

South-West Europe TSOs methodology for cross-zonal capacity calculation within the
balancing timeframe for the exchange of balancing energy or for operating the
imbalance netting process in accordance with Article 37 of Commission Regulation
(EU) 2017/2195 of 23 November 2017

December 2022

All TSOs, taking into account the following:

Whereas

- (1) This document (hereafter referred to as “South West Europe capacity calculation methodology within the balancing timeframe”, or “SWE capacity calculation methodology within the balancing timeframe”), is a common methodology developed by all Transmission System Operators (hereafter referred to as “TSOs”) within the South West Europe Capacity Calculation Region (hereafter referred to as “SWE Region” or “SWE CCR”) on the common capacity calculation performed for the capacity allocation within the balancing timeframe. This methodology is developed in accordance with Article 37 of Regulation (EU) 2017/2195 establishing a guideline on electricity balancing (hereafter referred to as the “EB Regulation”).
- (2) This methodology (hereafter referred to as the “BTCC methodology”) takes into account the general principles and goals set in the EB 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) This methodology takes into account the general principles and goals set in the EB Regulation, while respecting the principles set in Regulation (EC) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast) (hereafter referred to as “Electricity Regulation”).
- (4) The goal of the EB Regulation is the coordination and harmonisation of capacity calculation and allocation for the exchange of balancing energy or for operating the imbalance netting process. To facilitate these aims, the TSOs shall calculate in a coordinated manner the available cross-border capacity.
- (5) Article 37 of the EB Regulation defines, the following: “...*all TSOs of a capacity calculation region shall develop a methodology for cross-zonal capacity calculation within the balancing timeframe...*” and “*Such methodology shall avoid market distortions and shall be consistent with the cross-zonal capacity calculation methodology applied in the intraday timeframe established under Regulation (EU) 2015/1222.*”
- (6) Article 21 (1) of Regulation (EU) 2015/1222 (hereafter referred to as the “CACM Regulation”) constitutes the legal basis for the cross-zonal capacity calculation methodology applied in the intraday timeframe.
- (7) Article 20 (1) of the CACM Regulation defines the approach to use in the common capacity calculation methodologies as “flow-based approach except where the requirements of paragraph 7 are met” and (7) specifies that: “TSOs may jointly request the competent regulatory authorities to apply the coordinated net transmission capacity approach in regions and bidding zone borders other than those referred to in paragraphs 2 to 4, if the TSOs concerned are able to demonstrate that the application of the capacity calculation methodology using the flow-based approach would not yet be more efficient compared to the coordinated net transmission capacity approach and assuming the same level of operational security in the concerned region.”

- (8) The BTCC methodology contributes to and does not in any way hinder the achievement of the objectives of Article 3 of the EB Regulation:

Article 3 (a) of the EB Regulation aims at fostering effective competition, non-discrimination and transparency in balancing markets. The BTCC methodology serves the objective of fostering effective competition in the generation, trading and supply of balancing energy by defining a set of harmonised rules for capacity calculation, which contributes to the effectiveness of the balancing markets. Establishing common and coordinated processes for the capacity calculations within the balancing market timeframes contributes to achieve this objective.

Article 3 (b) of the EB Regulation aims at enhancing efficiency of balancing as well as efficiency of European and national balancing markets. The BTCC methodology contributes to achieve this objective by recalculating the capacity just before the balancing markets.

Article 3 (c) of the EB Regulation aims at integrating balancing markets and promoting the possibilities for exchanges of balancing services while contributing to operational security. The BTCC methodology contributes to achieve this objective by optimizing the capacity available for balancing markets and processes with the most updated information.

Article 3 (d) of the EB Regulation aims at contributing to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union while facilitating the efficient and consistent functioning of day-ahead, intraday and balancing markets. The BTCC methodology contributes to achieve this objective by being consistent with the long-term, day-ahead and intraday capacity calculation methodology in SWE CCR giving a coherent functioning along all the timeframes.

Article 3 (e) of the EB Regulation aims at ensuring that the procurement of balancing services is fair, objective, transparent and market-based, avoids undue barriers to entry for new entrants, fosters the liquidity of balancing markets while preventing undue distortions within the internal market in electricity. By offering all the updated calculated capacity in balancing timeframe to the balancing market and processes, the BTCC contributes to achieve this objective.

Article 3 (f) of the EB Regulation aims at facilitating the participation of demand response including aggregation facilities and energy storage while ensuring they compete with other balancing services at a level playing field and, where necessary, act independently when serving a single demand facility. By providing the most updated capacity to the balancing timeframe, the participation of demand response is ensured in balancing markets and processes.

Article 3 (g) of the EB Regulation aims at facilitating the participation of renewable energy sources and support the achievement of the European Union target for the penetration of renewable generation. By adapting the input data with the most updated information, the BTCC facilitate the participation of intermittent energy generation from renewable sources providing the optimal capacity to the balancing markets.

- (9) In conclusion, the BTCC methodology contributes to the general objectives of the EB Regulation.

Article 1

Subject matter and scope

1. The BTCC methodology as determined in this document is the common methodology for the capacity calculation performed for the balancing timeframe for SWE CCR in accordance with Article 37 of the EB Regulation.

Article 2

Definitions and interpretation

1. For the purposes of the BTCC methodology, the terms used shall have the meaning set forth in Article 2 of Directive 2009/72/EC, Article 2 of Regulation (EC) 714/2009, Article 2 of Commission Regulation (EU) 543/2013, Article 2 of Commission Regulation (EU) 2015/1222, Article 2 of Commission Regulation (EU) 2016/631, Article 2 of Commission Regulation (EU) 2016/1388, Article 2 of Commission Regulation (EU) 2016/1447, Article 2 of Commission Regulation (EU) 2016/1719, Article 3 of Commission Regulation (EU) 2017/1485, Article 3 of Commission Regulation (EU) 2017/2196 and article 2 of Regulation (EU) 2019/943.
2. In addition, the following definitions shall apply:
- a. 'RTE' means Réseau de Transport d'Electricité, the French system operator;
 - b. 'FR-ES border' means the bidding zone border between France and Spain;
 - c. 'REE' means Red Eléctrica de España, SAU, the Spanish system operator;
 - d. 'PT-ES border' means the bidding zone border between Portugal and Spain;
 - e. 'REN' means Rede Eléctrica Nacional, S.A., the Portuguese system operator;
 - f. 'D-1' means the day before the day of delivery;
 - g. 'D' means the day of delivery;
 - h. 'CNE' means a critical network element;
 - i. 'CNEC' means a CNE associated with a contingency used in capacity calculation;
 - j. 'Sensitivity ratio' means the variation of the flow, the voltage or the voltage phase angle difference in one critical network element with a change of 1MW in cross-zonal power exchanges of the bidding-zone border considered;
 - k. 'NTC' means the net transfer capacity that amounts to the maximum total exchange program (MW) for commercial purposes between adjacent bidding zones for each market time unit in a specific direction. NTC is obtained by subtracting the reliability margin to the TTC;
 - l. 'TTC' means the total transfer capacity that amounts to the maximum total exchange program (MW) complying with the operational security limits between adjacent bidding zones for each market time unit in a specific direction;
 - m. 'ROSC' means Regional Operational Security Coordination process; and
 - n. 'BTCC' means Balancing Timeframe Capacity Calculation.
3. In this BTCC methodology, unless the context requires otherwise:

- a. the singular indicates the plural and vice versa;
- b. headings are inserted for convenience only and do not affect the interpretation of this proposal; and
- c. any reference to legislation, regulations, directives, orders, instruments, codes or any other enactment shall include any modification, extension or re-enactment of it when in force.

Article 3

Application of this methodology

1. This methodology applies solely to the balancing timeframe capacity calculation within the SWE Region. Capacity calculation methodologies within others Capacity Calculation Regions or other timeframes are outside the scope of this methodology.

Article 4

Cross-zonal capacities within the balancing timeframe

1. For the electricity balancing market timeframe, individual values for cross-zonal capacity after the intraday-cross-zonal gate closure time shall be calculated using the common capacity calculation methodology within the balancing timeframe.
2. As such methodology shall be consistent with the cross-zonal capacity calculation methodology applied in the intraday timeframe according to Article 37(3) of EB Regulation, a coordinated net transmission capacity approach will be used and the influence of one border on the other can be neglected in SWE CCR. Thus, the TSOs of the SWE Region will not share the power flow capabilities of critical network elements among different bidding zone borders (article 21(1)(b)(vi) of the CACM Regulation). Taking into account the geographical and electrical distance between the SWE CCR and all other CCRs, the power flow capability of critical network elements will not be shared among different CCRs (article 21(1)(b)(vii) of the CACM Regulation).

Article 5

Reliability margin methodology

1. As Article 37 of the EB Regulation defines that the BTCC methodology shall be consistent with the cross-zonal capacity calculation methodology applied in the intraday timeframe established under CACM Regulation, for the capacity calculation performed balancing timeframe, the TSOs of SWE Region define the reliability margin in line with Article 22 of the CACM Regulation and based on the analysis of the following data:
 - a. 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
 - b. uncertainties which could affect capacity calculation and which could occur between the balancing capacity calculation time-frame and real time, for the market time unit being considered.
2. The reliability margin used by the TSOs of SWE Region for the balancing timeframe capacity calculation is the following:
 - a. For FR-ES border, in both directions, the reliability margin for the capacity calculation performed in balancing timeframe is calculated as the maximum value between 200 MW, covering the unintended deviation part of the reliability margin, and 7.5% of the TTC value, covering the uncertainties of the forecast part of the reliability margin.

- b. For PT-ES border, in both directions, the reliability margin for the capacity calculation performed in balancing timeframe is calculated as the maximum value between 100 MW, covering the unintended deviation part of the reliability margin, and 10% of the TTC value, covering the uncertainties of the part of the reliability margin.
3. Based on the acquired experience from the operation of the cross-zonal capacity calculation within the balancing timeframe, TSO should regularly reassess the reliability margins parameters calculated according to 2(a) and 2(b) of Article 5 of this methodology. A first reassessment of these parameter shall be presented to the NRAs of the SWE region no later than 2 years after the implementation of the BTCC process

Article 6

Methodologies for operational security limits, contingencies and allocation constraints

1. The TSOs of SWE Region shall not apply allocation constraints in the capacity calculation within SWE Region.
2. For the capacity calculation, the TSOs of SWE Region shall only monitor the operational security limits and contingencies on network elements significantly influenced by cross-zonal power exchanges. The selection of these critical network elements and contingencies shall be based on a sensitivity analysis updated at least once a year by the TSOs of the SWE Region in the different network states including but not limited to base case, after contingency and after activation of remedial actions.
3. The sensitivity can be defined as follow:

$$SI_{CNE} = \frac{P_{final} - P_{initial}}{\Delta E_{border}} \times 100$$

where:

SI_{CNE} is the Sensitivity Index for each monitored element (in %);

ΔE_{border} is the Increase of Exchange program through the border in MW (100 MW by default);

$P_{initial}$ is the CNE flow in initial state (in MW);

P_{final} is the CNE flow after a variation of ΔE through the border (in MW).

4. Only critical network elements with a sensitivity to cross-zonal power exchanges equal or higher than 10% shall be monitored during the capacity calculation process, except for operational security reasons in which a critical network element with a lower sensitivity to cross-zonal power exchanges needs to be monitored to ensure grid security. These particular exceptions shall be justified to the SWE NRAs in the Quarterly Report.
5. Only contingencies with a delta of sensitivity to cross-zonal power exchanges, between the base case and the case with the contingency of one critical network element, equal or higher than 5%, shall be considered in the capacity calculation process.
6. The TSOs of SWE Region shall review the list of critical network elements to be monitored in the capacity calculation process at least once a year.
7. The RCC shall use the critical network elements in accordance with paragraph 4 in order to determine the maximum net transmission capacity for each bidding-zone border.

8. This methodology to select the monitored elements is in line with article 21(1)(b)(ii) of CACM Regulation since it is an objective way to use in the capacity calculation only monitored elements inside bidding zones that are significantly taking part in the cross-zonal exchange. This way cross-zonal and internal exchanges are treated on the same level of importance, avoiding undue discrimination of one over the other.

Article 7

Generation and load shift keys methodology

1. As Article 37 of the EB Regulation defines that the BTCC methodology shall be consistent with the cross-zonal capacity calculation methodology applied in the intraday timeframe established under CACM Regulation, for the capacity calculation performed balancing timeframe, the TSOs of SWE Region shall define the generation shift keys methodology in accordance with Article 24 of CACM Regulation.
2. RTE shall define generation shift keys proportional to the base case scenarios for each market time unit with all expected generating units in the IGM, reflecting RTE's best forecast of market behavior.
3. REE shall define generation and load shift keys based on a merit order list, reflecting the best forecast of market behavior for each market time unit with all available loads that are enabled to participate in balancing markets and all available generation.
4. REN shall define generation and load shift keys based on a merit order list, reflecting the best forecast of market behavior for each market time unit with all available loads that are enabled to participate in balancing markets and all available generation.

Article 8

Methodology for remedial actions in capacity calculation

1. As Article 37 of the EB Regulation defines that the BTCC methodology shall be consistent with the cross-zonal capacity calculation methodology applied in the intraday timeframe established under CACM Regulation, the TSOs of SWE Region shall define the remedial actions in accordance with Article 25 of CACM Regulation.
2. Each TSO of SWE Region shall define the remedial actions of its responsibility area to be used in the capacity calculation within SWE Region with market time unit resolution.
3. The remedial actions that can be used in the BTCC are those which can be activated within the balancing timeframe in a coordinated way by the TSOs of SWE CCR to ensure the operational security. They shall be agreed between TSOs before the capacity calculation is performed.
4. The remedial actions to be defined by each TSO of SWE Region shall be either preventive (pre-fault) or curative (post-fault).
5. The following remedial actions shall also be considered in the BTCC and re-assessed if needed:
 - a. all preventive remedial actions as determined and validated during day-ahead and intraday ROSC process.
 - b. all triggered curative remedial actions as determined and validated during day-ahead and intraday ROSC process.

6. The TSOs of SWE Region shall review the list of the remedial actions that can be used in the capacity calculation within SWE region at least once a year.
7. For each calculation, in order to improve computation time and precision, SWE TSOs can adapt the list of available remedial actions offered for the capacity calculation. These remedial actions are adapted to the grid situation and forecast.
8. Each TSO of SWE Region shall inform the RCC in a timely manner on any change in its remedial actions within SWE Region to ensure an efficient capacity calculation.
9. RTE and REE shall coordinate, prior to the capacity calculation, the remedial actions that can be shared with each other to maximize the available cross-zonal capacities for the FR-ES border.
10. REN and REE shall coordinate, prior to the capacity calculation, the remedial actions that can be shared with each other to maximize the available cross-zonal capacities for the PT-ES border.
11. Each TSO of the SWE Region makes available costly remedial actions in accordance with the provisions of the methodology for coordinated redispatching and countertrading with cross-border relevance as defined in Article 35 of CACM Regulation. If any two available remedial actions deliver equivalent effects, the action with a lower cost shall be prioritized.

Article 9

Balancing timeframe capacity calculation

1. In accordance with Article 37 of the EB Regulation, the TSOs of SWE Region shall calculate for the balancing timeframe the cross-zonal capacities for each bidding-zone border of SWE Region.
2. The TSOs of SWE Region shall provide the RCC with the last updated information on the transmission systems in a timely manner for each balancing timeframe capacity calculation that is performed after intraday-cross-zonal gate closure time.
3. The TSOs of SWE Region shall provide the RCC with the previously allocated cross-zonal capacities on each border of the SWE Region.
4. By default, the RCC shall retrieve and use the most recent common grid model available for the corresponding time frame settled for the ROSC for SWE processes. The capacity calculation process shall consider the intraday allocation results as the starting point of the calculation.
5. The cross-zonal capacity shall be calculated for each timestamp in the direction indicated by the allocation results after intraday cross-zonal gate closure time. SWE TSOs shall also calculate the opposite market direction, provided that there will be sufficient time for the algorithm to proceed.
6. Any TSO from SWE region may ask for an 'on request common grid model update' to perform the calculation.

In case of activating an 'on request common grid model update' and before the intraday-cross-zonal gate closure time, the TSO who asks for an 'on request update' shall send updated IGMs. SWE RCC will merge these files with the latest updates of the other TSOs, if any, in order to perform the calculation.

7. The capacity calculation process should occur on an hourly basis after intraday cross-zonal gate closure. It is based on a computation which aims to find the higher secure capacity based on the inputs provided by the TSOs.
 - a. In case countertrading is proposed as remedial action by ROSC process, no BTCC computation will be done on the congested direction and the TTC value will respect the ROSC output.
 - b. Otherwise, the algorithm determines higher exchange which is safe after the occurrence of all the monitored contingencies, applying available remedial actions when necessary.
8. The workflow will run a load flow applying a Newton-Raphson solution method.
9. The RCC shall define the values of TTC for each market time unit. Those TTC values should respect, when they exist, the validation values sent by TSOs as per article 10.
10. The RCC of the SWE Region shall provide with the validated NTCs after application of the reliability margin.
11. The RCC shall use the reliability margin as described in Article 5.
12. In accordance with Article 37(3) of EB Regulation, the RCC and SWE TSOs shall continuously update the availability of cross-zonal capacity for the exchange of balancing energy or for operating the imbalance netting process.
13. The RCC shall make available the common grid model for SWE Region in the extreme scenarios for the relevant market time unit to the TSOs of SWE Region.

Article 10

Cross-zonal capacity validation methodology

1. The TSOs of SWE Region should validate the cross-zonal capacities calculated by the RCC of the SWE Region.
2. However, the tight time available for the RCC to perform the calculation after intraday-cross-zonal gate closure time requires a simplified methodology for validation for those situations in which operational security could be endangered.
3. Due to lack of time, before capacity calculation is performed, the TSOs may send to the RCC NTC limits which final NTC should respect, due to one of the following reasons:
 - a. dynamic behaviour of the grid;
 - b. unplanned outage that occurred after most updated common grid model from Regional Operational Security Coordination is built;
 - c. incomplete input;
 - d. lack of upwards or downwards reserve.
4. These particular exceptions which lead to the limitation of the cross-zonal capacities calculated by the RCC shall be justified to the SWE NRAs in the Quarterly Report.

Article 11

Fallback procedures

1. For each capacity calculation performed for balancing timeframe, where an incident occurs in the capacity calculation process and the RCC is unable to produce results, the last published capacity value should be used. The RCC or TSOs of SWE Region where

applicable, shall provide the capacity management module or balancing platforms of SWE Region with the coordinated value.

Article 12

Publication of data and Reporting

1. The TSOs of the SWE CCR shall¹ publish the following CC relevant data
 - a. Data related to the calculation process:
For each market time unit:
 - i. The MTU;
 - ii. Border and calculated direction;
 - iii. TTC values in MW (for two borders and calculated direction);
 - iv. NTC values in MW (for two borders and calculated direction);
 - v. The most limiting CNE (only one) and Contingency identified per MTU, border and direction;
 - vi. Clear name and EIC code of both CNE and Contingency;
 - vii. CNE location (name and EIC code): TSO which the CNE is attributed (REE/REN/RTE)
 - b. Data related to the validation process
For each market time unit, if any adjustment is performed in the validation phase:
 - i. Explanation on the reason for non-validation
2. All data listed in paragraph 1 are published on a daily basis (on the next day), using standard channels for delivery of information to market participants (such as the JAO platform).
3. The RCC shall, every three months, provide a “Quarterly Report” to all regulatory authorities of the SWE region containing, at least:
 - a. all reductions made during the validation of cross-zonal capacity;
 - b. the location and amount of any reduction in cross-zonal capacity and the reasons for the reductions;
 - c. CNEs with sensitivity lower than 10% that have been included for security reasons, including an explanation of such reason;
 - d. All activations of the fallback solution, with a detailed explanation of the reason and preventive & curative actions engaged to avoid process failures in the future.
4. The following information shall be communicated to market participants, as soon as available, using the JAO platform and other TSO channels:
 - a. activations of the fallback solution, including the fallback capacity made available;
 - b. reductions made during the validation of cross-zonal capacity;
 - c. if any of the aforementioned issues bears the risk of extending itself in time, an estimation on when it could be solved.

Article 13

Publication and Implementation of the BTCC methodology

¹ National laws for protection of critical infrastructure could limit the publication of information

1. The TSOs of the SWE Region shall publish the BTCC methodology without undue delay after all national regulatory authorities of SWE CCR have approved it or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 5 (6), Article 5 (7), Article 6 (1) and 6 (2) of the EB Regulation.
2. The TSOs of the SWE Region shall implement the BTCC methodology Proposal no later than 12 months after the implementation of SWE ROSC.

Article 14 Language

1. The reference language for this balancing timeframe capacity calculation Proposal shall be English.
2. For the avoidance of doubt, where TSOs need to translate this BTCC methodology Proposal into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with Article 7 of the EB Regulation and any version in another language, the relevant TSOs shall be obliged to dispel any inconsistencies by providing a revised translation of this BTCC methodology Proposal to their relevant national regulatory authorities.