Second amendment of the Day-Ahead Capacity Calculation Methodology of the Core Capacity Calculation Region

in accordance with Articles 20ff. of the Commission Regulation (EU) 2015/1222 of 24th July 2015 establishing a guideline on capacity allocation and congestion management

28 November 2023

Whereas

TSOs of the Core CCR ("Core TSOs"), taking into account the following:

(1) Hybrid coupling refers to the combined use of Flow-Based (FB) and Available Transmission Capacity (ATC) constraints in one single capacity allocation mechanism. There are two forms of hybrid coupling: Standard Hybrid Coupling (SHC) and Advanced Hybrid Coupling (AHC). The difference between SHC and AHC is how power flows on interconnectors between the Core CCR and adjacent CCRs are mapped onto Core CNECs. The SHC grants access to the scarce CNEC capacity by reserving capacity on the Core CNECs based on the forecasted power flows on the interconnectors. On the other hand, in the AHC, the power flows on the interconnectors between the Core CCR and adjacent CCRs are subject to non-discriminatory competition for CNEC capacity with all other power flows within the Core CCR. Besides ensuring a non-discriminatory competition for the scarce CNEC capacity, the expectation is that Core FB DA MC will benefit from the implementation of AHC in terms of socio-economic welfare as well;
(2) Six months after Core FB DA MC Go-Live, Core TSO need to submit to Core NRAs a proposal for amendment of this methodology detailing the implementation of AHC. In order to elaborate and discuss this proposal for amendment in detail, it was agreed with the Core NRAs to extend this deadline to the end of March 2023;
(3) With this amendment, Core TSOs aim to both detail the AHC methodology and set a timeline for the technical readiness of the tools used in the Core FB DA CC and MC processes for the introduction of AHC;
(4) The following changes fulfil the objectives set out in Article 3 CACM. In particular, an improvement will be made in relation to Article 3 (b), (d) and (j) improving the allocation of capacity at borders to other CCRs. The aim of the measures is to create a level playing field in Single Day Ahead Coupling ('SDAC') with regard to flows resulting from intra-CCR trade and flows resulting from trade with bidding zones outside the core CCR.

For the purposes of this second amendment to the Core CCR TSOs' Day-Ahead Capacity Calculation Methodology, terms used in this document shall have the meaning of the definitions included in Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast), Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM Regulation), Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation (FCA Regulation), Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (EB Regulation) and 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 and the definitions set out in Article 2 Annex I of the Decision No 02/2019 of the Agency for the Cooperation of the Energy Regulators of 21 February 2019 on the Core CCR TSOs' proposal for the regional design of the day-ahead and intraday common capacity calculation methodologies.

Article 1
Technical provisions for the implementation of Advanced Hybrid Coupling

1. Whereas

The Whereas section shall be amended by introducing a new paragraph (25) accordingly:

> **"(25) To enable a more accurate and efficient representation of connections with neighbouring CCRs, the advanced hybrid coupling (AHC) is foreseen in the Core DA CCM to replace the standard hybrid coupling and provide efficiency gains in the capacity calculation and allocation phase on the borders where AHC is applied. AHC principles can also rather efficiently be applied to a lowly meshed alternative current (AC) border between a Core and a non-Core bidding zone, while its efficiency and accuracy of network representation diminishes with the increased meshness of AC borders. Implementation of AHC is foreseen on all borders linking Core bidding zones and bidding zones of neighbouring CCRs and which are part of SDAC, except for the common borders with Italy North CCR which is planned to be merged with the Core CCR under a future common flow-based approach and for the common borders with SWE where only a low efficiency gain is expected in comparison with the challenges imposed by AHC.**"

2. Article 2 - Definitions and interpretation shall be amended accordingly:

1. by introducing new numbers 1a, 20a, 34a and 67a, accordingly:

> "1a. 'AHC border' means a border between a bidding zone within and outside of Core CCR where both bidding zones are part of Single-Day-Ahead Coupling and the AHC is applied;"
>
> "20a. 'external virtual hub' means a virtual bidding zone without any buy and sell orders, used to represent the imports and exports on an AHC border as specified in article 13 of this Methodology;"
>
> "**34a. 'internal virtual hub (IVH)' means a virtual bidding zone without any buy and sell orders, used to represent the commercial exchanges on an internal Core HVDC interconnector, where evolved flow based approach is applied as specified in Article 12 of this Methodology;"**
>
> "**67a. 'vritual hub (VH)' means external or internal virtual hub**"

2. by replacing definitions 12, 21, 68 and 69 which shall be read accordingly:

> "12. 'Core net position' means a net position of a bidding zone in Core CCR **or of a VH** resulting from the allocation of cross-zonal capacities within the Core CCR **and on AHC borders**;"
>
> "21. '$F_{0,Core}$' means the flow per CNEC in the situation without commercial exchanges within the Core CCR **and with EVH**;"

"68. 'zone-to-slack PTDF' means the PTDF of a commercial exchange between a bidding zone and the slack node **or between a VH and the slack node**;"

"69. 'zone-to-zone PTDF' means the PTDF of a commercial exchange between two bidding zones**, between two VHs or between a VH and a bidding zone**;"

3. Article 4 - Day-ahead capacity calculation process shall be amended by replacing paragraph 4 letter (b) which shall be read accordingly:

"(b) the adjustment values for long-term allocated capacities for each Core bidding zone border **and for each AHC border**, to enlarge the default flow-based domain beyond the long-term allocated capacities for the purpose of calculating the default flow-based parameters; and"

4. Article 5 - Definition of critical network elements and contingencies shall be amended by introducing a new paragraph (1a) accordingly:

" **1a. CNEs pursuant to paragraph 1 shall additionally include those elements on AHC borders. In case the capacity constraints resulting from cross-zonal network elements on an AHC border are already considered in another CCR, a Core TSO may decide not to define such network elements as CNE in Core. Such a CNE on an AHC border shall be regularly monitored only in a single CCR. Any deviation from this rule shall be subject to a sound justification.**

5 Article 7 - Methodology for allocation constraints shall be amended by replacing paragraph 2 letter (a) accordingly:

"(a) a constraint on the Core net position (the sum of cross-zonal exchanges within the Core CCR **and on AHC borders** for a certain bidding zone in the SDAC), thus limiting the net position of the respective bidding zone with regards to its imports and/or exports to other bidding zones in the Core CCR. This option shall be applied until option (b) can be applied."

6. Article 8 - Reliability margin methodology shall be amended accordingly:

1. Paragraph 1 letter (a) shall be replaced and read accordingly:

"(a) cross-zonal echanges on bidding zone borders outside the Core CCR **excluding AHC borders**;"

2. Paragraph 3 shall be replaced and read accordingly:

" The FRMs shall be calculated in two main steps. In the first step, the probability distribution of deviations between the expected power flows at the time of the capacity calculation and the realised power flows in real time shall be calculated. To calculate the expected power flows (F_exp), for each DA CC MTU of the observation period, the historical CGMs and GSKs used in capacity calculation shall be used. The historical CGMs shall be updated with the deliberated Core TSOs' actions (including at least the RAs considered during the capacity calculation) that have been applied in the

relevant DA CC MTU . The power flows of such modified CGMs shall be recalculated (F_ref) and then adjusted to take into account the realised commercial exchanges inside the Core CCR **and on AHC borders**. The latter adjustment shall be performed by calculating PTDFs according to the methodology as described in Article 11, but using the modified CGMs and the historical GSKs. The expected power flows at the time of the capacity calculation shall therefore be calculated using the final realised commercial exchanges in the Core CCR **and on AHC borders** which are reflected in realised power flows. This above calculation of expected power flows (F_exp) is described with Equation 2."

$$\vec{F}_{exp} = \vec{F}_{ref} + \mathbf{PTDF}\left(\overrightarrow{NP}_{real} - \overrightarrow{NP}_{ref}\right)$$

Equation 2

with

$\vec{F}_{exp}$	expected power flow per CNEC in the realised commercial situation in Core CCR
$\vec{F}_{ref}$	flow per CNEC in the CGM updated to take deliberate TSO actions into account
PTDF	power transfer distribution factor matrix calculated with updated CGM
$\overrightarrow{NP}_{real}$	Core net position**s** in the realised commercial situation
$\overrightarrow{NP}_{ref}$	Core net position**s** in the updated CGM"

7. Article 9 - Generation shift key methodology shall be amended by introducing a new paragraph (5a) accordingly:

"**5a. The CCC shall define GSKs for the EVHs according to Article 9 (1) as follows:**

(a) In case an EVH represents only HVDC interconnectors, the GSK shall be defined by all converter stations of the HVDC interconnectors, weighted based on the respective trans-mission capacity.

(b) In case an EVH represents only AC interconnectors, the CCC shall use the GSK of the adjacent bidding zone provided by the TSOs of that bidding zone. If this GSK is not available, the CCC shall define a GSK based on all positive injections in the IGM of the adjacent bidding zone.

(c) In case an EVH represents both HVDC interconnectors and AC interconnectors, the respective Core TSO shall define a single combined GSK based on the GSK for the HVDC and the GSK for the AC interconnectors."

8. Article 11 - Calculation of power transfer distribution factors and reference flows shall be amended accordingly:

1. Paragraph 2 shall be replaced and read accordingly:

> "2. In accordance with Article 29(3)(a) of the CACM Regulation, the CCC shall calculate the impact of a change in **net positions** of bidding zones **and of VHs** on the power flow on each CNEC (determined in accordance with the rules defined in Article 5). This influence is called the zone-to-slack $PTDF$. This calculation is performed from the CGM and the GSK defined in accordance with Article 9."

2. In paragraph 3 the definitions of the zone-to-slack PTDF and node-to-zone GSK shall be replaced and read accordingly:

> " $\mathbf{PTDF}_{zone-to-slack}$: matrix of zone-to-slack $PTDFs$ (columns: bidding zones **and virtual hubs**; rows: CNECs)"

> " $\mathbf{GSK}_{node-to-zone}$: matrix containing the $GSKs$ of all bidding zones (columns: bidding zones **and virtual hubs**; rows: nodes; sum of each column equal to one."

3. Paragraph 5 shall be replaced and read accordingly:

> "5. The maximum zone-to-zone $PTDF$ of a CNEC ($PTDF_{z2zma\ ,l}$) is the maximum influence that any Core exchange has on the respective CNEC, including **the exchanges with the virtual hubs, i.e. the** exchanges over HVDC interconnectors which are integrated pursuant to Article 12 **and the exchanges on AHC borders which are modelled through EVH pursuant to Article 13:**

$$PTDF_{z2zmax,l} = max\Big(\max_{\boldsymbol{X}\in\{\boldsymbol{BZ}\cup\boldsymbol{EVH}\}}\big(PTDF_{\boldsymbol{X},l}\big) - \min_{\boldsymbol{X}\in\{\boldsymbol{BZ}\cup\boldsymbol{EVH}\}}\big(PTDF_{\boldsymbol{X},l}\big), \max_{\boldsymbol{H_1},\boldsymbol{H_2}\in\boldsymbol{IVH}}\big(|(PTDF_{A,l} - PTDF_{\boldsymbol{H_1},l}) - (PTDF_{B,l} - PTDF_{\boldsymbol{H_2},l})|, |PTDF_{\boldsymbol{H_1},l} - PTDF_{\boldsymbol{H_2},l}|\big)\Big)$$

Equation 1

with

$PTDF_{\boldsymbol{X},l}$	zone-to-slack $PTDF$ of bidding zone **or external virtual hub X** on a CNEC l

BZ	set of all Core bidding zones
EVH	**set of all external virtual hubs**
$\max_{X \in \{BZ \cup EVH\}} (PTDF_{X,l})$	maximum zone-to-slack PTDF of Core bidding zones **or EVHs** on a CNEC l
$\min_{X \in \{BZ \cup EVH\}} (PTDF_{X,l})$	minimum zone-to-slack PTDF of Core bidding zones **or EVHs** on a CNEC l
$PTDF_{H1,l}$	zone-to-slack $PTDF$ of **internal** virtual hub $\mathbf{H_1}$ on a CNEC l, with $\mathbf{H_1}$ representing the converter station at the sending end of the HVDC interconnector **H** located in bidding zone A
$PTDF_{H2,l}$	zone-to-slack $PTDF$ of **internal** Virtual hub $\mathbf{H_2}$ on a CNEC l, with $\mathbf{H_2}$ representing the converter station at the sending end of the HVDC interconnector **H** located in bidding zone B

4. The definitions of NPi and NPref in Paragraph 7 shall be replaced and read accordingly:

"$\overrightarrow{NP_i}$	Core net position**s** in the commercial situation i
$\overrightarrow{NP_{ref}}$	Core net position**s** in the reference commercial situation"

9. Article 12 - Integration of HVDC interconnectors on bidding zone borders of the Core CCR shall be amended accordingly:

1. Paragraph 1 shall be extended accordingly:

> "1. The Core TSOs shall apply the evolved flow-based (EFB) methodology when including HVDC interconnectors on the bidding zone borders of the Core CCR[5]. According to this methodology, a cross-zonal exchange over an HVDC interconnector on the bidding zone borders of the Core CCR is modelled and optimised explicitly as a bilateral exchange in capacity allocation, and is constrained by the physical impact that this exchange has on all CNECs considered in the final flow-based domain used in capacity

[5] EFB is different from AHC. AHC imposes the capacity constraints of one CCR on the cross-zonal exchanges of another CCR by considering the impact of exchanges between two capacity calculation regions. E.g. the influence of exchanges of a bidding zone which is part of a CCR applying a coordinated net transmission capacity approach is taken into account in a bidding zone which is part of a CCR applying a flow-based approach. EFB takes into account commercial exchanges over the cross-border HVDC interconnector within a single CCR applying the flow-based method of that CCR.

allocation **and constraints modelling the maximum possible exchange of the HVDC interconnector**."

2. Paragraphs 2, 3 and 4 shall be amended to account for the introduction of AHC and – consequently – to differentiate between the two types of virtual hubs, i.e. the internal virtual hubs introduced for the modelling of HVDC interconnectors on bidding zone borders of the Core CCR on the one hand, and the external virtual hubs introduced for the modelling of AHC borders on the other hand, accordingly:

"2. In order to calculate the impact of the cross-zonal exchange over a HVDC interconnector **pursuant to paragraph 1** on the CNECs, the converter stations of the cross-zonal HVDC shall be modelled as two **internal** virtual hubs, which function equivalently as bidding zones. Then the impact of an exchange **between A and B, each being either a** bidding **zone or an external virtual hub A and B or external virtual hubs** over such HVDC interconnector shall be expressed as an exchange from the bidding zone **or external virtual hub** A to the **internal** virtual hub representing the sending end of the HVDC interconnector plus an exchange from the **internal** virtual hub representing the receiving end of the interconnector to the bidding zone **or external virtual hub** B:

$$PTDF_{A\rightarrow B,l} = (PTDF_{A,l} - PTDF_{\boldsymbol{IVH\_1},l}) + (PTDF_{\boldsymbol{IVH\_2},l} - PTDF_{B,l})$$

Equation 2

with

$PTDF_{\boldsymbol{IVH\_1},l}$ zone-to-slack $PTDF$ of **internal** virtual hub 1 on a CNEC l, with **internal** virtual hub 1 representing the converter station at the sending end of the internal Core HVDC interconnector

$PTDF_{\boldsymbol{IVH\_2},l}$ zone-to-slack $PTDF$ of **internal** virtual hub 2 on a CNEC l, with **internal** virtual hub 2 representing the converter station at the receiving end of the internal Core HVDC interconnector

3. The PTDFs for the two **internal** virtual hubs $PTDF_{IVH\_1,l}$ and $PTDF_{IVH\_2,l}$ are calculated for each CNEC and they are added as two additional columns (representing two additional **internal** virtual bidding zones) to the existing $PTDF$ matrix, one for each **internal** virtual hub.

4. The **internal** virtual hubs introduced by this methodology are only used for modelling the impact of an exchange through a HVDC interconnector and no orders shall be attached to these **internal** virtual hubs in the coupling algorithm. The two **internal** virtual hubs will have a combined net position of 0 MW, but their individual net position will reflect the exchanges over the interconnector. The flow-based net positions of these **internal** virtual hubs shall be of the same magnitude, but they will have an opposite sign.

10. Article 13. Consideration of non-Core bidding zone borders shall be amended accordingly:

1. The first sentence of paragraph 3 shall be replaced and be read accordingly:

> "In other cases, the Core TSOs shall consider using a standard hybrid coupling (SHC) **or** an advanced hybrid coupling (AHC). "

2. Paragraph 3 letter (b) shall be replaced and be read accordingly:

> "(b) In the AHC, the CNECs of the **Core** Day-ahead capacity calculation **region** shall not only limit the net positions of Core bidding **zones due to** exchanges on bidding zone borders of the Core CCR **but also the** exchanges on bidding zone borders **between the Core CCR and respective adjacent bidding zones**.
>
> Core TSOs applying AHC shall:
>
> i. For each AHC border, the Core TSOs shall introduce at least one single external virtual hub **for each AHC border, meaning that multiple HVDCs at a single AHC border can be assigned to separate EVHs.**

3. Paragraph 3 letter (c) number (viii) shall be replaced by a new paragraph 4 and be read accordingly:

> "4. Core TSOs may impose a limit to the net position of the external virtual hubs:
>
> a) **for HVDC interconnectors, the limit takes into** account the physical limitations of the HVDC cables on **the** border and the converter stations on the Core side;
>
> **b)** Core TSOs may consider a limit in the form of an NTC value as an outcome of the capacity calculation from the neighbouring CCR.

4. Paragraph 3 letter (c) shall be replaced by a new paragraph 5 and be read accordingly:

> "5. Core TSOs shall monitor the accuracy of non-Core exchanges in the CGM **which are not handled through AHC**. The Core TSOs shall report in the annual report to all Core regulatory authorities the accuracy of such forecasts."

11. Article 16 – Non-costly remedial actions optimisation shall be amended as follows:

Equation 9 and the definition of the variable '*neighbour pairs*' in Equation 9 in Paragraph 3 letter (d) shall be amended and be read accordingly:

$$RAM_{rel} = \frac{RAM_{nrao}}{\sum_{(A,B) \in neighbour\ pairs} \left| PTDF_{A \rightarrow B,nrao} \right|} \quad if\ RAM_{nrao} \geq 0$$

$$RAM_{rel} = RAM_{nrao} \; if \; RAM_{nrao} < 0^{6}$$

Equation 9

with

neighbour pairs	**Set of two neighbouring Core bidding zones or set of a Core bidding zone and a neighbouring EVH**

12. Article 17 - Adjustment for minimum RAM shall be amended as follows:

1. Paragraph 2 shall be replaced and be read accordingly:

"2. In order to determine the adjustment for minimum *RAM* for a CNEC, the flow in the situation without commercial exchanges within the Core CCR **and on AHC borders** is first calculated by setting the net positions $\overrightarrow{NP_i}$ in Equation 6 to zero for all Core bidding zones **and for all VHs**, leading to the following equation:

$$\vec{F}_{0,Core} = \vec{F}_{ref} - \mathbf{PTDF_f} \; \overrightarrow{NP}_{ref,Core}$$

Equation 10

with

$\vec{F}_{0,Core}$	flow per CNEC in the situation without commercial exchanges within the Core CCR **and without commercial exchanges on AHC borders**
$\vec{F}_{ref}$	flow per CNEC in the CGM after the NRAO
$\mathbf{PTDF_f}$	power transfer distribution factor matrix for the Core CCR, **including VHs**
$\overrightarrow{NP}_{ref,Core}$	Core net position**s** included in the CGM

2. In Paragraph 4 the definition of unscheduled allocated flows F_{uaf} shall be replaced and be read accordingly:

"

$\vec{F}_{uaf}$	flow per CNEC assumed to result from commercial exchanges outside Core CCR **excluding flows resulting from commercial exchanges on AHC borders**

"

3. In paragraph 5 the second sentence shall be replaced and be read accordingly:

"This means that the sum of *RAM* (capacity offered within the Core CCR

[6] RAM_{rel} ignores PTDFs for overloaded CNECs, in order to solve the largest absolute overloads first.

and on the AHC borders) and F_{uaf} (capacity offered outside the Core CCR **except the AHC borders**) on the Core CNECs shall be equal or higher than the specific percentage, defined in paragraph 9, of F_{max}."

4. In Paragraph 8 the definitions of unscheduled allocated flows F_{uaf} and of Core zero-balanced flows $F_{0,Core}$ shall be replaced and be read accordingly:

"

F_{uaf}	flow per CNEC resulting from assumed commercial exchanges outside the Core CCR, but **excluding flows resulting from commercial exchanges on AHC borders**
$F_{0,\mathrm{Core}}$	flow in the situation without commercial exchanges within the Core CCR **and without commercial exchanges on AHC borders**

"

13. Article 18 - Long-term allocated capacities (LTA) inclusion shall be amended as follows:

1. Paragraph 1 letter (b) shall be amended accordingly:

"(b) previously-allocated capacities on all bidding zone borders of the Core CCR **and on the AHC borders** are the long-term allocated capacities (LTA) calculated and allocated pursuant to the FCA Regulation"

2. Paragraph 3 shall be amended accordingly:

" 3. The first step in the LTA inclusion is to calculate the flow for each CNEC (including external constraints) in each combination of net positions resulting from the full utilisation of previously-allocated capacities on all bidding zone borders of the Core CCR **and on AHC borders**, based on Equation 6:

$$\vec{F}_{LTAi} = \vec{F}_{ref} + \mathbf{PTDF_f}\left(\overrightarrow{NP}_{LTAi} - \overrightarrow{NP}_{ref}\right)$$

Equation 16

with

$\vec{F}_{LTAi}$	flow per CNEC in LTA capacity utilisation combination i
$\vec{F}_{ref}$	flow per CNEC in the CGM after the NRAO
$\mathbf{PTDF_f}$	zone-to-slack power transfer distribution factor matrix
$\overrightarrow{NP}_{LTAi}$	Core net position**s** in LTA capacity utilisation combination i
$\overrightarrow{NP}_{ref}$	Core net position**s** in the CGM"

14. Article 19 - Calculation of flow-based parameters before validation shall be amended as follows:

The definition of zero-balanced flows $F_{0,Core}$ shall be replaced and be read accordingly:

“	$\vec{F}_{0,Core}$	Flow without commercial exchanges in the Core CCR **and without commercial exchanges on AHC borders,** described in Equation 10. For external constraints, in line with Article 18(2), this flow is equal to zero.”

15. Article 21 - Calculation and publication of final flow-based parameters shall be amended as follows:

The definition of NP_{LTN} in paragraph 2 shall be replaced and be read accordingly:

“

$\overrightarrow{NP_{LTN}}$	Core net position**s** resulting from LTN

”

16. Article 22 - Day-ahead capacity calculation fallback procedure shall be amended as follows:

1. The paragraph under letter (a) shall be replaced and be read accordingly:

“(a) when the day-ahead capacity calculation fails to provide the flow-based parameters for strictly less than three consecutive hours, the CCC shall calculate the missing flow-based parameters with the spanning method. The spanning method is based on the union of the previous and subsequent available flow-based parameters (resulting in the intersection of the two flow based domains), adjusted to zero Core net positions (to delete the impact of the reference net positions **of the Core bidding zones and VHs**). All flow-based constraints from the previous and subsequent data sets are first converted into zero Core net positions. Then all previous and subsequent constraints are combined, the redundant constraints are removed, and the pre-solved constraints are adjusted for the long term nominations in accordance with Article 21. In case the extended LTA inclusion approach is applied, the LTA domain for missing hours contains for each Core border **and AHC border** the minimum of the long-term allocated capacities values of the hours for which the previous and subsequent flow-based parameters are available.”

2. The paragraph under letter (b) shall be replaced and be read accordingly:

“(b) when the day-ahead capacity calculation fails to provide the flow-based parameters for three or more consecutive hours, the Core TSOs shall define the missing parameters by calculating the default flow-based parameters. Such calculation shall also be applied in cases of impossibility to span the missing parameters pursuant to point (a) or in the situation as described in 1(e)(9). The calculation of default flow-based parameters shall be based on long-term allocated capacities as provided by TSOs pursuant to Article 4(4)(a). The capacities on the bilateral Core bidding zone **borders and on AHC borders** shall be defined based on the LTA capacity for each oriented bidding zone border:

i. increased by the minimum of the two adjustments provided by the TSO(s) on each side of the **Core** bidding zone border, pursuant to Article 4(4)(b) ; **and**

ii. adapted by the adjustment provided by the Core TSO on its adjacent AHC border, pursuant to Article 4(4)(b).

These capacities are then adjusted for long-term nominations pursuant to Article 21, to obtain the final parameters."

17. Article 23 - Calculation of ATCs for SDAC fallback procedure shall be amended as follows:

1. Paragraph 3 letter (c) shall be replaced and be read accordingly:

"(c) if defined, the global allocation constraints shall be assumed to constrain the Core net positions pursuant to Article 7(5), and shall be described following the methodology described in Article 18(2). Such constraints shall be adjusted for offered cross-zonal capacities on the **remaining** non-Core bidding zone borders."

2. Paragraph 5 letter (a) shall be replaced and be read accordingly:

"a) The initial ATCs are set equal to LTAs for each Core **and AHC** oriented bidding zone border, i.e.:

$$\overrightarrow{ATC}_{k=0} = \overrightarrow{LTA}$$

with

$\overrightarrow{ATC}_{k=0}$	the initial ATCs before the first iteration
$\overrightarrow{LTA}$	the LTA on Core **and AHC** oriented bidding zone borders

"

3. Paragraph 5 letter (b) numbers (ii), (iii) and (iv) shall be replaced and be read accordingly:

" ii. for each CNEC, share $RAM_{ATC}(k)$ with equal shares among the Core **and AHC** oriented bidding zone borders with strictly positive zone-to-zone power transfer distribution factors on this CNEC;

iii. from those shares of $RAM_{ATC}(k)$, the maximum additional bilateral oriented exchanges are calculated by dividing the share of each Core **and AHC** oriented bidding zone border by the respective positive zone-to-zone PTDF;

iv. for each Core **and AHC** oriented bidding zone border, $\overrightarrow{ATC}_k$ is calculated by adding to $\overrightarrow{ATC}_{k-1}$ the minimum of all maximum additional bilateral oriented exchanges for this border obtained over all CNECs and external constraints as calculated in the previous step;"

4. Paragraph 5 point (c) should be amended and be read accordingly:

"c) positive zone-to-zone PTDF matrix (**pPTDF**$_{zone-to-zone}$) for each Core **and AHC** oriented bidding zone border shall be calculated from the **PTDF**$_f$ as follows (for HVDC interconnectors integrated pursuant to Article 12, Equation 7 shall be used):

$$pPTDF_{zone-to-zone,A\rightarrow B} = \max\left(0, PTDF_{zone-to-slack,A} - PTDF_{zone-to-slac\ ,B}\right)$$

Equation 24

with

$pPTDF_{zone-to-zone,A\rightarrow B}$	positive zone-to-zone $PTDFs$ for Core **and AHC** oriented bidding zone border *A* to *B*
$PTDF_{zone-to-slack,m}$	zone-to-slack $PTDF$ for Core **and AHC** bidding zone border m"

5. Paragraph 5a shall be replaced and be read accordingly:

" 5a. In case extended LTA inclusion approach is applied the ATCs for SDAC fallback procedure are set equal to the LTAs for each Core **and AHC** oriented bidding zone border, reduced by LTN, i.e.:

$$\overrightarrow{ATC} = \overrightarrow{LTA} - \overrightarrow{LTN}$$

with

$\overrightarrow{ATC}$	the ATC for SDAC fallback procedure
$\overrightarrow{LTA}$	the LTA on Core **and AHC** oriented bidding zone borders
$\overrightarrow{LTN}$	the nomination of the long-term allocated capacity on Core **and AHC** oriented bidding zone borders"

18. Article 25 - Publication of data shall be amended as follows:

Paragraph 2 letter (d) numbers (i) and (ii) shall be replaced and be read accordingly:

" i. maximum and minimum possible net position of each bidding zone **and EVH**;

ii. maximum possible bilateral exchanges between all pairs of **two** Core bidding zones, pairs of **two EVHs and pairs of one Core bidding zone and one EVH**;"

19. Article 27 - Monitoring, reporting and information to the Core regulatory authorities shall be amended as follows:

Paragraph 4 letter (b) shall be replaced and be read accordingly:

" (b) according to Article 13(5), the Core TSOs shall monitor the accuracy of non-Core exchanges in the CGM **which are not handled through AHC. The Core TSOs shall report in the annual report to all Core regulatory authorities the accuracy of such forecasts**."

Article 2

Timescale for Advanced Hybrid Coupling implementation

Article 28 - Timescale for implementation shall be amended as follows:

1. Paragraph 1 shall be replaced and be read accordingly:

"1. The TSOs of the Core CCR shall publish this methodology without undue delay after the decision has been taken by the **Core NRAs or by the** Agency in accordance with Article 9 of the CACM Regulation."

2. Two new paragraphs, paragraph 6 and paragraph 7, shall be added and be read accordingly:

"6. **By 31 March 2025, Core TSOs shall have developed AHC. By the same deadline they shall update the explanatory note and publish an analysis that allows market participants to understand the impact of AHC.**

7. By 30 June 2025, Core TSOs shall implement AHC for borders to bidding zones outside of the Core CCR insofar these bidding zones are part of SDAC, excluding common borders with Italy North CCR and with SWE CCR. The implementation is subject to the readiness of SDAC. Before the implementation of AHC, Core TSOs shall involve Core NEMOs to test the implementation of AHC within SDAC and market participants to adapt to the effects of applying AHC via an external parallel run which shall last at least one (1) month. Core TSOs shall publish the results of this parallel run, including the resulting monitoring and performance criteria established pursuant to paragraph (4)."