) Any reference to legislation, regulations, directives, orders, instruments, codes or any other enactment shall include any modification, extension or re-enactment of it when in force.

3. For the sake of clarity, this CCM does not affect TSOs' right to delegate their task in accordance with the Article 62 of the FCA Regulation. In this CCM "TSO" shall refer to Transmission System Operator or to a third party whom the TSO has delegated task(s) to in accordance with the FCA Regulation, where applicable. However, the delegating TSO shall remain responsible for ensuring compliance with the obligations under the FCA Regulation.

# TITLE 2
# Calculation of the inputs to capacity calculation for the long-term time frame

## Article 3
## Methodology for determining transmission reliability margin

1. The methodology for determining the Transmission Reliability Margin (TRM) applies solely to a border connected by AC lines in the CCR Hansa.

2. The methodology for the TRM pursuant to Article 11 of the FCA Regulation is founded on the principles for calculating the probability distribution of the deviations between the expected power flows at the time of the capacity calculation, and realised power flows in real time, and subsequently specifies the uncertainties to be considered in the capacity calculation.

3. Following Article 11 of the FCA Regulation, the methodology for the TRM takes into account unintended deviations of physical electricity flows caused by the adjustment of electricity flows within and between control areas and unintended deviations of flows which could occur between the capacity calculation time frame and real time. The activation of remedial actions is not regarded as a source of uncertainty which needs to be considered in the TRM.

4. The TRM calculation consists of the following steps:
    a) Identification of sources of uncertainty for each TTC calculation. The TTC calculation is based on the CGM which includes assumptions of cross-border exchanges between third parties and forecasts for wind and solar infeed which impact the generation and load pattern as well as the grid topology;
    b) Derivation of independent time series for each uncertainty and determination of probability distributions (PD) of each time series. Generic time series from an already existing database are used as a starting point. The time series cover an appropriate timespan from the past in order to get a significant and representative amount of data;
    c) Convolution of the individual PDs and derivation of the TRM value from the convoluted PD. From the convoluted PD the 90th percentile is taken.

5. The inputs for the TRM calculation shall be coordinated and commonly agreed by the involved CCR Hansa TSOs to ensure a harmonised approach for deriving the reliability margin from the probability distribution.

6. The TRM shall be updated regularly and at least once a year by the relevant CCR Hansa TSOs.

## Article 4
## Methodology for determining operational security limits

1. The CCR Hansa TSOs shall respect the same operational security limits as in the operational security analysis in accordance with Article 12 of the FCA Regulation. These limits shall be

defined in accordance with Article 25 of the SO Regulation. Each CCR Hansa TSO shall provide relevant operational security limits to the CCC to be used in the capacity calculation.

2. Thermal limits of the CCR Hansa CNEs are considered in the TTC as described in the calculation process in Article 9.

3. Operational security limits and contingencies of AC grid elements adjacent to the CCR Hansa CNEs, reflecting the flow interactions between the CCR Hansa interconnectors and the AC grids, are to be considered in the flow-based parameters of CCR Nordic and CCR Core.

4. CCR Hansa TSOs can assess individually the operational security limits which cannot be reflected in the flow-based parameters of adjacent CCRs, including but not limited to: voltage stability limits, short-circuit limits and dynamic stability limits.

## Article 5
## Methodology for Allocation Constraints

1. CCR Hansa TSOs may, besides active power-flow limits on CCR Hansa interconnectors, apply allocation constraints during the capacity allocation phase that are needed to maintain the transmission system within operational security limits which cannot be transformed efficiently into maximum flows on critical network elements or constraints intended to increase economic surplus, to take into account:
    a. The production in a bidding zone shall be above a given minimum production level;
    b. The combined import or export from one bidding zone to other adjacent bidding zones shall be limited in order to ensure adequate level of generation reserves required for secure system operation;
    c. Maximum flow change per bidding zone border, connected with DC lines, between MTUs (ramping restrictions);
    d. Implicit loss factors on DC lines.

2. Following Article 5(1)(a), a minimum production level may need to be assured in a bidding zone in order to guarantee a minimum number of generators running in the system that are able to supply reactive power needed for voltage support or to safeguard sufficient inertia to ensure dynamic stability.

3. Following Article 5(1)(b), a CCR Hansa TSO may use allocation constraints to ensure a minimum level of operational reserve for balancing in case of a central dispatch model. The allocation constraints introduced are bi-directional, with independent values for directions of import and export, depending on the foreseen balancing situation. The details, justifications for use, and the methodology for the calculation of this kind of allocation constraints are set forth in Annex 1.

4. Following Article 5(1)(c), a ramping restriction is an instrument of system operation to maintain system security for frequency management purposes. This sets the maximum change in power flows between MTUs (max. MW/MTU per CCR Hansa bidding zone border).

5. Following Article 5(1)(d), in case of implicit loss handling an implicit loss factor on DC lines during capacity allocation ensures that the DC line will not carry a flow unless the welfare gain exceeds the costs of the corresponding losses.

6. Each CCR Hansa TSO applying one or more allocation constraints of Article 5(1) shall describe the allocation constraint(s) with the applied limits and communicate these transparently to the market participants together with a justification

7. CCR Hansa TSOs report on statistical indicators of cross-zonal capacity, including allocation constraints where appropriate for each capacity calculation time frame as a part of a biennial report on capacity calculation and allocation according to Article 31 of the CACM Regulation. Upon request of the CCR Hansa NRAs, CCR Hansa TSOs shall provide additional information about allocation constraints.

8. The shadow prices of the applied allocation constraints in the capacity allocation shall be recorded and reported by the NEMOs to the CCR Hansa TSOs and CCR Hansa NRAs.

## Article 6
## Methodology for determining contingencies relevant to capacity calculation

1. The CCR Hansa TSOs shall respect the same contingencies as in the operational security analysis in accordance with Article 12 of the FCA Regulation and Article 72 of the SO Regulation. These contingencies are to be considered in respective CCMs developed by adjacent CCRs.

## Article 7
## Methodology for determining generation shift keys (GSKs)

1. For the TTC calculation of the radial AC lines, as described in Article 9, the GSKs of the relevant bidding zones are to be defined in the CCMs of adjacent CCRs and shall be in accordance with Article 13 of the FCA Regulation. These GSKs are applied to represent the distribution of the power flow on the interconnectors in CCR Hansa.

2. Flow interactions between the CCR Hansa interconnectors and the adjacent AC grids are to be reflected in the corresponding LT CCM parameters of adjacent CCRs.

## Article 8
## Methodology for determining remedial actions (RAs) to be considered in capacity calculation

1. Costly RAs shall not be considered in capacity calculation.

2. Each CCR Hansa TSO shall define if non-costly RAs are available to be applied in capacity calculation in accordance with Article 25(1) of the FCA Regulation.

3. If non-costly RAs are available, each CCR Hansa TSO shall take them into account in the capacity calculation to allow for an increase in cross-zonal capacity in line with the equation in Article 9

4. Available RAs shall be coordinated between CCR Hansa TSOs in the same way as regulated in Coordinated Redispatching and Countertrading Methodology established in accordance with Article 35 of the CACM Regulation, clearly described, and communicated to other TSOs and the CCC.

5. If RAs are used in the capacity calculation, their application shall regularly and at least once a year be reviewed by the CCR Hansa TSOs the in accordance with Article 27(4)(c) of the CACM Regulation.

# TITLE 3
# Detailed description of the capacity calculation approach for the long-term time frame

## Article 9
## Mathematical description of the applied capacity calculation approach with different capacity calculation inputs

1. The following mathematical description applies for the calculation of ATC on the DC lines between bidding zones.

   The $ATC_{DC,A\rightarrow B}$ on a bidding-zone border that is connected by DC lines in the direction A→B is calculated as follows:

$$ATC_{DC,A\rightarrow B} = TTC_{A\rightarrow B} - AAC_{A\rightarrow B}$$

2. If adjacent CCR CCM is based on cNTC approach the capacity shall be calculated in three steps for both directions, A→B and B→A.

   Step 1: The $ATC_{i,DC,A\rightarrow B}$ on a DC line i in the direction A→B is calculated as follows:

$$ATC_{i,DC,A\rightarrow B} = TTC_{i,A\rightarrow B} - AAC_{i,A\rightarrow B}$$

   Step 2: In addition, ATC values are collected from CCR Core and CCR Nordic being the ATC values for the connection between the AC grids and the relevant nodes for the interconnector:

$$ATC^{Core}_{i,A\rightarrow B} = \text{Defined by the CCM of CCR Core}$$

$$ATC^{Nordic}_{i,A\rightarrow B} = \text{Defined by the CCM of CCR Nordic}$$

Step 3: The capacity on the bidding-zone border is then calculated by selecting the lowest of the three values from the previous steps:

$$ATC_{A \to B} = \text{Min}\ \{ATC^{Hansa}, ATC^{Core}, ATC^{Nordic}\}$$

If an interconnector is out of operation for certain period, then the available capacity of that interconnector in that period is set to zero, i.e. $ATC_i = 0$.

Where

| | | |
|---|---|---|
| A | := | Bidding zone A. |
| B | := | Bidding zone B. |
| $ATC_{i,DC,A \to B}$ | := | Available Transfer Capacity on a DC line i in direction A→B provided to the long-term market. |
| $TTC_{i,A \to B}$ | := | Total Transfer Capacity (TTC) of a DC line i in direction A→B. The TTC corresponds only to the full capacity of the DC line, in case of no failure on the CCR Hansa interconnector, including converter stations.<br><br>The TTC for a DC line i is defined as follows:<br>$TTC_{i,A \to B} = \alpha_i \cdot P_{i,max\,thermal} * (1 - \beta_{i,Loss,A \to B})$ |
| $AAC_{i,A \to B}$ | := | Already Allocated including also nominated Capacity for a DC line i in direction A→B in accordance with Article 10. |
| $\alpha_i$ | := | Availability factor of equipment defined through scheduled and unscheduled outages, $\alpha_i$, being a real number in between and including 0 and 1. |
| $P_{i,max\,thermal}$ | := | Thermal capacity for a DC line i. |
| $\beta_{i.Loss,A \to B}$ | := | Loss factor in case of explicit grid loss handling on a DC line i in direction A→B, can be a different value depending on $\alpha_i$. In case of implicit loss handling, the loss factor is set to zero but considered as an import/export limit in accordance with Article 5. |

3. The following mathematical description applies for the calculation of ATC on the AC lines between bidding zones.

   The $ATC_{AC,A\rightarrow B}$ on a bidding-zone border that is connected by AC lines in the direction A→B is calculated as follows:

$$ATC_{AC,A\rightarrow B} = TTC_{A\rightarrow B} - TRM_{A\rightarrow B} - AAC_{A\rightarrow B}$$

4. If adjacent CCR CCM is based on cNTC approach the capacity shall be calculated in three steps for both directions, A→B and B→A.

   Step 1: The $ATC_{i,AC,A\rightarrow B}$ on an AC line i in the direction A→B is calculated as follows:

$$ATC_{i,AC,A\rightarrow B} = TTC_{i,A\rightarrow B} - TRM_{i,A\rightarrow B} - AAC_{i,A\rightarrow B}$$

   Step 2: In addition, ATC values are collected from CCR Core and CCR Nordic representing the value for the node relevant for the interconnector:

$$ATC^{Core}{}_{i,A\rightarrow B} = \text{Defined by the CCM of CCR Core}$$

$$ATC^{Nordic}{}_{i,A\rightarrow B} = \text{Defined by the CCM of CCR Nordic}$$

   Step 3: The capacity on the bidding-zone border is then calculated by selecting the lowest of the three values from the previous steps:

$$ATC_{i,A\rightarrow B} = \text{Min}\,\{ATC^{Hansa}, ATC^{Core}, ATC^{Nordic}\}$$

   If an interconnector is out of operation for certain period, then the available capacity of the interconnector in that period is set to zero, i.e. $ATC_i$=0.

   Where

| | | |
|---|---|---|
| A | := | Bidding zone A. |
| B | := | Bidding zone B. |
| $ATC_{AC,A\rightarrow B}$ | := | Available Transfer Capacity on an AC line of a bidding-zone border in direction A→B, provided to the long-term market. |

| | | |
|---|---|---|
| $TTC_{A \rightarrow B}$ | := | Total Transfer Capacity of a bidding-zone border in direction A→B.<br>The TTC is determined according to the following steps:<br>1. Performing load-flow calculation using the CGM and the GSKs according to Article 7.<br>2. When assessing the loading of the individual circuits of the CCR Hansa interconnector, and to take N-1 security criterion into account, the processes of point 3 and 4 are repeated with the outage of each of the individual circuits on the CCR Hansa interconnector where the minimum TTC for each CCR Hansa interconnector and in each direction is set as TTC in the given direction.<br>3. Using the GSK to increase the net position of bidding zone A while decreasing the net position of bidding zone B at equal amounts until a circuit or multiple circuits of the CCR Hansa interconnector reach their permanent admissible thermal loading. The TTC is then equal to the maximum exchange between the bidding zones.<br>4. The process of point 3 is repeated in the opposite direction to determine the TTC in the direction B to A. |
| $TRM_{A \rightarrow B}$ | := | Transmission Reliability Margin for a bidding-zone border in direction A→B, in accordance with Article 3. |
| $AAC_{A \rightarrow B}$ | := | Already Allocated Capacity for a bidding-zone border in direction A→B, in accordance with Article 10. |

5. The following mathematical description applies solely to the calculation of ATC on the Kriegers Flak Combined Grid Solution (KF CGS), being a hybrid interconnector and offshore wind farm (OWF) grid connection between DK2-DE/LU and in accordance with Commission Decision (EU) 2020/2123 of 11 November 2020:

The $ATC_{KF\ CGS,DE \rightarrow DK}$ on KF CGS, in direction from DE/LU→DK2 is calculated as follows:

$$ATC_{KF\ CGS,\ DE \rightarrow DK} = \alpha_i \cdot \min\left(\frac{P_{max\ thermal,DE}}{1 + Loss_{DE} + Loss_{XB}},\ \frac{P_{max\ thermal,XB}}{1 + Loss_{XB}},\ P_{max\ thermal,DK} - InstC_{DK}^{Wind}\right) - AAC_{KF\ CGS,DE \rightarrow DK}$$

The $ATC_{KF\ CGS,DK \rightarrow DE}$ on KF CGS, in direction from DK2 → DE/LU is calculated as follows:

$$ATC_{KF\ CGS,DK \rightarrow DE} = \alpha_i \cdot \min\left(\frac{P_{max\ thermal,DK}}{1 + Loss_{DK}}, P_{max\ thermal,XB}, \frac{P_{max\ thermal,DE} - InstC_{DE}^{Wind}}{1 - Loss_{XB}},\ \frac{P_{max\ thermal,DE} - InstC_{DE}^{Wind}(1 - Loss_{DE})}{1 - Loss_{XB} - Loss_{DE}}\right) - AAC_{KF\ CGS,DK \rightarrow DE}$$

When KF CGS is not in operation ($P_{\max \text{thermal,DK}}$, $P_{\max \text{thermal,DE}}$ or $P_{\max \text{thermal,XB}}$ is equal to zero) due to a planned or unplanned outage:

$$\text{ATC}_{\text{KF CGS,DE}\rightarrow\text{DK}} = 0$$

Where:

| | |
|---|---|
| DE | := Bidding zone DE/LU. |
| DK | := Bidding zone DK2. |
| $\text{ATC}_{\text{KF CGS,DE}\rightarrow\text{DK}}$ | := Transfer Capacity on KF CGS in direction DE/LU→DK2 available for long term capacity allocation. |
| $\text{ATC}_{\text{KF CGS,DK}\rightarrow\text{DE}}$ | := Transfer Capacity on KF CGS in direction DK2→DE/LU available for long term capacity allocation. |
| $\text{AAC}_{\text{KF CGS,DE}\rightarrow\text{DK}}$ | := Already Allocated Capacity for KF CGS in direction DE/LU→DK2. |
| $\text{AAC}_{\text{KF CGS,DK}\rightarrow\text{DE}}$ | := Already Allocated Capacity for KF CGS in direction DK2→DE/LU. |
| $\text{InstC}_{\text{DE}}^{\text{Wind}}$ | := Installed generation capacities of the OWF(s) that is a part of bidding zone DE/LU and connected to the KF CGS. |
| $\text{InstC}_{\text{DK}}^{\text{Wind}}$ | := Installed generation capacities of the OWF(s) that is a part of bidding zone DK2 and connected to the KF CGS. |
| $\text{Loss}_{\text{DE}}$ | := Electrical losses between the connection point of KF CGS in bidding zone DE/LU and $CP_{\text{OWF, DE}}$ |
| $\text{Loss}_{\text{XB}}$ | := Electrical losses between the connection point in $CP_{\text{OWF, DK}}$ and $CP_{\text{OWF, DE}}$ |
| $\text{Loss}_{\text{DK}}$ | := Electrical losses between the connection point of KF CGS in bidding zone DK2 and $CP_{\text{OWF, DK}}$ |
| $\alpha_i$ | := Availability factor of equipment defined through scheduled and unscheduled outages, $\alpha_i$, being a real number in between and including 0 and 1. |
| $P_{\max \text{thermal,DE}}$ | := Thermal capacity for line section from bidding zone DE/LU to $CP_{\text{OWF, DE}}$ |
| $P_{\max \text{thermal,XB}}$ | := Thermal capacity for line section from $CP_{\text{OWF, DK}}$ to $CP_{\text{OWF, DE}}$ |
| $P_{\max \text{thermal,DK}}$ | := Thermal capacity for line section from bidding zone DK2 to $CP_{\text{OWF, DK}}$ |

## Article 10
## Rules for taking into account previously allocated cross-zonal capacity

Cross-zonal capacities shall be reduced, where appropriate, by the amount of previously allocated capacities for already allocated transmission rights. In case previously allocated capacities are bigger than cross-zonal capacities on a bidding-zone border, defined in accordance with Article 9, the relevant CCR Hansa TSO(s) shall provide zero cross-zonal capacity for the capacity allocation and use RAs to ensure operational security.

## Article 11
## Rules on the adjustment of power flows of cross-zonal capacity due to RAs

CCR Hansa TSOs shall take into account the capacity calculation RAs as defined in Article 8 to increase the cross-zonal capacity for the long-term time frame.

## Article 12
## Rules for calculating cross-zonal capacity, including rules for efficiently sharing power-flow capabilities of CNEs among different bidding-zone borders

CCR Hansa interconnectors are the only CNEs considered in the capacity calculation. None of these elements or their power-flow capabilities are shared between CCR Hansa bidding-zone borders, following CACM Regulation Article 21(1)(b)(vi).

## Article 13
## Rules for sharing the power flow capabilities of CNEs among different CCRs

With the CCM for the CCR Hansa being aligned with the CCMs of adjacent CCRs, the selection of CNEs and the calculation of available margins is handled by the adjacent CCRs' CCMs. All selected CNEs, including CNEs jointly relevant for different CCRs, are treated equally in the calculation process ensuring proper sharing of power-flow capacities of CNEs among different CCRs.

## Article 14
## Scenarios to be used in a security analysis

1. Scenarios to be used in a security analysis for long-term capacity calculation time frames associated with AC grid of adjacent CCRs shall be considered by applying in CCMs of adjacent CCRs Core and Nordic scenarios as defined in Article 3 of the CGM methodology developed in accordance with Article 18 of FCA regulation.

2. Relevant maintenance plans shall be considered when applying security analysis for long-term capacity calculation time frames associated with CCR Hansa bidding-zone borders.

3. The capacity values, resulting from the capacity calculation for each scenario, shall be published.

# TITLE 4
# Methodology for the validation of cross-zonal capacity for long-term time frame

## Article 15
## Methodology for the validation of cross-zonal capacity

1. Each CCR Hansa TSO shall perform the validation of cross-zonal capacities on its bidding-zone border(s) to ensure that the results of regional calculation of cross-zonal capacity will comply with operational security limits. When performing the validation, the CCR Hansa TSOs shall consider operational security, considering new and relevant information obtained during or after the most recent capacity calculation.

2. If CCR Hansa TSOs find errors in cross-zonal capacity provided for validation, the relevant CCR Hansa TSOs provide new information to the CCC for recalculation. The CCC shall redo the calculation and send the recalculated cross-zonal capacities for revalidation. Recalculations are executed until no errors are found.

3. Each CCC shall report all reductions made during the validation of cross-zonal capacity to all NRAs of the Hansa CCR. This report shall include the location and amount of any reduction in cross-zonal capacity and shall give reasons for the reductions.

4. The CCC shall coordinate with the neighbouring CCCs during the capacity calculation and validation.

## TITLE 5
## Miscellaneous

### Article 16
### Fallback procedure if the initial capacity calculation does not lead to any results

1. In case the initial capacity calculation does not lead to any results, the CCC shall try to solve the problem and perform long-term capacity calculation again, if time allows making such calculation.

2. If the CCC is not able to perform long-term capacity calculation in accordance with Article 16(1), CCR Hansa TSOs shall contact the single allocation platform (SAP) and ask for possible auction postponement.

3. If the CCC is not able to perform long-term capacity calculation in accordance with Article 16(1), and if postponement of allocation process in accordance with Article 16(2) is not possible, each CCR Hansa TSO shall individually calculate the cross-zonal capacity for relevant long-term time frames for its bidding-zone borders, and the lowest value calculated for each bidding-zone border by neighbouring CCR Hansa TSOs shall be applied.

### Article 17
### Monitoring data to the national regulatory authorities

1. All technical and statistical information related to this CCM shall be made available upon request to the NRAs in the CCR Hansa.

2. Monitoring data shall be provided to the NRAs in the CCR Hansa as a basis for supervising a non-discriminatory and efficient capacity calculation in CCR Hansa.

3. Any data requirements mentioned above should be managed in line with confidentiality requirements pursuant to national legislation.

### Article 18
### Publication of data

1. The CCR Hansa TSOs shall, in compliance with national legislation and in accordance with Article 3(f) of the FCA Regulation, and in addition to the data items and definitions of Transparency Regulation, publish the following on a regular basis and as soon as possible:|

   Information for each forward capacity calculation, and in accordance with article 9 of the FCA Regulation, at least on annual and monthly time frames, which shall include the following:
   a) cross-zonal capacity for each bidding-zone border;
   b) all components of the cross-zonal capacity, i.e. TTC, AAC, and RM, for each bidding-zone border.

2. The data shall be published for annual capacity calculation, one week before the yearly allocation process but no later than 15 December, for all months of the following year.

3. The data shall be published for monthly capacity calculation, two working days before the monthly allocation process for all days of the following month.
4. The data, obtained from the capacity calculation on a time frame different than referred to in Article 18(2) and 18(3), shall be published in due time.
5. The above-mentioned publication requirements are without prejudice to confidentiality requirements pursuant to national legislation.

# TITLE 6
# Final Provisions

## Article 19
## Publication and Implementation

1. Implementation of this CCM will be a stepwise process with the following milestones:
   a) The SAP in accordance with Article 48 of the FCA Regulation is established and in operation.
   b) The CCR Hansa CCC is appointed and in operation pursuant to Article 21(2) of the FCA Regulation.
   c) The CGM methodology is implemented in accordance with Article 18 of the FCA Regulation.
   d) The LT CCMs of CCR Core and of CCR Nordic have been implemented and take fully into account the influences of the CCR Hansa interconnectors during the capacity calculation according to the respective CCMs of these two regions.

2. Following Article 20(1)(b), with the CCR Hansa CCC appointment and its entry into operation, CCR Hansa CCC will calculate the cross-zonal capacity while the CCR Hansa TSOs will send the results from their capacity calculations on the AC grid to the CCR Hansa CCC, based on current methodologies. The minimum capacity calculated will prevail and will be applied by the CCR Hansa CCC. The resulting cross-zonal capacities are subject to validation by each CCR Hansa TSO for its bidding-zone borders. The CCR Hansa CCC provides the validated cross-zonal capacities to the allocation mechanism.

3. Following Article 20(1)(c), with the implementation of the long term CGMs, CCR Hansa TSOs will use the same CGM input in their CCR Hansa related capacity calculation processes. This will ensure that the forecast of demand, generation and line availability are the same, thus increasing the coordination of the capacity calculation.

4. Following Article 20(1)(d), when LT CCMs of CCR Core and of CCR Nordic will take fully into consideration the influences of the CCR Hansa interconnectors, the influence of the CCR Hansa interconnectors on the AC grid will be market driven, ensuring equal treatment of the CCR Hansa bidding-zone borders and bidding-zone borders in the adjacent CCRs. Until that time, the CCR Hansa TSOs will follow the capacity calculation as described in Article 20(2) towards this adjacent CCR. This implies that the capacity calculation process will continue on the CCR Hansa bidding-zone borders even when the CCR Core is considering CCR Hansa influence as fixed and provided in scenarios developed in accordance to the common grid model methodology pursuant to Article 18 of FCA Regulation.

## Article 20
## Language

The reference language for this CCM shall be English. For the avoidance of doubt, where CCR Hansa TSOs need to translate this CCM into their national languages, in the event of inconsistencies between the English version published by CCR Hansa TSOs in accordance with Article 4(13) of the FCA Regulation and any version in another language, the relevant CCR Hansa TSOs shall be obliged to dispel any inconsistencies by providing a revised translation of this CCM to their relevant national regulatory authorities.

## Annex 1: Justification of the Methodology for Calculation of Allocation Constraints (Article 5) and its Application

The following section depicts in detail the justification of usage and methodology currently used BYT PSE to design and implement allocation constraints, if applicable. The legal interpretation on eligibility of using allocation constraints and the description of their contribution to the objectives of the FCA Regulation is included in the Explanatory Document.

PSE may use an allocation constraint to limit the import and export of the Polish bidding zone.

**Technical and legal justification**

Implementation of allocation constraints as applied by PSE is related to integrated scheduling process applied in Poland (also called central dispatching model) and the way how reserve capacity is being procured by PSE. In a central dispatching model, in order to balance generation and demand and ensure secure energy delivery, the TSO dispatches generating units taking into account their operational constraints, transmission constraints and reserve capacity requirements. This is realised in an integrated scheduling process as a single optimisation problem called security constrained unit commitment (SCUC) and economic dispatch (SCED).

The integrated scheduling process starts after the day-ahead capacity calculation and SDAC and continues until real-time. This means that reserve capacity is not blocked by TSO in advance of SDAC and in effect not removed from the wholesale market and SDAC. However, if balancing service providers (generating units) would already sold too much energy in the day-ahead market because of high exports, they may not be able to provide sufficient upward reserve capacity within the integrated scheduling process1. Therefore, one way to ensure sufficient reserve capacity within integrated scheduling process is to set a limit to how much electricity can be imported or exported in the SDAC.

Allocation constraints are determined for the whole Polish power system, meaning that they are applicable simultaneously for all CCRs in which PSE has at least one bidding zone border (i.e. Core, Baltic and Hansa). This solution is the most efficient. Considering such constraints separately in each CCR would require PSE to split global constraints into CCR-related sub-values, which would be less efficient than maintaining the global value. Moreover, in the hours when Poland is unable to absorb any more power from outside due to violated minimal downward reserve capacity requirements, or when Poland is unable to export any more power due to insufficient upward reserve capacity requirements, Polish transmission infrastructure is still available for cross-border trading between other bidding zones and between different CCRs.

**Methodology to calculate the value of allocation constraints**

When determining the allocation constraints, PSE takes into account the most recent information on the technical characteristics of generation units, forecasted power system load as well as minimum reserve margins required in the whole Polish power system to ensure secure operation and forward import/export contracts that need to be respected from previous capacity allocation time frames.

[1] This conclusion equally applies for the case of lack of downward balancing capacity, which would be endangered if balancing service providers (generating units) sell too little energy in the day-ahead market, because of too high imports.

The constraints are calculated according to the below equations:

$$EXPORT_{constraint} = P_{CD} - (P_{NA} + P_{ER}) + P_{NCD} - (P_L + P_{UPres}) \quad (1)$$

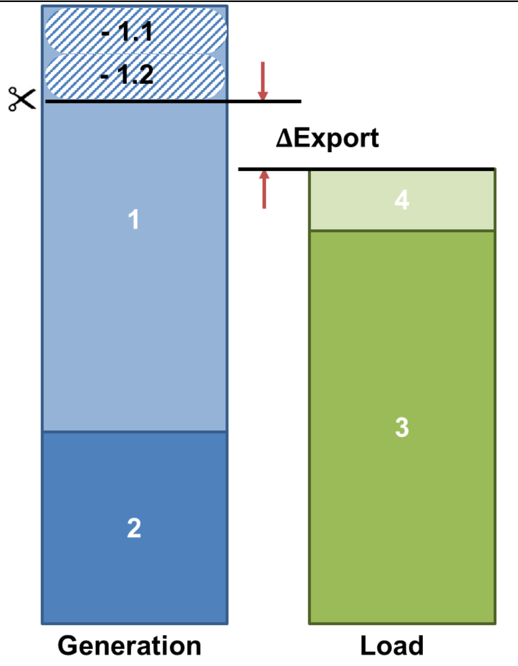
$$IMPORT_{constraint} = P_L - P_{DOWNres} - P_{CD_{min}} - P_{NCD} \quad (2)$$

Where:

| | |
|---|---|
| $P_{CD}$ | Sum of available generating capacities of centrally dispatched units as declared by generators |
| $P_{CD_{min}}$ | Sum of technical minima of available centrally dispatched generating units |
| $P_{NCD}$ | Sum of schedules of generating units that are not centrally dispatched, as provided by generators (for wind farms: forecasted by PSE) |
| $P_{NA}$ | Generation not available due to grid constraints (both planned outage and/or anticipated congestions) |
| $P_{ER}$ | Generation unavailability's adjustment resulting from issues not declared by generators, forecasted by PSE due to exceptional circumstances (e.g. cooling conditions or prolonged overhauls) |
| $P_L$ | Demand forecasted by PSE |
| $P_{UPres}$ | Minimum reserve for upward regulation |
| $P_{DOWNres}$ | Minimum reserve for downward regulation |

For illustrative purposes, the process of practical determination of allocation constraints in export direction in the framework of the long-term capacity calculation is illustrated below in Figure 1. The figure illustrate how a forecast of the Polish power balance for the delivery period is developed by PSE in order to determine reserves in generating capacities available for potential exports, for the long-term market.

Allocation constraint in export direction is applicable if □Export is lower than the sum of cross-zonal capacities on all Polish interconnections in export direction.




1. Sum of available generating capacities of centrally dispatched units as declared by generators, reduced by:
   - 1.1 Generation not available due to grid constraints
   - 1.2 Generation unavailability's adjustment resulting from issues not declared by generators, forecasted by PSE due to exceptional circumstances (e.g. cooling conditions or prolonged overhauls)
2. Sum of schedules of generating units that are not centrally dispatched, as provided by generators (for wind farms: forecasted by PSE)
3. Demand forecasted by PSE
4. Minimum necessary reserve for up regulation

Figure 1: Determination of Allocation constraint in export direction (generating capacities available for potential exports) in the framework of the long-term capacity calculation.

**Frequency of review**

Allocation constraints are determined in a continuous process based on the most recent information, for each capacity allocation time frame.