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

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TSOs of the SEE CCR, taking into account the following:

Whereas

- (1) This document (hereafter referred to as “South East Europe common capacity calculation methodology”, or “SEE common capacity calculation methodology”) is a common proposal developed by all Transmission System Operators (hereafter referred to as “TSOs”) within the South East Europe Capacity Calculation Region (hereafter referred to as “SEE Capacity Calculation Region”), on the common capacity calculation performed for the capacity allocation within the day-ahead and intraday market timeframes. This proposal is required by Article 20 (2) and developed in accordance with Article 21 of “CACM Regulation”.
- (2) This proposal (hereafter referred to as the “common capacity calculation methodology 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”).
- (3) 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.
- (4) Article 21(1) of the CACM Regulation constitutes the legal basis for this proposal and defines several specific requirements that the common capacity calculation methodology 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 the inputs to capacity calculation, which shall include the following parameters:*
 - (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.”*
- (5) 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 time-frame, 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”.*
- (6) Article 14 of the CACM Regulation, with reference to the intraday ahead timeframe, defines the following: *“1. (...) TSOs shall calculate cross- zonal capacity for (...) (b) intraday, for the intraday market;” and “4. All TSOs in each capacity calculation region shall ensure that cross-zonal capacity is recalculated within the intraday market time-frame based on the latest available information. The frequency of this recalculation shall take into consideration efficiency and operational security”*
- (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“. So, the common capacity calculation methodology 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 common capacity calculation methodology Proposal on the objectives of the CACM Regulation is described. The impact is presented below (point (11)) of this Whereas Section.
- (11) The common capacity calculation methodology 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 common capacity calculation methodology 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 and intraday coupling. Establishing common

and coordinated processes for the capacity calculations within the day-ahead and intraday market timeframes contributes to achieve this objective.

Article 3(b) of the CACM Regulation aims at ensuring optimal use of the transmission infrastructure. The common capacity calculation methodology 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 common capacity calculation methodology Proposal contributes to achieve the objective of ensuring operational security by coordinating the capacity calculation with updated inputs for the day-ahead and intraday 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 common capacity calculation between TSOs and the coordinated capacity calculator, the common capacity calculation methodology 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 SEE region, 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 common capacity calculation methodology Proposal contributes to the general objectives of the CACM Regulation.

SUBMIT THE FOLLOWING DAY-AHEAD AND INTRADAY COMMON CPACITY CALCULATION METHODOLOGY TO NATIONAL REGULATORY AUTHORITIES OF THE SEE CCR:

Article 1

Subject matter and scope

The common capacity calculation methodology shall be considered as a SEE TSOs methodology in accordance with Article 21 of the CACM Regulation and shall cover the day-ahead and intraday common capacity calculation for SEE CCR bidding zone borders.

Article 2

Definitions and interpretation

1. For the purposes of the day-ahead and intraday common capacity calculation methodology, the terms used in this document shall have the meaning set forth in Article 2 of the CACM Regulation, of Regulation (EC) 714/2009, of Regulation (EU) 543/2013.
2. In addition, the following definitions shall apply:
 - a. 'ADMIE' is the Greek Transmission System Operator;
 - b. 'ESO EAD' is the Bulgarian Transmission System Operator;
 - c. 'Transelectrica' is the Romanian Transmission System Operator;
 - d. 'GR-BG border' means bidding zone border between Greece and Bulgaria ;
 - e. 'BG-RO border' means bidding zone border between Bulgaria and Romania;
 - f. 'D-1' means the day before the day of delivery;
 - g. 'D-2' means two days before the day of delivery;
 - h. '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 time-frame in accordance with Article 17 of the CACM Regulation;
'D-1 Common Grid Model' means the common grid model built for each market time unit one day before the day of delivery for the intraday capacity calculation time-frame in accordance with Article 17 of the CACM Regulation;
 - i. 'NTC' means the Net Transmission Capacity which is the maximum energy exchange for commercial purposes between adjacent bidding zones for each market time unit in a specific direction;
 - j. 'TTC' means the Total Transmission Capacity which is the maximum exchange) complying with the operational security limits between adjacent bidding zones for each market time unit in a specific direction.
3. In this day-ahead and intraday capacity calculation 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 methodology; 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 methodology

This methodology solely applies to the day-ahead and intraday common capacity calculation within the SEE CCR. Common capacity calculation methodologies within others capacity calculation regions or others time-frames are outside the scope of this methodology.

Article 4

Cross-zonal capacities for the day-ahead market

1. For the day-ahead market time-frame, 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. This approach has been selected since a flow-based approach is effective only when is applied to a large number of borders which are in a closed-loop formulation, on contrary the GR-BG-RO connection is like a single path connection, where bidding zones are connected through a single root. In line with the above and based on Article 20(4) of CACM Regulation after at least all South East Europe Energy Community Contracting Parties participate in the single day-ahead coupling the flow-based method shall be proposed.
2. The TSOs of the SEE CCR shall provide the coordinated capacity calculator (*CCC*) sufficiently in advance of the day-ahead firmness deadline as defined in accordance with Article 69 of CACM Regulation the following initial inputs:
 - a. D-2 IGMs respecting the methodology developed in accordance with Article 19 of the CACM Regulation;
 - b. operational security limits and contingencies in accordance with Article 7;
 - c. reliability margins (*RMs*) in accordance with Article 6;
 - d. generation shift keys (*GSKs*) in accordance with Article 8; and
 - e. remedial actions (*RAs*) in accordance with Article 9.
3. SEE TSOs, or an entity acting on behalf of SEE 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, without undue delay.
4. When providing the inputs, the TSOs of the SEE CCR shall respect the formats commonly agreed between the TSOs and the coordinated capacity calculators of the SEE CCR, while respecting the requirements and guidance defined in the CGMM.
5. Once D-2 IGMs have been received, the merging agent shall merge the D-2 IGMs to create the D-2 CGMs respecting the methodology developed in accordance with Article 17 of the CACM Regulation.
6. For the day-ahead common capacity calculation in the SEE CCR, 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) and Article 4(4) 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 7 used during common capacity calculation;
 - c. the third step is to determine the Net Transmission Capacity (*NTC*) values for each direction and border of SEE CCR in accordance with Article 11;
 - 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 12;
 - e. after *LTA* assessment, the resulting cross-zonal capacities are validated by the TSOs of the SEE CCR;
 - f. finally, the Available Transmission Capacity (*ATC*) values are calculated for day-ahead market time-frame taking into account the *LTN* values.
7. As described before, for each SEE CCR border, direction and market time unit, the final available transmission capacity for the day-ahead market time-frame shall be defined as the difference between the computed *NTC*

values and the already nominated capacities in the previous market time-frames.

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

Cross-zonal capacities for the intraday market

1. For the intraday market time-frame, individual values for cross-zonal capacity for each remaining intraday Market Time Unit (*MTU*) 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. This approach has been selected since a flow-based approach is effective only when is applied to a large number of borders which are in a closed-loop formulation, on contrary the GR-BG-RO connection is like a single path connection, where bidding zones are connected though a single root.
2. The TSOs of the SEE CCR shall provide the coordinated capacity calculator (*CCC*) without undue delay the following initial inputs for the first intraday capacity calculation and subsequent re-calculations of intraday cross-zonal capacity:
 - a. D-1 and Intraday IGMs respecting the methodology developed in accordance with Article 19 of the CACM Regulation;
 - b. operational security limits and contingencies in accordance with Article 7;
 - c. reliability margins (*RMs*) in accordance with Article 6;
 - d. generation shift keys (*GSKs*) in accordance with Article 8; and
 - e. remedial actions (*RAs*) in accordance with Article 9.
3. A first intraday common capacity calculation is performed in the end of D-1 for all *MTUs* of day D, and a second intraday capacity calculation is performed during intraday (i.e. day D), for the remaining *MTUs* of day D.
4. SEE TSOs, or an entity acting on behalf of SEE TSOs, shall send for each market time unit the already allocated capacities (*AAC*) and already nominated capacities (*ANC*) to the coordinated capacity calculator, without undue delay.
5. When providing the inputs, the TSOs of the SEE CCR shall respect the formats commonly agreed between the TSOs and the coordinated capacity calculators of the SEE CCR, while respecting the requirements and guidance defined in the *CGMM*.
6. Once D-1 or intraday IGMs have been received, the merging agent shall merge the IGMs to create the D-1 or intraday *CGMs* respecting the methodology developed in accordance with Article 17 of the CACM Regulation.
7. For the intraday common capacity calculation in the SEE CCR, performed by the *CCC*, the high-level process flow includes five steps until the final *CNTC* domain for the intraday market time-frame is set:
 - a. First, for the capacity calculation inputs as defined in Article 4(2) and Article 4(4) 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 7 used during common capacity calculation;

- c. the third step is to determine the Net Transmission Capacity (*NTC*) values for each direction and border of SEE CCR in accordance with Article 11;
 - d. after *NTC* values computation, the resulting cross-zonal capacities are validated by the TSOs of the SEE CCR;
 - e. finally, the Available Transmission Capacity (*ATC*) values are calculated for intraday market time-frame taking into account the *ANC* values.
8. As described before, for each SEE CCR border, direction and market time unit, the final available transmission capacity for the intraday market time-frame shall be defined as the difference between the computed *NTC* values and the already nominated capacities in the previous market time-frames.
 9. In accordance with Article 58(1) of CACM Regulation, the *CCC* and TSOs of the SEE CCR shall provide cross-zonal capacity to relevant entities no later than 15 minutes before the intraday cross-zonal gate opening time. However, SEE TSOs may refrain from providing any cross-zonal capacity until the intraday common capacity calculation as described in Article 5(7) has been finalized or an ultimate deadline of 22:00 CE(S)T D-1, whichever is earlier.
 10. The SEE TSOs shall review the frequency of re-calculations two years after the implementation of the common capacity calculation methodology for the intraday market time-frame.

Article 6

Reliability margin methodology

1. The day-ahead and intraday common capacity calculation methodologies are based on forecast models of the transmission system. Therefore, the outcomes are subject to inaccuracies and uncertainties. The aim of the 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 Reliability Margins (*RM*s) cover the following forecast uncertainties:
 - a. SEE external transactions (out of SEE CCR control: both between SEE CCR and other CCRs as well as among TSOs outside the SEE 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 frequency containment reserves.
3. For the capacity calculation performed for day-ahead market time-frame, the TSOs of SEE CCR shall compute the *RM*s in accordance 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 control areas, 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. For the capacity calculation performed for intraday market time-frame, the TSOs of SEE CCR shall compute the *RM*s in accordance 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 control areas, to maintain a constant frequency;

- uncertainties which could affect capacity calculation and which could occur between the respective capacity calculation time and real time, for the market time unit being considered.
5. Regarding the unintended deviation (*UD*) for control-related reasons, deviations occur between the scheduled values and the actual values during the exchange of energy between neighboring control areas. This implies that at any moment the exchange between two control areas can be significantly higher than the scheduled exchanged, endangering the security of supply.
 6. Regarding the uncertainties (*UN*) the CNTC methodology is based on different inputs provided by TSOs, they are based on best available forecast at the time of the capacity calculation for renewable energy sources, consumption, generation or available network elements and those could differ from the real-time situation.
 7. The *RM*s can be considered as an indirect input to the capacity calculation process since it refers to the difference when the TTC and the NTC limits are reached for the constraint under investigation.
 8. The *RM*s determination is based on a probability distribution function of the deviations between the expected power flows at the time of the capacity calculation and realized power flows in real time.
 9. The *RM*s on the SEE CCR borders are calculated in a three-step approach:
 - a. in a first step, for each market time unit of the observatory period, the relevant common grid models (CGM) are updated in order to take into account the real-time situation of the remedial actions that are considered in the common capacity calculation. This step is undertaken by copying the real-time configuration of these remedial actions and applying them into the historical CGM where the capacity calculation was performed. The exchange on BG-RO and BG-GR borders of the SEE CCR, as expected with the common capacity calculation methodology is then compared with the real time exchange observed on the same borders. All differences for all market time units of a one-year observation period are statistically assessed and a probability distribution is obtained;
 - b. in a second step and in accordance with Article 22(3) of the CACM Regulation the 95th percentiles of the probability distributions for the BG-RO and BG-GR borders of the SEE CCR are calculated. This means that the TSOs apply a common risk level of 5% i.e. the *RM* values cover 95% of the historical errors;
 - c. a possible third step is to undertake an operational adjustment on the values derived previously, which can applied to adjust the computed *RM* values to a value within the range between 1% and 20% of the TTC calculated under normal weather conditions.
 10. The *RM* values shall be updated every year (including the risk level) based upon an observatory period of one year such that seasonal effects can be reflected in the values. The *RM*s values remain fixed until the next update.
 11. For the day-ahead common capacity calculation, the *RM*s for the SEE CCR borders shall be implemented 3 months after collecting 1 year of data since the day-ahead capacity calculation go-live.
 12. For the intraday common capacity calculation, the *RM*s for the SEE CCR borders shall be implemented 3 months after collecting 1 year of data since the intraday capacity calculation go-live.
 13. Before the first operational calculation of the *RM*s values, SEE CCR TSOs shall use the *RM* values already in operation in the existing capacity calculation initiatives. The *RM*s before the first operational calculation for the BG-RO and BG-GR borders shall be 100 MW for each direction.

Article 7

Methodologies for operational security limits, contingencies and allocation constraints

1. Each SEE 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, SEE 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 7(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 7(1) and from the list of contingencies established in Article 7(2). It shall follow the rules established in Article 75 of SO GL.
4. Each SEE TSO may provide a list of nodes in order to verify 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 7(7).
6. In accordance with Article 21(1)(b)(iv) of the CACM Regulation, this day-ahead and intraday 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. Sensitivity factor is the criterion 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 7(3);

- b. voltage level for each node defined in accordance with Article 7(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 list described in Article 7(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 SEE 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 SEE 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 6.
10. SEE TSOs shall not apply allocation constraints.
11. TSOs shall review and update methodologies for determining operational security limits and contingencies on a yearly basis.

Article 8

Generation Load shift keys methodology

1. In accordance with Article 24 of the CACM Regulation, SEE TSOs developed the following methodology to determine the common generation shift key:
 - a. SEE 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 SEE TSO shall aim to apply a GSK that resembles the dispatch and the corresponding flow pattern, thereby contributing to minimizing the reliability margins;
 - c. SEE TSOs shall define a constant generation shift key per market time unit.
2. For the application of the methodology, SEE TSOs shall define, for the capacity calculation process, generation shift keys impacted by the actual generation and/or load present in the relevant CGM, for each market time unit.
3. SEE TSOs have harmonized their GSK determination methodologies:
 - a. In its GSK, each TSO shall use flexible and controllable production units which are available inside the TSO grid
 - b. Units unavailable due to outage or maintenance are not included.
 - c. GSK is reviewed on a daily basis.
4. For the Greek bidding zone a proportional representation of the generation variation to the remaining capacity, based on ADMIE's best estimate of the initial generation profile, ensure the best modeling of the Greek system.
5. For the Bulgarian bidding zone a proportional representation of the generation variation to the remaining capacity respecting the limits of the generating units, based on ESO EAD's best estimate of the initial generation profile, ensure the best modeling of the Bulgarian system. The nuclear units are not included in the list.
6. The Transelectrica GSK file contains dispatchable units which are available in the day of operation. The nuclear units are not included in the list. The fixed participation factors of GSK are impacted by the actual generation present in the D-2 CGM.
7. Generation shift keys methodology shall be reviewed on a yearly basis.

Article 9

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, SEE TSOs shall individually define Remedial Actions (RAs) to be taken into account in the day-ahead and intraday common capacity calculation.
2. Each TSO of SEE CCR shall inform the coordinated capacity calculator in a timely manner on any change in its remedial actions within SEE CCR to ensure an efficient capacity calculation.
3. 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.
4. 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.
5. In accordance with Article 25(5) of the CACM Regulation, the day-ahead and intraday common capacity calculation take non-costly RAs into account which can be explicitly modelled in the CGM.
6. The RAs defined by each SEE TSOs shall be either preventive (pre-fault) or curative (post-fault). The SEE TSOs may use the following remedial actions, but not limited to:

- a. changing the tap position of a phase-shifting transformer (PST),
 - b. topological 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 to another, connection/disconnection of reactor(s), capacitor(s).
7. In accordance with Article 25(6) of the CACM Regulation, the RAs taken into account are the same for day-ahead and intra-day common capacity calculation, depending on their technical availability.
8. The RAs coordination (RAC) in the day-ahead and intraday common capacity calculation is performed in accordance with a set of pre-defined characteristics such as an objective function, constraints and variables:
 - a. The RAC 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 nodes voltage;
 - b. The constraints are the operational security limits in accordance with Article 7, minimum impact on objective function value for use RAs and without negative impact on the TTC values calculated according with Article 11.
 - c. The variables are the switching states of the topological measures and tap positions.
9. In case a remedial action is made available for the capacity calculation in the SEE CCR is also one which is made available in another CCR, the TSOs taking control of the remedial action shall take care, when defining it, of a consistent use in its potential application in both regions to ensure a secure power system operation.
12. In accordance with Article 21(1)(b)(iv) of the CACM Regulation, at this day-ahead and intraday common capacity calculation methodology:
 - a. an exchange of foreseen remedial actions in each CCR, with sufficient impact on the cross-zonal capacity in other CCRs, should be coordinated among CCCs.
 - b. the coordinated application of RAs shall aim at increasing cross-zonal capacity in the SEE CCR in accordance with Article 29(4) of the CACM Regulation;
 - c. the applied RAs should be transparent to all TSOs, also of adjacent CCRs, and shall be an input to the coordinated operational security analysis established under SO GL Article 75.
13. Remedial actions methodology shall be reviewed once a year.

Article 10

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;
 - d. a mistake in input data, that leads to an overestimation of cross-zonal capacity from an operational security perspective.
2. When one or more SEE TSOs do not validate the cross-zonal capacity calculated, the concerned TSO(s) shall provide the CCC with the updated amount of cross-zonal capacities for the border considered and the reasons for the reduction. The final cross-zonal capacity is the minimum value sent by the SEE TSOs of the border

considered.

3. Any reduction of cross-zonal capacities during the validation process shall be communicated the SEE 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 SEE TSOs.

Article 11

Mathematical description of the day-ahead and intraday capacity calculation approach

1. The Coordinated Net Transmission Capacity (CNTC) computation is a centralized calculation based on AC load flow which delivers the main parameter needed for the definition of CNTC domain: Total Transmission Capacity (TTC). The TTC represent the maximum power exchange on a bidding zone border and calculation is performed from relevant CGM and the GSK defined in accordance with Article 8, taking into account Article 7 and Article 9.

2. The CCC shall define the values of TTC for each market time unit for the north Greek borders, BG-GR border, south Romanian borders, BG-RO border. These values shall be provided to TSOs of the SEE CCR for validation of BG-RO and BG-GR borders.

3. The *TTC* on the BG-GR direction is a ratio of the total *TTC* value calculated from all north Greek systems (power systems of Albania, FYROM, Bulgaria and Turkey) to the Greek system:

$$TTC_{BG-GR} = k_{BG-GR} \cdot TTC_{north\ GR\ systems-GR}$$

with

TTC_{BG-GR}	<i>TTC</i> on the BG-GR direction
k_{BG-GR}	splitting factor for BG-GR direction
$TTC_{north\ GR\ systems-GR}$	<i>TTC</i> from all north Greek systems to the Greek system

4. The *TTC* on the GR-BG direction is a ratio of the total *TTC* value calculated from the Greek system to all north Greek systems (power systems of Albania, FYROM, Bulgaria and Turkey):

$$TTC_{GR-BG} = k_{GR-BG} \cdot TTC_{GR-north\ GR\ systems}$$

with

TTC_{GR-BG}	<i>TTC</i> on the GR-BG direction
k_{GR-BG}	splitting factor for GR-BG direction
$TTC_{GR-north\ GR\ systems}$	<i>TTC</i> from the Greek system to all north Greek systems

5. The *TTC* on the BG-RO direction is a ratio of the total *TTC* value calculated from all south Romanian systems (power systems of Bulgaria and Serbia) to the Romanian system:

$$TTC_{BG-RO} = k_{BG-RO} \cdot TTC_{south\ RO\ systems-RO}$$

with

TTC_{BG-RO}	<i>TTC</i> on the BG-RO direction
k_{BG-RO}	splitting factor for BG-RO direction
$TTC_{south\ RO\ systems-RO}$	<i>TTC</i> from all south Romanian systems to the Romanian system

6. The *TTC* on the RO-BG direction is a ratio of the total *TTC* value calculated from the Romanian system to all south Romanian systems (power systems of Bulgaria and Serbia):

$$TTC_{RO-BG} = k_{RO-BG} \cdot TTC_{RO-south RO systems}$$

with

TTC_{RO-BG}	<i>TTC</i> on the RO-BG direction
k_{RO-BG}	splitting factor for RO-BG direction
$TTC_{RO-south RO systems}$	<i>TTC</i> from the Romanian system to all south Romania systems

7. The splitting factor used for day-ahead and intraday capacity calculation in the year *Y* will be based on the *NTC* values from the last two years. This approach is based on the Article 3(h) of the CACM Regulation that contributes to the objective of respecting the need for a fair and orderly market and price formation and ensures a fair distribution of costs and benefits between the involved TSOs. Moreover the approach is in line with the distribution of the congestion income (as defined in the Article 73 of CACM Regulation and Article 57 of FCA Regulation) collected by the TSOs, and thus do not alter the signals for investments to TSOs given by the congestion income. The splitting factors used at the *NTC* computation will comply with the security operation in accordance with Article 3(c) of the CACM Regulation, will not alter the signals for investments to TSOs given by the congestion income and allow reasonable financial planning according with Article 73 of the CACM Regulation.

8. The splitting factor for BG-GR direction is determined with the following equation:

$$k_{BG-GR} = NTC_{BG-GR} / NTC_{north GR systems-GR}$$

where:

k_{BG-GR}	splitting factor as percentage to be applied for BG-GR direction for day-ahead and intraday capacity calculation in the year <i>Y</i>
NTC_{BG-GR}	Average value of the <i>NTC</i> for the direction BG-GR (excluding the period when the tie-line BG-GR was out of operation for maintenance) in the last two years
$NTC_{north GR systems-GR}$	Average value of the total <i>NTC</i> for the direction north GR systems -GR (excluding the period when the tie-line BG-GR was out of operation for maintenance) in the last two years

9. The splitting factor for GR-BG direction is determined with the following equation:

$$k_{GR-BG} = NTC_{GR-BG} / NTC_{GR-north GR systems}$$

where:

k_{GR-BG}	splitting factor as percentage to be applied for GR-BG direction for day-ahead and intraday capacity calculation in the year <i>Y</i>
NTC_{GR-BG}	Average value of the <i>NTC</i> for the direction GR-BG (excluding the period when the tie-line BG-GR was out of operation for maintenance) in the last two years
$NTC_{GR-north GR systems}$	Average value of the total <i>NTC</i> for the direction GR-north GR systems (excluding the period when the tie-line BG-GR was out of operation for maintenance) in the last two years

10. The splitting factor for BG-RO direction is determined with the following equation:

$$k_{BG-RO} = NTC_{BG-RO} / NTC_{south RO systems-RO}$$

where:

k_{BG-RO}	splitting factor as percentage to be applied for BG-RO direction for day-ahead and intraday capacity calculation in the year <i>Y</i>
NTC_{BG-RO}	Average value of the <i>NTC</i> for the direction BG-RO in the last two years
$NTC_{south RO systems-RO}$	Average value of the total <i>NTC</i> for the direction south RO systems-RO in the last two years

11. The splitting factor for RO-BG direction is determined with the following equation:

$$k_{RO-BG} = NTC_{RO-BG} / NTC_{RO-south RO systems}$$

where:

k_{RO-BG}	splitting factor as percentage to be applied for RO-BG direction for day-ahead and intraday capacity calculation in the year Y
NTC_{RO-BG}	Average value of the NTC for the direction RO-BG in the last two years
$NTC_{RO-south RO systems}$	Average value of the total NTC for the direction RO-south RO systems in the last two years

12. The CCC of the SEE CCR shall provide to the SEE TSOs with the validated *NTCs* values after application of the *RMs* defined in accordance with Article 6 for the BG-RO and BG-GR borders.

13. The Net Transmission Capacity (NTC) on the BG-GR border is determined with the following equations:

$$NTC_{BG-GR} = TTC_{BG-GR} - RM_{BG-GR}$$

$$NTC_{GR-BG} = TTC_{GR-BG} - RM_{GR-BG}$$

with

NTC_{BG-GR}	<i>NTC</i> on the BG-GR direction
NTC_{GR-BG}	<i>NTC</i> on the GR-BG direction
TTC_{BG-GR}	<i>TTC</i> on the BG-GR direction
TTC_{GR-BG}	<i>TTC</i> on the GR-BG direction
RM_{BG-GR}	<i>RM</i> on the BG-GR direction
RM_{GR-BG}	<i>RM</i> on the GR-BG direction

14. The Net Transmission Capacity (NTC) on the BG-RO border is determined with the following equations:

$$NTC_{BG-RO} = TTC_{BG-RO} - RM_{BG-RO}$$

$$NTC_{RO-BG} = TTC_{RO-BG} - RM_{RO-BG}$$

with

NTC_{BG-RO}	<i>NTC</i> on the BG-RO direction
NTC_{RO-BG}	<i>NTC</i> on the RO-BG direction
TTC_{BG-RO}	<i>TTC</i> on the BG-RO direction
TTC_{RO-BG}	<i>TTC</i> on the RO-BG direction
RM_{BG-RO}	<i>RM</i> on the BG-RO direction
RM_{RO-BG}	<i>RM</i> on the RO-BG direction

15. In accordance with Article 21(1)(b)(iii) of the CACM Regulation, SEE TSOs shall apply the rules for taking into account the previously-allocated cross-zonal capacity. The objective of the rules is to verify that the Available Transmission Capacity (*ATC*) value of each border and direction of the SEE CCR remains non-negative in case of previously-allocated commercial capacity.

16. The Available Transmission Capacity (*ATC*) taking into consideration the Already Allocated Capacities (*AAC*) is determined with the following equations in case of BG – GR border:

$$ATC_{BG-GR} = NTC_{BG-GR} - AAC_{BG-GR} + AAC_{GR-BG}$$

$$ATC_{GR-BG} = NTC_{GR-BG} - AAC_{GR-BG} + AAC_{BG-GR}$$

with

ATC_{BG-GR}	<i>ATC</i> on the BG-GR direction
NTC_{BG-GR}	<i>NTC</i> on the BG-GR direction

AAC_{BG-GR}	AAC on the BG-GR direction
AAC_{GR-BG}	AAC on the GR-BG direction
ATC_{GR-BG}	ATC on the GR-BG direction
NTC_{GR-BG}	NTC on the GR-BG direction

17. The Available Transmission Capacity (ATC) taking into consideration the Already Allocated Capacities (AAC) is determined with the following equations in case of BG – RO border:

$$ATC_{BG-RO} = NTC_{BG-RO} - AAC_{BG-RO} + AAC_{RO-BG}$$

$$ATC_{RO-BG} = NTC_{RO-BG} - AAC_{RO-BG} + AAC_{BG-RO}$$

with

ATC_{BG-RO}	ATC on the BG-RO direction
NTC_{BG-RO}	NTC on the BG-RO direction
AAC_{BG-RO}	AAC on the BG-RO direction
AAC_{RO-BG}	AAC on the RO-BG direction
ATC_{RO-BG}	ATC on the RO-BG direction
NTC_{RO-BG}	NTC on the RO-BG direction

18. The Available Transmission Capacity (ATC) for day-ahead market time-frame and also for the intraday market time-frame is determined with the following equations in case of BG – GR border, taking into account the NTC values calculated before and Already Nominated Capacity (ANC):

$$ATC_{BG-GR} = NTC_{BG-GR} - ANC_{BG-GR} + ANC_{GR-BG}$$

$$ATC_{GR-BG} = NTC_{GR-BG} - ANC_{GR-BG} + ANC_{BG-GR}$$

with

ATC_{BG-GR}	ATC on the BG-GR direction
NTC_{BG-GR}	NTC on the BG-GR direction
ANC_{BG-GR}	ANC on the BG-GR direction
ANC_{GR-BG}	ANC on the GR-BG direction
ATC_{GR-BG}	ATC on the GR-BG direction
NTC_{GR-BG}	NTC on the GR-BG direction

19. The Available Transmission Capacity (ATC) for day-ahead market time-frame and also for the intraday market time-frame is determined with the following equations in case of BG – RO border, taking into account the NTC values calculated before and Already Nominated Capacity (ANC):

$$ATC_{BG-RO} = NTC_{BG-RO} - ANC_{BG-RO} + ANC_{RO-BG}$$

$$ATC_{RO-BG} = NTC_{RO-BG} - ANC_{RO-BG} + ANC_{BG-RO}$$

with

ATC_{BG-RO}	ATC on the BG-RO direction
NTC_{BG-RO}	NTC on the BG-RO direction
ANC_{BG-RO}	ANC on the BG-RO direction
ANC_{RO-BG}	ANC on the RO-BG direction
ATC_{RO-BG}	ATC on the RO-BG direction
NTC_{RO-BG}	NTC on the RO-BG direction

20. If the ATC values calculated according with Article 11(18) and Article 11(19) are negative, no capacity will be made available for day-ahead, respectively intraday market time-frame.

21. In accordance with Article 46 of CACM regulation, the CCC and TSOs of the SEE CCR 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.
22. In accordance with Article 58 of CACM regulation, the CCC and TSOs of the SEE CCR shall ensure that the intraday validated cross-zonal capacity shall be provided to relevant entity before the intraday firmness deadline.
23. The TSOs of SEE CCR shall review the frequency of recalculation two years after the implementation of the capacity calculation for the intraday market time-frame.

Article 12

Fallback procedures

1. Prior to the day-ahead common capacity calculation, the TSOs of SEE CCR shall provide to the CCC the coordinated cross-zonal capacities defined according with the long-term capacity calculation processes. For day-ahead market time-frame are used as fallback solution the NTCs values calculated for yearly and monthly processes.
2. For the day-ahead common capacity calculation, where an incident occurs in the capacity calculation process and the CCC is unable to produce results within the allotted time for the calculation process, the SEE TSOs shall validate for day-ahead market time-frame the coordinated cross-zonal capacities calculated within the long-term time-frame.
3. Prior to the intraday common capacity calculation, the TSOs of SEE CCR shall provide to the CCC the coordinated cross-zonal capacities calculated within the day-ahead capacity calculation processes.
4. For the intraday common capacity calculation, where an incident occurs in the capacity calculation process and the CCC is unable to produce results, the SEE TSOs shall validate the cross-zonal capacities calculated within the day-ahead capacity calculation processes.

Article 13

Consideration of non-SEE CCR borders

1. In accordance with Article 21(1)(b)(vii) of the CACM Regulation, SEE TSOs take into account the influences of other CCRs by making assumptions on what will be the future non-SEE 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-SEE exchanges are implicitly captured in the relevant CGM by the non-SEE 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 SEE CCR, this constitutes the rule for sharing power flow capabilities among different CCRs.

Article 14

Publication and Implementation of the capacity calculation methodology

1. The TSOs of SEE CCR shall publish the day-ahead and intraday capacity calculation methodology without undue delay after relevant national regulatory authorities have approved the proposed methodology or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 9 (10), (11) and (12) of the CACM Regulation.

2. The TSOs of SEE CCR shall implement the day-ahead common capacity calculation methodology no later than 1st July 2020.
3. The TSOs of SEE CCR shall implement the intraday common capacity calculation methodology no later than 1st October 2020.

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, SEE 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 RAC.
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 SEE 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 SEE NRAs. If any change leads to an adaptation of the methodology, SEE TSOs will amend the methodology according to Article 9(13) of the CACM Regulation.

Article 16

Publication of data

1. In accordance with Article 3(f) of the CACM Regulation aiming at ensuring and enhancing the transparency and reliability of information to the regulatory authorities and market participants, the following data items shall be published in addition to the data items and definitions of Commission Regulation (EU) No 543/2013 on submission and publication of data in electricity markets:
 - a. NTC values determined for day-ahead and intraday market time-frames;
 - b. Reliability Margins for each direction of the SEE CCR borders;
 - c. Remedial Actions resulting from the RAC;
 - d. Limiting CNECs and/or nodes.

Article 17

Language

1. The reference language for this methodology shall be English.
2. For the avoidance of doubt, where TSOs need to translate this methodology 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 methodology to their relevant national regulatory authorities.