Channel TSOs proposal of a common capacity calculation methodology for the long-term time frames in accordance with Article 10 of Commission Regulation (EU) 2019/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

January 21st, 2020

Table of Contents

Whereas 3

TITLE 1 General provisions 6

Article 1 Subject matter and scope 6

Article 2 Definitions and interpretation 6

Article 3 Capacity calculation approach 8

TITLE 2 Requirements for long-term capacity calculations under a statistical-based approach 10

Article 4 General principles 10

Article 5 Methodology for the statistical long-term capacity calculations 10

Article 6 Validation 11

TITLE 3 Requirements for long-term capacity calculations under a scenario-based approach 12

Article 7 General principles for long-term cross-zonal capacity calculations 12

Chapter 1 Methodologies for the provision of the inputs for calculation 13

Article 8 Critical Network Element and Contingency (CNEC) methodology 13

Article 9 Reliability margin methodology 13

Article 10 Methodology for operational security limits 13

Article 11 Generation shift keys methodology 14

Article 12 Methodology for Remedial Actions in capacity calculation 15

Article 13 Scenarios definition methodology 15

Article 14 Timestamp selection 15

Chapter 2 Input gathering phase 16

Article 15 Provision of the inputs for the long-term capacity calculations 16

Chapter 3 Qualification phase 17

Article 16 Long-term capacity calculations 17

Article 17 Coordinated Net Transmission Capacity process 17

Article 18 Implementation of reduction of the interconnectors capacity 18

Article 19 Implementation of the power shift 18

Article 20 N-1 security assessment of maximum import/export for each timestamp of the calculation 18

Article 21 Calculation consistency 18

Chapter 4 Validation phase 19

Article 22 Cross-zonal capacity validation methodology 19

TITLE 4 Fall-back procedures 20

Article 23 Fall-back procedures for annual and monthly capacity calculations 20

TITLE 5 Publication and implementation 21

Article 24 Publication of information 21

Article 25 Implementation of the LT CC Methodology 21

Article 26 Implementation of new interconnectors 21

Article 27 Language 22

All TSOs of the Channel CCR, taking into account the following:

Whereas

1. Commission Regulation (EU) 2016/1719 of 26 September 2016 establishes a guideline on forward capacity allocation (hereinafter referred to as the "FCA Regulation"), which entered into force on 17 October 2016.

2. This document is a common proposal developed by all Transmission System Operators (hereinafter referred to as "TSOs") within the Channel Capacity Calculation Region (hereinafter referred to as "Channel CCR"), as defined in accordance with Article 15(1) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereinafter referred to as the "CACM Regulation"), on the common capacity calculation performed for the forward capacity allocation within the long-term time frames (hereinafter referred to as "LT CC Methodology"). This proposal is required by, and developed in accordance with, Article 10 of the FCA Regulation.

3. Article 10(1) of the FCA Regulation requires the LT CC Methodology to be submitted within six months following the approval of the common coordinated capacity calculation methodology in the Channel CCR referred to in Article 9(7) of the CACM Regulation (hereinafter referred to as the "Channel Day-Ahead and Intraday Capacity Calculation Methodology"). The TSOs of the Channel CCR being unable to reach consensus on the LT CC Methodology by the due date, they informed the national regulatory authorities of the Channel CCR and the Agency for the Cooperation of Energy Regulators (hereinafter referred to as "the Agency") on 23 May 2019 and provided the relevant documentation and information in compliance with Article 4(4) of the FCA Regulation. Following information to the European Commission by the Agency, the former provided some guidance which resulted in the TSOs of the Channel CCR being able to reach an agreement on the main principles of the LT CC Methodology. The TSOs of the Channel CCR were requested by the European Commission to draft the LT CC Methodology based on these main principles under an agreed timetable.

4. The LT CC Methodology takes into account the general principles and goals set in the FCA Regulation.

   (a) In accordance with Article 10(2) of the FCA Regulation, the approach to be used is a coordinated net transmission capacity approach or a flow-based approach. This LT CC Methodology applies the coordinated net transmission capacity approach which is set up according to the definition of Article 2(8) of the CACM Regulation.

   (b) In compliance with Article 10(3) of the FCA Regulation, the LT CC Methodology shall be compatible with the Channel Day-Ahead and Intraday Capacity Calculation Methodology.

   (c) Article 10(4) of the FCA Regulation requires the uncertainty associated with long-term capacity calculation time frames to be taken into account when applying either a security analysis based on multiple scenarios or a statistical approach based on historical cross-zonal capacity for day-ahead and intraday time frames. Uncertainties have been

considered in Article 9 of this LT CC Methodology.

(d) In accordance with Article 10(6) of the FCA Regulation, where a security analysis based on multiple scenarios is applied, 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 shall apply. These elements have been included in Articles 8 to 22 of this LT CC Methodology.

(e) In accordance with Article 10(7) of the FCA Regulation and Article 21(3) of the CACM Regulation, fallback procedures have been developed in Article 23 of this LT CC Methodology.

(f) Article 4(8) of the FCA Regulation requires that the proposed timescale for the implementation and the expected impact of the LT CC Methodology on the objectives of the FCA Regulation is described. They are respectively presented in Article 25 and in recital 5 of this Whereas Section.

5. The LT CC Methodology contributes to and does not in any way hinder the achievement of the objectives of Article 3 of the FCA Regulation. In particular, the LT CC Methodology:

(a) Establishes common and coordinated processes for the capacity calculations by defining a set of harmonised rules for long-term cross-zonal capacity calculation, seeking to release capacity at the earliest possible time. As such, this serves the objective of promoting effective long-term cross-zonal trade with long-term cross-zonal hedging opportunities for market participants in accordance with Article 3(a) of the FCA Regulation;

(b) Contributes to the objective of optimising the calculation and allocation of long-term cross-zonal capacity in accordance with Article 3(b) of the FCA Regulation by coordinating the timings for the delivery of inputs, the calculation approach and the validation requirements;

(c) Contributes to the objective of providing non-discriminatory access to long-term cross-zonal capacity in accordance with Article 3(c) of the FCA Regulation by ensuring that the capacity calculation is available to all market participants and is transparent;

(d) Contributes to the objective of ensuring fair and non-discriminatory treatment of TSOs, the Agency, regulatory authorities and market participants in accordance with Article 3(d) of the FCA Regulation by reducing long-term uncertainties in respect of cross-zonal capacities;

(e) Contributes to the objective of respecting the need for a fair and orderly forward capacity allocation and orderly price formation in accordance with Article 3(e) of the FCA Regulation by providing market participants with information on the quantity of long-term cross-zonal capacity that can be released and the reduction periods (if any);

(f) Contributes to the objective of ensuring and enhancing the transparency and reliability of information on forward capacity allocation in accordance with Article 3(f) of the FCA Regulation by coordinating the inputs of the capacity calculation and requiring these inputs to be transparent;

(g) 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 by providing TSOs and market participants with information on cross-border availability in a timely manner and ensuring that the results of each capacity calculation are based on the best possible forecast of the transmission systems at that point in time. Furthermore, this LT CC Methodology outlines how future interconnectors joining the Channel CCR would be incorporated within the capacity calculation.

SUBMIT THE FOLLOWING LT CC METHODOLOGY TO ALL NATIONAL REGULATORY AUTHORITIES OF THE CHANNEL CCR:

TITLE 1 General provisions

Article 1 Subject matter and scope

1. The common capacity calculation methodology as determined in this LT CC Methodology is the common proposal of all the TSOs of the Channel CCR in accordance with Article 10(1) of the FCA Regulation.

2. This LT CC Methodology applies solely to the long-term capacity calculations within the Channel CCR. Common capacity calculation methodologies within other capacity calculation regions or other timeframes are outside the scope of this proposal.

3. The LT CC Methodology covers the annual and monthly long-term time frames pursuant to Article 9 of the FCA Regulation.

4. The methodology for splitting long-term cross-zonal capacity is out of scope of this LT CC Methodology but in the scope of the methodology pursuant to Article 16 of the FCA Regulation.

Article 2 Definitions and interpretation

1. For the purposes of the LT CC Methodology, the terms used shall have the meaning given to them in Article 2 of Regulation (EC) 714/2009, Article 2 of Regulation (EC) 2013/543 and Article 2 of the FCA Regulation.

2. In addition, the following definitions shall apply:

CC	Capacity Calculation
CCC	Coordinated Capacity Calculator, as defined in Article 2(11) of the CACM Regulation
CCR	Capacity Calculation Region, as defined in article 2(3) of the CACM Regulation
CGM	Common Grid Model, as defined in Article 2(2) of the CACM Regulation
CGMM	Common Grid Model Methodology, as requested by Article 17(1) of the CACM Regulation
CNE	Critical Network Element
CNEC	Critical Network Element and Contingency
cNTC	Coordinated Net Transmission Capacity, as defined in Article 2(8) of the CACM Regulation
Day-Ahead	Has the meaning given to in Article 2(34) of the CACM Regulation

EC	European Commission
ENTSO-E	European Network of Transmission System Operators for Electricity
EU	European Union
Fmax	Maximum Allowable Power Flow
FRM	Flow Reliability Margin
GSK	Generation Shift Key, as defined in article 2(12) of the CACM Regulation
HVDC	High-Voltage Direct Current
$I_{\max}$	Maximum Admissible Current
Import/export limit	Limits of the net position of a bidding zone
LT	Long-Term
LTA	Long-Term Allocated capacity
Maximum Secure Value	The maximum power transfer between two adjacent Bidding Zones respecting the operational security (no negative margin on the relevant CNECs)
Minimum Guaranteed Value	Minimum of the calculated values during the first annual cross-zonal capacity calculation under a scenario-based approach
MPTC	Maximum Permanent Technical Capacity. For the avoidance of doubt, it means, for the relevant market time unit(s), the maximum permanent technical capacity which is the maximum continuous active power which a cross-zonal network element (interconnector/HVDC system) is capable of transmitting (taking into account potential reduced availability due to planned and unplanned outages of the interconnector asset). This parameter is defined by the interconnector's asset operators, and only considers the interconnector asset availability
NRA	National Regulatory Authority
NTC	Net Transmission Capacity
PTDF	Power Transfer Distribution Factor

Remedial Action	Has the meaning given to it in Article 2(13) of the CACM Regulation
RoCoF	Rate of Change of Frequency
SO GL	Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

3. In this LT CC Methodology, unless the context requires otherwise:

   (a) the singular indicates the plural and vice versa;

   (b) headings are inserted for convenience only and do not affect the interpretation of this proposal; 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 Capacity calculation approach

1. This LT CC Methodology is based on a cNTC approach in accordance with Article 10(2) of the FCA Regulation and uses both statistical and scenario-based calculations.

2. This LT CC Methodology is composed of three steps in respect of the annual capacity calculation:

   i. A statistical calculation performed by the CCC by end of February Y-1. This calculation shall result in a single NTC value per interconnector and per direction with potential reduction periods. Once the calculation is completed, the capacity can be allocated to the market in the form of long term auctions subject to Article 16 of the FCA Regulation;

   ii. A first scenario-based calculation performed by the CCC by the end of September Y-1. This calculation shall result in a single NTC value per interconnector and per direction without additional reduction periods, which is the Minimum Guaranteed Value (MGV). The MGV represents the capacity which is guaranteed during the whole period except at times of interconnector outages. Once the calculation is completed, the capacity up to the MGV (which has not been already allocated) can be allocated to the market in subsequent long-term auctions subject to Article 16 of the FCA Regulation;

   iii. A second scenario-based calculation performed by the CCC in December Y-1. This calculation shall release the MPTC subject to potential reduction periods. The calculation is optional in the event that no updated or additional input data is received. If the calculation is not performed, MPTC shall be released with the potential reduction periods included in the first scenario-based calculation. Once the calculation is completed, the capacity up to the MPTC of the interconnector or the capacity calculated during the reduction periods (which has not been already allocated) can be allocated to the market in subsequent long-term auctions subject to Article 16 of the FCA Regulation.

3. This LT CC Methodology is composed of a single step in respect of the monthly capacity calculation:

    i. A Monthly capacity scenario-based calculation performed by CCC before the end of the month M-2.

4. Capacity allocation for all long-term products will be based on the latest calculated results.

5. For products with a duration greater than one month, the capacity will be derived from annual capacity calculations. For products with a duration equal to or less than one month, the capacity will be derived from monthly capacity calculations.

TITLE 2 Requirements for long-term capacity calculations under a statistical-based approach

Article 4 General principles

A volume of annual cross-zonal capacity is to be made available before the end of February preceding the delivery year. Due to the unavailability of the input data for a scenario-based approach in accordance with Article 3(1) of CGMM for forward capacity allocation in conjunction with Article 65 of SO GL before this deadline, annual cross-zonal capacities will be calculated under a statistical-based approach. The result of the capacity calculation will be validated in accordance with the validation conditions described in Article 6 but will be capped at 35% of the interconnector MPTC.

Article 5 Methodology for the statistical long-term capacity calculations

The CCC shall calculate the annual cross-zonal capacity for each interconnector and direction on a bidding zone border as follows:

1. Obtain the last 2 years' worth of Day-Ahead NTC data per interconnector and per direction.
2. Take the average of those NTC values.
3. Calculate the value equal to 50% of the average value in order to take account of:
   (a) Removing LTA inclusion;
   (b) Removing the impact of intraday as a Remedial Action (in Great Britain only);
   (c) Removing the impact of countertrading; and
   (d) Adding a margin to reflect the difference between historical cross-zonal capacity values and forecasted long-term cross-zonal capacity values as required by Article 23 (1)(c) of the FCA Regulation.
4. Where the resulting value is above 35% of the interconnector MPTC, the applied capacity is 35% of the interconnector MPTC.
5. Where the resulting value is below 35% of the interconnector MPTC, either the resulting capacity of <35% of the interconnector MPTC is applied in case this is justified in line with Article 6(2), or the applied capacity is increased to 35% of the interconnector MPTC.
6. The value calculated in Article 5(4) or Article 5(5) is subject to validation as described in Article 6.

Any new interconnector that does not have two full years of day-ahead data to complete the calculation described in Article 5, will be given either of the following:

(a) In case the new interconnector shares some limiting CNEs with an existing interconnector, the value calculated for this existing interconnector.

(b) Otherwise, 35 % of the interconnector MPTC.

This value shall be validated in accordance with Article 6.

Article 6 Validation

1. TSOs of the Channel CCR have the responsibility to validate the capacity proposed by the CCC and subject to Article 6(2) or Article 6(3), may locally re-assess the computed NTCs per interconnector.

2. If the result of the calculation described in Article 5 gives a value lower than 35% of the interconnector MPTC, the concerned TSOs may reduce the applied capacity below 35% of the interconnector MPTC but not lower than the value calculated in Article 5. A justification for the reduction shall be sent to the relevant NRAs.

3. TSOs may reduce the applied capacity below 35% of the interconnector based on planned outages, new infrastructure and generation and load pattern for the long-term capacity calculation time frames in accordance with Article 23(1)(d) of the FCA Regulation. The reduction shall be incorporated in the long-term products as reduction periods. The level of reduction shall be duly justified based on an individual analysis to demonstrate that additional capacity would cause operational security concerns and this analysis must be presented to the TSOs of bidding zone border and shall be sent to the relevant NRAs. This analysis must be performed in a timely manner in order to release forward cross-zonal capacity before the end of February preceding the delivery year.

4. In case several interconnectors influence similar CNECs in the same control area, any reductions on these interconnectors shall be done proportionally to their influence on the limiting CNECs.

5. The TSOs of the Channel CCR shall report to NRAs any NTC reduction resulting from the validation phase.

TITLE 3 Requirements for long-term capacity calculations under a scenario-based approach

Article 7 General principles for long-term cross-zonal capacity calculations

1. For the long-term time frames, the CCC shall calculate the cross-zonal capacity for each interconnector on a bidding zone border and for each timestamp selected in accordance with Article 14 of this LT CC Methodology in respect of each long-term calculation using the cNTC approach.

2. Following the long-term statistical calculation occurring before the end of February Y-1, three different long-term calculations under a scenario-based approach will be performed in the following order:

   (a) Annual capacity calculation using a Minimum Guaranteed Value before the end of September Y-1;

   (b) Annual capacity calculation releasing the interconnector MPTC while using reduction periods in December Y-1; and

   (c) Monthly capacity calculation using reduction periods before the end of the month M-2.

3. The timestamps that will be used are the ones during which one or several outage(s) on a CNE is/are planned by an onshore TSO in one of the bidding zones. For timestamps without any planned outage on any CNE the calculation will give the interconnector MPTC except in respect of the calculation described in Article 7(2)(a) in which the lower value of each calculation over the period (excluding interconnectors outages) will be taken. The planned outages of an onshore TSO with a significant impact on the interconnector in one of the bidding zones to which that interconnector is connected shall be defined as follows:

   (a) A planned outage on one CNE satisfying the requirements set out in Article 8; and

   (b) Any other pre-determined conditions defined by the TSO, agreed with all Channel NRAs and published on the TSO's website before its application. In such a case, the concerned TSO shall explicitly publish without delay on its website the list of concerned grid elements and the estimated duration of the application of this specific grid condition when known.

4. Each onshore TSO shall publish on its website the list of the grid elements resulting from the selection criteria under Article 8.

5. The long-term capacity calculation shall be composed of the following three phases in accordance with Article 10(6) of the FCA Regulation: the input gathering phase as described in Chapter 2, the qualification phase as described in Chapter 3 and the validation phase as described in Chapter 4.

Chapter 1 Methodologies for the provision of the inputs for calculation

Article 8 Critical Network Element and Contingency (CNEC) methodology

1. Each TSO of the Channel CCR shall perform the selection of the CNECs based on the assessment of the cross-zonal flow sensitivity.

2. For the Channel CCR, the cross-zonal flow sensitivity shall correspond to maximum of the following bidding zone to bidding zones PTDF absolute value:

   (a) Great Britain to France;

   (b) Great Britain to Belgium;

   (c) Great Britain to The Netherlands.

3. According to Article 23(2) of the FCA Regulation, each TSO of the Channel CCR shall consider as not significantly influenced the CNECs with cross-zonal flow sensitivity below a certain threshold. Those not significantly influenced CNECs shall be ignored for the cross-zonal capacity calculation.

4. The cross-zonal flow sensitivity threshold for the LT CC methodology in the Channel CCR is identical to the threshold for the DA/ID CC methodology in the Channel CCR.

5. Each TSO of the Channel CCR shall monitor the CNECs to assess the relevance of the sensitivity threshold over time.

6. Each TSO of the Channel CCR shall critically assess the relevance of the CNECs against its CNEC selection criteria and may decide to discard some of the CNEC from the list. This must be based on a study performed by the TSO or operational experience.

Article 9 Reliability margin methodology

1. The TSOs of the Channel CCR consider that the additional uncertainties between the long-term and Day-Ahead time frames are covered by the selected scenarios, therefore long-term capacity calculations will use the same Flow Reliability Margin applied in the Channel Day-Ahead and Intraday Capacity Calculation Methodology.

2. Determination of a reliability margin does not apply to direct current interconnections due to their controllability.

3. The TSOs of the Channel CCR shall maintain consistency between the Day Ahead/Intraday and Long Term timescales by aligning the same FRM in a timely manner.

Article 10 Methodology for operational security limits

In accordance with Article 12 of the FCA Regulation:

1. Each TSO within the Channel CCR shall define at least per season (spring, summer, autumn & winter) and for each CNE the maximum permanent allowable current according to its operational security limits criteria defined in line with Article 25 of SO GL.

2. The TSOs of the Channel CCR shall maintain consistency with their neighbouring CCRs in a timely manner. TSO of the Channel CCR who are also active in neighbouring CCRs shall apply the operational security limits identical to those in the neighbouring CCRs.

3. The TSOs of the Channel CCR applying the security constraint on the bidding zone import/export limits shall provide this information to the CCC as an input data for the relevant capacity calculations.

Article 11 Generation shift keys methodology

1. The TSOs of Channel CCR shall define the generation shift keys (GSK) for long-term time frames in accordance with Article 13 of the FCA Regulation.

2. The GSK in Great Britain shall represent the best forecast of the relation of a change in net position of the bidding zone to a specific change of generation or load in the CGM.

3. The French GSK will be composed of all the units connected to RTE's network which are relevant for this long-term time frame. The variation of the generation pattern inside the GSK is the following: all the units which are in operations in the base case will follow the change of the French net position on a pro-rata basis. This means, if for instance one unit is representing n% of the total generation on the French grid, n% of the shift of the French net position will be attributed to this unit.

4. The Belgian GSK shall be determined for the Belgian bidding zone based on a defined list of nodes located where the most relevant flexible and controllable production units are connected. This list shall be defined in a way to limit as much as possible the impact of model limitations on the loading of the CNEs. The variation of the generation pattern inside the GSK shall be such that for each of these nodes, the sum of the generation units which are in operations on each of these nodes in the CGM will follow the change of the Belgian net position in such a way that the generation at the node will reach its maximum when the maximum generation capability of the Belgian bidding zone is reached and will reach its minimum when the minimum generation capability of the Belgian bidding zone is reached.

5. The Dutch GSK will dispatch the main generators in a manner which avoids extensive and unrealistic under- and overloading of the units for extreme import or export scenarios. The GSK is directly adjusted in case of new power plants. In addition, unavailability of generators due to outages is considered in the GSK. All GSK units are re-dispatched pro-rata on the basis of predefined maximum and minimum production levels for each active unit. The total production level remains the same. The maximum production level is the contribution of the unit in a predefined extreme maximum production scenario. The minimum production level is the contribution of the unit in a predefined extreme minimum production scenario. Base-load units will have a smaller difference between their maximum and minimum production levels than start-stop units.

Article 12 Methodology for Remedial Actions in capacity calculation

1. Each TSO of the Channel CCR shall define individually the Remedial Actions, used for the calculation defined in Article 17, that shall be made available for the long-term capacity calculation within the Channel CCR in accordance with Article 14 of the FCA Regulation. Each TSO of the Channel CCR shall, at minimum, ensure that all relevant non-costly Remedial Actions according to the TSOs' operational principles which are anticipated to be available on the day of delivery are made available to the CCC. The type of non-costly remedial action shall cover, among others, topological changes and phase shifting transformer tap changes.

2. Each TSO of the Channel CCR may decide to make available costly Remedial Actions.

3. When defining a Remedial Action, each TSO of the Channel CCR shall specify at minimum:

   (a) The type of the Remedial Action and the sequence of actions to be implemented;

   (b) In case of quantifiable Remedial Action, the maximum and minimum values of the scalable quantity; and

   (c) Whether the Remedial Action is a shared Remedial Action and can be considered for all contingencies or whether it shall be limited to a subset of contingencies. In the latter case, the TSO shall specify the list of contingencies.

4. In case a Remedial Action made available for the long-term capacity calculation in the Channel CCR is also one which is made available in another CCR, the TSO taking control for the Remedial Action shall take care when defining it of a consistent use in its potential application in both CCRs to ensure a secure power system operation.

Article 13 Scenarios definition methodology

1. In accordance with Article 19 of the FCA Regulation, all TSOs in the Channel CCR shall jointly develop a common set of scenarios to be used in the CGM for each long-term capacity calculation time frame.

2. In order to meet the above requirements, the TSOs of the Channel CCR shall use the ENTSO-E year-ahead reference scenarios which are created on an annual basis (i.e. default scenarios), in line with Article 3.1 of CGMM developed according to Articles 67(1) and 70(1) of SO GL. This pan-European process is based on the common grid methodology as developed in accordance with Article 18 of the FCA Regulation.

3. ENTSO-E year-ahead reference scenarios can be updated by each TSO of the Channel CCR at a monthly level to incorporate the latest available information with regard to the generation pattern.

Article 14 Timestamp selection

1. Long-term cross-zonal capacity will be computed only in respect of the periods including a planned outage of a CNE with significant impact on the interconnector.

2. The outage planning of the CNEs listed before is available through the Outage Planning Coordination database according to Articles 97, 98 & 99 of SO GL. Based on this database, the timestamp selection will use the outage planning of the CNEs of the Channel CCR as follows:

   (a) Timestamps will be selected per granularity of the concerned period. This granularity is fixed in advance and is the following:

      i. 1 month for the annual cNTC calculation;

      ii. 1 week for the monthly cNTC calculation.

   (b) The selected timestamp within the granularity is the day with the largest simultaneous number of planned outages.

   (c) In case two or more timestamps take place within the same scenario and contain the same planned outages, those redundant timestamps will be ignored. The outcome of the calculation will be considered equal for the two timestamps without an additional calculation.

   (d) In case there is no planned outage within the granularity or redundancy occurs, no timestamp is selected. Instead, a second timestamp within another granularity can be selected.

   (e) As the timestamp selection is mainly driven by the number of simultaneous outages and not by the impact of the outages, the TSO may request extra timestamps.

3. The timestamp selections based on the outage planning of the CNE in the Channel CCR is proposed by the CCC to the TSOs sufficiently in advance of each annual calculation and each monthly calculation.

4. In case the CCC has no access to the outage planning, then the CCC requests the individual outage planning sufficiently in advance to the concerned TSOs prior to the relevant calculation.

5. After the standard timestamps are selected, TSOs can send their request of additional ad-hoc timestamps to the CCC.

6. For each selected timestamp, the CCC will generate a CGM in accordance with the CGMM related to Article 18 of the FCA Regulation and shall include the planned outages according to Article 14(2)(b).

Chapter 2 Input gathering phase

Article 15 Provision of the inputs for the long-term capacity calculations

1. The TSOs of the Channel CCR shall provide the CCC before a deadline commonly agreed between the TSOs and the CCC the following inputs:

   (a) Generation Shift Key in accordance with Article 11;

   (b) Maximum Permanent Technical Capacity in accordance with Article 2(2);

(c) Critical Network Elements and Contingencies in accordance with Article 8;

(d) Flow Reliability Margin in accordance with Article 9;

(e) Maximum admissible current on a CNE (Imax) / Maximum allowable power flow (Fmax) in accordance with Article 10;

(f) Remedial Actions in accordance with Article 12; and

(g) Ad hoc timestamp in accordance with Article 14.

2. When providing the inputs, the TSOs of the Channel CCR shall respect the formats commonly agreed between the TSOs of the Channel CCR and the CCCs.

Chapter 3 Qualification phase

Article 16 Long-term capacity calculations

The CCC shall calculate, subject to Art.20, the following:

(a) the maximum secure value of simultaneous import of the synchronous grid of Continental Europe ; and

(b) the maximum secure value of simultaneous export of the synchronous grid of Continental Europe,

over all the interconnectors of the Channel CCR bidding zone borders, for each timestamp following the process outlined in Article 14.

Article 17 Coordinated Net Transmission Capacity process

1. The CCC shall prepare the CGM for the timestamps selected according to Article 14 and shall use GSKs according to Article 11 for each scenario timestamp in order to reflect the starting point by setting the exchanges on the interconnectors at the level of their MPTC in the direction of the synchronous grid of Continental Europe towards Great-Britain or vice versa.

2. The CCC shall run a contingency analysis on the CGM using the CNEC list provided by the TSOs and evaluate results either allowing interconnector MPTC without further actions or indicating a potential interconnector import or export limitation as a result of a negative margin on a CNE or operational security standard violation.

3. For each negative margin on a CNE, the CCC shall deploy the list of Remedial Actions to alleviate such a margin. If Remedial Actions can alleviate the negative margin of the CNE, the interconnector MPTC can be made available for that scenario timestamp. If the Remedial Actions used in this respect cannot alleviate the CNE violation, the maximum secure value of the interconnector capacity of the bidding zone where the limiting CNEC(s) is/are located should be progressively reduced in steps from starting points according to Article 18. Following each reduction, the contingency analysis should be repeated with the Remedial Actions already deployed until a level of the maximum secure value of the interconnector capacity has been identified for which no CNE violations occur.

Article 18 Implementation of reduction of the interconnectors capacity

1. For each timestamp, the CCC shall perform a reduction of the interconnector capacity as follows:

   (a) In case of negative margin on the CNECs which cannot be solved with available Remedial Actions, the CCC shall in his calculation reduce the capacity of the Interconnector connected to the bidding zone where the limiting CNE is located.

   (b) In case several interconnectors are located in the concerned bidding zone, the reduction shall be applied only to the interconnectors which have an influence on the limiting CNE above the thresholds defined in Article 8 and proportionally to their influence.

2. In case of a calculation resulting in a Minimum Guaranteed Value following Article 7(2)(a), the most significant reduction of capacity of all scenario timestamps, with exception of the interconnector outages, will be the NTC value of the interconnector for the entire time frame under calculation.

3. In case of a calculation resulting in the MPTC including reduction period(s) following Article 7(2)(b) or Article 7 (2)(c), the reduction of capacity, with exception of the interconnector outages, will apply for the entire duration of the relevant reduction period.

Article 19 Implementation of the power shift

When computing the capacity, the CCC shall implement any shift of the power transfer between two bidding zones by adjusting the generation in each of the bidding zones using the GSK of the bidding zones.

Article 20 N-1 security assessment of maximum import/export for each timestamp of the calculation

The CCC shall perform N-1 security assessments for the timestamps selected in accordance with Article 14.

Article 21 Calculation consistency

1. For the first scenario-based cross-zonal long-term calculation (resulting in a Minimum Guaranteed Value), for each interconnector in both import and export directions, the maximum value between the results obtained under the statistical-based approach in Article 6 and the results obtained under the first scenario-based approach in Article 18 shall be taken as the capacity to be validated in accordance with Chapter 4. This means that the Minimum Guaranteed Value resulting from the calculation described in Article 7(2)(a) cannot be lower than the relevant value validated under the statistical-based approach in Article 6.

2. For each remaining long-term calculation, for each interconnector in both import and export, the maximum value between the results obtained in Article 18 and the long-term Allocated capacity (LTA) corresponding to the studied timestamp shall be taken as the capacity to be validated for the reduction periods in accordance with Chapter 4.

Chapter 4 Validation phase

Article 22 Cross-zonal capacity validation methodology

1. The TSOs of the Channel CCR have the responsibility to validate the capacity proposed by the CCC and subject to paragraph 2 below, may locally re-assess the computed NTCs on the interconnector.

2. The TSOs of the Channel CCR have the right to re-assess the capacity calculated to prevent any risk due to possible unforeseen changes in grid situations which have occurred during the qualification phase such as:

   (a) Forced outage on one interconnector or one element defined as CNE or contingency;

   (b) A mistake in input data leading to an incorrect cross-zonal capacity; and/or

   (c) Any other criteria that the TSO shall have previously defined, agreed by its NRA and published in its website before its application.

3. In case of such possible unforeseen changes and should a TSO is detect a constraint, the TSOs of the Channel CCR may have to reject the calculated NTCs on the interconnector(s) of its bidding zone. Those TSOs shall be entitled to reduce the proposed NTC towards its own interconnector.

4. The reduction of the proposed NTCs shall be monitored, based at minimum on an identification of the limiting CNEC and the explanation of the unforeseen event causing the NTC reduction. Under these circumstances, the output of this process is the amended NTC which is considered as the final NTC.

5. The TSOs of the Channel CCR shall report to NRAs any NTC reduction resulting from the validation phase and the related CNEC.

TITLE 4 Fall-back procedures

Article 23 Fall-back procedures for annual and monthly capacity calculations

1. In accordance with Article 42 of the FCA Regulation, in the event that the CCC is unable to produce results, the default fall-back procedure shall be the postponement of the forward capacity allocation and a reasonable deadline shall be agreed by the TSOs of the Channel CCR to rerun the calculation.

2. In case the postponement of the forward capacity allocation is not possible, or the new deadline has been reached and no results are available, the TSOs of the Channel CCR foresee the following fall-back process:

   (a) For the annual capacity calculation, the TSOs will use as a starting point cross-zonal long-term capacity calculated by the CCC for the equivalent planned outages of the previous year. The TSOs of the Channel CCR will bilaterally validate these NTC values and then these values will be validated in a coordination meeting of the TSOs of the Channel CCR.

   (b) For the monthly capacity calculation, the TSOs of the Channel CCR will use as a starting point cross-zonal long-term capacity calculated by the CCC during the annual process for this month. The TSOs of the Channel CCR will bilaterally validate these NTC values and then these values will be validated in a coordination meeting of the TSOs of the Channel CCR.

TITLE 5 Publication and implementation

Article 24 Publication of information

1. In accordance with Article 3(f) and Article 21(3) of the FCA Regulation, all TSOs of the Channel CCR shall regularly and at least once a year review and update the key input and output parameters listed in Article 27(4)(a) to (d) of the CACM Regulation.

   (a) If the operational security limits and contingencies used for the capacity calculation need to be updated based on this review, the TSOs of the Channel CCR shall publish the changes at least one week before the implementation.

   (b) The TSOs of the Channel CCR shall include the re-assessment of the further need of security constraints.

2. The review of the common list of Remedial Actions taken into account in the capacity calculation shall include at least an evaluation of the efficiency of specific phase-shifting transformers and the topological Remedial Actions considered.

3. In case the review proves the need for updating the application of the methodologies in respect of CNECs and GSKs referred to in Articles 12 and 13 of the FCA Regulation, referring respectively to the Articles 23 to 24 of the CACM Regulation, changes will have to be published at least three months before the final implementation.

4. Any changes of parameters listed in Article 27(4) of the CACM Regulation have to be communicated to market participants and the NRAs of the Channel CCR.

Article 25 Implementation of the LT CC Methodology

1. The TSOs of the Channel CCR shall publish the LT CC Methodology without undue delay after all NRAs have approved the proposed LT CC Methodology or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 4(9), Article 4(10) and 4(11) of the FCA Regulation.

2. The TSOs of the Channel CCR shall implement the LT CC Methodology for the capacity calculation performed in annual and monthly time frames no later than 12 months after the go-live of Channel Day-Ahead and Intraday Capacity Calculation.

3. The deadline defined in Article 25(2) can be modified on request of all TSOs of the Channel CCR in case the testing results of the testing period do not meet the necessary conditions for implementation.

4. During the implementation period, and especially in case of new interconnector, each TSO may apply a stepwise implementation of the LT CC Methodology for the interconnectors connected to its bidding zone.

Article 26 Implementation of new interconnectors

1. The LT CC Methodology will apply by default to new interconnectors in case no need for amendment is identified by the TSOs of the Channel CCR.

2. The TSOs of the Channel CCR shall jointly discuss, and not unreasonably withhold, proposed amendments to the LT CC Methodology required for a new interconnector joining the Channel CCR.

Article 27 Language

1. The reference language for this LT CC Methodology shall be English.

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

Explanatory note for Channel TSOs proposal of common capacity calculation methodology for the long-term market timeframe in accordance with Article 10 of Commission Regulation (EU) 2019/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

January 21st, 2020

Disclaimer

This explanatory document is submitted by all TSOs of the Channel Region to all NRAs of the Channel Region for information and clarification purposes only accompanying the proposal for common capacity calculation methodology for the long-term market timeframe in accordance with Article 10 of Commission Regulation (EU) 2016/1719 of 26 September 2016.

Contents

1 Introduction 4
1.1 Purpose of the document 4
1.2 Explanation of the main choices of the proposed methodology 4
1.3 Planning for implementation 6
2 LT CC Methodology under a statistical based approach 7
3 LT CC Methodology under a scenario-based approach 9
3.1 High level process 9
3.2 Timestamp selection 9
3.3 Step 1: Inputs gathering phase 11
3.3.1 Definition of a Critical Network Element and a Contingency (CNEC) 11
3.3.2 Flow Reliability Margin 13
2.2.4 Operational security limits on the Critical Network Elements 13
3.3.3 Generation shift keys 14
3.3.4 Remedial Actions 16
3.3.5 Scenarios and planned outages 17
3.4 Step 2: Grid Models 18
3.5 Step 3: Calculation methodology 19
3.5.1 Mathematical description 19
3.5.2 Remedial Action optimization 20
3.5.3 Implementation of reduction of the interconnector capacity 21
3.5.4 NTC calculation process for each timestamp 23
3.6 Long-term cross-zonal capacity process 24
3.6.1 Annual cross-zonal capacity 24
3.6.2 Monthly cross-zonal capacity 25
3.6.3 Other long-term cross-zonal capacity 25
3.7 Step 4: cross-zonal validation 26
3.8 Fallback procedure 27
4 Criteria for an operational process 28

1 Introduction

1.1 Purpose of the document

Article 10 (1) of the FCA Regulation requires the LT CC Methodology to be submitted within six months following the approval of the common coordinated capacity calculation methodology in the Channel CCR referred to in Article 9 (7) of the CACM Regulation (hereinafter referred to as the "Channel Day-Ahead and Intraday Capacity Calculation Methodology"). The TSOs of the Channel CCR being unable to reach consensus on the LT CC Methodology by the due date, they informed the national regulatory authorities of the Channel CCR and the Agency for the Cooperation of Energy Regulators (hereinafter referred to as "the Agency") on 23 May 2019 and provided the relevant documentation and information in compliance with Article 4 (4) of the FCA Regulation. Following information to the European Commission by the Agency, the former provided some guidance which resulted in the TSOs of the Channel CCR being able to reach an agreement on the main principles of the LT CC Methodology. The TSOs of the Channel CCR were requested by the European Commission to draft the LT CC Methodology based on these main principles under an agreed timetable. This document provides further explanation on the concepts and different inputs used for long term (LT) capacity calculation for the Channel CCR. Where deemed necessary, the document explains differences in the proposed LT CC Methodology between the different TSOs of the Channel CCR.

The following topics are out of scope of this document:

- Channel Day-Ahead and Intraday Capacity Calculation Methodology.
- Splitting rules of LT cross-zonal capacity.
- Allocation of cross-zonal capacity in LT timeframe.
- Any compensation payable to an interconnector in the event that its capacity is restricted. Bilateral agreement will be put in place between System Operators ("SO") and Interconnectors ("IC").

1.2 Explanation of the main choices of the proposed methodology

The Channel Capacity Calculation Region consists of the following bidding zone borders:

- France – Great Britain (FR-GB);
- Netherlands – Great Britain (NL-GB); and
- Belgium – Great Britain (BE-GB).

Figure 1 provides the lay-out of the Channel CCR bidding zone borders:

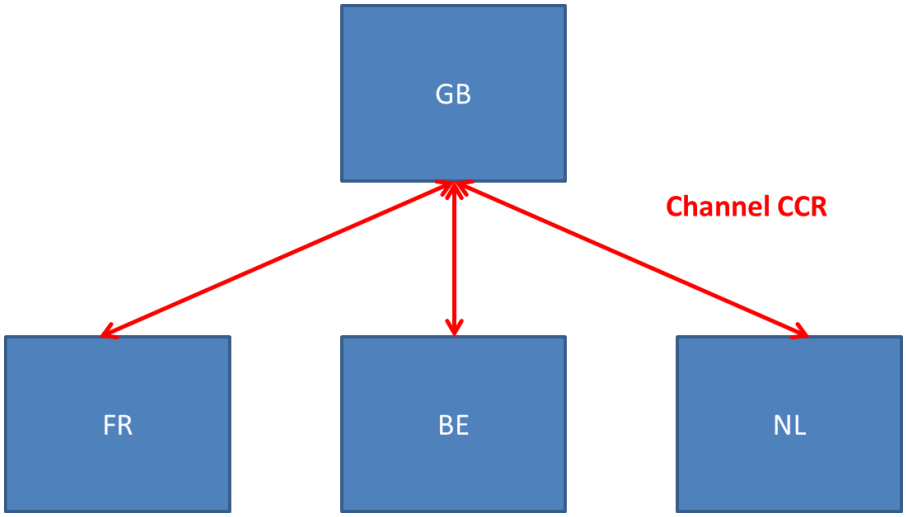

Figure 1: Lay-out of the Channel CCR bidding zone borders

The LT CC Methodology needs to define cross-zonal capacities for the different HVDC interconnectors between Great-Britain and the continent. The Long-Term capacity calculation for the BE-FR and BE-NL bidding zones borders is to take place in the Core CCR, as decided by ACER in its decision 06/2016.

The Great-Britain and Continental European grids belong to different synchronous areas (i.e. having different frequencies). All bidding zone borders in the Channel CCR consist of controllable HVDC interconnectors. From technical point of view each of the HVDC interconnectors in the Channel CCR can be controlled in an independent way.

According to Article 2 of the FCA Regulation, forward capacity allocation means "*the attribution of long-term cross-zonal capacity through an auction before the day-ahead time frame*". Also, Article 9 of the FCA Regulation states that "*all TSOs in each capacity calculation region shall ensure that long-term cross-zonal capacity is calculated for each forward capacity allocation and at least on annual and monthly time frames*". The proposed LT CC Methodology in the Channel CCR will perform calculations for the annual and monthly timeframes for the associated cross-zonal capacities allocations. Capacity allocation for eventual other long-term timeframes will use the results of the most recent available calculations. For example the allocation of seasonal and quarterly products is based on the results of the annual capacity calculation and the allocation of weekly and weekend products is based on the results of the monthly capacity calculation.

According to Article 10.4 of the FCA Regulation, the LT CC Methodology shall be based whether on a security analysis using multiple scenarios or on a statistical analysis of historical data in which the former is the default approach and the latter only allowed under certain conditions. Furthermore, in accordance with Article 10.2 and 10.5 of the FCA Regulation, the LT CC Methodology shall apply a Coordinated Net Transmission Capacity (CNTC) approach or a flow-based approach in which the former is the default approach and the latter only allowed under certain strict conditions.

Taking into account the above default approaches, the nature of the Channel CCR (where cross-zonal capacity is less interdependent) and the requirement set out in Article 10.3 of the FCA Regulation to be compatible with the Channel Day-Ahead and Intraday Capacity Calculation Methodology, the proposed LT CC Methodology will be a CNTC approach based on security analysis of different scenarios with the exception of the first calculation that will take place in February before the delivery year and will be performed under a statistical-based approach instead.

The Channel CCR consists of HVDC interconnectors that can be operated in an independent way. The proposed LT CC Methodology provides that ultimately the maximum permanent technical

capacity (MPTC) of the interconnectors is given to the market, except during the periods with a planned outage on the interconnector cables or in case of a planned outage of a critical network element with significant impact on the interconnector in one of the bidding zones to which that interconnector is connected.

The reason for this is that, under normal operating conditions and without planned outages of a critical network element with significant impact on the interconnector, the grid is considered sufficiently strong to accommodate the full MPTC of the interconnectors. The MPTC is the maximum permanent technical capacity which is the maximum continuous active power which a cross-zonal network element (interconnector/HVDC system) is capable of transmitting.

1.3 Planning for implementation

The implementation will be prepared by interactions with TSOs and coordinated capacity calculator(s) ("CCCs").

The first step will aim at defining the IT requirements based on the high level business process and requirements resulting from the proposed methodologies and developed by the TSOs. This shall cover identification of formats, AS IS model, TO BE model, performance... IT development shall then follow.

In parallel with the IT development, TSOs shall organize trial runs, where possible failure can be detected and feedback from end-user will lead to improvements. The trial run is expected to start not sooner than Q1-2021 and will continue until the go-live.

The capacity calculation process is expected to go-live no later than 12 months after the go-live of Channel Day-Ahead and Intraday Capacity Calculation.

This schedule is based on the following assumptions:

a. Channel TSOs submission of the LT CC Methodology by 21st January 2020;

b. Channel NRA approval of the LT CC Methodology by 21 July 2020;

2 LT CC Methodology under a statistical based approach

The first year-ahead cross-zonal capacities are to be made available before the end of February of the preceding year. Following the unavailability of the input data for a scenario based CNTC approach following SO GL Regulation before this deadline, the first year-ahead cross-zonal capacities are subject to a statistical capacity calculation and associated validation conditions capped at 35% of the IC transmission capacity (MPTC).

FCA Art.10(4)(b) demonstration

As outlined in Art.3 of the proposal, the LT CC Methodology for the Channel CCR is composed partly of a statistical calculation. Following Article 10(4)(b) of the FCA Regulation the usage of a statistical capacity calculation in the methodology needs to be justified. Channel TSOs believe that the requirements stipulated under Article 10(4)(b) are demonstrated as follows:

FCA Article 10(4)(b)(i) "increase the efficiency of the capacity calculation methodology"

The LT CC Methodology wants to release a first part of the annual cross-zonal capacity (to be allocated to the market in the form of long term auctions, subject to Article 16 of the FCA Regulation) by the end of February of the preceding year. The input data required for a scenario based approach, such as the definitions of the seasonal scenarios in accordance with Article 19 of the FCA regulation and the associated common grid models in accordance with Article 18 of the FCA regulation, are not available before the end of February of the preceding year following the deadlines stipulated in the SO GL Regulation in conjunction with the Common Grid Model Methodology approved by all NRAs on 04.07.2018 (*All TSOs' proposal for a common grid model methodology in accordance with Article 18 of Commission Regulation EU 2016/1719 of 26 September 2016 establishing a Guideline on forward capacity allocation*). Following the unavailability of the input data for a scenario based approach the Channel TSOs believe that it is more efficient to apply a statistical capacity calculation for the first year-ahead cross-zonal capacities.

FCA Article 10(4)(b)(ii) "better take into account the uncertainties in long-term cross-zonal capacity calculation than the security analysis in accordance with paragraph 4(a) [a security analysis based on multiple scenarios]"

As mentioned above, computing cross-zonal capacity before the end of February of the preceding year has no access to coordinated and common scenarios and hence to the load and generation patterns (of TSOs out of the Channel CCR). Aside the uncertainty of the load and generation patterns, many onshore TSOs have no knowledge yet concerning the unavailability plans of grid elements (according to Articles 97 and 99 of the SO GL Regulation, preliminary year-ahead availability plans are available as from 1 November and final year-ahead availability plans as from 1 December). Therefore Channel TSOs believe that a statistical calculation takes into account better the uncertainties for this part of the LT CC Methodology.

FCA Article 10(4)(b)(iii) "increase economic efficiency with the same level of system security."

By releasing a first part of the annual cross-zonal capacity by the end of February of the preceding year, way earlier than possible under a scenario based approach, Channel TSOs

believe that this promotes long-term cross-zonal trade with long-term cross-zonal hedging opportunities for market participants. Following a maximum setting of 35% of the interconnectors MPTC under the statistical part of the methodology as outlined under Article 5 of the Proposal in conjunction with the possibility to perform individual grid security analysis as outlined under Article 6 of the Proposal, Channel TSOs believe that the same level of system security is maintained.

STATISTICAL ASSESSMENT

This methodology recognises the implicit agreement between onshore and interconnector TSOs that 35% of Channel interconnector capacity will be released for Long Term capacity products in February of the year before delivery, except for identified exceptional circumstances. The emphasis in this methodology therefore minimises the required effort of a more complex statistical methodology, as the desired output is already understood, and the purpose is to expose those times when a 35% allocation may not be appropriate, based on historical data.

Therefore the CCC shall calculate the cross-zonal capacity for each interconnector and direction on a bidding zone border as follow:

1. Obtain the last 2 years' worth of Day Ahead NTC data per interconnector and per direction (including zero values and times of interconnector outage)
2. Take the average of those NTC values
3. Apply a 50% threshold to this average value
4. Where the resulting number is above 35% of the interconnector MPTC, a cap at 35% of the interconnector capacity is applied. Where the resulting number is below 35% of the interconnector MPTC, the relevant <35% is applied.
5. The value calculated in step 4 is subject to validation.

The main advantage of this methodology is that it is very simple to apply, and takes into account the raw historical data, which needs no further manipulation such as:

- Removing LTA inclusion
- Removing the impact of Intraday as a remedial Action (NGESO)
- Removing the impact of counter-trading

The broad assumption in this methodology is the application of a 50% threshold generically takes account of the above without the necessity of complex manipulation of the historical data set. In addition, it takes into account the margin reflecting the difference between historical cross-zonal capacity values and forecasted long-term cross-zonal capacity values as required by Article 23(1)(c) of the FCA Regulation.

VALIDATION

1. Channel TSOs have the responsibility to validate the capacities proposed by the CCC and may locally re-assess the computed NTCs per bidding zone or interconnector.
2. If the result of the calculation gives a lower value than 35 percent of the MPTC, Channel Onshore TSOs have the right to increase the outcome of the calculation up to 35 percent of the MPTC.

3. Channel Onshore TSOs may reduce the 35 percent value or the value coming from Article 5 due to planned outages. The reduction shall be incorporated in the yearly product as reduction periods. The level of reduction shall be duly justified thanks to a scenario-based analysis and presented to the concerned TSOs.

4. If several interconnectors influence similar CNECs in the same control area, any reductions on these interconnectors shall be done proportionally to their influence on the limiting CNECs.

3 LT CC Methodology under a scenario-based approach

3.1 High level process

On a high level the Long-Term cross-zonal capacity calculation process can be described by the following flow chart:

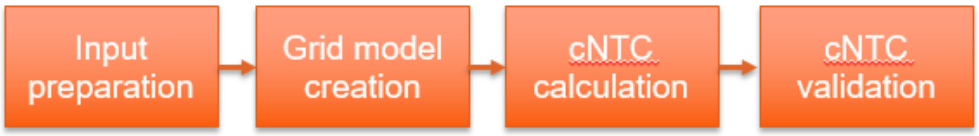

Figure 2: high level long-term cross-zonal capacity calculation process

The Coordinated Capacity Calculator (CCC) shall calculate the cross-zonal capacity for each interconnector on a bidding zone border for each selected timestamp of the annual or monthly timeframe using the coordinated net transmission capacity approach. This calculation process is composed of the following 4 steps: input gathering, grid model creation, calculation and validation. After validation of the resulting capacities by TSOs for each timestamp, the final NTCs are submitted to the TSOs for allocations.

3.2 Timestamp selection

The LT CC Methodology for the Channel CCR considers that under normal operating conditions and without planned outages of a Critical Network Element with significant impact on the interconnector, the grid is sufficiently strong to accommodate the full MPTC of the interconnectors. Therefore the long-term cross-zonal capacities will be computed only in respect of the periods with a planned outage of a Critical Network Element with significant impact on the interconnector. The outage planning of the Critical Network Elements listed before is available through the Outage Planning Coordination (OPC) database (see further in §2.3.5 *Scenarios and planned outages*). Based on this database, the timestamp selection will use the outage planning of the Critical Network Elements of the Channel CCR (see further in §2.3.1 *Definition of a Critical Network Element and a Contingency*) as follows:

i. One timestamp will be selected per granularity of the concerned period. This granularity is fixed in advance and is the following:

   a. 1 month for the annual cNTC calculation

   b. 1 week for the monthly cNTC calculation

ii. The selected timestamp is the day with the largest simultaneous number of planned outages within the granularity.

iii. In case two or more timestamps take place within the same scenario and contain the same planned outages, those redundant timestamps will be ignored. In case the

granularity does not contain any planned outages, no timestamp will be selected. Instead, a second timestamp within another granularity can be selected.

iv. As the timestamp selection is mainly driven by the number of simultaneous planned outages and not by the impact of the outages, the TSO may request ad hoc extra timestamps.

v. Particularity for the annual timestamps selection:

a. for the first annual scenario based calculation:

As some months of the year may have no planned outages (i.e. no planned outages within the granularity), no timestamps will be selected for those months. Therefore an alternative timestamp (i.e. second or more) within another month with more than one planned outage can be selected. The maximum number of timestamps to be selected is 12 at this stage as the delivery of the results is time sensitive (before end of September Y-1).

b. For the second annual scenario based (re)calculation (which is optional):

The aim is to reuse the calculation results of the 1st scenario based calculation. Planned outages within the granularity for which no timestamp was selected, the value of the other outage within the granularity (for which the timestamp was selected) is used. If this value is deemed to be unrepresentative for this outage, the value of a representative outage that is already calculated for another granularity is taken (e.g. outage of a parallel line during the month before,….). Only when deemed necessary and in exceptional cases a new timestamp and calculation on this new timestamp will be performed.

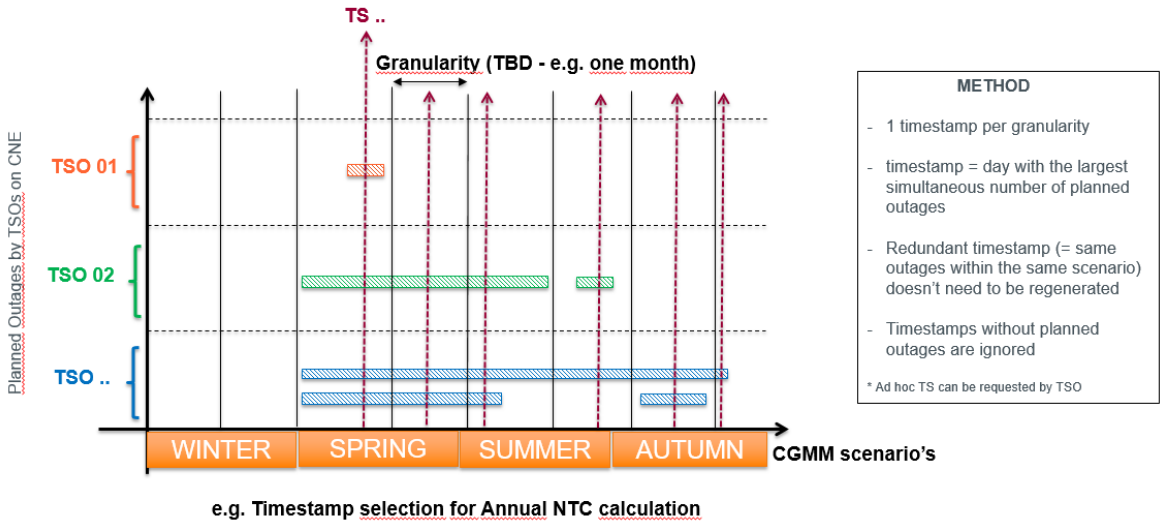

Figure 3: selection of timestamps

Timing & validation

The timestamp selection, which is based on the outage planning of the CNE in the Channel CCR, is proposed by the CCC to the TSOs sufficiently in advance of the relevant calculation, i.e. on D-10 for the first annual calculation and D-5 for the monthly calculation (with "D" being the starting day of

the calculation by the CCC). The individual TSOs can send their request for ad-hoc timestamps at the latest on D-5 for the first annual calculation and on D-2 for the monthly calculation.

The timings mentioned are a starting assumption and need to be validated during a parallel run.

3.3 Step 1: Inputs gathering phase

The following input data is required to generate the grid models for each timestamp selected:

- Critical Network Elements (CNEs) and Contingency (Cs);
- Flow Reliability Margin (FRM);
- Maximum admissible current on a Critical Network Element (Imax) / Maximum allowable power flow (Fmax);
- Remedial Actions (RAs);
- Generation Shift Key (GSK);
- Maximum Permanent Technical Capacity of the HVDC interconnectors (MPTC); and
- Ad hoc timestamp.

3.3.1 Definition of a Critical Network Element and a Contingency (CNEC)

A Critical Network Element (CNE) is a network element, significantly impacted by Channel cross-zonal flows, which can be monitored under certain operational conditions, the so-called Contingencies. The CNECs (Critical Network Element and Contingencies) are determined by each onshore TSO of the Channel CCR for its own network according to agreed rules, described below.

The CNECs are defined by:

- A CNE: a line or a transformer that is significantly impacted by cross-zonal flows;
- An “operational situation”: normal (N) or contingency cases (N-1, N-2, busbar faults; depending on the TSO risk policies).

A contingency can be:

- Trip of a line, interconnector or transformer;
- Trip of a busbar;
- Trip of a generating unit;
- Trip of a (significant) load;
- Trip of several elements.

The combination of a CNE and a C is referred to as a CNEC.

Given that all interconnectors in the Channel CCR are HVDC links, considering their ability to control the flow to a fixed value, these interconnectors shall not be monitored as Critical Network Elements, but are considered as Contingencies.

The CNEC selection criteria will be based on cross-zonal flow sensitivity thresholds. These cross-zonal flow sensitivity thresholds determine the maximum CNEC list, but TSOs have the possibility to discard elements from the list, based on operational studies or operational experience.

Explanation of the cross-zonal sensitivity thresholds:

The cross-zonal flow sensitivity is a crucial criterion for selecting relevant CNECs. The significantly influenced CNECs shall be defined on the basis of a minimum sensitivity from any cross zonal flow in the Channel CCR above a certain threshold.

This sensitivity criterion corresponds to the maximum of the following bidding zone to bidding zone power transfer distribution factor (PTDF) absolute value:

i. Great Britain to France;

ii. Great Britain to Belgium;

iii. Great Britain to The Netherlands.

TSOs want to point out the fact that the identification of this threshold is driven by three objectives:

- Need for an objective and quantifiable notion of “significant impact”;
- Guaranteeing security of supply by allowing as much exchange as possible, in compliance with TSOs’ risks policies, which are binding and have to be respected. In other words, this value is a direct consequence of Channel TSOs’ risk policies standards; and
- Striving for consistency with the other calculation timeframes (i.e. day-ahead and intraday timeframes in the Channel CCR).

The TSOs of the Channel CCR will implement the CNEC selection principles as defined in the Channel Day-Ahead and Intraday Capacity Calculation Methodology.

For the Channel CCR the cross-zonal flow sensitivity of a CNE to an exchange over one of the bidding zone borders of the Channel CCR expresses the MW flow impact of such exchange over the CNE;

- E.g. a sensitivity of X% on a CNE for exchanges over the IFA interconnector implies that an exchange of 100 MW over IFA will result in an additional flow of X MW on the CNE.

This is equivalent to saying that the maximum “zone to zone” PTDF of a given grid element should be at least equal to X% for it to be considered objectively “critical”.

For each CNEC the following sensitivity value is calculated:

Sensitivity = max(Zone to slack PTDFs) - min(Zone to slack PTDFs)

If the sensitivity is above the threshold value of X%, then the CNEC is said to be significantly impacted by Channel trades.

For the Channel CCR, the cross-zonal sensitivity relates to exchanges over the Channel CCR bidding zone borders.

Thus, to find the influence on any grid constraint from any cross border exchange, we may trace the route between the two bidding zones by PTDFs. For example if we would like to find the influence on a Critical Network Element "n" by a cross-zonal trade from zone "A" to zone "B", we can calculate:

The influence of cross border trade from zone "A=Great Britain" to zone "B=Continental Europe” (the Netherlands, Belgium or France) on constraint "n".

PTDF A-B (n) = PTDF A(n) – PTDF B(n).

The PTDF of zone "A" on constraint "n"

The PTDF of zone "B" on constraint "n"

Generally, we would like to find the largest between any bidding zones (A,B) on each grid constraint "n" and evaluate if this is above chosen threshold. This might be found directly by calculating:

Max PTDF A-B (n) = Max PTDF A,B (n) – Min PTDF A,B (n).

If this value is below the threshold X%, the CNEC is considered as not significantly influenced by the changes in bidding zone net positions.

3.3.2 Flow Reliability Margin

Article 11 of the FCA Regulation requires a methodology for reliability margin (hereafter referred to as "RM") to be included in the LT CC Methodology. This RM methodology shall meet the requirements set out in Article 22 of the CACM Regulation.

Article 2 (14) of the CACM Regulation defines the reliability margin as the reduction of cross-zonal capacity to cover the uncertainties within capacity calculation.

Flow Reliability Margin (FRM) means the margin reserved on the permissible loading of a Critical Network Element or cross zonal capacity to cover uncertainties of power flows in the period between the capacity calculation and real time, taking into account the availability of Remedial Actions.

The uncertainties covered by the FRM values are among others:

a) Channel external transactions (out of Channel CCR control: both between Channel CCR and other CCRs as well as among TSOs outside the Channel CCR);

b) Generation pattern including specific wind and solar generation forecast;

c) Generation Shift Key;

d) Load forecast;

e) Topology forecast;

f) Unintentional flow deviation due to the operation of load frequency controls.

In accordance with Article 22 of the CACM Regulation the methodology to determine the RM shall consist of a probability distribution of deviations between the expected power flows at the time of the capacity calculation and realised power flows in real time, and a RM calculation based on this probability distribution.

For Long-Term cross-zonal capacity calculations the annually created ENTSO-E year-ahead reference scenarios are used (those scenarios are created in accordance to Article 65 of the SO GL).

The LT CC Methodology considers that the additional uncertainties between Long-Term and Day-Ahead timeframes are covered by the selected scenarios, therefore Long-Term capacity calculations will use the same FRM as the one applied in the Day-Ahead timeframe.

The RM methodology shall remain consistent with the RM methodology developed in the Channel Day-Ahead and Intraday Capacity Calculation Methodology.

Due to the controllability of the power flow over DC interconnections, the determination of a reliability margin does not need to be applied on bidding zone borders only connected by DC interconnections.

2.2.4 Operational security limits on the Critical Network Elements

According to article 12 of the FCA Regulation the proposal for a common LT CC Methodology shall include methodologies for operational security limits and contingencies and it shall meet the requirements set out in articles 23(1) and 23(2) of the CACM Regulation.

Maximum admissible current on a Critical Network Element (I_{max})

The maximum admissible current (I_{max}) is the physical limit of a CNE determined by each TSO in line with its operational security policy. I_{max} is defined as a permanent physical (thermal) current limit of the CNE. As the thermal limit and protection setting can vary in function of weather conditions, I_{max} is usually fixed (at least) per season. Each individual TSO is responsible for deciding which value should be used. No dynamic rating will be used in Channel for Long-Term capacity calculations due to absence of the required forecast parameters.

Maximum allowable power flow (F_{max})

The value F_{max} describes the maximum allowable power flow on a CNEC in MW. F_{max} will be calculated using reference voltages.

F_{max} is calculated from I_{max} by the given formula:

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

where I_{max} is the maximum permanent allowable current in kA of a Critical Network Element(CNE). The values for cos(ϕ) and the reference voltage U (in kV) are fixed values for all CNE of one synchronous area. For continental Europe TSOs, in line with current practises, the cos(ϕ) will be 1 and reference voltage U will be 225 kV and 400 kV.

Specificities of TSOs

National electricity transmission system of Great Britain operational security limits

The operational security limits for the national electricity transmission system of Great Britain are outlined within the NETS Security and Quality of Supply Standard (SQSS). This document outlines the acceptable operating boundaries for secure grid operation such as thermal limits, voltage limits, short-circuit current limits, frequency and dynamic stability limits.

These operational security limits are the same as those used in operational security analysis.

Since NGESO is applying a zero FRM, any monitored CNEC in GB can be monitored using operational security limits in I_{max}, therefore NGESO shall not be required to provide corresponding F_{max} limits. Hence NGESO shall not define a conversion formula to convert I_{max} to F_{max}

RTE, TTN and ELIA as TSOs of the CE synchronous area

The LT CC Methodology should maintain consistency with the neighbouring CCRs in this respect and these TSOs who are also active in neighbouring CCRs shall apply the operational security limits identical to those in the neighbouring CCRs. Therefore,

3.3.3 Generation shift keys

The Generation Shift Key (GSK) defines how a change in net position is mapped to the generating units in a bidding zone. Therefore, it contains the relation between the change in net position of the bidding zone and the change in output of every generating unit inside the same bidding zone.

In case generating units are injecting electricity in lower voltage layer which are not contained in the CGM, TSOs can attribute factors on consumption.

Every TSO assesses a GSK for its control area taking into account the characteristics of its system. Individual GSKs can be merged if a bidding zone contains several control areas.

A GSK aims to deliver the best forecast of the impact on Critical Network Elements of a net position change, taking into account the operational feasibility of the reference production program, projected market impact on generation units and market/system risk assessment.

In general, the GSK includes power plants that are market driven and that are flexible in changing the electrical power output. TSOs can also use fewer flexible units, e.g. nuclear units, if they do not have sufficient flexible generation for matching maximum import or export program or if they want to moderate impact of flexible units. Since the generation pattern (locations) is unique for each TSO and the range of the shift in net position is also different, there is no unique formula for all TSOs of the Channel CCR for creation of the GSK. Finally, the resulted change of bidding zone balance should reflect the appropriate power flow change on CNECs and should be relevant to the real situation.

The GSK values can vary and are given in dimensionless units. For instance, a value of 0.05 for one unit means that 5 % of the change of the net position of the bidding zone will be realized by this unit. Technically, the GSK values are allocated to units in the Common Grid Model. In cases where a generation unit contained in the GSK is not directly connected to a node of the CGM (e.g. because it is connected to a voltage level not contained in the CGM), its share of the GSK can be allocated to one or more aggregated generation units of the CGM in order to model its technical impact on the transmission system.

Justification on why GSKs can be different for different TSOs

Each bidding zone has its specificities in terms of market and systems: the pattern and type of market players are not the same in each market area and the design of the network is also not the same. As GSKs intend to represent at best the market behaviour in a specific area, it is of importance to take into consideration these specificities of each area. As a consequence, it is hard to impose the same principles and rules everywhere.

Additionally, technical limitation on the tools need to be taken into account too when designing the GSKs in an area. And as, for a question of transparency, the TSOs of the Channel CCR intend to use the same GSK definition for an area which may be involved in different regions, these technical limitations have to consider the tools used not only in the Channel CCR, but also in other CCRs like CORE. The real Pmin/Pmax of the units cannot be taken into account when adjusting the net position of an area using the GSKs. Moreover, in order to ensure convexity, GSKs need to be linear and the same for an increase or a decrease of the net position. Both technical limitations have a strong influence on the way the design/definition of the GSKs may impact the loading of the system, especially in bidding zone where the number of market driven units is low.

Then, for each area, considering these technical limitations, there is a need to find the best compromise between representing at best the expected market behaviour while respecting the limits and specificities of the network. We can notice that the Belgian and Dutch TSOs, which have similar size of grid and number of market driven units, have similar approach in their definition of the GSKs, aiming at avoiding unrealistic loading of grid equipment that would be the case with a pure pro-rata approach while for the French TSO, considering the higher size of system and number of market driven units, a pure pro-rata approach is sufficient.

Specificities of the TSOs

Great Britain GSK:

For the Long-Term timeframes, the Britain GSK shall represent the best forecast of the relation of a change in net position of the bidding zone to a specific change of generation or load in the Common Grid Model.

French GSK:

The French GSK is composed of all the units connected to RTE's network. The variation of the generation pattern inside the GSK is the following: all the units which are in operations in the base case will follow the change of the French net position on a pro-rata basis. That means, if for instance one unit is representing n% of the total generation on the French grid, n% of the shift of

the French net position will be attributed to this unit. This choice of the proportional GSK is mainly related to the fact that generation in France is composed at 75% by nuclear power that does not vary following a merit order. Indeed the French electricity market being a portfolio market, the merit order is not geographically relevant. Thus a proportional representation of the generation variation, based on RTE's best estimate of the initial generation profile, ensure the best modelling of the French market.

Belgian GSK:

The Belgian TSO will use in its GSK a fixed list of nodes based on the locations where most relevant flexible and controllable production units (market oriented generating units) are connected. This list will be determined in order to limit as much as possible the impact of model limitations on the loading of the CNEs. The variation of the generation pattern inside the GSK is the following: the variation of the generation pattern inside the GSK shall be such that the sum of the generation which are in operations on each of these nodes in the CGM will follow the change of the Belgian net position in such a way that the generation at the node will reach its maximum when the maximum generation capability of the Belgian bidding zone is reached and will reach its minimum when the minimum generation capability of the Belgian bidding zone is reached.

Dutch GSK:

The Dutch GSK will dispatch the main generators in a manner which avoids extensive and unrealistic under- and overloading of the units for extreme import or export scenarios. The GSK is directly adjusted in case of new power plants. Also unavailability of generators due to outages are considered in the GSK.

All GSK units are re-dispatched pro rata on the basis of predefined maximum and minimum production levels for each active unit. The total production level remains the same.

The maximum production level is the contribution of the unit in a predefined extreme maximum production scenario. The minimum production level is the contribution of the unit in a predefined extreme minimum production scenario. Base-load units will have a smaller difference between their maximum and minimum production levels than start-stop units.

3.3.4 Remedial Actions

Article 14 of the FCA Regulation provides to the TSOs of the Channel CCR the possibility to use Remedial Actions (RA) in the LT CC Methodology.

During Coordinated Capacity Calculation, TSOs take Remedial Actions into account to maximize as much as possible the allowed exchanges over the bidding zone borders of the CCR while ensuring a secure power system operation, i.e. N-1/N-k criterion fulfilment.

Remedial Actions used in capacity calculation embrace the following measures:

- changing the tap position of a phase shifter transformer (PST)
- topology measure: opening or closing of a line, interconnector, transformer, bus bar coupler.

The effect of these RAs on the CNEs is directly determined in the calculation process to monitor the shift of load flow in the synchronous area.

There are several types of RAs, differentiated by the way they are used in the capacity calculation.

- Preventive (pre-fault) and curative (post-fault) RAs: Preventive RAs are applied before any fault occurs, and thus to all CNECs of the domain, curative RAs are only used after a fault occurred. As such the latter RAs are only applied to those CNECs associated with this

contingency. Curative RAs allow for a temporary overload of grid elements and reduce the load below the permanent threshold.

• Shared and non-shared RAs: Each TSO can define whether he wants to share the RA provided for capacity calculation or not. In case a RA is shared, it can be applied to increase the remaining available margin on all relevant CNECs. If it is non-shared a TSO can determine the CNECs for which the RA can be applied in the capacity calculation.

Each TSO defines the available RAs in its responsibility area according to his operational principles and ensures the availability of the measure until real-time.

Each TSO shall ensure all relevant available non costly Remedial Actions are made available to the coordinated capacity calculator. Each TSO of the Channel CCR may decide to make available costly Remedial Actions.

In accordance to Article 25(6) of the CACM Regulation, the Long-Term capacity calculation will consider the same RAs used for the DA capacity calculation, taking into account their technical availability.

At the end of the calculation of cross zonal capacity, where a Remedial Action is assumed to be used to increase the cross zonal capacity, the coordinated capacity calculator shall inform the respective TSO. The decision to instruct any Remedial Action remains with each TSO.

In case a RA made available for the capacity calculation is also a RA which may be used during capacity calculation in another CCR, the TSO owning the RA shall take care when defining the RA to ensure consistent, non-contradicting, use in his potential application in both CCR to ensure a secure power system operation.

Specificities of the TSOs Belgian RA:

For ELIA, the application of BE PSTs shall be considered as RA in both Core and Channel CCRs. In order to ensure consistent use in both CCRs, ELIA may restrict the range of application of each PST depending on the loading of the Belgian CNEs in the base cases.

3.3.5 Scenarios and planned outages

Scenarios

In accordance with Article 19 of the FCA Regulation, the TSOs of the Channel CCR shall jointly develop a common set of scenarios to be used in the Common Grid Model for each long-term capacity calculation timeframe. This applies for the situation where security analysis based on multiple scenarios pursuant to Article 10 of the FCA Regulation is applied, which is also the case for the Channel CCR.

Article 2.4 of the CACM Regulation defines scenario as t*he forecasted status of the power system for a given time-frame* and hence reflects a specific representative predicted grid state (expected grid topology, generation and load pattern, net position. etc …) for a certain period of time.

The definition of the scenarios and the methodology to determine its key values are part of the Common Grid Model Methodology ("CGMM"). The CGMM developed in accordance with Article 18 of the FCA Regulation has been approved by all NRAs on 04.07.2018 (*All TSOs' proposal for a common grid model methodology in accordance with Article 18 of Commission Regulation EU 2016/1719 of 26 September 2016 establishing a Guideline on forward capacity allocation*).

As a security analysis based on multiple scenarios is applied in the Channel region for the long-term capacity calculation, the common grid model ("CGM") for long-term capacity calculation time

frames shall be established on the basis of this CGMM pursuant Article 18(2) of the FCA regulation. As there is no reason to change the key values, the LT CC Methodology for the Channel CCR proposes to take over the scenarios and associated grid models containing the key values as established by the CGMM without any modifications. Following the CGMM, the description of these scenarios is available ultimately on 15 July each year; the accompanying CGMs are available ultimately on 15 September each year.

The scenarios for each year have the following structure:

Figure 4: seasonal Entso-E scenarios

As the figure shows, the current CGMM proposal defines the key values for the creation of 4 scenarios of non-overlapping time periods: WINTER, SPRING, SUMMER and AUTUMN. For each season a scenario is created for peak and valley, hence resulting in 8 final scenarios for each year.

The related year-ahead seasonal scenarios used for annual cNTC calculation may be updated for monthly cNTC calculation by incorporating the latest available information regarding the generation pattern. TSOs should require a scenario update for any predictable change compared to the year-ahead seasonal scenarios in accordance with Articles 3(2) and 3(3) of CGMM as part of the FCA Regulation, which is associated with a specific measure concerning the grid topology respectively generation pattern. If this is the case, the TSOs may update:

- the generation pattern,
- the topology due to grid element commissioning or decommissioning,

in its own Individual Grid Model (IGM), and may provide one updated IGM for each default seasonal scenario for the referred calculation time frame, while the net positions in the IGMs shall remain the same as given in the year-ahead CGMs. Accordingly, the CCC updates the merged CGM by replacing the initial IGM with the newly updated single TSOs' IGM in accordance with the agreed timing.

Outages

As described above, the key values of the scenarios as part of the CGMM are among others the expected grid topology, load, net position, generation pattern, PST tap position but NOT the planned outages. The LT CC Methodology for the Channel CCR proposes to take into account the planned outages of the onshore TSOs (and not of the interconnector TSOs) in Article 14.

All ENTSO-E RG CE TSOs' planned outages are stored and regularly updated in Outage Planning Coordination (OPC) database. According to SO GL, preliminary year-ahead availability plans, i.e. planned outages of TSOs, are available in OPC database as from 1 November for the next year, and final year-ahead availability plans as from 1 December.

According to the OPC process time schedule, first quality check of preliminary availability plans regarding tie-line inconsistencies is performed by RSCs and accordingly, availability plans are corrected by TSOs by 4 November.

3.4 Step 2: Grid Models

For each selected timestamp, the LT CC Methodology for the Channel CCR proposes to generate a common grid model pursuant to Article 18 of the FCA Regulation using the scenarios and associated

grid models as established by the CGMM without any modifications of the key values but adding the planned outages of the onshore TSOs on the relevant CNEs foreseen for these timestamps as available in the OPC database. This process is done by the CCC.

The grid models delivered by the CGMM have the aim to be congestion free but this is not guaranteed. The outage of the Critical Network Element combined with the eventual topological changes will lead to different loading of the elements compared to the loading of those elements in seasonal grid models. Therefore a quality check will take place to verify that the selected timestamps do not contain overloaded CNECs. In case the timestamp is not congestion free the TSO will take appropriate actions to ensure that the grid models become congestion free.

Timing & validation

The description of the scenarios is available by the CGMM ultimately on 15 July each year; the accompanying CGMs are available ultimately on 15 September each year. The individual TSOs do not need to confirm their agreement on the key values of these scenarios as the use of the CGMM for the determination of the key values of the scenarios is the main concept of this LT CC Methodology for the Channel CCR.

By D-5 for the annual calculation & D-2 for the monthly calculation, the CCC has received all required input and can start the creation of the CGM for each timestamp based on the seasonal grid models from the CGMM (with “D” being the start day of the calculation by the CCC).

The timings mentioned are a starting assumption and need to be validated during a parallel run.

3.5 Step 3: Calculation methodology

For each selected timestamp a Common Grid Model is available containing the seasonal scenario and the planned outages of the relevant CNEs. For each timestamp the cross-zonal capacities in the Channel CCR will be assessed using a coordinated NTC approach.

3.5.1 Mathematical description

In theory the coordinated NTC approach should aim at assessing the maximum transfer of power in each direction of each of the bidding zone borders of the CCR that will be possible to reach simultaneously without endangering the security of the system.

This maximum power transfer is called Total Transfer Capacity. When each of the bidding zone border is composed of HVDC links, no Transfer Reliability Margin needs to be considered for these links and the Net Transfer Capacity is equal to the Total Transfer Capacity.

For the Channel CCR, the assessment will consider the maximum secure value of simultaneous import and export of the synchronous grid of Continental over all the interconnectors of the Channel CCR bidding zone borders for each timestamp that has been selected (further called ‘market direction’).

Practically, in the Channel CCR, the assessment of this maximum secure value of the interconnector capacity will be done through a calculation, using the common grid model as reference and considering the MPTC of each interconnector (in the direction of the synchronous grid of Continental Europe towards Great-Britain and vice versa) as a starting position.

This approach will evaluate at each step of the assessment the ability to cope with the operational security limits expressed by the Imax/Fmax on each CNEC taking into account an optimal use of the available Remedial Actions in the defined market direction. A Remedial Action Optimizer (RAO) will be used which has as objective function to increase margins until a positive value is reached on all CNECs.

If case of no negative margin on a CNE in a bidding zone at this timestamp, the maximum secure value of the interconnector capacity will be made available for both market directions for that timestamp.

If case of no negative margin on a CNE in all the bidding zones at this timestamp, the maximum secure value of the interconnector capacity will be made available on all interconnectors and no calculation will be needed for that timestamp.

If no available Remedial Actions can be found to fulfil the operational security limit of a CNEC in one market direction in one bidding zone, the assessment will be repeated with a reduced maximum secure value of the interconnector capacity (in respect of the interconnectors linked to this bidding zone) until a level of the maximum secure value of the interconnector capacity has been identified for which no CNE violations occur.

The assessment will be stopped when operational security limits are respected on all CNECs.

3.5.2 Remedial Action optimization

Article 14 of the FCA Regulation provides the TSOs of the Channel CCR with the possibility to use Remedial Actions in the LT CC Methodology.

In accordance to Article 25(6) of the CACM Regulation, the Long-Term capacity calculation will consider the same RAs as used for the DA capacity calculation, taking into account their technical availability, to deal with both internal and cross-zonal congestion in order to facilitate more efficient capacity allocation and to avoid unnecessary curtailments of cross-zonal capacities.

The coordinated capacity calculator shall maximise cross-zonal capacity using the list of available Remedial Actions given by the TSOs within the capacity calculation process.

To achieve this optimization in the calculation process, the coordinated capacity calculator will use a Remedial Action Optimizer (RAO).

RAO tool:

The Remedial Action Optimizer (RAO) tool determines the optimal Remedial Actions (RAs) from a defined objective function. More precisely, the goals of the optimizer are twofold:

- Secure the reference network situations; and

- Determine the optimal Remedial Actions from a defined objective function.

In particular, the objective function of RAO tool for the Channel CCR is to increase margins of all CNEC until a positive value is reached for all CNECs.

High level process flow of optimisation process is as followed:

Figure 5. High level process flow of optimisation process.

Depending on the base case (Common Grid Model) and contingencies, different preventive Remedial Actions can be used during the capacity calculation: it could be a change of taps of a PST on a given range, or a change of state (open / close) of a circuit breaker.

In addition, the remedial actions optimizer (RAO) will take into account 'remedial action usage rules' in the process, i.e. in which case a remedial action can be used.

The 'remedial action usage rules' will be defined upfront by TSOs. Concretely, for each Remedial Action (RA) within its grid, each TSO indicates in its input data for which kind of cases this RA can be used. For instance:

- to solve congestion only on a specific Critical Network Element;
- to solve congestion on any Critical Network Elements being part of its Control Area.

Determining the preventive and curative RAs

The inputs of the RA optimisation process are the following data:

- Common grid model: containing the seasonal scenario with the planned outages for this timestamp;

- List of Critical Network elements and Contingencies;

- List of Remedial Actions available per TSO.

The outputs of the optimisation process are the optimal Remedial Actions set for the considered timestamp and the computed cross-zonal capacity:

- Preventive Remedial Actions;

- If relevant, Curative Remedial Actions after each Contingency ("C");

- Cross-zonal capacity on the HVDC interconnectors before LTA or AAC inclusion.

The RAO algorithm explores solutions through a sequential approach made of the following subproblems: 1. Preventive problem for all CNECs; 2. Curative problem for every Contingency.

On both preventive and curative steps, the available Remedial Actions are tested. The objective function selects the most efficient ones, which are then implemented. RAs are tested and implemented through iterations within a search tree by simulating all the implemented contingencies for preventive RAs. Once the preventive optimization is finished, the set of preventive actions is fixed and implemented as starting point for all curative optimizations. For curative RAs, approach is different, and is made contingency per contingency.

Algorithm keeps applying RA until one of the following conditions is fulfilled:

In preventive:

- All preventive Remedial Actions have been tested;

- At a certain step of optimization, no preventive Remedial Actions improve the objective function.

In curative:

- The maximum number of curative actions have been reached;

- At a certain step of optimization, no curative actions improve the objective function.

The output of the RAO is a coordinated set of preventive RAs linked to each Contingency.

3.5.3 Implementation of reduction of the interconnector capacity

In case of a negative margin on CNECs which cannot be solved with available Remedial actions, the maximum secure value of the interconnector capacity will have to be reduced.

The reduction of the maximum secure value of the interconnector capacity will only concern the bidding zone where the limiting CNECs are located.

In case several interconnectors are located in the concerned bidding zone, the reduction shall be applied only to the interconnectors which have an influence on the limiting CNE above the thresholds defined in Article 8 of the LT CC Methodology and proportionally to their influence.

This is illustrated by the below example, where the capacity over the interconnectors must be reduced in order to resolve an overload on CNEC X. In this particular case the capacity reduction over HVDC1 will be twice the reduction of capacity on HVDC2 since the impact of an exchange of HVDC1 on CNEC X is twice the impact of an exchange of HVDC2 over CNEC X.

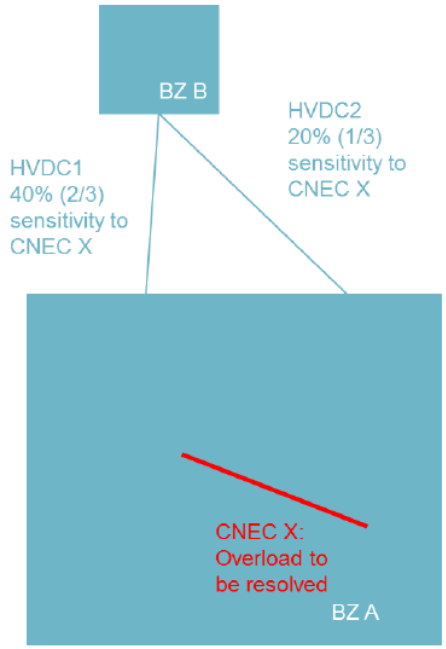

Figure 6 reduction of interconnector capacity in case of multiple interconnectors connected to a bidding zone

Specificities of LT time Horizon

The LT capacity for the computed timestamp can differ from the maximum permanent technical capacity only in case of a specific planned outage of a Critical Network Element with significant impact on the interconnector exists in one of the bidding zones to which that interconnector is connected. Each HVDC link will be associated with a set of CNECs that will be monitored in order to implement reductions of the maximum secure value of the interconnectors capacity.

The NTC values will be computed per interconnector in each bidding zone border per selected timestamps. In case of a negative margin on the CNECs which cannot be solved with available Remedial Actions, the congestion is solved by reducing only the maximum secure value of the interconnector capacity on the interconnectors in the bidding zone border where the limiting CNE is located. As each interconnector is associated with a set of potential CNECs, the maximum secure value of the interconnector capacity will be reduced on the interconnectors associated with the limiting CNECs.

How to implement a shift of import/export

Any shift of the power transfer between two bidding zones shall be realized by adjusting the generation in each of the bidding zone in line with the GSK of the bidding zone.

Timing & validation

The annual capacity calculation using a Minimum Guaranteed Value must be carried out before the end of September Y-1 whereas the annual capacity calculation releasing the interconnector MPTC while using reduction periods must be performed in December Y-1. In respect of the monthly capacity calculations using reduction periods, they shall be done before the end of the Month M-2.

The calculations start on D-0 and ends on D+5 for the annual capacity calculation using a Minimum Guaranteed Value and ends on D+3 for the Monthly capacity calculation. The exact timing of day "D-0" are the following:

Annual computations: "D-0" = September 15th

Final annual computations: "D-0" = December 1st

Monthly computations: "D-0" = 10th of Month-2

The timings mentioned are a starting assumption and need to be validated during a parallel run.

Mitigating actions

In case no values could be generated during the monthly calculations then the results of the annual calculation are used.

In case no values could be generated during the annual calculations then the results of the previous year are used.

3.5.4 NTC calculation process for each timestamp

i. Select and load the representative CGM base case for each selected timestamp;

ii. Apply Generation Shift Keys to each base case in order to reflect each interconnector operating at

   a. Interconnector MPTC in the direction of the synchronous grid of Continental Europe towards Great Britain and vice versa;

   b. Or alternative lower figures used in place of (a) above if an established longer term restriction is identified based on technical limitations or as the result of a contract or agreement.

iii. Run contingency analysis on the CGM using the CNEC list provided by the TSOs;

iv. Evaluate results to identify base cases

   a. allowing Interconnector MPTC without further actions

   b. indicating a potential Interconnector import or export limitation as a result of a negative margin on a Critical Network Element or operational security standard violation.

v. For each negative margin on a CNE identified in step iv(b), deploy the list of Remedial Actions to alleviate this margin of the Critical Network Element.

vi. Evaluate the impact of Remedial Actions. If Remedial Actions can mitigate the negative margin of the CNE or the operational security standard violation, the interconnector MPTC can be made available for that scenario timestamp.

vii. If the Remedial Actions used cannot alleviate the CNE violation, the maximum secure value of the interconnector capacity of the bidding zone where the limiting CNEC(s) is/are located should be progressively reduced in steps from the starting points set out in Article 18. In case several interconnectors are located in the concerned bidding zone, the reduction shall be applied only to the interconnectors which have an influence on the limiting CNE above the CNE thresholds and proportionally to their influence.

Following each capacity reduction, the contingency analysis should be repeated with the Remedial Actions already deployed until a level of the maximum secure value of the interconnector capacity has been identified for which no CNE violations occur. This establishes the maximum secure value of the interconnector capacity for these scenario timestamps.

3.6 Long-term cross-zonal capacity process

During the previous step the cNTC is calculated for each selected timestamp delivering a technical profile that represents the maximum capacity allowed on each HVDC-cable to comply with safety standards of the network for the concerned time window. With the objective to maximize the capacity available for the market this technical profile will be given by using the principle of reduction periods with the exception of the annual capacity calculation using a Minimum Guaranteed Value.

3.6.1 Annual cross-zonal capacity

Annual capacity

The long-term capacity calculation takes into account planned outages of the relevant CNEs, but under the SO GL the finalization of the outage planning occurs between 31 October and 30 November of the preceding year. As this is too late to start the allocation of the long-term products under a scenario-based approach, the first annual NTC-calculation will take place based on a provisional outage planning before the end of September Y-1 and a second annual NTC calculation will take place later (in December Y-1) based on the final outage planning. The former generates a preliminary technical profile and the latter a final technical profile.

Step 1: Minimum Guaranteed Value (MGV)

Following the annual capacity calculation before the end of September Y-1 based on a provisional outage planning (a high-level knowledge of outage requests for the upcoming year is needed), a preliminary technical profile will be calculated based on the selected timestamps. The NTC (Net Transfer Capacity) given will equal the minimum value of the technical profile (Cfr. Figure 7) with the exception of the planned outage of the HVDC-interconnector itself (which could potentially lead to 0MW capacity for LT allocation depending on the technical construction of the HVDC).

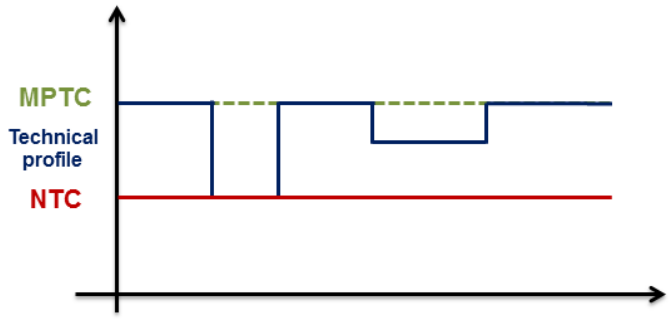

Figure 7. Example of Minimum Guaranteed Value

This Minimum Guaranteed Value approach offers margins towards changes in onshore TSOs outage planning (the outage can be shifted in time without the need for curtailment).

The MGV approach allows to allocate capacity prior to the finalization of the outage planning while taking into account safety standards. The planned outage of the HVDC-interconnector itself will be immediately considered as reduction period and will not part of the MGV approach.

Step 2: Reduction Period

After finalization of the outage planning on the CNEs under SO GL (at the latest before 1 December of the preceding year) a final technical profile is defined based on the selected timestamps as outages are considered as firm. Based on the preliminary profile additional calculations are performed if required. The NTC given will be equal to the technical profile calculated by using the principle of reduction periods (Cfr. Figure 8). The exact start and end dates of the reduction period must be provided before the allocation stage.

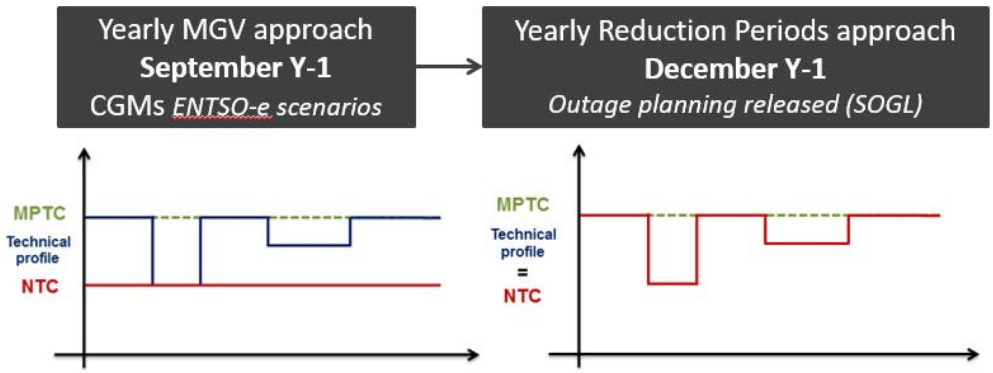

Figure 8. Example of reduction periods in LT products

This approach releases the remaining capacity available during periods with no planned outages. In case the planned outage on a CNE is reduced or cancelled, the updated reduction period has to be communicated as soon as possible.

3.6.2 Monthly cross-zonal capacity

Based on the latest information on the outages planned of the Critical Network elements, available in the OPC database, an updated technical profile will be calculated based on the selected timestamps. The NTC given to the market will be equal to the updated technical profile calculated by using the principle of reduction periods (Cfr. Figure 8) taking into account LTA. In case the planned outage on a CNE is reduced or cancelled, the updated reduction period has to be communicated as soon as possible.

3.6.3 Other long-term cross-zonal capacity

No updated technical profile will be calculated, instead the most recent available technical profile is used. For products with a duration greater than one month, the capacity will be derived from annual capacity calculations. For products with a duration equal to or less than one month, the capacity will be derived from monthly capacity calculations.

Timing & validation:

Preliminary scenario based annual cross-zonal capacity using a Minimum Guaranteed Value

With D+0 fixed on September 15th of the preceding year, or the first Monday after in case of a weekend, the preliminary annual calculations start on D+0 and are finished by D+5 expressed in

working days. The validation of the preliminary technical profile ends by D+10 giving a period of 5 working days for initial calculations and 5 working days for iterations and validation. The resulting MGV is published on D+10.

Final scenario based annual cross-zonal capacity using reduction periods

With D+0 fixed on December 1st of the preceding year (immediately after the finalization of the outage planning according SO GL), or the first Monday after in case of a weekend, each TSO indicates the latest on D+2 to the CCC if new NTC calculation is required. The CCC recomputes the requested timestamps before D+5. On D+5 the final technical profile is validated by the TSOs and the remaining capacity is released.

Monthly cross-zonal capacity

With D+0 fixed on the 10th of Month-2, or the first Monday after in case of a weekend, the monthly calculations start on D+0 and are finished by D+3. The validation of the updated technical profile ends by D+8 giving a period of 5 working days for iterations on the cNTC calculation and validations. The resulting NTCs are released on D+8.

The timings mentioned are a starting assumption and need to be validated during a parallel run.

Mitigating Actions

In case no values could be generated during the monthly calculations then the results of the annual calculation are used.

In case no values could be generated during the annual calculations then the results of the previous year are used.

3.7 Step 4: cross-zonal validation

As mentioned in the paragraph of the long-term cross-zonal capacity process, all TSOs have the responsibility to validate the capacities proposed by the CCC and may locally re-assess the computed NTCs on the interconnector. This re-assessment may be necessary to prevent any risk due to possible unforeseen changes in grid situations which have occurred during the qualification phase such as

a. Forced outage on one interconnector or one element defined as CNE or Contingency;

b. A mistake in input data, that leads to an incorrect cross-zonal capacity;

c. Any other criteria that the TSO shall have previously defined, let agreed by its NRA and published in its website before its application.

In the case of such unforeseen changes and if a TSO is detecting a constraint, the TSO may reduce the proposed NTCs.

The reduction of the proposed NTCs shall be monitored, based at minimum on an identification of the limiting CNEC and the explanation of the unforeseen event causing the NTC reduction. The output of this process is the amended NTC which is considered as the final NTC.

3.8 Fallback procedure

In accordance with Article 42 of the FCA Regulation, in the event that the coordinated capacity calculator is unable to produce results, the default fallback procedure shall be the postponement of the forward capacity allocation.

In case the postponement of the forward capacity allocation is not possible, or the new deadline has been reached and no results are available, the TSOs of the Channel CCR foresees the following fallback process:

- For the annual capacity allocation, the TSOs will use as a starting point cross-zonal long-term capacity calculated by the CCC for the equivalent planned outages for the previous year. The TSOs of the Channel CCR will bilaterally validate these NTC values and then these values will be validated in a coordination meeting of the TSOs of the Channel CCR.
- For the monthly allocation, the TSOs of the Channel CCR will use as a starting point cross-zonal long-term capacity calculated by the coordinated capacity calculator during the annual process for this month. The TSOs of the Channel CCR will bilaterally validate these NTC values and then these values will be validated in a coordination meeting of the TSOs of the Channel CCR.

4 Criteria for an operational process

Performance of the N-1 security assessment of the maximum import/export

NTCs computation is based on an N-1 security assessment of both import and export market directions for the Channel CCR for each timestamp. The capacity calculation process for the Channel CCR is based on an AC loadflow computation using several input data from TSOs to be processed by the CCC. Following the defined methodology, 4 grid situations (import/ export cases on UK side and on continental Europe side) have to be computed for each timestamp. In addition, the computation time will be mostly influenced by, on one hand, the content of input data and in particular the number of outages, amount and kind of Remedial Actions and also the base case situation of the grid which could vary from non-congested cases to highly congested cases that will have to be managed by the CCC operator, and on the other hand by the IT infrastructure (machine speed and memory) will also influence the possibilities to run parallel computations in a dedicated short period of time. Moreover, the use of the new CGMES format containing much more information in the grid models will have an impact on the memory of the used machine. For the Channel project, real simulations of the calculation process with industrialized solution, which have not been started yet, will give a better view on the possibilities to optimize the computation time. Considering the time available for LT CC process the feasible number of assessed TS will be confirmed.

Taking into account the abilities of the tools and their foreseen development, the CCC shall maximize the number of assessed representative timestamps.
During the implementation phase and especially during internal parallel run, TSOs and CCC will consider the maximum number of assessed representative timestamps. Considering the time available to perform the process in the annual and monthly time horizon, the number of assessed timestamps may be different in each case.

Consultation Report for the Channel TSOs proposal of a common capacity calculation methodology for the long-term time frames

January 21st, 2020

Disclamer

This assessment of stakeholders' comments is submitted by all TSOs of the Channel Region to all NRAs of the Channel Region for information and clarification purposes only accompanying the proposal for common capacity calculation methodology for the long-term market timeframe in accordance with Article 10 of Commission Regulation (EU) 2019/1719 of 26 September 2016.

Table of Contents

1. Assessment of the Stakeholder's comment 2
1.1 General consultation responses 2
1.2 Consultation responses per article 3

1. Assessment of the Stakeholder's comment

Common main themes grouped together as follows:

1. Provision of 35%
    a. Justification for choice of 35% cap.
    b. More clarity on value being fixed as max./min threshold.
    c. Why restricted to 35% if calculations would allow a higher fraction?

2. Approaches
    a. Which approach is most optimal in achieving 35%?
    b. Working examples of each approach to be provided.
    c. Arbitrariness of 50% reduction (app 1), P10 (app 2), 35th percentile (app 3).
    d. Unclear why margin per Art. 23.1(c) added (app 1).
    e. Inclusion/exclusion of effects of RAs/countertrading.
    f. Is countertrading before or after DA market coupling?

3. Validation
    a. Rationale behind reductions to proposed value.
    b. Arbitrariness of "very high risk threshold".
    c. Principle of reduction periods and their application.
    d. CNEs per Art. 6(4) not part of statistical approach.

4. General Context
    a. If this behaviour triggers increase in dispatching actions taken by TSOs, it risks non-compliance with clean energy policy.
    b. Will TSOs in Channel CCR provide an economic assessment for the chosen approach once agreed and submitted to NRAs?

1.1 General consultation responses

This consultation report is provided to the Channel National Regulatory Authorities and has been prepared by all Channel TSOs. Channel TSOs aim at providing more clarity on the Channel Long Term Capacity Calculation to the market Parties.

Channel TSOs acknowledge that providing an explanatory note to the Market parties would have been useful. An explanatory note is in the process of being prepared which will provide further relevant information on the principles underpinning the long-term capacity calculation methodology as well as elaborating on the content and text of the proposal itself.

One main point which was not clear for the market parties is why the capacity is capped to 35% in February. Market parties would like maximum capacity earlier in the year for their hedging strategy. This is clear; however, from a TSOs perspective, we believe that offering at most 35% of the MPTC in February Y-1 is already a big step for the market parties as in all the other capacity calculation regions in Europe, there is no calculation before end of the year Y-1 and so the possibility for hedging is more restricted.

Another point which might be confusing, is that the auctions need the capacity calculation results as an input. But once these results are available, the Interconnectors are free to schedule the auctions all along the year (and not necessary only in February, September and December) as long as the splitting rules methodology is respected by all parties.

Market Parties have been requested to deliver their view on the topic of RoCoF, Channel TSOs have delivered to the Channel NRAs two different documents concerning RoCoF explaining the two different views.

1.2 Consultation responses per article

Article 1: Subject matter and scope

"Non-standard" products (e.g. seasonal, quarterly, weekly etc.) are also accommodated in the LT CCM and referenced under Article 3.4

Article 2: Definitions and interpretation

No comments received related to this article.

Article 3: Capacity calculation approach

A clearer differentiation of the statistical and scenario-based capacity calculation approaches (accompanied by additional text elaborating on their respective timings) is provided in this Article following this feedback. The document justifying the use of a statistical-based approach in accordance with Article 10.4(b) of the FCA Regulation will be prepared and submitted in the Explanatory Note following the received guidance of the Channel NRAs

Article 4: General principles

This refers to the statistical-based approach where the February Y-1 timeframe for performing the capacity calculation is proposed and as such broadly reflects the recognition that annual capacity being made available to the market early in the year prior to delivery supports the objective described in Article 3(a) of the FCA Regulation.

Article 5: Methodology for the statistical long-term capacity calculations

No comments received related to this article.

Article 6: Validation

No comments received related to this article.

Article 7: General principles for long-term cross-zonal capacity calculations

No comments received related to this article.

Article 8: Critical Network Element and Contingency (CNEC) methodology

The chosen wording in Articles 8.5 and 8.6 is the same as that used in Articles 7.5 and 7.6 of the DA/ID capacity calculation methodology as are the selection criteria themselves. Article 7.4 also makes it a mandatory task for each onshore TSO to publish on its website the list of grid elements identified as a result of applying such selection criteria.

Article 9: Reliability margin methodology

Some market parties consider that using for the LT CCM the same FRM (Flow Reliability Margin) as in the day-ahead and intraday CCM is not adequate since uncertainties are necessarily higher in the LT timeframes.

Channel TSOs understand the reasoning of the market parties. However, the uncertainties between LT CCM & DA/ID CCM will be covered by the choice of scenarios. So Channel TSOs believe this uncertainty is acceptable and covered in the LT CCM methodology.

Article 10: Methodology for operation security limits

No comments received related to this article.

Article 11: Generation shift keys methodology

No comments received related to this article.

Article 12: Methodology for Remedial Actions in capacity calculation

No comments received related to this article.

Article 13: Scenarios definition methodology

No comments received related to this article.

Article 14: Timestamp selection

Channel TSOs received the following proposal: “Rather than selecting the timestamp via the number of simultaneous outages, why not considering the gravity of the outage directly via the PTDFs?”

We believe this proposal is highly interesting, make sense and would be an improvement of the methodology. However, due to the already limited list of CNECs following the usage of a PTDF threshold, Channel TSOs believe that the impact of such an improvement will be very limited.

Article 15: Provision of the inputs for the long-term capacity calculations

No comments received related to this article.

Article 16: Long-term capacity calculations

In theory, the simultaneous import/export aim at assessing the maximum transfer of power on each direction between GB and Continental Europe that will be possible to reach simultaneously without endangering the security of the system.

So from a GB perspective, it is to maximize the import/export flow from continental Europe to GB.

On the formulation, Channel TSOs will work to make the articulation between Articles 16 & 20 clearer and more precise (and across all the document as a general statement).

Article 17: Coordinated Net Transmission Capacity process

In article 17.2 the CCC will just do a contingency analysis to see if the MPTC for each interconnector can be reached or not without limitation or further actions. In order to make it clearer the sentence “With the objective to maximize cross zonal capacity” will be deleted from the final methodology as this paragraph refers to a contingency analysis only without the use of remedial actions.

Only in case the check is negative and the capacity could potentially be limited then the CC will apply the remedial actions as described in article 17.3.

Article 18: Implementation of reduction of import/export

Some Market parties don’t understand why Channel TSO will only consider the BZ where the CNE is located for the max import/export. Channel TSOs will update the article to make it clear.

Article 19: Implementation of shift of import/export

No comments received related to this article.

Article 20: N-1 security assessment of maximum import/export for each timestamp of the calculation

No comments received related to this article.

Article 21: Calculation consistency

No comments received related to this article.

Article 22: Cross-zonal capacity validation methodology

In case of LT capacity already auctioned, and if a TSO sees the need to re-assess this capacity, the reasons behind this re-assessment would be transparent as they should follow only the points described in article 22.2. This Article 22 is not to be confused with the general transparency requirements as stipulated under Article 24 of the proposal

A point which need to be clear is that unless in case of real issue for security operation, the final NTC provided by the LT capacity Calculation to the market would not be lower than the capacity already sold by the Interconnectors (in accordance to Article 21.2).

Article 23: Fall-back procedures for annual and monthly capacity calculations

No comments received related to this article.

Article 24: Publication of information

No comments received related to this article.

Article 25: Implementation of the LT CC Methodology

No comments received related to this article.

Article 26: Implementation of new interconnectors

No comments received related to this article.

Article 27: Language

No comments received related to this article.