First amendment of the Long-term Capacity Calculation Methodology
of the Core Capacity Calculation Region

in accordance with Article 10 of Commission Regulation (EU)
2016/1719 of 26 September 2016
establishing a guideline on forward capacity allocation

March 2025

Track-change version
(for informative purpose only)

Contents

Whereas

(1) This document is the common coordinated long-term capacity calculation methodology ('LT CCM' or 'this methodology') for the Core capacity calculation region ('Core CCR') in accordance with Article 10 of Commission Regulation (EU) 2016/1719 establishing a guideline on Forward Capacity Allocation ('FCA Regulation').

(2) The LT CCM takes into account Regulation (EC) No 2019/943 on the internal market for electricity ('Electricity Regulation'), the general principles of forward capacity allocation set out in Article 10 of the FCA Regulation and the objectives listed in Article 3 of the FCA Regulation.

(3) Pursuant to Article 10(2) of the FCA Regulation, the LT CCM uses the flow-based approach.

(4) Pursuant to Article 10(3) of the FCA Regulation, the LT CCM is compatible with the day-ahead and intraday capacity calculation methodologies established in accordance with Article 21(1) of Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management ('CACM Regulation').

(5) Pursuant to Article 10(4)(a) of the FCA Regulation, the LT CCM takes into account the uncertainty associated with long-term capacity calculation time frames when applying a security analysis based on multiple scenarios i.e. Common Grid Models (CGM) and using the capacity calculation inputs, the capacity calculation approach referred to in Article 21(1)(b) of the CACM Regulation and the validation of cross-zonal capacity referred to in Article 21(1)(c) of the CACM Regulation.

(6) Pursuant to Article 10(5) of the FCA Regulation, the LT CCM applies the flow-based approach since:

   (a) the flow-based approach leads to an increase of economic efficiency in the Core CCR with the same level of system security;

   (b) the transparency and accuracy of the flow-based results have been confirmed in Core CCR; and

   (c) the implementation timeframe provided in the methodology is sufficient for the market participants to adapt their processes[1];

(7) Pursuant to Article 10(6) of the FCA Regulation, as the LT CCM applies a security analysis based on multiple scenarios, it also applies the requirements for the capacity calculation inputs, the capacity calculation approach and the validation of cross zonal capacity as provided for in Article 21(1) of the CACM Regulation, except Article 21(1)(a)(iv) where relevant.

(8) Pursuant to Article 10(7) of the FCA Regulation, the LT CCM takes into account the requirements for the fallback procedures and the requirement provided for in Article 21(3) of the CACM Regulation.

(9) The LT CCM covers the yearly and monthly long-term time frames pursuant to Article 9 of the FCA Regulation.

(10) The LT CCM provides yearly and monthly capacity calculation outputs. Splitting of long-term capacity is subject to a separate methodology for splitting long-term cross-zonal capacity developed pursuant to Article 16 of the FCA Regulation,and is not addressed in this LT CCM. Splitting of long-term capacity may reduce the yearly capacity calculation outputs in order to provide more capacity at a monthly level.

(11) During the development of the LT CCM, it has been recognised that outputs of the common grid model methodology ('CGMM') are insufficient for the Core LT CCM, which requires higher granularity of common grid models ('CGM') and a flexibility in defining the timestamps for additional CGMs, as well as the application of planned outages, to properly represent the network

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[1] The fulfilment of these three conditions is discussed in section 6.2.1.2 of ACER's Decision: *Assessment of the general requirements (Article 10 of the FCA Regulation).*

for the capacity calculation. In addition, in order to ensure a coordinated approach for the long-term network modelling, the CGMM needs to be amended to incorporate the common elements of the Core temporary procedure. The temporary procedure in Core may be applied only until such amendment of the CGMM takes place. After that, the Core LT CCM should apply the amended CGMM.

(12) In line with Article 37(1)(a) of the Electricity Regulation, the regional coordination centres ('RCCs') need to carry out the coordinated capacity calculation in accordance with the methodologies developed pursuant to the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009. Article 35(2) of the Electricity Regulation requires that RCCs enter into operation by 1 July 2022. Thereby, as of this date, RCCs of the Core CCR will take over the role of the coordinated capacity calculator ('CCC') as referred to in this LT CCM.

(13) The LT CCM contributes to the achievement of the objectives of forward capacity allocation listed in Article 3 of the FCA Regulation. In particular, this LT CCM:

(a) Takes into account the hedging needs of electricity market participants by calculating reliable capacities at an early stage and making them available to market participants, which makes long-term planning possible. Thus it is promoting effective long-term cross-zonal trade with long-term cross-zonal hedging opportunities for electricity market participants in accordance with Article 3(a) of the FCA Regulation;

(b) Takes into account all critical network elements, coordinates the timings of delivery of inputs, provides a calculation approach and coordinates validation requirements of the capacity calculation between the Core TSOs and the Core CCC. The flow-based capacity calculation is a result of a close cooperation of TSOs and the CCC and establishes a reliable and coordinated input towards the capacity allocation process for market participants. The flow-based approach allocates the cross-zonal capacities by putting the different bidding zone borders in competition with each other in order to receive a portion of the remaining available margin (RAM) of a critical network element with contingency (CNEC) and therefore increases economic efficiency. In contrast, the application of net transmission capacity (NTC) is based on a fixed distribution of capacities of each CNEC over the interdependent borders. Consequently, these NTCs are allocated independently on each interdependent border which essentially limits the competition between interdependent borders. Lack of competition among borders for the capacity of CNECs, which these borders are significantly impacting, inevitably leads to loss of economic efficiency in allocating the capacity of such network elements. Thus, by applying the flow-based approach this LT CCM contributes to the optimisation of the calculation and allocation of long-term cross-zonal capacity in Core, in accordance with Article 3(b) of the FCA Regulation;

(c) Applies equally to all market participants on all respective bidding zone borders in the Core CCR, thereby ensuring a level playing field amongst market participants, and providing non-discriminatory access to long-term cross-zonal capacity in accordance with Article 3(c) of the FCA Regulation;

(d) Has been developed and adopted in a transparent process involving all the relevant stakeholders. This ensures fair and non-discriminatory treatment of the TSOs, ACER, regulatory authorities and market participants in accordance with Article 3(d) of the FCA Regulation;

(e) Allows timely release of information about cross-zonal capacities and provides a backup solution when capacity calculation fails to provide results. In this way, it respects the need for a fair and orderly forward capacity allocation and orderly price formation in accordance with Article 3(e) of the FCA Regulation;

(f) Requires the Core TSOs to provide market participants with reliable information on cross-zonal capacities for the forward allocation in a transparent and continuous way by publication of the validated results. This includes regular reporting on specific processes within capacity

calculation. As such, it ensures and enhances the transparency and reliability of information on forward capacity allocation in accordance with Article 3(f) of the FCA Regulation;

(g) Enables the allocation of long-term cross-zonal capacities and this provides long-term price signals and hedging and thus facilitates efficient investments in transmission, generation and consumption and contributes to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union in accordance with Article 3(g) of the FCA Regulation.

TITLE 1: GENERAL PROVISIONS

Article 1
Subject matter and scope

1. This LT CCM is the methodology pursuant to Article 10 of the FCA Regulation and applies to the bidding zone borders of the Core CCR.

2. This LT CCM applies to the long-term capacity calculation within the Core CCR and covers the yearly and monthly long-term time frames pursuant to Article 9 of the FCA Regulation and in line with the regional design of the long-term transmission rights in the Core CCR.

3. This LT CCM applies to all TSOs and CCC within the Core CCR.

Article 2
Definitions

1. For the purpose of the LT CCM, the definitions in Article 2 of the Electricity Regulation, Article 2 of the FCA Regulation, Article 2 of the CACM Regulation as well as Article 2 of Regulation (EC) 2013/543 of 14 June 2013 on submission and publication of data in electricity markets, shall apply.

2. In addition, the following abbreviations shall apply. In the event of any inconsistency between the following abbreviations and the definitions pursuant to paragraph (1),[2] the latter shall prevail.

    (a)   'AC' means: Alternating Current;

    (ab)   'AAC' means: Already Allocated Capacity;

    (b)   'AHC' means: Advanced Hybrid Coupling;

    (c)   'AMR' means: Adjustment of Minimum RAM;

    (cb)   ATC' means the available transmission capacity on bidding zone borders, which is the transmission capacity that remains available after the deduction of eventual previously allocated capacities and which respects the physical conditions of the transmission system.

    (d)   'CC' means: Capacity Calculation;

    (e)   'CCC' means: Coordinated Capacity Calculator, as defined in Article 2(11) of the CACM Regulation;

    (f)   'CCM' means: Capacity Calculation Methodology;

    (g)   'CCR' means: Capacity Calculation Region, as defined in Article 2(3) of the CACM Regulation;

    (h)   'CGM' means: Common Grid Model, as defined in Article 2(2) of the CACM Regulation;

    (i)   'CGMES' means: Common Grid Model Exchange Standard, developed by ENTSO-E pursuant to the CGMM;

    (j)   'CGMM' means: Common Grid Model Methodology pursuant to Article 18 of the FCA Regulation;

    (k)   'CNE' means: Critical Network Element;

    (l)   'CNEC' means: Critical Network Element and Contingency;

    (m)   'cNTC' means: coordinated Net Transmission Capacity;

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[2] References to paragraphs are to be read as references to paragraphs within a given Article of Annex I, unless explicitly stated otherwise.

(n)   'DA' means: Day-Ahead, as defined in Article 2(34) of the CACM Regulations;

(o)   'DA CCM' means: Day-Ahead Capacity Calculation Methodology approved under Article 20 of the CACM Regulation;

(p)   'DC' means: Direct Current

(q)   'EFB' means: Evolved Flow Based

(r)   'EIC' means: Energy Identification Code;

(s)   'ENTSO-E' means: European Network of Transmission System Operators for Electricity;

(t)   'FB' means: Flow Based;

(u)   'Fmax' means: Maximum Admissible Power Flow;

(v)   'Fref' means: Reference Flow;

(w)   'FRM' means: Flow Reliability Margin;

(x)   'F0,Core' means: Flow without commercial exchanges within Core CCR;

(y)   'GSK' means: Generation Shift Key, as defined in Article 2(12) of the CACM Regulation;

(z)   'HVDC' means: High-Voltage Direct Current;

(aa)   'IGM' means: Individual Grid Model, as defined in Article 2(1) of the CACM Regulation;

(bb)   'Imax' means: Maximum Admissible Current;

(cc)   'LF' means: Load Flow;

(dd)   'LT' means: Long-Term;

(ee)   'LTCC' means: Long-Term Capacity Calculation;

(ff)   'LT CCM' means: Long-Term Capacity Calculation Methodology;

(gg)   'kA' means: Kilo Ampère;

(hh)   'kV' means: Kilo Volt;

(ii)   'minRAM' means: Minimum Remaining Available Margin;

(jj)   'MPTC' means: Maximum Permanent Technical Capacity;

(kk)   'MTU' means: Market Time Unit;

(ll)   'MW' means: Megawatt;

(mm)   'NP' means: Net Position;

(nn)   'NRA' means: National Regulatory Authority;

(oo)   'NTC' means: Net Transfer Capacity;

(pp)   'OPC' means: Outage Planning Coordination;

(qq)   'OPDE' means: Operational Planning Data Environment, as defined in Article 3(74) of the SO Regulation;

(rr)   'PST' means: Phase-Shifting Transformer;

(ss)   'PTDF' means: Power Transfer Distribution Factor;

(tt)   'RA' means: Remedial Action, as defined in Article 2(13) of the CACM Regulation;

(uu)   'RAM' means: Remaining Available Margin;

(vv)   'Ramr' means: Minimum RAM factor;

(ww)   'RM' means: Reliability Margin;

(xx)   'RCC' means: Regional Coordination Centre;

(yy)   'SAP' means: Single Allocation Platform;

(zz)   'SO' means: System Operation;

(aaa) 'SO Regulation' means: Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation;

3.   In this LT CCM, unless the context clearly indicates otherwise:

   (a) the singular also includes the plural and vice versa;

   (b) headings are inserted for convenience only and do not affect the interpretation of this LT CCM; and

   (c) 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.

Article 3
Long-Term Capacity Calculation Process

1. The capacity calculation process for the long-term time frames in the Core CCR shall apply the FB approach, pursuant to Article 10(1) of the FCA Regulation.

2. The year-ahead and month-ahead capacity calculation process shall consist of three main stages:

   (a) the creation of capacity calculation inputs by the Core TSOs, in accordance with Title 2;[3]

   (b) the capacity calculation process by the Core CCC, in accordance with Title 3; and

   (c) the capacity validation by the Core TSOs in coordination with the Core CCC, in accordance with Title 4.

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[3] References to Titles and/or Articles are to be read as references to Titles and/or Articles of Annex I, unless explicitly stated otherwise

TITLE 2: CAPACITY CALCULATION INPUTS

Article 4
Reliability Margin Methodology

1. The uncertainty associated with long-term capacity calculation shall be taken into account by the application of multiple scenarios i.e. CGMs pursuant to Article 10. The capacity calculation outputs obtained based on these CGMs shall represent the joint set of constraints to the long-term allocation pursuant to Article 12(6). For this reason, the flow reliability margin (FRM) for long-term capacity calculation shall correspond to the values from the DA time frame, according to paragraph 2.

2. For all CNECs, the Core TSOs shall use the latest available FRM from the DA time frame. The latest available FRMs are the yearly updated FRMs as defined per CNEC in the Core DA CCM and in accordance with Article 22 of the CACM Regulation. They shall be applied for all yearly and monthly capacity calculations. In case the FRM considered in the DA CC have been updated between the yearly and the monthly capacity calculation, the latest FRM shall be considered in the subsequent monthly capacity calculation.

3. For the new CNEs coming into operation during the forthcoming long-term capacity calculation period, the initial FRM shall be equal to 10% of Fmax.

4. As provided in the Core DA CCM, the FRM is a portion of Fmax of a CNEC given in megawatts, which covers the uncertainties within capacity calculation.

5. The Core TSOs, with support of the Core CCC, shall review and update the methodology for reliability margin in accordance with Article 18(5).

Article 5
Methodology for Operational Security Limits

1. In accordance with Article 12 of the FCA Regulation, referring to Article 23 of the CACM Regulation, each Core TSO shall respect in the LT CC the operational security limits of Critical Network Elements (CNEs). The operational security limits used in the LT CCM are the same as those used in the operational security analysis. In particular:

    (a) to take into account the thermal limits of CNEs, the Core TSOs shall use the maximum admissible current limit (Imax) which is the physical limit of a CNE according to the operational security limits in line with Article 25 of the SO Regulation. The maximum admissible current can be defined by:

        i.   fixed limits for all CGMs in the case of CNEs which are transformers or certain types of conductors which are not sensitive to ambient conditions;

        ii. fixed limits for all CGMs of a specific season for all other CNEs.

    (b) when applicable, Imax shall be defined as a temporary current limit of a CNE in accordance with Article 25 of the SO Regulation. A temporary current limit means that an overload is only allowed for a certain finite duration.

    (c) Imax is not reduced by any security margin, as all uncertainties in the LT CCM are covered on each CNEC by the reliability margin in accordance with Article 4.

2. The Fmax value, expressed in MW, describes the maximum admissible active power flow on a CNE. Fmax is calculated by the Core CCC on the basis of Imax by the given formula:

$$F_{max} = \sqrt{3} \cdot I_{max} \cdot U \cdot \cos \varphi \qquad (1)$$

With:

Imax	maximum admissible current of a CNE, in kA
U	average voltage, expressed in kV, on two connecting nodes of a CNE resulting from AC load flow calculation with applied reactive power constraints; It shall not be lower than 95% of reference voltage of the CNE;

$$U = \max(U_{average}, 0.95 \cdot U_{ref})$$

For transformers, voltages shall be normalised to the side of a transformer for which Imax is defined;

$\cos \varphi$	average power factor on two connecting nodes of a CNE resulting from AC load flow calculation and shall not be lower than 0.95

$$\cos \varphi = \max(\cos \varphi_{average}, 0.95)$$

In case that either AC load flow without reactive power constraints or DC load flow have to be applied for a CGM as a fallback pursuant to Article 14, U [kV] shall be equal to reference voltage, and cos φ shall be equal to 1.

3. The Core TSOs shall aim towards determining the maximum admissible current using seasonal limits pursuant to paragraph (1)(a)(ii). The Core TSOs shall insert this information into the list of CNECs where Imax of a CNE is defined.

4. The Core TSOs, with support of the Core CCC, shall review and update the values and methodology for operational security limits in accordance with Article 18(5).

Article 6
Methodology for Allocation Constraints

1. In case operational security limits cannot be transformed efficiently into Imax pursuant to Article 5, the Core TSOs may transform them into allocation constraints. For this purpose, the Core TSOs may only use external constraints as a specific type of allocation constraint that limits the maximum import and/or export of a given Core bidding zone.

2. Borders with existing external constraints at the day-ahead level may be also subject to the application of external constraints at the long-term level, but only as long as the external constraints at the long-term level serve to accommodate the existing day-ahead external constraints.

3. The TSOs applying the long-term external constraints shall:

   a) update the calculation of external constraints at least on a quarterly basis; and

   b) provide to all Core TSOs and NRAs the detailed calculation and its results upon each update of the external constraints' values.

4. A Core TSO may discontinue the use of external constraints. The concerned Core TSO shall communicate this change to the other Core TSOs, all Core NRAs and market participants at least one month before discontinuation.

5. The Core TSOs, with support of the Core CCC, shall review and update the methodology for allocation constraints in accordance with Article 18(5).

Article 7
Methodology for Critical Network Elements and Contingencies Selection

1. The Core TSOs shall use the latest available initial CNEC list from the DA time frame defined according to the Core DA CCM, for each subsequent long-term capacity calculation, as an initial list.

2. New network elements coming into operation during the subsequent time frame of yearly or monthly auctions, may be included in the initial CNEC list according to the principles set out in Article 5 of the Core DA CCM.

3. The Core TSOs, with support of the Core CCC, shall review and update the application of the methodology for determining CNECs in accordance with Article 18(5).

Article 8
Generation Shift Keys Methodology

1. In line with Article 13 of the FCA Regulation, the Core TSOs shall determine common Generation Shift Keys(GSK) according to the following methodology:

   (a) each Core TSO shall define for its bidding zone and for each CGM a GSK, which translates a Net Position (NP) change of a given bidding zone into estimated specific injection increases or decreases in the Common Grid Model (CGM). A GSK shall have fixed values, which means that the relative contribution of generation or load to the change in the bidding zone NP shall remain the same, regardless of the volume of the change;

   (b) the Core TSOs shall take into account the actual information on generation, load and/or other elements connected to the network, such as storage equipment, available in the CGM for each scenario developed in accordance with Article 19 of the FCA Regulation, in order to select the nodes that shall contribute to the GSK;

   (c) each Core TSO shall apply a GSK that resembles the dispatch and the corresponding flow pattern;

   (d) the Core TSOs shall define a GSK for each long-term calculation time frame. This GSK created by each Core TSO can be different for each CGM or can be the same for all CGMs of a calculation time frame; and

   (e) the Core TSOs belonging to the same bidding zone shall jointly define a common GSK for that bidding zone and shall agree on a methodology for such coordination. For Germany and Luxembourg, each TSO shall define its individual GSK and the Core CCC shall combine them into a single GSK for the whole German-Luxembourgian bidding zone, by assigning relative weights to each country's GSK. The German and Luxembourgian TSOs shall agree on these weights, based on the share of generation in each Core TSO's control area which is responsive to changes in NP, and provide them to the Core CCC.

2. Not later than twelve months after implementation of the amendment related to further harmonization of the GSK methodology, referred to in Article 9(6) of the Core DA CCM, the Core TSOs shall submit to the Core NRAs a proposal for amendment of this LT CCM in accordance with Article 4(12) of the FCA Regulation for which the Core TSOs shall use the DA GSK methodology as the basis. The proposal shall include at least:

   (a) the criteria and metrics for defining the efficiency and performance of GSKs and allowing for quantitative comparison of different GSKs; and

(b) a harmonised GSK methodology combined with, where necessary, rules and criteria for TSOs to deviate from the harmonised GSK methodology.

Article 9
Application of Remedial Actions

1. The Core TSOs shall not apply remedial actions in the Core LT CC.

2. The Core TSOs, with support of the Core CCC, shall review the approach to applying remedial actions in the LT CC in accordance with Article 18(5).

Article   10
Common Grid Models

1. In accordance with Article 19 of the FCA Regulation, the Core TSOs shall use the ENTSO-E CGMs for each LTCC time frame, provided on the basis of the CGMM for FCA.

2. For the needs of the Core LT CCM, the Core TSOs may establish a temporary procedure of building the CGMs suitable for the Core LT CCM, with respect to:

    a) Providing the non-available yearly and monthly CGMs from paragraph (1), or increasing the granularity of CGMs from paragraph (1), assuming additional calculation timestamps on top of those defined in the CGMM. The Core TSOs may include additional calculation timestamps on top of those defined in CGMM, up to 24 calculation timestamps for yearly auctions (2 calculation timestamps a month) and up to 10 calculation timestamps for monthly auctions (2 calculation timestamps a week);

    b) Application of outage topologies. The Core TSOs may adjust all applied CGMs, by applying the planned outages from the Outage Planning Coordination (OPC) database at reference timestamps.

3. The temporary procedure referred to in paragraph 2 shall be replaced by the first next CGMM amendment in that regard. As soon as the relevant amendment is implemented, the Core TSOs shall use the CGMs pursuant to the amended CGMM for FCA.

4. The Core TSOs, with support of the Core CCC, shall review and update the methodology for the usage of CGMs in the LT CC either in accordance with Article 18(5) or following the implementation of the CGMM amendment referred to in paragraph 3, whichever comes first.

Article 11
Integration of HVDC Interconnectors at the Core Bidding Zone Borders

1. The Core TSOs shall provide information on the capacity of their High-Voltage Direct Current (HVDC) interconnector located within the Core CCR in the long-term time frame, the so-called maximum permanent technical capacity (MPTC).

2. The calculation of impact of cross-zonal exchange over an HVDC interconnector on the CNECs relies on the evolved flow-based (EFB) concept. Based on this concept, the converter stations of the cross-zonal HVDC shall be modelled as two virtual hubs which function equivalently as bidding zones. Then, the impact of an exchange between two real bidding zones A and B over such HVDC interconnector shall be expressed as an exchange from the bidding zone A to the virtual hub representing the sending end of the HVDC interconnector plus an exchange from the virtual hub representing the receiving end of the interconnector to the bidding zone B:

$$PTDF_{A \to B,l} = (PTDF_{A,l} - PTDF_{VH\_1,l}) + (PTDF_{VH\_2,l} - PTDF_{B,l}) \qquad (2)$$

With:

$PTDF_{VH\_1,l}$ ~~zone-to~~-slack *PTDF* of Virtual hub 1 on a CNEC *l*, with virtual hub 1 representing the converter station at the sending end of the HVDC interconnector located in bidding zone A

$PTDF_{VH\_2,l}$ zone-to-slack *PTDF* of Virtual hub 2 on a CNEC *l*, with virtual hub 2 representing the converter station at the receiving end of the HVDC interconnector located in bidding zone B

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

4. The exchange over the respective HVDC shall be limited to the value of its MPTC, which represents the maximum continuous active power an HVDC element is capable of transmitting, taking into account potential reduced availability due to planned outages of the interconnector asset. This parameter is defined by the interconnector's asset operators. ~~In case of a planned outage of the HVDC interconnector, the MPTC shall be set to zero.~~

TITLE 3: CAPACITY CALCULATION PROCESS

Article 12
Description of the CC inputs and outputs

1. For each calculation time frame and CGM, the Core TSOs shall provide the Core CCC with the following inputs:

    (a) GSKs in accordance with Article 8;

    (b) MPTCs of HVDCs inside the Core CCR in accordance with Article 11;

    (c) CNECs in accordance with Article 7;

    (d) Reliability margin in accordance with Article 4;

    (e) Imax per CNE in accordance with Article 5(1)(a);

    (f) External constraints in accordance with Article 6; and

    (g) OPC data in accordance with Article 10.

2. For each calculation time frame, the Core CCC shall provide the following inputs:

    (a) CGMs for each calculation time frame in accordance with Article 10;

    (b) for monthly auctions, the already allocated capacities (AAC) from the Single Allocation Platform (SAP) operator of the preceding yearly auction and the portion of AAC returned before the monthly auction; and

    (c) the Fmax per CNE pursuant to Article 5(2).

3. For each calculation time frame, the Core CCC shall use the R_{amr} threshold for the adjustment of the minimum Remaining Available Margin (minRAM) pursuant to Article 14.

4. When providing the capacity calculation inputs pursuant to paragraph (1), the Core TSOs shall respect the formats commonly agreed between the Core TSOs and the Core CCC while fulfilling the requirements and guidance provided in the CGMM pursuant to Article 18 of the FCA Regulation.

5. The capacity calculation process shall be performed by the Core CCC and shall provide the calculated flow-based parameters, computed in accordance with Article 13 and Article 14 respectively, subject to the Core TSOs' validation in accordance with Article 17.

6. As the capacity calculation outputs, the calculated flow-based parameters shall be provided by the Core CCC in the following form:

    a) the CNECs with calculated Remaining Available Margin (RAM) and PTDFs from all CGMs (scenarios) of a calculation period (yearly or monthly), as a union of constraints, before removing redundant CNECs; and

    b) the non-redundant CNECs from point a) remaining after removing the redundant CNECs. This non-redundant set of CNECs with associated RAM and PTDFs shall be provided to the long-term capacity auction operator (SAP) as a union of constraints for each related auction.

Article 13
Computation of Power Transfer Distribution Factors

1. For each calculation time frame using the associated CGM, CNECs and GSKs, the Core CCC shall calculate for each CNEC its PTDFs for each Core bidding zone representing the influence of a variation of a commercial exchange between bidding zones on a CNEC. The calculation process is mathematically described below. Firstly, zone-to-slack PTDFs shall be derived as follows:

$$\mathbf{PTDF}_{zone-to-slack} = \mathbf{PTDF}_{node-to-slack}\,\mathbf{GSK}_{node-to-zone} \qquad (3)$$

With:

$\mathbf{PTDF}_{zone-to-slack}$ matrix of zone-to-slack PTDFs (columns: bidding zones; rows: CNECs)

$\mathbf{PTDF}_{node-to-slack}$ matrix of node-to-slack PTDFs (columns: nodes; rows: CNECs)

$\mathbf{GSK}_{node-to-zone}$ matrix containing the GSKs of all bidding zones (columns: bidding zones; rows: nodes; sum of each column equal to one)

2. The slack node shall be the same node across all CGMs of a capacity calculation time frame.

3. The zone-to-slack PTDFs as calculated above can also be expressed as zone-to-zone PTDFs. A zone-to-slack $PTDF_{A,l}$ represents the influence of a variation of a NP of bidding zone A on a CNEC l and assumes a commercial exchange between a bidding zone and a slack node. A zone-to-zone $PTDF_{A\rightarrow B,l}$ represents the influence of a variation of a commercial exchange from bidding zone A to bidding zone B on CNEC l. The zone-to-zone $PTDF_{A\rightarrow B,l}$ can be derived from the zone-to-slack PTDFs as follows:

$$PTDF_{A\rightarrow B,l} = PTDF_{A,l} - PTDF_{B,l} \qquad (4)$$

4. The maximum zone-to-zone $PTDF$ of a CNEC ($PTDF_{z2zmax,l}$) is the maximum influence that any Core exchange has on a respective CNEC, including exchanges over HVDC interconnectors which are integrated pursuant to Article 11.

$$PTDF_{z2zmax,l} = max\left(\max_{A\in BZ}(PTDF_{A,l}) - \min_{A\in BZ}(PTDF_{A,l}),\ \max_{B\in HVDC}(PTDF_{B,l})\right) \qquad (5)$$

With:

$\mathbf{PTDF_{A,l}}$ zone-to-slack $PTDF$ of bidding zone A on a CNEC l

HVDC   set of HVDC interconnectors integrated pursuant to Article 11

BZ   set of all Core bidding zones

$\max_{A\in BZ}(PTDF_{A,l})$ maximum zone-to-slack PTDF of Core bidding zones on a CNEC l

$\min_{A\in BZ}(PTDF_{A,l})$ minimum zone-to-slack PTDF of Core bidding zones on a CNEC l

Article 14
Computation of Remaining Available Margin

1. The Core CCC shall use the initial list of CNECs determined pursuant to Article 7, and, by using the CGMs pursuant to Article 10, shall remove those CNECs for which the maximum zone-to-zone Power Transfer Distribution Factor (PTDF) is not higher than 5%. The remaining CNECs shall constitute the final list of CNECs for the actual long-term capacity calculation.

2. Using zone-to-hub PTDFs, the Core CCC shall determine the flow on a CNEC in the situation without commercial exchanges within the Core CCR as follows:

$$\vec{F}_{0,Core} = \vec{F}_{ref} - \mathbf{PTDF}_{z2h}\ \vec{\vec{NP}}_{ref,Core} \tag{6}$$

with:

$\vec{F}_{0,Core}$	flow per CNEC in the situation without commercial exchanges within the Core CCR
$\vec{F}_{ref}$	flow per CNEC obtained with the CGM
$\mathbf{PTDF}_{z2h}$	zone-to-hub power transfer distribution factor matrix for CNECs of the Core CCR
$\vec{\vec{NP}}_{ref,Core}$	The net positions of Core bidding zones calculated from the commercial cross-border exchanges among the Core bidding zones as provided in the reference program associated with the CGMs of the ENTSO-E scenarios

3. The load flow solution for the F_{ref} calculation shall be as follows:

   a) AC load flow solution with respecting reactive power limits of modelled generation for base (n-0) topology and for contingency topologies, by default;

   b) In case of divergence of solution under a) for certain contingency topologies, the AC load flow solution without respecting reactive power limits of modelled generation shall be used for such topologies, as a first fallback;

   c) In case of divergence of both solutions under a) and b) for certain contingency topologies, DC load flow shall be used for such topologies as a second fallback, with the active power losses as obtained at the AC load flow of the base (n-0) topology, assigned to the active power-sending node of each branch of the CGM;

   d) In case of divergence of AC load flow for the base (n-0) topology, the lossless DC load flow shall be applied as a last resort solution. An imbalance from the expected NP of each modelled area caused by the lack of losses shall be assigned to all area's load nodes in proportion to the amount of a particular load.

4. The flows resulting from previously allocated cross-zonal capacities within the Core CCR in accordance with Article 29(7)(c) of the CACM Regulation:

   a) for yearly capacity calculation, they shall be equal to zero for all CNECs;

   b) for monthly capacity calculation, they shall be calculated for each CNEC by multiplying the volumes of previously allocated cross-zonal capacities at yearly Core flow-based auctions reduced by the returned AACs, with the positive zone-to-zone $PTDFs$, as follows:

$$\vec{F}_{AAC} = \mathbf{pPTDF}_{z2z} \cdot \vec{\vec{AAC}} \tag{7}$$

with:

$\vec{F}_{AAC}$ flows resulting from previously allocated cross-zonal capacities in Core CCR

$pPTDF_{z2z}$ positive zone-to-zone power transfer distribution factor matrix

$\vec{AAC}$ already allocated capacities on Core bidding zone borders

All Core TSOs shall ensure that the RAM for each CNEC is equal or higher than a given percentage of Fmax of a given CNEC of as specified in paragraph 5. For this purpose, the Core TSOs shall calculate the following adjustment of minimum RAM:

$$AMR = \max(R_{amr} \cdot F_{max} - (F_{max} - FRM - F_{0,Core} - F_{AAC}), 0) \qquad (8)$$

with:

AMR adjustment of minimum RAM

R_{amr} percentage of F_{max} for adjustment of minimum RAM

5. Each Core TSO shall define the minimum percentage of Fmax for RAM for its own CNECs. This value shall be at least 20% of Fmax for the yearly time frame and 10% of Fmax for the monthly time frame. If, during the experimentation, before the implementation of this LT CCM, the Core TSOs experience that the experimentation and its analysis do not reveal network security risks, they shall increase these values pursuant to the decision-making process referred to in Article 19 in order to better achieve the objectives of the FCA Regulation, with upper limits of minimum RAM of 40% of Fmax for the yearly time frame and 20% of the Fmax for the monthly time frame. Before doing so, the Core TSOs shall provide a comprehensive analysis consistent with the objectives listed in Article 3 of the FCA Regulation, and consult the modified minimum RAM with the Core regulatory authorities and stakeholders.

6. Finally, the RAM before validation shall be calculated according to the following equation:

$$\vec{RAM}_{bv} = \vec{F}_{max} - \vec{FRM} - \vec{F}_{0,Core} + \vec{AMR} - F_{AAC} \qquad (9)$$

Article 15
Consideration of Non-Core CCR Bidding Zone Borders

1. Where CNEs within the Core CCR are impacted by electricity exchanges outside the Core CCR, the Core TSOs shall take this impact into account.

2. The Core TSOs shall consider the electricity exchanges with and among the bidding zones outside the Core CCR as fixed input to the LT CCM, as provided in the common set of ENTSO-E yearly and monthly reference scenarios, with unchanged NPs. These electricity exchanges, defined as best forecasts of NPs and flows in the LTCC CGMs, are defined and agreed based on the CGMM developed in accordance with Article 18 of the FCA Regulation, and incorporated in the CGMs.

3. Treatment of non-Core bidding zone borders in the LT CCM shall be studied by the Core TSOs in order to take into account their influence in the most efficient and accurate manner, and to heed

Article 21(1)(b)(vii) of the CACM Regulation. The Core TSOs shall start to study solutions for considering influence of non-Core CCR bidding zone borders immediately upon the implementation of Advanced Hybrid Coupling (AHC) in the Core DA CCM, and shall provide a report with the proposal for the improvements of treatment of non-Core exchanges in the LT CCM within 12 months after AHC implementation in Core DA CCM.

Article 16
Fallback Procedure

1. Taking into account the requirements stipulated in Article 10(7) of the FCA Regulation, in the event that a LTCC process is unable to produce results, a fallback procedure shall be applied.

2. In case the initial capacity calculation does not lead to any results, the Core CCC shall try to solve the problem and perform the LTCC again within a new time frame, jointly agreed with the Core TSOs.

3. In accordance with Article 42 of the FCA Regulation, in the event that the Core CCC is unable to produce results, the default fallback procedure shall be the postponement of the forward capacity allocation and a reasonable deadline shall be agreed by the Core TSOs and the Core CCC to retry the calculation.

4. In case the postponement of the forward capacity allocation is not possible, or the new deadline has been reached and the results are still not available, the Core CCC shall deliver the following fallback long-term FB parameters to the SAP:

   a) For the yearly capacity calculation, the FB parameters calculated for the equivalent CGMs of the previous year shall be used as a basis;

   b) For the monthly capacity calculation, the FB parameters calculated for the ~~corresponding time horizon at the preceding yearly auction~~ preceding monthly auction shall be used as a basis.

5. The fallback FB parameters under paragraph (4) shall be commonly validated by the Core TSOs and the Core CCC.

TITLE 4: VALIDATION PROCESS

Article 17
Validation Methodology

1. In accordance with Article 15 and Article 24 of the FCA Regulation, referring to Article 26 of the CACM Regulation, the Core TSOs shall have the right to correct long-term capacity on their CNECs for reasons of operational security during the validation process. The individual validation adjustments may be done by a Core TSO only in the following situations:

   (a) where a mistake in the input data has occurred, resulting in a wrong estimation of long-term capacity from an operational security perspective;

   (b) where there is a potential need to reconsider voltage or cos□ on certain CNECs;

   (c) where there is an exceptional outage topology which considerably limits the RAM of the CNEC, and which is not covered with the CGMs defined in Article 10(2);

   (d) where the calculated level of a RAM is unable to ensure operational security and the adjustment required by the TSO cannot be modelled via the input data for the capacity calculation process. Such situations can concern voltage limits, short-circuit current limits, frequency and dynamic stability limits; or

   (e) where the calculated level of a RAM is unable to ensure operational security and the adjustment required by the TSO would, under the attempt to be modelled via the input data, be overwritten by the application of the minimum RAM.

2. The Core TSOs shall perform individual validation adjustments under paragraph (1) as follows:

   (a) in case of a required reduction due to situations defined in points (b), (c), (d) and (e) of paragraph (1), a Core TSO may decrease RAM for its own CNECs, even below the minimum RAM specified in Article 14(5), if necessary;

   (b) in case of a situation according to point (a) of paragraph (1), each Core TSO or the Core CCC may request a common decision by all Core TSOs to calculate capacities with the correct input data. If the TSOs find errors in cross-zonal capacity provided for validation, the relevant TSOs shall provide updated capacity calculation inputs to the Core CCC for recalculation of cross-zonal capacities. The Core CCC shall repeat calculation with updated capacity calculation inputs and send the recalculated cross zonal capacity values again for validation. Recalculations shall be executed until the critical process end time. If there is still no result by this time, then the fallback process shall be triggered.

3. The Core TSOs shall justify individual validation adjustments under paragraph (1) as follows:

   (a) in case of a situation according to point (c) of paragraph (1), the TSO requiring the adjustment shall provide a justification that explains the effects and capacity calculation results due to the exceptional outage topologies, as well as the CGMs with those topologies applied;

   (b) in case of a situation according to point (d) of paragraph (1), the TSO requiring the adjustment shall provide a justification that explains the need to adjust the RAM level and the inability to model this adjustment via the input data;

   (c) in case of a situation according to point (e) of paragraph (1), the TSO requiring the adjustment shall provide a justification that explains the need to adjust the RAM level and the consequence of a potential application of the minimum RAM.

4. Pursuant to Article 26(5) of the CACM Regulation, every three months, the Core CCC shall report all reductions made during the validation of cross-zonal capacity to all Core NRAs, including the location, amount and reasons for the reductions.

5. Every year, the Core CCC shall provide the annual report with all the information on the reductions of cross-zonal capacity, as communicated to the CCC by the Core TSOs. The report shall include at least the following information for each CNEC of the pre-solved domain affected by a reduction and for each DA CC MTU:

   a) the identification of the CNEC;

   b) volume of change of RAM value;

   c) the reason(s) for reduction, and the operational security limit(s) that would have been violated without reduction, and under which circumstances they would have been violated;

   d) statistics on the estimated loss of economic surplus of applied validation reductions; and

   e) general measures to avoid validation reductions in the future.

6. Pursuant to Article 24(5) of the FCA Regulation, upon request of the Core NRAs, the Core TSOs shall provide a report detailing how the value of long-term cross-zonal capacity for a specific long-term capacity calculation time frame has been obtained.

7. The Core TSOs, with support of the Core CCC, shall review and update the validation methodology in the LT CC, also assessing the need for coordinated validation, in accordance with Article 18(5).

TITLE 5: UPDATES

Article   18
Review and Updates

1. Based on Article 3(f) of the FCA Regulation and in accordance with Article 21(3) of the FCA Regulation, referring to Article 27 of the CACM Regulation, the Core TSOs shall regularly, and at least once a year, review and update the key input parameters listed in Article 27(4) of the CACM Regulation. Should the operational security limits, CNEs, contingencies and import/export limits used for the common capacity calculation need to be updated based on this review, the Core TSOs shall publish the changes simultaneously with the update and publication requirements of the Core DA CCM.

2. In case the review proves the need of an update of the reliability margins, the Core TSOs shall publish the updated values of the reliability margin at least one month before their implementation.

3. In case the review proves the need for updating the application of the methodologies for determining GSKs, CNEs, and contingencies referred to in Articles 12 and 13 of the FCA Regulation, referring respectively to Articles 23 to 24 of the CACM Regulation, Article 4(12) of the FCA Regulation applies. After approval by the Core NRAs, the Core TSOs shall publish changes made in the methodologies at least three months before their implementation.

4. Any changes of parameters listed in paragraphs (1), (2) and (3) have to be communicated to market participants, ACER and the Core NRAs.

5. Within eighteen months after the go-live of the Core LT CCM in accordance with Article 22, all Core TSOs, with support of the Core CCC, shall review the methodology and, if relevant, submit by the same deadline to all Core NRAs a proposal for its amendment in accordance with Article 4(12) of the FCA Regulation, and in particular, in the following areas if improvements are possible:

    a) Reliability margin, pursuant to Article 4;

    b) Operational security limits, pursuant to Article 5;

    c) Allocation constraints, pursuant to Article 6;

    d) Critical network elements with contingencies, pursuant to Article 7;

    e) Remedial actions, pursuant to Article 9;

    f) CGMs, pursuant to Article 10;

    g) Remaining Available Margin, including the minimum RAM approach, pursuant to Article 14;

    h) Fallback procedure pursuant to Article 16; and

    i) Validation methodology pursuant to Article 17.

6. As defined in Article 8(2), the deadline for the amendment of GSK methodology is connected to its application in the Core DA CCM.

7. In case the calculation parameters under paragraph 5 are subject to change, the Core TSOs shall publish and implement the updated calculation parameters after approval by the Core NRAs, not later than three months before their application.

8. The Core TSOs shall assure that CGMES shall be applied in the long-term capacity calculation not later than 12 months after its application in the Core DA CCM.

TITLE 6: GOVERNANCE

Article 19
Rules Concerning Governance and Decision Making Among the Core TSOs

1. All Core TSOs shall cooperate for the implementation and operation of this LT CCM. This cooperation shall be carried out through common bodies where each TSO shall have at least one representative. The members of the common bodies shall aim to make unanimous decisions. Where unanimity cannot be reached, qualified majority voting based on the voting principles established in accordance with Article 4(3) of the FCA Regulation shall apply.

2. For the purpose of paragraph 1, all Core TSOs shall establish at least a steering committee consisting of one representative from each Core TSO. The steering committee shall make binding decisions on any matter or question related to the implementation and operation of this LT CCM. The steering committee shall adopt rules governing its operation.

3. The steering committee shall also act as a body for settlement of disputes among the Core TSOs regarding the implementation and operation of this LT CCM. The steering committee shall solve the problems and disputes regarding, but not limited to, the following issues:

    (a) resolution of disputes on the interpretation of aspects of this LT CCM, which may not be clear;

    (b) resolution of disputes on design choices required for implementation and operation of this LT CCM, which are not defined in this methodology; and

    (c) resolution of possible disputes in the implementation and operation of this LT CCM, including the disputes related to the provisions governing the day-to-day operation, but excluding the day-to-day operation itself.

4. The decisions adopted by the common bodies and the steering committee is without prejudice to any regulatory decision adopted by the competent NRAs.

TITLE 7: REPORTING

Article 20
Publication of Data

1. In accordance with Article 3(f) of the FCA Regulation, the Core CCC shall publish at least the following data items, in addition to the data items set out in Commission Regulation (EU) No 543/2013 on submission and publication of data in electricity markets:

    (a) CNECs' names;

    (b) CNECs' Energy Identification Codes (EIC);

    (c) indication if a CNEC is redundant or not, including the information on a CGM;

    (d) GSK relative weights among the TSOs belonging to the same bidding zone;

    (e) detailed breakdown of the final FB parameters per CNEC: Imax, U, cosφ, Fmax, Fref, F(0,Core), FRM, F_{AAC}, RAM, minRAM application, zone-to-~~slackzone~~ slack PTDFs;

    (f) external constraints including their calculation details (reasoning, methodology and results) in accordance with Article 6;

    (g) flow-based parameters applied in case of activation of the fallback procedure in accordance with Article 16(3);

    (h) maximum non-simultaneous bilateral exchanges on Core bidding zone borders, pursuant to Article 20(9) of the CACM Regulation;

    (i) forecast information contained in the CGM:

        i. vertical load for each Core bidding zone and each TSO;

        ii. production for each Core bidding zone and each TSO;

        iii. reference net positions of all bidding zones in the synchronous area of Continental Europe and reference exchanges for all HVDC interconnectors within the synchronous area of Continental Europe and between the synchronous area of Continental Europe and other synchronous areas; and

    (j) information about the capacity validation, as provided in Article 17.

2. The Core CCC shall publish the data items listed in paragraph 1 on a monthly basis, after each LTCC, on a dedicated online communication platform representing all Core TSOs. To facilitate the readability of the published data, the Core TSOs shall include the information related to the LTCC in the handbook which is published on the communication platform in the framework of the DA CCM, using the same data format.

3. Any change in the identifiers listed in paragraph 1, point (a) and point (b), shall be publicly notified at least one month before its entry into force.

4. Any Core TSO may withhold the information referred to in paragraph 1, point (a) and point (b) if it is classified as sensitive critical infrastructure protection related information in its Member State as provided for in point (d) of Article 2 of Council Directive 2008/114/EC on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection. In such a case, the information referred to in paragraph 1, point (a) and point (b), shall be replaced with an anonymous identifier which shall be the same for each CNEC across all LT CC time frames. The anonymous identifier shall also be used in all TSO communications related to the CNEC and when communicating about an outage or an investment in infrastructure. The Core TSOs shall publish the communication about which information has

been withheld pursuant to this paragraph, on the communication platform referred to in paragraph 2.

5. The Core NRAs may request additional information to be published by the Core TSOs. For this purpose, all Core NRAs shall coordinate their requests among themselves and consult it with the Core TSOs, ACER and all the relevant stakeholders. Any Core TSO may refuse to publish any additional information which has not been requested by its competent NRA.

Article 21
Monitoring and Reporting to the National Regulatory Authorities

1. The Core TSOs shall provide data on LTCC to the Core NRAs for the purpose of monitoring its compliance with this methodology and the relevant legislation. The reporting framework shall be developed by the Core TSOs in coordination with the Core NRAs, and reviewed and updated as required.

2. The data provided to the Core NRAs shall at least include the information on non-anonymized names of CNECs as referred to in Article 20(1), point (a) and point (b):

    a) on a yearly basis for each CNEC after the yearly calculations; and

    b) on a monthly basis for each CNEC after each monthly calculation.

    This information shall be in a format that allows easily to combine the CNEC names with the information published in accordance with Article 20(1).

3. The Core NRAs may request additional information from the Core TSOs. For this purpose, the Core NRAs shall coordinate their requests and forward a single, coordinated request to the Core TSOs. Individual information requests of NRAs, not coordinated with the other Core NRAs, are beyond the scope of this methodology, and shall be dealt with on a national level.

4. The Core CCC, with support and after approval of the Core TSOs, shall submit to the Core NRAs an annual monitoring report containing:

    (a) an assessment of the quality of the data published on the dedicated online communication platform referred to in Article 20, accompanied by a detailed analysis of a failure to achieve sufficient data quality standards by the concerned Core TSOs, where relevant;

    (b) the Core TSOs´ and the Core CCC's report pursuant to Article 22(4) on their continuous monitoring of the effects and performance of the application of the LT CCM, in a commonly agreed template;

    (c) the monitoring of the accuracy of non-Core exchanges' forecasts in the CGM;

    (d) validation monitoring pursuant to Article 17;

    (e) the pre-solved CNECs that were subject to minimum RAM adjustment; and

    (f) statistics on CNECs with minimum RAM applied pursuant to Article 14.

TITLE 8: IMPLEMENTATION AND LANGUAGE

Article 22
Timescale for Implementation

1. The Core TSOs shall publish this LT CCM without undue delay after its adoption pursuant to Article 4(10) of the FCA Regulation.

2. The Core TSOs shall implement this LT CCM in accordance with processes and deadlines provided in paragraph 3 point (c).

3. The implementation process shall consist of the following steps:

   (a) an internal parallel run during which the Core TSOs and the Core CCC shall test the operational processes for the LT CC inputs, the LT CC process and the long-term capacity validation, and develop appropriate IT tools and infrastructure;

   (b) an external parallel run during which the Core TSOs and the Core CCC shall continue testing their internal processes and IT tools and infrastructure. In addition, the Core TSOs shall involve the SAP to test the implementation of this methodology, and market participants to test the effects of applying this methodology to the market and allow them to adapt their processes. In accordance with Article 10(5)(c) of the FCA Regulation, this phase shall not be shorter than 6 months;

   (c) implementation by the following deadlines of:

      i. a coordinated capacity calculation with an ATC extraction as a transitional solution for a yearly auction for 2026; and

      ii. a coordinated capacity calculation with an ATC extraction as a transitional solution for a monthly auction for January 2026.

      iii. a flow-based yearly auction for 2027; and

      ii.iv. a flow-based monthly auction for January 2027

4. During the internal parallel run, the Core TSOs and the Core CCC shall continuously monitor the effects and the performance of the application of the LT CCM, and shall develop the monitoring and performance criteria, in coordination with the Core NRAs. During the external parallel run, the Core TSOs and the Core CCC shall publish the monitoring and performance criteria indicators on a monthly basis. After the implementation of this methodology, the outcome of this monitoring shall be summarised in an annual report.

5. Until the implementation of this Core LT CCM, the Core TSOs shall continue to apply the NTC capacity calculation approach.

Article 23
Language

1. The reference language for this LT CCM shall be English.

2. For the avoidance of doubt, where the Core TSOs need to translate the LT CCM into their national language(s), in the event of inconsistencies between the English version published by the Core TSOs in accordance with Article 4(13) of the FCA Regulation and any version in another language, the relevant Core TSOs shall clarify any inconsistencies by providing a revised translation of the LT CCM to their respective NRAs.

Annex 1 - Transitional solution for calculation of long-term cross-zonal capacities

1. As a transitional solution in accordance with Article 22 3(c), the CCC shall transform the final flow-based parameters into available transmission capacity ('ATC') values on bidding zone borders of the CORE CCR.

2. The following inputs are required to calculate yearly and monthly ATC as a transitional solution for calculation and allocation of long-term cross-zonal capacities:

    (a) the calculated flow-based parameters (**$PTDF_f$** and , **RAM_f**), where RAM_f is defined as:

    $$RAM_f = R_{SP} * (RAM_{bv} - IVA) \qquad (10)$$

    With:

    RAM_{bv} remaining available margin before validation, calculated in accordance with Article 14 equation (9)

    R_{SP} splitting factor for yearly and monthly timeframes as defined by Long-term Splitting Rules Methodology, in accordance with FCA regulation Article 16.

    IVA: adjustments resulting from validation pursuant to Article 17

    (b) if defined, the global allocation constraints shall be assumed to constrain the net positions

3. The final PTDFs (**$PTDF_f$**) of all or only a subset of CNECs can be adjusted before the ATC extraction by setting the positive zone-to-zone PTDFs below a certain threshold to zero.

4. The calculation of the ATCs for LTTR allocation is an iterative procedure, which calculates ATCs for each timeframe, while respecting the constraints of the final flow-based parameters pursuant to paragraph 3

    (a) The initial ATCs are set equal to zero for each Core oriented bidding zone border, i.e.:

    $$\overrightarrow{ATC}_{k=0} = 0 \qquad (11)$$

    with

    $$\overrightarrow{ATC}_{k=0} \text{ the initial ATCs before the first iteration}$$

    (b) the remaining available margin at iteration zero is equal to the updated remaining available margin

    $$\overrightarrow{RAM}_{ATC}(0) = \overrightarrow{RAM}_f \qquad (12)$$

    with

    $$\overrightarrow{RAM}_{\overrightarrow{RAM}_{ATC}}(0) \text{ remaining available margin for ATC calculation at}$$

iteration $k=0$

$\overrightarrow{RAM}_{\overrightarrow{RAM}_f}$ updated remaining available margin for long term cross-zonal capacities as defined in equation 10

(c) The iterative method applied to calculate the ATCs for LTTR allocation consists of the following actions for each iteration step k:

   i.   for each CNEC and external constraint of the flow-based parameters pursuant to paragraph 3, calculate the remaining available margin based on ATCs at iteration k-1

$$\overrightarrow{RAM}_{ATC}(k) = \overrightarrow{RAM}_{ATC}(0) - \mathbf{pPTDF_{z2z}}\overrightarrow{ATC}_{k-1} \qquad (13)$$

   with

$\overrightarrow{RAM}_{ATC}(k) \overrightarrow{RAM}_{ATC}(k)$ remaining available margin for ATC calculation at iteration k

$\overrightarrow{ATC}_{k-1}$ ATCs at iteration k-1

$\mathbf{pPTDF_{z2z}}$ positive zone-to-zone power transfer distribution factor matrix

   ii. for each CNEC, share $RAM_{ATC}(k)$ with equal shares among the Core 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 oriented bidding zone border by the respective positive zone-to-zone PTDF.

   iv. for each Core 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;

   v.   iterate until the difference between the sum of ATCs of iterations k and k-1 is smaller than 1kW;

   vi. the resulting positive ATCs for LTTR allocation stem from the ATC values determined in iteration k, after rounding down to integer values;

at the end of the calculation, there are some CNECs and external constraints with no remaining available margin left. These are the limiting constraints for the calculation of ATCs for LTTR allocation.

5. In addition to publication requirements pursuant to Article 20 and until the Single Allocation Platform ('SAP') in accordance with Article 49 of the FCA Regulation is able to support the allocation of cross-zonal capacities based on flow-based parameters, the Core CCC shall publish the ATCs for allocation of LTTRs.

5.6. While the ATC extraction transitional solution is applied, the reduction of already allocated cross-zonal capacities by the returned volumes defined in Article 14(4)(b) shall not be applied. Prior to ATC extraction, the calculation of flows resulting from already allocated cross-zonal capacities ($\overrightarrow{F}_{AAC}$) shall be based on the full allocated volumes without deduction of returned AACs. The handling of returned AACs shall be performed as outlined in Title 5 of the Harmonised Allocation

Rules for Long-Term Transmission Rights [Articles 38-40].