
Italy North TSOs proposal for an intraday common capacity calculation 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 Italy North Region taking into account the following:

Whereas

- (1) This document (hereafter referred to as “Italy North Borders ID common capacity calculation methodology”), including its annexes, is a common proposal developed by all Transmission System Operators (hereafter referred to as “TSOs”) within the Italy North Capacity Calculation Region (hereafter referred to as “Italy North Region”) regarding the proposal for the common capacity calculation performed for the capacity allocation within the intraday timeframe. This proposal is required by Article 21 of Regulation (EU) 2015/1222 on Capacity Allocation and Congestion Management (the “CACM Regulation”).
- (2) This proposal (hereafter referred to as the “ID CCC 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) In addition, this proposal takes into account the effective structure of the grid and, in line with the TSOs' proposal for day-ahead capacity calculation methodology as well as for countertrading and redispatching, it includes the border between Italy and Switzerland. Therefore, this proposal is developed by TSOs of the Italy North Capacity Calculation Region together with Swissgrid.
- (4) The goal of the CACM Regulation is the coordination and harmonisation of capacity calculation and allocation in the day-ahead and intraday cross-border markets. To facilitate these aims and implement single day-ahead and intraday coupling, it is necessary to calculate in a coordinated manner by the TSOs the available cross-border capacity.
- (5) Article 21 (1) of the CACM Regulation constitutes the legal basis for this proposal and defines several specific requirements that the ID CCC 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) *for the flow-based approach, a mathematical description of the calculation of power transfer distribution factors and of the calculation of available margins on critical network elements;*
- (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 defines the capacity calculation time-frames as “intraday, for the intraday. For the intraday market time-frame, individual values for cross-zonal capacity for each remaining intraday market time unit shall be calculated. 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” and Article 20 (3) of the CACM Regulation specifies that: “The TSOs from the capacity calculation region where Italy, as defined in point (c) of point 3.2 of Annex I to Regulation (EC) No 714/2009, is included, may extend the deadline without prejudice to the obligation in paragraph 1 for submitting the proposal for a common coordinated capacity calculation methodology using flow-based



approach for the respective region pursuant to paragraph 2 up to six months after Switzerland joins the single day-ahead coupling.“

- (8) Article 20 (2) of the CACM Regulation defines the deadline to submit the common proposal based on the coordinated net transmission capacity approach for the TSOs from the capacity calculation region where Italy, as defined in point (c) of point 3.2 of Annex I to Regulation (EC) No 714/2009, is included:
2. *“No later than 10 months after the approval of the proposal for a capacity calculation region in accordance with Article 15(1), all TSOs in each capacity calculation region shall submit a proposal for a common coordinated capacity calculation methodology within the respective region. The proposal shall be subject to consultation in accordance with Article 12.”*
- (9) 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”*.
- (10) 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”*.
- (11) Article 9 (9) of the CACM Regulation requires that the proposed timescale for the implementation and the expected impact of the ID CCC methodology Proposal on the objectives of the CACM Regulation is described. The impact is presented below in the point (11) of this Whereas Section.
- (12) The CCC 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 ID CCC methodology Proposal serves the objective of promoting effective competition in the generation, trading and supply of electricity by defining a set of harmonised rules for capacity calculation and congestion management which contributes to the effectiveness of the intraday market. Establishing common and coordinated processes for the capacity calculations within the intraday market timeframe contributes to achieving this aim.

Article 3 (b) of the CACM Regulation aims at ensuring optimal use of the transmission infrastructure.

The ID CCC methodology Proposal contributes to 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 ID CCC methodology Proposal contributes to the objective of ensuring operational by coordinating the capacity calculation with updated inputs for the intraday market timeframe at regional level to ensure its reliability.



Article 3 (d) of the CACM Regulation aims at optimising the calculation and allocation of cross-zonal capacity.

By coordinating the timings for the delivery of inputs, calculation approach and validation requirements of the CCC between TSOs and the coordinated capacity calculator, the ID CCC methodology proposal contributes to the objective of optimising 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 Italy North region, the results of the coordinated capacity calculation contribute to determine the most limiting branches within this region, by then help TSOs for a more efficient development of the electricity transmission system.

- (13) In conclusion, the ID CCC methodology Proposal contributes to the general objectives of the CACM Regulation.

SUBMIT THE FOLLOWING ID CCC METHODOLOGY PROPOSAL TO THE NATIONAL REGULATORY AUTHORITIES OF THE REGION:



Article 1 **Subject matter and scope**

The ID common capacity calculation methodology as determined in this ID CCC methodology Proposal is the common proposal of all Italy North TSOs in accordance with Article 21 of the CACM Regulation.

Considering the structure of the grid, and in line with the Countertrading & Redispatching methodology as well as the methodology for Day-Ahead Capacity Calculation defined for the same Capacity Calculation Region, also the border Italy North – Switzerland is included in the scope of this methodology. The participating TSOs to the Intraday Capacity Calculation are therefore Terna (Italy), RTE (France), APG (Austria), ELES (Slovenia) and Swissgrid (Switzerland).

Article 2 **Definitions and interpretation**

1. For the purposes of the ID CCC methodology Proposal, the terms used shall have the meaning given to them in Article 2 of Regulation (EC) 714/2009, Article 2 of Regulation (EC) 2013/543 and Article 2 of Regulation (EC) 2015/1222.

2. In addition, the following definitions shall apply:
 - a) ‘APG’ means Austrian Power Grid AG, the Austrian system operator;
 - b) ‘AT-IT border’ means bidding zone border between Austria and Italy;
 - c) ‘ELES’ means ELES, d.o.o. , the Slovenian system operator;
 - d) ‘SI-IT border’ means bidding zone border between Slovenia and Italy;
 - e) ‘RTE’ means Réseau de Transport d’Electricité, the French system operator;
 - f) ‘FR-IT border’ means bidding zone border between France and Italy;
 - g) ‘Swissgrid’ means Swissgrid AG, the Swiss system operator;
 - h) ‘CH-IT border’ means bidding zone border between Switzerland and Italy;
 - i) ‘TERNA’ means TERNA S.p.A. Rete Elettrica Nazionale, the Italian system operator.

3. Definition of Acronyms

CC	Capacity Calculation
CCC	Common Capacity Calculation
CGM	Common Grid Model
CGMES	Common Information Model (CIM) for Grid Model Exchanges
D-2	Two Days Ahead
DACF	Day Ahead Congestion Forecast
IDCF	Intraday Congestion Forecast
IGM	Individual Grid Model
MC	Market Coupling
NEMOs	Nominated Electricity Market Operators
NRAs	National Regulatory Authorities



NTC	Net Transfer Capacity
PST	Phase Shifter Transformer
RSC	Regional Security Coordinator
SOGL	System Operations Guideline
TRM	Transmission Reliability Margin
TTC	Total Transfer Capacity (of the Italy North Region)
Ur	Uncertainty of regulation
Us	Uncertainty of scenario
σ	Standard Deviation

4. In this ID
CCC
methodology
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 applies solely to the ID common capacity calculation methodology based on the coordinated net transmission capacity approach within the Italy North Capacity Calculation Region. The ID common capacity calculation methodology using the flow-based approach, the common capacity calculation methodologies within others Capacity Calculation Regions and other timeframes are outside the scope of this proposal.

Article 4 **Cross-zonal capacities for the intraday market**

For the intraday market time-frame, individual values for cross-zonal capacity for each remaining intraday market time unit shall be calculated using the ID common capacity calculation methodology.

Article 5 **Reliability margin methodology**

1. For the capacity calculation performed in ID, the TSOs of Italy North Region shall 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 ID and real time, for the market time unit being considered.



2. The reliability margin shall be defined as the 99 percentile of the convolution of the probability distribution functions of the two variables mentioned in paragraph 1 of this Article.
3. The TSOs of Italy North Region shall review once a year the reliability margin for the whole Italy North Region.

Article 6

Methodologies for operational security limits, contingencies and allocation constraints

1. For the capacity calculation, the TSOs of Italy North 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 performed for each calculated timestamp by the TSOs of the Italy North Region in the different network states including but not limited to base case, after contingency and after remedial action.
2. Only critical network elements with a sensitivity to cross-zonal power exchanges equal or higher than 5% shall be monitored during the capacity calculation process (the percentage to be used can be reassessed during the implementation of the ID CCC Methodology). The sensitivity shall be assessed using the same methodology for simulating exchanges as the one used during the capacity calculation process. The sensitivity to cross zonal power exchanges shall be equal to the relative change of flow on CNE after the change of zonal balance. The zonal balances are adjusted using the same GLSK as for the capacity calculation.
3. Where the power flows on network elements monitored in the capacity calculation are influenced by cross-zonal power exchanges in different capacity calculation regions, the TSOs of the Italy North region shall define the rules for sharing the power flow capabilities of network elements among different capacity calculation regions in order to accommodate these flows. These rules will be detailed in cooperation with the other capacity calculation regions during the implementation phase of this methodology.
4. The TSOs of Italy North Region shall review the list of critical network elements to be monitored in the capacity calculation process at least once a year.
5. The coordinated capacity calculator shall use the critical network elements in accordance with Article 7.3 for the capacity calculation performed within Italy North Region in order to determine the maximum net transmission capacity for each bidding-zone border.
6. The Italian operational constraints related to the control of voltage profiles and dynamic stability of Italian system, which are needed to maintain the transmission system within operational security limits but cannot be transformed efficiently into maximum flows on critical network elements, shall be expressed via allocation constraints.

Article 7

Generation shift keys methodology

1. The TSOs of Italy North Region shall define the generation shift keys 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 behaviour.
3. TERNNA shall define generation shift keys Merit order to the base case scenarios for each market time unit with all expected generating units in the IGM, reflecting TERNNA's best forecast of market behaviour.
4. Swissgrid shall define generation shift keys Reserve to the base case scenarios for each market time unit with all expected generating units in the IGM, reflecting Swissgrid's best forecast of market behaviour.
5. ELES shall define generation shift keys Proportional to the base case scenarios for each market time unit with all expected generating units and selected loads in the IGM, reflecting ELES's best forecast of market behaviour.
6. APG shall define generation shift keys Participation factors to the base case scenarios for each market time unit with all expected generating units in the IGM, reflecting APG's best forecast of market behaviour. To achieve this the shift is done in generation/load nodes (PV or PQ nodes), according to a participation factor. The chosen nodes are evaluated by APG and are nodes with generation/load units that will change along with a market changes. The participation factor for each node is set by APG and reflects the best forecast of generation/load distribution in the Austrian grid.
7. The IN TSOs have the possibility to use some nodes belonging to non-participating TSOs for the shifting during winter period (from October 1st to April 30th).

Article 8

Methodology for remedial actions in capacity calculation

1. The TSOs of Italy North Region shall define the remedial actions in accordance with Article 25 of CACM Regulation.
2. Each TSO of Italy North Region shall define individually the remedial actions of its responsibility area to be used in the intraday common capacity calculation within Italy North Region.
3. The remedial actions to be defined by each TSO of Italy North Region shall be either preventive (pre-fault) or curative (post-fault). The TSOs of Italy North Region may use the following remedial actions, but not limited to:
 - a) changing the tap position of a phase shifter transformer;
 - b) topology measure: opening or closing of a line, cable, transformer, bus bar coupler;
 - c) switching of a network element from one bus bar to another; or
 - d) modification of generation.
4. All types of remedial actions can be used in preventive and/or curative state. Only SPS (Special Protection Schemes) will act in curative stage, after tripping of grid elements.



5. Preventive Remedial Actions are implemented in the final CGM of the capacity calculation. Their application during later operational security timeframes (IDCF and real time) shall be evaluated based on the Security Analysis taking into account the latest grid information.
6. Each TSO of Italy North Region shall inform the coordinated capacity calculator in a timely manner on any change in its remedial actions within Italy North Region to ensure an efficient capacity calculation.
7. Each TSO within the Italy North Region shall coordinate with the other TSOs of the Region regarding the use of remedial actions to be taken into account in capacity calculation and their actual application in real time operation. The coordination of remedial actions is ensured by the capacity calculation methodology
8. Each TSO shall ensure that remedial actions are taken into account in capacity calculation under the condition that the available remedial actions remaining after calculation, taken together with the reliability margin referred to in Article 5, are sufficient to ensure operational security. The use, during later operational security timeframes (IDCF and real time), of remedial actions defined during capacity calculation process will be coordinated in line with the methodologies to be defined according to the Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (the “SOGL” Article 75 and 76).

Article 9

Cross-zonal capacity validation methodology

1. The TSOs of Italy North Region shall validate the cross-zonal capacities calculated by the coordinated capacity calculator of the Italy North Region.
2. The coordinated capacity calculator shall make available the common grid model for Italy North Region for all scenarios for the relevant market time unit to the TSOs of Italy North Region.
3. TSOs can validate the cross-zonal capacities calculated by the Coordinating Capacity Calculator with grid model provided in accordance with Article 10.2.
4. In case TSOs expect different flow patterns as a result of different market situations compared to the assumption of the Capacity Calculation process, the TSOs shall assess and validate a secure capacity value.
5. Where one or more Italy North TSOs do not validate the cross-zonal capacity calculated, the concerned TSO(s) shall provide the updated amount of cross-zonal capacities for the border(s) considered and the reasons for the reduction. The final cross-zonal capacity is the minimum value sent by the Italy North TSOs.
6. Whenever a TSO is reducing the amount of cross-zonal capacity during the validation, a report with the reasons and further details about the reduction shall be created. This report shall be submitted to the NRAs on regularly basis.



Article 10 **Intraday capacity calculation**

1. In accordance with Article 8 of CACM Regulation, the TSOs of Italy North Region shall calculate cross-zonal capacities for each bidding-zone border of Italy North Region.
2. The TSOs of Italy North 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-1.
3. The coordinated capacity calculator shall use the CGM built in accordance with Article 28 of CACM.
4. The capacity calculation process is based on a Remedial Action Optimization methodology which aims to find the highest secure capacity based on the inputs provided by the TSOs. The algorithm tests several levels of cross-zonal exchanges and determines if these exchanges are secure after the occurrence of all the monitored contingencies, applying available remedial actions when necessary. The purpose of the Remedial Action Optimization is to find an optimal set of Remedial Actions to secure the CGM. In case the operational limits of a grid element defined in Article 6 are exceeded, Remedial Actions are applied. The final set of Remedial Actions that has the highest positive effect on the congested grid element without creating any negative impact elsewhere in the grid is chosen based on sensitivities.
5. The coordinated capacity calculator shall define the values of TTC for each market time unit. These values shall be provided to TSOs of the Italy North Region for validation.
6. The NTC Calculation for each border is achieved according to the following steps:
 - a) TTC Selection: In this sub process, the TTC value is forced to be within a limiting band.
 - b) TTC Validation: In this sub process, each TSO of the Italy North Region has to verify its network security at the TTC value provided by the TTC Selection sub process. The TSO of the Italy North Region have the possibility to reduce this TTC value in case it is considered not secure.
 - c) Border NTC Calculation: The lowest value provided by the TTC Validation sub process is considered, reduced by the TRM and then split between the borders according to agreed splitting factors.

The TSOs of the Italy North Region do not perform a daily capacity calculation in export direction because the full export is still expected to be the unlikely market direction. The export capacity for each border is reassessed every year, and this value is used for the daily allocation.

However, export scenarios, especially on one border of Italy (transit scenario), occurring more and more frequent recently. Therefore, the TSOs of the Italy North Region shall, in alignment with the D-2 methodology, adapt the TTC calculation algorithm in the intraday timeframe in order cover export scenarios and start its implementation as soon as the ID CC is operational.



7. The coordinated capacity calculator of the Italy North Region shall provide the relevant NEMOs with the validated NTCs after application of the reliability margin defined in accordance with Article 6 for each bidding-zone border of Italy North Region.
8. In accordance with Article 58 of CACM Regulation, the coordinated capacity calculator and Italy North TSOs shall ensure that cross-zonal capacity shall be provided to relevant NEMOs 15 minutes before the intraday cross-zonal gate opening time as defined in accordance with Article 59 of CACM Regulation.

Article 11 **Fallback procedures**

1. Prior to each capacity calculation performed in ID, the TSOs of Italy North Region shall ensure the coordinated capacity calculator is provided with the already allocated capacities within the day-ahead timeframe.
2. For the capacity calculation performed in ID, 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 Italy North TSOs shall validate the last coordinated cross-zonal capacities calculated within the day-ahead timeframe and review it where relevant. After this validation step, the coordinated capacity calculator or Italy North TSOs where applicable, shall provide the relevant NEMOs with this coordinated value.

Article 12 **Publication and Implementation of the ID CCC methodology Proposal**

1. The TSOs of Italy North Region shall publish the ID CCC methodology Proposal without undue delay after all national regulatory authorities have approved the proposed ID CCC methodology or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 9 (10), Article 9(11) and 9(12) of the CACM Regulation.
2. The TSOs of Italy North Region currently implement the ID CCC methodology Proposal. The intraday capacity calculation process will be ready to be in service during second semester of 2018. The individual values for cross-zonal capacity for each remaining intraday market time unit will be calculated and offered to the intraday market as soon as the ID common capacity calculation methodology will be approved by the regulators of the Italy North region.
3. The TSOs of Italy North Region will evaluate the possibility to increase the 5% threshold, referred to in Article 6.2, by submitting a proper study to Italy North NRAs by March 2019 at the latest.
4. The TSOs of Italy North Region will abandon the use of the upper and lower limit in the selection process no later than 24 months after the approval of NRAs. In the meanwhile, the TSOs of Italy North Region will provide a specific report to Italy North NRAs every 6 months indicating reasons when the TTC value resulting from the computation process lays outside the selection band.



5. The TSOs of Italy North Region will provide a specific report in accordance with Article 26.5 of the CACM Regulation to Italy North NRAs every 3 months indicating reasons of the reduction occurred during validation phase.

Article 13

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 ID CCC methodology 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 ID CCC methodology Proposal to their relevant national regulatory authorities.