



Shadow CCR 10 TSOs' proposal of coordinated capacity calculation methodology for the day-ahead market timeframe

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Shadow CCR 10 TSOs' proposal of coordinated capacity calculation methodology for the day-ahead market timeframe in accordance with Article 21 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

December 2018

All TSOs, taking into account the following:

Whereas

- (1) This document (hereafter referred to as “Shadow CCR 10 coordinated capacity calculation methodology” or “CCCM”) is a common proposal developed by all Transmission System Operators (hereafter referred to as “TSOs”) within the Shadow South East Europe Capacity Calculation Region (hereafter referred to as “Shadow CCR 10”). The document refers to the common capacity calculation performed for the capacity allocation within the day-ahead market timeframe¹. This proposal is required by Article 20 (2), and developed in accordance with Article 21 of “CACM Regulation”.
- (2) This methodology document was created by initiation of Energy Community through project “TA Regional Coordinated Capacity Calculation WB”. The objective of the Project is to contribute to an efficient step-wise creation of a regional day-ahead market in the Western Balkans and its neighbouring countries, in line with the commitment made by WB6 at the 2015 Vienna Western Balkans Summit to establish a regional electricity market through the implementation of the energy soft measures. These measures target the development of the electricity market in different timeframes, tackling capacity allocation and calculation, spot markets, and balancing markets. The 2016 Paris Western Balkans Summit reemphasized the need to cooperate closer on a regional level and to integrate the markets of the WB6 into the Pan-European market.
- (3) This proposal (hereafter referred to as the “CCCM Proposal”) takes into account the general principles and goals set in Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management (hereafter referred to as the “CACM Regulation”) as well as Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity (hereafter referred to as “Regulation (EC) No 714/2009”), including Commission regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as the “SO GL Regulation”) and RG CE OH – Policy 4: Coordinated Operational Planning (hereafter referred to as the “OH – Policy 4”).
- (4) The goal of the CACM Regulation is the coordination and harmonization of capacity calculation and allocation in the day-ahead and intraday cross-border markets. To facilitate these aims the TSOs in the Capacity Calculation Region shall calculate in a coordinated manner the available cross-border capacity. As previously stated, intraday cross-border market timeframe is out of scope of this CCCM.
- (5) Article 21 (1) of the CACM Regulation constitutes the legal basis for this proposal and defines several specific requirements that the CCCM Proposal should take into account:

“1. The proposal for a common capacity calculation methodology for a capacity calculation region determined in accordance with Article 20(2) shall include at least the following items for each capacity calculation time-frame:

 - (a) *methodologies for the calculation of inputs to capacity calculation, which shall include the following parameters:*

¹ As required by Terms of Reference of “TA Regional Coordinated Capacity Calculation WB” project, only day-ahead market timeframe is the subject of the Shadow CCR 10 coordinated capacity calculation methodology.

- (i) *a methodology for determining the reliability margin in accordance with Article 22;*
 - (ii) *the methodologies for determining operational security limits, contingencies relevant to capacity calculation and allocation constraints that may be applied in accordance with Article 23;*
 - (iii) *the methodology for determining the generation shift keys in accordance with Article 24;*
 - (iv) *the methodology for determining remedial actions to be considered in capacity calculation in accordance with Article 25.*
- (b) *a detailed description of the capacity calculation approach which shall include the following:*
- (i) *a mathematical description of the applied capacity calculation approach with different capacity calculation inputs;*
 - (ii) *rules for avoiding undue discrimination between internal and cross-zonal exchanges to ensure compliance with point 1.7 of Annex I to Regulation (EC) No 714/2009;*
 - (iii) *rules for taking into account, where appropriate, previously allocated cross-zonal capacity;*
 - (iv) *rules on the adjustment of power flows on critical network elements or of cross-zonal capacity due to remedial actions in accordance with Article 25;*
 - (v) *(...)*
 - (vi) *for the coordinated net transmission capacity approach, the rules for calculating cross-zonal capacity, including the rules for efficiently sharing the power flow capabilities of critical network elements among different bidding zone borders;*
 - (vii) *where the power flows on critical network elements are influenced by cross-zonal power exchanges in different capacity calculation regions, the rules for sharing the power flow capabilities of critical network elements among different capacity calculation regions in order to accommodate these flows.*
- (c) *a methodology for the validation of cross-zonal capacity in accordance with Article 26.”*
- (6) Article 14 of the CACM Regulation, with reference to the day ahead timeframe, defines the following: “1. (...) TSOs shall calculate cross- zonal capacity for (...) (a) “day-ahead, for the day-ahead market “and“2. For the day-ahead market time-frame, individual values for cross-zonal capacity for each day-ahead market time unit shall be calculated.”, and “3. For the day-ahead market timeframe, the capacity calculation shall be based on the latest available information. The information update for the day-ahead market time-frame shall not start before 15:00 market time two days before the day of delivery”.
- (7) Article 20 (1) of the CACM Regulation defines the approach to use in the common capacity calculation methodologies as “flow-based approach” after the conditions Article 20 (4) are met and (4) specifies that: “No later than six months after at least all South East Europe Energy Community Contracting Parties participate in the single day-ahead coupling, the TSOs from at

least Croatia, Romania, Bulgaria and Greece shall jointly submit a proposal to introduce a common capacity calculation methodology using the flow-based approach for the day-ahead and intraday market time-frame“. Therefore, CCCm Proposal is based on coordinated net transmission capacity approach.

- (8) Article 2 (8) of the CACM Regulation defines the “*coordinated net transmission capacity approach*” as “*the capacity calculation method based on the principle of assessing and defining ex ante a maximum energy exchange between adjacent bidding zones*”.
- (9) In the context of this proposal, the definition of “*coordinated capacity calculator*” is important and is defined in Article 2 (11) of the CACM Regulation as: “*the entity or entities with the task of calculating transmission capacity, at regional level or above*”.
- (10) Article 9 (9) of the CACM Regulation requires that the proposed timescale for the implementation and the expected impact of the CCCm Proposal on the objectives of the CACM Regulation is described. The impact is presented below (point (11)) of this Whereas Section.
- (11) The CCCm Proposal contributes to and does not in any way hinder the achievement of the objectives of Article 3 of the CACM Regulation:

Article 3 (a) of the CACM Regulation aims at promoting effective competition in the generation, trading and supply of electricity. The CCCm Proposal serves the objective of promoting effective competition in the generation, trading and supply of electricity by defining a set of harmonized rules for capacity calculation and congestion management, which contributes to the effectiveness of the single day-ahead coupling. Establishing common and coordinated processes for the capacity calculations within the day-ahead market timeframe contributes to achieve this objective.

Article 3 (b) of the CACM Regulation aims at ensuring optimal use of the transmission infrastructure. The CCCm Proposal contributes to achieve the objective of ensuring optimal use of the transmission infrastructure by using last available inputs based on the best possible forecast of transmission systems at the time of each capacity calculation, updated in a timely manner.

Article 3 (c) of the CACM Regulation aims at ensuring operational security. The CCCm Proposal contributes to achieve the objective of ensuring operational security by coordinating the capacity calculation with updated inputs for the day-ahead market timeframe at regional level to ensure its reliability.

Article 3 (d) of the CACM Regulation aims at optimizing the calculation and allocation of cross-zonal capacity. By coordinating the timings for the delivery of inputs, calculation approach and validation requirements of the capacity calculation between TSOs and the coordinated capacity calculator, the CCCm proposal contributes to achieve the objective of optimizing the calculation and allocation of cross-zonal capacity.

Article 3 (g) of the CACM Regulation aims at contributing to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union. By using the best possible forecast of the transmission systems at the time of each capacity calculation within the Shadow CCR 10, the results of the coordinated capacity calculation contributes to determine the most limiting branches within this region, thus supporting TSOs for a more efficient development of the electricity transmission system.

(12) In conclusion, the CCCm Proposal contributes to the general objectives of the CACM Regulation.

SUBMIT THE FOLLOWING COORDINATED CAPACITY CALCULATION METHODOLOGY PROPOSAL TO ALL NATIONAL REGULATORY AUTHORITIES:

Article 1

Subject matter and scope

The CCCm as determined in this CCCm Proposal shall be considered as a common proposal of all TSOs of Shadow CCR 10 in accordance with Article 21 of the CACM Regulation and shall cover the day-ahead coordinated capacity calculation for Shadow CCR 10 bidding zone borders.

Article 2

Definitions and interpretation

1. For the purposes of the CCCm Proposal, the terms used shall have the meaning set forth in Article 2 of Regulation (EC) 714/2009, Article 2 of Regulation (EC) 543/2013, which amends the previous, and Article 2 of CACM Regulation.
2. In addition, the following definitions shall apply:

The bidding zones of Shadow CCR 10 are as follows:

- a. 'ADMIE' is the Greek Transmission System Operator;
- b. 'CGES' is the Montenegrin Transmission System Operator;
- c. 'EMS' is the Serbian Transmission System Operator;
- d. 'ESO EAD' is the Bulgarian Transmission System Operator;
- e. 'HOPS' is the Croatian Transmission System Operator;
- f. 'KOSTT' is the Kosovo*¹ Transmission System Operator;
- g. 'MAVIR' is the Hungarian Transmission System Operator;
- h. 'MEPSO' is the Macedonian Transmission System Operator;
- i. 'NOSBiH' is the Bosnian and Herzegovinian Transmission System Operator;
- j. 'OST' is the Albanian Transmission System Operator;
- k. 'TRANSELECTRICA' is the Romanian Transmission System Operator;

The borders of Shadow CCR 10 are as follows:

- l. 'OST-ADMIE' is the bidding zone border between Albania and Greece;
- m. 'OST-CGES' is the bidding zone border between Albania and Montenegro;
- n. 'OST-EMS&KOSTT' is the bidding zone border between Albania and Serbia/Kosovo*;
- o. 'NOSBiH-HOPS' is the bidding zone border between Bosnia&Herzegovina and Croatia;
- p. 'NOSBiH-CGES' is the bidding zone border between Bosnia&Herzegovina and Montenegro;
- q. 'NOSBiH-EMS&KOSTT' is the bidding zone border between Bosnia&Herzegovina and Serbia/Kosovo*;
- r. 'ESO-ADMIE' is the bidding zone border between Bulgaria and Greece;
- s. 'ESO-MEPSO' is the bidding zone border between Bulgaria and FYROM;

¹ This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

- t. 'ESO-TRANSELECTRICA' is the bidding zone border between Bulgaria and Romania;
- u. 'ESO-EMS&KOSTT' is the bidding zone border between Bulgaria and Serbia/Kosovo*;
- v. 'ADMIE-MEPSO' is the bidding zone border between Greece and FYROM;
- w. 'HOPS-EMS&KOSTT' is the bidding zone border between Croatia and Serbia/Kosovo*;
- x. 'MAVIR-EMS&KOSTT' is the bidding zone border between Hungary and Serbia/Kosovo*;
- y. 'CGES-EMS&KOSTT' is the bidding zone border between Montenegro and Serbia/Kosovo*;
- z. 'MEPSO-EMS&KOSTT' is the bidding zone border between FYROM and Serbia/Kosovo*;
- aa. 'TRANSELECTRICA-EMS&KOSTT' is the bidding zone border between Romania and Serbia/Kosovo*;
- bb. 'CGES-TERNA' is the bidding zone border between Montenegro and Italy;
- cc. 'D-1' means the day before the day of delivery;
- dd. 'D-2' means two days before the day of delivery;
- ee. 'D-2 Common Grid Model' means the common grid model built for each market time unit two days before the day of delivery for the day-ahead capacity calculation timeframe in accordance with Article 17 of the CACM Regulation;
- ff. 'NTC' means the net transmission capacity which is the maximum power exchange (MW) for commercial purposes between adjacent bidding zones for each market time unit in a specific direction;
- gg. 'TTC' means the total transmission capacity which is the maximum exchange (MW) complying with the operational security limits between adjacent bidding zones for each market time unit in a specific direction;
- hh. 'BCE' means base case exchange program (MW) that, together with parallel flows, induces Notified Transmission Flows.
- ii. 'NTF' means physical flow (MW) over tie lines between the considered areas observed in the base case prior to any generation shift between areas.
- jj. 'TRM' represents the transmission reliability margin (MW) required to cover uncertainties and unintended deviations of power flows in the period between the capacity calculation and real time.

3. In this CCCm Proposal, 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

Application of this proposal

This proposal solely applies to the CCCm for day-ahead market timeframe within the Shadow CCR 10. Coordinated capacity calculation methodologies within others Capacity Calculation Regions or others timeframes are outside the scope of this proposal.

Article 4

Cross-zonal capacities for the day-ahead market

1. For the day-ahead market timeframe, individual values for cross-zonal capacity for each day-ahead market time unit shall be calculated using the Coordinated Net Transmission Capacity (*CNTC*) approach as defined in the common capacity calculation methodology, as set forth in Article 14 and Article 21 of the CACM Regulation.
2. According to Article 20(4) of CACM Regulation: “No later than six months after at least all South East Europe Energy Community Contracting Parties participate in the single day-ahead coupling, the TSOs from at least Croatia, Romania, Bulgaria and Greece shall jointly submit a proposal to introduce a common capacity calculation methodology using the flow-based approach for the day-ahead and intraday market time-frame. The proposal shall provide for an implementation date of the common capacity calculation methodology using the flow-based approach of no longer than two years after the participation of all SEE Energy Community Contracting Parties in the single day-ahead coupling. The TSOs from Member States which have borders with other regions are encouraged to join the initiatives to implement a common flow-based capacity calculation methodology with these regions.”
3. The TSOs of the Shadow CCR 10 shall provide to the coordinated capacity calculator (*CCC*) the following initial inputs:
 - a. D-2 IGMs necessary for D-2 CGMs creation in accordance with Article 17 and Article 28 of the CACM Regulation;
 - b. operational security limits and contingencies in accordance with Article 6;
 - c. transmission reliability margins (*TRMs*) in accordance with Article 5;
 - d. generation shift keys (*GSKs*) in accordance with Article 7; and
 - e. remedial actions (*RAs*) in accordance with Article 8.
4. Shadow CCR 10 TSOs shall send for each market time unit of the day the long term allocated capacities (*LTA*) and long term nominated capacities (*LTN*) to the coordinated capacity calculator.
5. When providing the inputs, the TSOs of the Shadow CCR 10 shall respect the formats commonly agreed between the TSOs and the coordinated capacity calculators of the Shadow CCR 10, while respecting the requirements and guidance defined in the CGMM.
6. For the day-ahead coordinated capacity calculation in the Shadow CCR 10, performed by the *CCC*, the high-level process flow includes six steps until the final *CNTC* domain for the day-ahead market time-frame is set:
 - a. First, for the capacity calculation inputs as defined in Article 4(2) a quality check process shall be performed by the *CCC*;
 - b. the second process step is to determine the relevant *CNECs* and critical nodes in accordance with Article 6 used during common capacity calculation;
 - c. the third step is to determine the Net Transmission Capacity (*NTC*) values for each direction and border of Shadow CCR 10 in accordance with Article 10(7);
 - d. the fourth step is to check if the previously-allocated cross-zonal capacities are fully covered by the *NTC* values in accordance with Article 10(9);
 - e. after *LTA* assessment, the resulting cross-zonal capacities are validated by the TSOs of the Shadow CCR 10;
 - f. finally, the Available Transmission Capacity (*ATC*) values are calculated for day-ahead market timeframe taking into account the *LTN* values.

7. As described before, for each Shadow CCR 10 border, direction and market time unit, the final available transmission capacity for the day-ahead market timeframe shall be defined as the difference between the computed *NTC* values and the already nominated capacities in the previous market timeframes.
8. In accordance with Article 46 of CACM Regulation, the CCC and TSOs of the SEE CCR shall ensure that cross-zonal capacity shall be provided to relevant entities before the day-ahead firmness deadline as defined in accordance with Article 69 of CACM Regulation.

Article 5

Transmission Reliability Margin methodology

1. The day-ahead common capacity calculation methodology is based on forecast models of the transmission system. Therefore, the outcomes are subject to inaccuracies and uncertainties. The aim of the transmission reliability margin is to cover a level of risk induced by these forecast errors.
2. In accordance with Article 22(2) and (4) of the CACM Regulation, the Transmission Reliability Margins (*TRMs*) cover the following forecast uncertainties:
 - a. Shadow CCR 10 external transactions (out of Shadow CCR 10 control: both between Shadow CCR 10 and other CCRs as well as among TSOs outside the Shadow CCR 10);
 - 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 frequency containment reserves.
3. For the capacity calculation performed for day-ahead market time-frame, the TSOs of Shadow CCR 10 shall compute the Transmission Reliability Margins (*TRMs*), in line with Article 22 of the CACM Regulation and based on the analysis of the following data:
 - unintended deviations of physical electricity flows within a market time unit caused by the adjustment of electricity flows within and between bidding zones, to maintain a constant frequency;
 - uncertainties which could affect capacity calculation and which could occur between D-2 and real time, for the market time unit being considered.
4. The methodology for the TRM determination is based on a probability distribution function, quantifying the deviations of the cross border power flows, by comparing the forecasted model used in D-2 capacity calculation (adjusted with latest scheduled net positions - close to real time, topology and applied remedial actions) with the corresponding data snapshot reflecting the real time situation for the same timestamp. Until the CGM snapshots are suitable for TRM assessment, real time recordings will be used for the realized data.
5. The 95th percentiles of the probability distributions for the borders of the Shadow CCR 10 are calculated. This means that the TSOs apply a common risk level of 5% i.e. the TRM values cover 95% of the historical errors. A possible additional step is to undertake an operational adjustment on the values derived previously, which can be applied to adjust the computed TRM values to a value within the range between 1% and 20% of the TTC calculated under normal weather conditions.
6. The TRM values shall be updated every year based upon an observatory period of one year such that seasonal effects can be reflected in the values. The TRM values remain fixed until the next update.
7. The transition period shall be 1 year (acquisition of data) and 3 months (creation of report and TRM values) after the start of the day-ahead capacity calculation go-live. After this period, Shadow CCR 10

TSOs will provide to the NRAs the initially calculated TRM values, and a report with the final proposal of reliability margin methodology, adjusted on the basis of the results and findings obtained during the transition period.

8. For the day-ahead common capacity calculation, the TSOs from the Shadow CCR 10 have the obligation to implement the TRM methodology no later than 6 months after the approval of the TRM methodology by NRAs.
9. Before the first operational calculation of the TRM values, the TSOs of Shadow CCR 10 shall use the TRM values already in operation in the existing capacity calculation initiatives. The *TRMs* before the first operational calculation for the Shadow CCR 10 borders shall be 100 MW for all Shadow CCR 10 borders, except on EMS&KOSTT – OST border (50 MW) and NOSBiH – HOPS border (150 MW).

Article 6

Methodologies for operational security limits, contingencies and allocation constraints

1. Each Shadow CCR 10 TSO shall provide a list of critical network elements (CNEs) which need to be monitored during the coordinated NTC calculation process based on each TSO operational experience. This list shall be updated at least on a yearly basis and in case of topology changes (commissioning of new grid elements in the observability area of each TSO). A CNE is a network element, significantly impacted by SEE cross-zonal trades, which are supervised under certain operational conditions, the so-called contingencies. A CNE can be a cross zonal element or an internal network element. Those elements can be an overhead line, an underground cable, or a transformer.
2. In accordance with Article 23(1) of CACM Regulation, Shadow CCR 10 TSOs shall provide a list of contingencies used in operational security analysis in line with Article 33 of the SO GL, limited to their relevance for the set of CNEs as defined in Article 6(1) and pursuant to Article 23(2) of the CACM Regulation. This list shall be updated at least on a yearly basis and in case of topology changes (commissioning of new grid elements in the observability area of each TSO).

A contingency can be a trip of:

 - a line, a cable, or a transformer;
 - a busbar;
 - a generating unit;
 - a load; or
 - a set of the aforementioned contingencies.
3. The association of contingencies to CNEs shall be done from the list of CNEs established in Article 6(1) and from the list of contingencies established in Article 6(2). It shall follow the rules established in Article 75 of SO GL.
4. Each Shadow CCR 10 TSO may provide a list of nodes, in order to monitor the voltage level during coordinated NTC calculation process based on each TSO operational experience. This list shall be updated at least on a yearly basis and in case of topology changes (commissioning of new grid elements in the observability area of each TSO).
5. The result of the previous process will be an initial pool of CNECs and nodes to be used for all steps of the common capacity calculation. The initial pool of CNECs and nodes can be reviewed before the computation pursuant to Article 6(7).

6. In accordance with Article 21(1)(b)(iv) of the CACM Regulation, this day-ahead common capacity calculation methodology shall describe the rules to mitigate possible discrimination between the treatment of internal and cross-zonal transactions, in response to Article 21(1)(b)(ii) of the CACM Regulation and Article 1.7 of Annex I to the Regulation (EC) 714/2009 and in line with Article 3(a), 3(b) and 3(e) of the CACM Regulation. The rules to mitigate possible discrimination between the treatment of internal and cross-zonal transactions are based on the sensitivity factor assessment which is the criteria for selecting the CNECs and nodes that are significantly impacted by cross-zonal trade. Cross-zonal network elements are by definition considered to be significantly impacted. The other CNECs and the nodes shall have a sensitivity factor that exceeds the threshold of 5% to be taken into account in all of the steps of the common capacity calculation and will determine the cross-zonal capacity.
7. The assessment of sensitivity factors calculated as a percentage is performed from the relevant CGM and GSK in order to determine the effect on:
 - a. additional flow for each CNEC defined in accordance with Article 6(3);
 - b. voltage level for each node defined in accordance with Article 6(4).
8. In an exceptional situation, such as extreme weather conditions, untypical flow conditions or topology or grid situation, a TSO may decide to modify the CNEC and nodes list described in Article 6(6) for one or several market time units covering the expected period of presence of the exceptional situation.
 - a. In case a TSO decides, in an exceptional situation, to use a CNEC or node which is not significantly influenced by the changes in bidding zone net positions, the respective TSO shall inform Shadow CCR 10 national regulatory authorities without undue delay and provide a clear description of the specific situation providing detailed information such as the specific topology or grid situation that led to this decision;
 - b. In case a TSO decides, in an exceptional situation, to exclude a CNEC or node which is significantly influenced by the changes in bidding zone net positions, the respective TSO shall inform Shadow CCR 10 national regulatory authorities without undue delay and provide a clear description of the specific situation providing detailed information such as the specific topological or grid situation that led to this decision.
9. In accordance with Article 23(1) of the CACM Regulation, SEE TSOs shall respect the operational security limits used in operational security analysis carried out in line with Article 72 of the SO GL. The operational security limits used in the common capacity calculation are the same as those used in operational security analysis, therefore any additional descriptions pursuant to Article 23(2) of the CACM Regulation are not needed. In particular:
 - a. SEE TSOs shall respect the maximum admissible current (I_{max}) which is the physical limit of a CNE according to the operational security policy in line with Article 25 of the SO GL. The maximum admissible current can be defined with:
 - i. fixed limits for all market time units of a specific season;
 - ii. fixed limits for all market time units in the case of transformers and certain types of conductors which are not sensitive to ambient conditions;
 - iii. fixed limits for all market time units, in case of specific situations where the limit reflects the capability of substation equipment (such as circuit-breaker, current transformer, or disconnecter).
 - b. when applicable, I_{max} shall be defined as a temporary current limit of the CNE in accordance with Article 25 of the SO GL. A temporary current limit means that an overload is only allowed for a certain finite duration.

- c. I_{max} is not reduced by any security margin, as all uncertainties in the common capacity calculation are covered by the reliability margin (RM) in accordance with Article 5.
10. SEE TSOs shall not apply additional allocation constraints in accordance with Article 2 of CACM Regulation.
 11. TSOs shall review and update methodologies for determining operational security limits and contingencies on a yearly basis.

Article 7

Generation - Load shift key methodology

1. In accordance with Article 24 of the CACM Regulation, Shadow CCR 10 TSOs developed the following methodology to determine the common generation shift key:
 - a. Shadow CCR 10 TSOs shall take into account the available information on generation or load available in the common grid model for each scenario developed in accordance with Article 18 of the CACM Regulation in order to select the nodes that will contribute to the generation shift key;
 - b. Each Shadow CCR 10 TSO shall aim to apply a GSK that resembles the dispatch and the corresponding flow pattern, thereby contributing to minimizing the reliability margins;
 - c. Shadow CCR 10 TSOs shall define a constant generation shift key per market time unit.
2. Load can be included in the shift list where representing generation on low voltage levels, which is not explicitly modelled.
3. For the application of the methodology, Shadow CCR 10 TSOs shall define, for the capacity calculation process, generation shift keys impacted by the actual generation present in the relevant CGM, for each market time unit. Following agreement with the coordinated capacity calculator, the TSOs of Shadow CCR 10 should specify generation shift keys according to one of the following descriptions:
 - Generation shift keys proportional to the remaining available capacity of generation units in the D-2 CGM for each market time unit;
 - Generation shift keys proportional to the actual generation in the D-2 CGM for each market time unit;
 - Generation shift keys based on participation factors;
 - Generation shift keys based on merit order list.
4. The default generation shift methodology for all concerned bidding zones is: *proportional to the remaining available capacity of generation units* in the D-2 CGM for each market time unit, until the exploitation of all available reserve. After that, in case of need for further shifting (transmission limit is not reached), additional shift is done proportionally to the actual generation from the previous calculation step.

The default generation shift principle considers *all generation units*.
5. Exact generation shift, with the participating units needs to be defined for each bidding zone.

6. Generation shift keys methodology shall be reviewed on a yearly basis.

Article 8

Methodology for remedial actions in capacity calculation

1. In accordance with Article 25(1) of the CACM Regulation and Article 20(2) of SO GL, Shadow CCR 10 TSOs shall individually define the list of Remedial Actions (RAs) to be taken into account in the day-ahead common capacity calculation.
2. In accordance with Article 25(2) and (3) of the CACM Regulation, these RAs will be used in calculation of cross-zonal capacities while ensuring secure power system operation in real time.
3. In accordance with Article 25(4) of the CACM Regulation, a TSO may refrain from considering a particular remedial action in capacity calculation in order to ensure that the remaining remedial actions are sufficient to ensure operational security.
4. In accordance with Article 25(5) of the CACM Regulation, the day-ahead common capacity calculation takes non-costly RAs into account which can be explicitly modelled in the CGM.
5. The remedial actions defined by each TSO of Shadow CCR 10 shall be either preventive (pre-fault) or curative (post-fault). The TSO of Shadow CCR 10 may use the following remedial actions, but not limited to:
 - Changing the tap position of a phase shifter transformer (PST),
 - Topology measure: opening or closing of one or more line(s), cable(s), transformer(s), bus bar coupler(s) or switching of one or more network element(s) from one bus bar system to another,
 - Connection/disconnection of reactive power devices (tap-changers, reactors, capacitor banks, SVC, etc.).
6. Each TSO of Shadow CCR 10 shall inform the coordinated capacity calculator in a timely manner on any change in its remedial actions within Shadow CCR 10 to ensure an efficient capacity calculation.
7. The RAs coordination in the day-ahead common capacity calculation is performed in accordance with a set of pre-defined characteristics such as an objective function, constraints and variables:
 - a. The RA coordination objective is to enlarge the capacity domain around the balanced net position of the Common Grid Model Alignment process, with the objective function to minimize the overload of the CNECs and/or the violation of the node voltage;
 - b. The constraints are the operational security limits in accordance with Article 6, minimum impact on objective function value for use RAs and without negative impact on the TTC values calculated according with Article 11 of this Proposal.
 - c. The variables are the switching states of the topological measures and tap positions.
8. The TSOs of the Shadow CCR 10 shall determine the common list of remedial action for capacity calculation taking into account that remedial actions in a bidding zone with borders in several CCRs can only be assigned to one CCR.

Article 9

Base case exchange methodology

1. Base Case Exchange (BCE) values are related to the best forecast of commercial exchanges at the timeframe considered. In order to standardize NTC calculation, the numerical assessment of BCE values is required.

2. Notified Transmission Flow (NTF) is physical flow between two areas in base case through interconnected lines prior to any generation shift between areas. It results from the flow originated by the BCE and from the parallel flows.
3. Base Case Exchange values can be derived from CGMA process as well. As part of CGMA output results, Indicative AC flows per border will be delivered. By default, the CGMA algorithm computes AC flows in such a way that these flows are minimized and balanced net positions are respected.
4. The TSOs of Shadow CCR 10 shall define base case exchange (BCE) – determined by using one of following two approaches:
 - BCE is considered equal to NTF, in transition period;
 - Using Indicative AC flows values from CGMA process, after CGMA becomes operational, in sense of providing credible indicative cross-border flows usable as BCE.
5. BCE approach shall be agreed among all Shadow CCR 10 TSOs.

Article 10

Day-ahead capacity calculation governance process

1. CCCs in Shadow CCR 10 shall calculate cross-zonal capacities for each bidding zone border of Shadow CCR 10, on behalf of TSOs.
2. The Shadow CCR 10 TSOs shall provide the coordinated capacity calculator with the last updated information on the transmission systems in a timely manner for the capacity calculation that is started in the end of D-2.
3. The Regional Security Coordinator (RSC) shall merge the individual grid models provided by each TSO of the Shadow CCR 10 and other TSOs of Continental Europe. During the merging process, quality checks of the input data provided by each TSO of the Shadow CCR 10 shall be performed by the designated RSC, in accordance with Article 77(1) (a) of SO GL Regulation.
4. The capacity calculation process will take into account Remedial Action coordination.
5. The coordinated capacity calculator shall define the values of NTC for each market time unit for all borders mentioned in Article 2 of this Proposal. These values shall be provided to TSOs of Shadow CCR 10 for validation.
6. The coordinated capacity calculator of the Shadow CCR 10 shall provide the Shadow CCR 10 TSOs with the validated NTCs after application of the reliability margin defined in accordance with Article 6 for each border.

Article 11

Composite NTC

1. The TSOs of Shadow CCR 10 shall determine borders on which NTC is to be calculated in a composite manner, based on its network interdependence and their expertise.
2. The CCC shall calculate the values of NTC for each market time unit for all composite borders. These values shall be provided to TSOs of the Shadow CCR 10 for validation.
3. In order to determine NTC values per bidding zone border, methodology for splitting NTC values calculated in composite manner has to be defined. Shadow CCR 10 TSOs can use one of following three approaches:
 - Static coefficient approach

- Dynamic coefficient approach
 - Fixed ratio based on operational experience and agreed among concerned TSOs
4. The CCC of the Shadow CCR 10 shall provide to the TSOs with the validated *NTCs* values after application of the *TRMs* defined in accordance with Article 5 of this Proposal.
 5. The Net Transmission Capacity (*NTC*) on the Area_A–Area_B border is determined with the following equations:

$$NTC_{A-B} = TTC_{A-B} - TRM_{A-B}$$

6. In accordance with Article 21(1)(b)(iii) of the CACM Regulation, Shadow CCR 10 TSOs shall apply the rules for taking into account the previously allocated cross-zonal capacity. One objective of the procedure is to check if the Available Transmission Capacity (*ATC*) value of each border and direction of the Shadow CCR 10 remains non-negative after deducing the previously allocated and nominated transmission rights.
7. The Available Transmission Capacity (*ATC*) will be determined taking into consideration the Already Allocated Capacities (*AAC*) is determined with the following equations in case of Area_A – Area_B border. The two checks of *ATC* value will be done in two different timeframes of D-2 calculation process:

- In the evening of D-2, when only the information of already allocated capacity (*AAC*) from forward allocation timeframes is available, the preliminary check is done, in a way:

$$ATC_{A-B} = NTC_{A-B} - AAC_{A-B}$$

This check should provide the awareness to the CCCs and TSOs, in case that *ATC* appears as negative. *AAC* of different directions at the same borders is not netted, due to the optionality of its realisation.

- In the morning of D-1, after the nominations of already allocated capacities, the information about Already Nominated Capacity (*ANC*) from forward allocation timeframes is available, the preliminary check is done, in a way:

$$ATC_{A-B} = NTC_{A-B} - ANC$$

This check provides the final information on the size of *ATC* available for the D-1 allocation processes, and the trigger of eventual curtailment of long-term transmission rights, in case that *ATC* appears as negative. *ANC* is netted value based on nominations at different directions at the same border.

8. If the *ATC* values calculated according to Article 11(7) is negative, no capacity will be made available for day-ahead, respectively intraday market timeframe.
9. In accordance with Article 46 of CACM regulation, the CCC and TSOs of the Shadow CCR 10 shall ensure that the day-ahead validated cross-zonal capacity shall be provided to relevant entity before the day-ahead firmness deadline as defined in accordance with Article 69 of CACM Regulation.
10. Approach for splitting composite *NTC* values shall be agreed among all TSOs that share certain border.
11. The list of composite *NTC* profiles is as follows:
 - EMS&KOSTT ↔ NOS BiH + HOPS

- TRANSELECTRICA + ESO ↔ EMS&KOSTT
- EMS&KOSTT ↔ CGES + MEPSO + OST
- ADMIE ↔ OST + MEPSO + ESO + TEIAS
- TRANSELECTRICA ↔ ESO + EMS&KOSTT

Article 12

Cross-zonal capacity validation methodology

1. Each TSO shall, in accordance with Article 26(1) and 26(3) of the CACM Regulation, validate and have the right to correct cross-zonal capacity relevant to the TSO's bidding zone borders for reasons of operational security during the validation process. In exceptional situations, cross-zonal capacities can be decreased by TSOs. These situations are:
 - a. A forced outage as defined in Article 3 of SO GL;
 - b. when remedial actions, that are needed to ensure the calculated capacity, are not sufficient;
 - c. extremely low demand of a TSO which leads to low system inertia and high voltage conditions and so require a minimum number of power plants on the grid;
2. Where one or more Shadow CCR 10 TSOs do not validate the cross-zonal capacity calculated, the concerned TSO(s) shall provide the coordinated capacity calculator with the updated amount of cross-zonal capacities for the border considered and the reasons for the modification. The final cross-zonal capacity is the minimum value sent by the Shadow CCR 10 TSOs of the borders considered.
3. Any reduction of cross-zonal capacities during the validation process shall be communicated the Shadow CCR 10 national regulatory authorities. The CCC shall issue a three-monthly report to regulatory authorities that shall include the amount of reduction in cross-zonal capacity and reason for reduction, pursuant to Article 26(5) of CACM. In cases of reduction, the report shall contain possible measures to prevent similar cases in the future.
4. The CCC shall coordinate with neighbouring CCCs during the validation process, where at least the reductions in cross-zonal capacity are shared among them. Any information on decreased cross-zonal capacity from neighbouring CCCs shall be provided to Shadow CCR 10 TSOs.

Article 13

Influence of exchanges by other CCRs

1. In accordance with Article 21(1)(b)(vii) of the CACM Regulation, Shadow CCR 10 TSOs take into account the influences of other CCRs by making assumptions on what will be the future non-Shadow CCR 10 exchanges in accordance with Article 18(3) of the CACM Regulation and Article 19 of the Common Grid Model Methodology.
2. The assumptions of non-Shadow CCR 10 exchanges are implicitly captured in the relevant CGM by the non-Shadow CCR 10 TSOs' best forecasts of net positions and flows for HVDC lines, according to Article 18(3) of CACM Regulation and are used as the basis for the common capacity calculation. In Shadow CCR 10, this constitutes the rule for sharing power flow capabilities among different CCRs.

Article 14

Fallback procedures

1. Prior to each day-ahead capacity calculation, the TSOs of Shadow CCR 10 shall provide to the coordinated capacity calculator the cross-zonal capacities defined at the long-term capacity calculation processes. For day-ahead market timeframe are used as fallback solution the NTCs values calculated for yearly and monthly processes.
2. For the day-ahead capacity calculation, where an incident occurs in the capacity calculation process and the coordinated capacity calculator is unable to produce results within the allotted time for the calculation process, the TSOs from Shadow CCR 10 shall validate the last coordinated cross-zonal capacities calculated within the long-term timeframe and review it where relevant.

Article 15

Reviews and updates

1. Based on Article 3(f) of the CACM Regulation and in accordance with Article 27(4) of the CACM Regulation all TSOs 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.
2. In case the review proves the need of an update of the reliability margins methodology, Shadow CCR 10 TSOs shall publish the changes at least 1 month before the implementation.
3. The review of the common list of remedial actions taken into account in capacity calculation shall include at least an evaluation of the efficiency of RAs considered during RA coordination.
4. In case the review proves the need for updating the application of the methodologies for determining generation shift keys, operational security limits, and contingencies referred to in Articles 23 to 24 of the CACM Regulation, changes have to be published at least 3 months before the final implementation.
5. Any changes of parameters listed in Article 27(4) of the CACM Regulation have to be communicated to market participants and Shadow CCR 10 NRAs.
6. The impact of any changes of the parameters listed in Article 27(4)(d) of the CACM Regulation have to be communicated to Shadow CCR 10 NRAs. If any change leads to an adaptation of the methodology, Shadow CCR 10 TSOs will amend the methodology according to Article 9(13) of the CACM Regulation.

Article 16

Publication and Implementation of the CCCm Proposal

1. The CCCm will be analysed within the test period, assuming 6 months of internal run, among TSOs and RSCs/CCCs solely, and after that 6 months of external run, including feedback from electricity market participants. After the test period, the CCCm will be refined according to the conclusions and gained experiences. Within 3 months after the test period, the updated CCCm will be provided to NRAs for the approval.
2. The TSOs of Shadow CCR 10 shall publish the CCCm Proposal without undue delay after relevant national regulatory authorities have approved the proposed CCCm.
3. The TSOs of Shadow CCR 10 shall implement the final CCCm Proposal for the day-ahead capacity

calculation no later than 6 months after the approval of CCCm by NRAs.

4. The deadlines defined in Article 16(2), Article 16(3) can be modified on request from all TSOs of Shadow CCR 10 to their national regulatory authorities.

Article 17

Monitoring

1. Monitoring and information to regulatory authorities with reference to the “Whereas” section and Article 26(5) of the CACM Regulation, monitoring data shall be provided towards the SEE NRAs as basis for supervising a non-discriminatory and efficient SEE congestion management.
2. The provided monitoring data shall also be the basis for the biennial report to be provided according to Article 31 of the CACM Regulation.
3. All technical and statistical information related to this CCM shall be made available upon request to the NRAs in the SEE CCR.

Article 18

Language

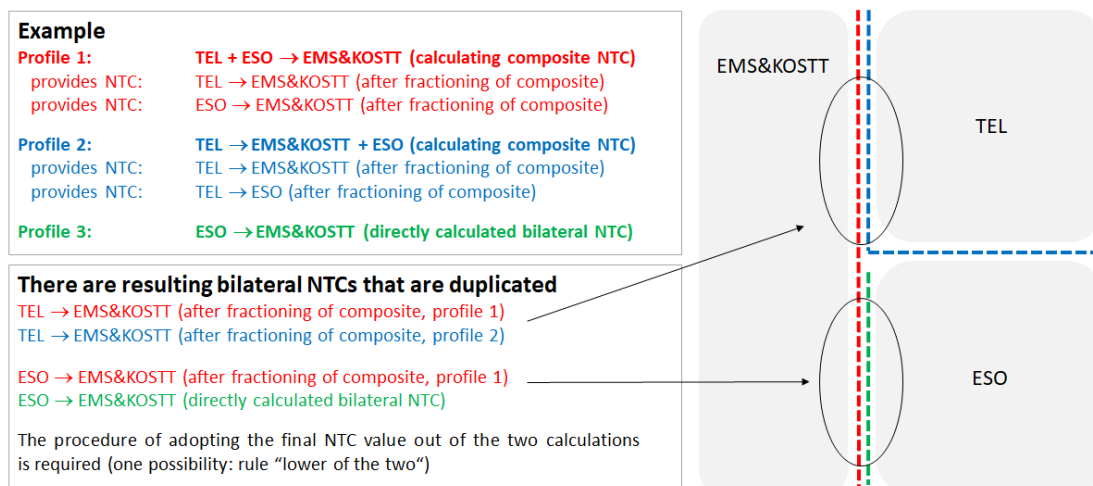
1. The reference language for this common capacity calculation Proposal shall be English.
2. For the avoidance of doubt, where TSOs need to translate this CCCm Proposal into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with Article 9 (14) of the CACM Regulation and any version in another language, the relevant TSOs shall be obliged to dispel any inconsistencies by providing a revised translation of this CCCm Proposal to their relevant national regulatory authorities.

Annex: List of open issues

During the course of the project, it is recognized that certain aspects of Regional Coordinated Capacity Calculation methodology require either further elaboration, fulfilling external conditions (such as CACM GL adoption on the level of EnC parties from WB6) or coordination among TSOs, for which the duration of this project was not sufficient.

These issues are listed here, and require the resolving before preparing final Methodology applicable in Shadow CCR 10.

- In the CCCm article related to GSK, the default shifting principles (proportionally to reserve) and default lists (all available units) are defined. Exact generation shift key principles, with the participating units needs to be defined for each bidding zone; to be provided by involved TSOs.
- Recognition of all composite borders/directions; needs to be further elaborated and verified by TSOs.
- Rules for sharing each composite NTC needs to be agreed by all concerned TSOs. This includes the recognition of need for duplicated calculations (e.g. fractions of different composite NTCs, or combining composite and bilateral) and the adoption of final NTC value at certain borders.



- Allowing different shape of composite/bilateral calculation at different directions, where reasonable. NTC can be calculated as composite in one direction and bilateral in another.

Example: NTC can be calculated,

- as composite at the direction EMS&KOSTT → CGES + MEPSO + OST, due to predominant exchange flow towards south
- as bilateral in opposite direction e.g. for CGES → EMS&KOSTT
- Options for sharing of responsibilities of coordinated capacity calculation at perimeter borders (among the TSOs which are service users of different RSCs/CCCs) are recognised in Explanatory Note (in Table 4), but no final proposal is done. The final CCCm needs to select among the offered options; it can be different per each concerned border.
 - One RSC calculates, while another RSC monitors/provides fallback
 - Both RSCs periodically (e.g. on monthly basis) switch the roles of main and fallback CCC
- It is needed to define further details of test periods for CCCm and for TRM in particular; harmonizing times and deadlines. This includes the implications of formal adoption of CACM GL at WB6 EnC Contracting Parties and its correspondent timing.