Explanatory note to the South West Europe TSOs proposal for a common long-term capacity calculation in accordance with Article 10 of Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

January 2020

Disclaimer: This explanatory document is submitted by the TSOs of the South West Europe region for information and clarification purposes only accompanying the TSOs' proposal for a common LT capacity calculation methodology in accordance with Article 10 of the Regulation 2016/1719 of 26 September 2016 establishing a Guideline on Forward Capacity Allocation.

RED ELÉCTRICA DE ESPAÑA

REN Redes Energéticas Nacionais

Rte

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1 Introduction

This explanatory note sets out the main principles for the coordinated capacity calculation methodology for the long-term market time frames applied in South West Europe region. It contains a description of both the methodology and the calculation processes in compliance with the Forward Capacity Allocation guideline (hereafter FCA Regulation). Its main goal is to provide the necessary definitions, explanations, justifications and transparency to understand the methodology.

The participating TSOs for this calculation are REE (ES), REN (PT) and RTE (FR). The following borders are considered: Spain – France and Spain – Portugal.

This methodology is necessarily compatible with the South West Europe TSOs proposal of 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. For this reason, the aforementioned document is referenced in this document as SWE DA&ID CC methodology.

2 Definitions and acronyms

a. ‘CACM Regulation’ means Capacity Allocation and Congestion Management Guideline according to Commission Regulation (EU) 2015/1222.

b. ‘Calculation scenario’ means the product of combining the CGMs with the planned outages, the seasonal operational security limits and the remedial actions sent by the TSOs.

c. ‘CGM’ means Common Grid Model.

d. ‘CGMM’ means, in this context, All TSOs’ proposal for a common grid model methodology in accordance with Article 18 of FCA Regulation.

e. ‘CNE’ means critical network element.

f. ‘CNEC’ means CNE and contingency.

g. ‘Coordinated capacity calculator’ means the entity or entities with the task of calculating transmission capacity, at regional level or above.

h. ‘CRAC file’ means the file containing contingencies, remedial actions and CNEs.

i. ‘ENTSO-E’ means European Network of Transmission System Operators for Electricity.

j. ‘FACTS’ means flexible alternating current transmission system.

k. ‘FCA Regulation’ means Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation.

l. ‘GLSK’ means generation and load shift keys.

m. ‘IGM’ means Individual Grid Model.

n. ‘NTC’ means net transfer capacity.

o. ‘PST’ means phase shifter transformer.

p. 'RA' means remedial action.

q. 'RAO' means remedial action optimization.

r. 'REE' means Red Eléctrica de España, the Spanish system operator.

s. 'REN' means Redes Energéticas Nacionais, the Portuguese system operator.

t. 'RES' means renewable energy sources.

u. 'RTE' means Réseau de Transport d'Electricité, the French system operator.

v. 'ES-FR border' means bidding zone border between Spain and France.

w. 'ES-PT border' means bidding zone border between Spain and Portugal.

x. 'SWE capacity calculation for day-ahead' means the capacity calculation done in SWE Region for day ahead according with SWE DA&ID CC methodology.

y. 'SWE DA&ID CC methodology' means South West Europe TSOs proposal of 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.

z. 'TRM' means transmission reliability margin.

aa. '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 'UD' means unintended deviation.

bb. 'UN' means uncertainties.

3 Capacity Calculation Approach

Article 10.2 of FCA Regulation sets that the approach used in the common capacity calculation methodology shall be either a coordinated net transmission capacity approach or a flow-based approach. SWE TSOs will use **coordinated NTC approach** to determine the long-term cross-border capacities for each border of the SWE CCR.

Article 10.4 of FCA Regulation sets that the uncertainty associated with long-term capacity calculation time frames shall be taken into account by applying a security analysis based on multiple scenarios and using the capacity calculation inputs, or a statistical approach based on historical cross-zonal capacity for day-ahead or intraday time frames, if it can be demonstrated that this approach may increase the efficiency of the capacity calculation methodology; better take into account the uncertainties in long-term cross-zonal capacity calculation than the security analysis; increase economic efficiency with the same level of system security. For SWE region, a **security analysis based on multiple scenarios** will be applied.

These two choices make this proposal fully compatible with SWE DA&ID CC methodology, as requested in Article 10.3 of FCA Regulation.

4 Capacity calculation inputs

4.1 Transmission Reliability Margin

Taking into consideration Article 11 of FCA Regulation, the common capacity calculation methodology shall include a reliability margin methodology which shall meet the requirements set out in Article 22 of CACM Regulation. This Article sets that the TRM methodology shall set out the principles for calculating the probability distribution of the deviations between the expected power flows at the time of the capacity calculation and realised power flows in real time, and specifies the uncertainties to be taken into account in the calculation. To determine those uncertainties, the methodology shall in particular take into account both unintended deviations and uncertainties:

Unintended deviations

For control-related reasons, deviations occur between the scheduled flows and the actual flows during the exchange of energy between neighbouring 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[1].

This part of the reliability margin is linked to the border and not to the market time frame studied.

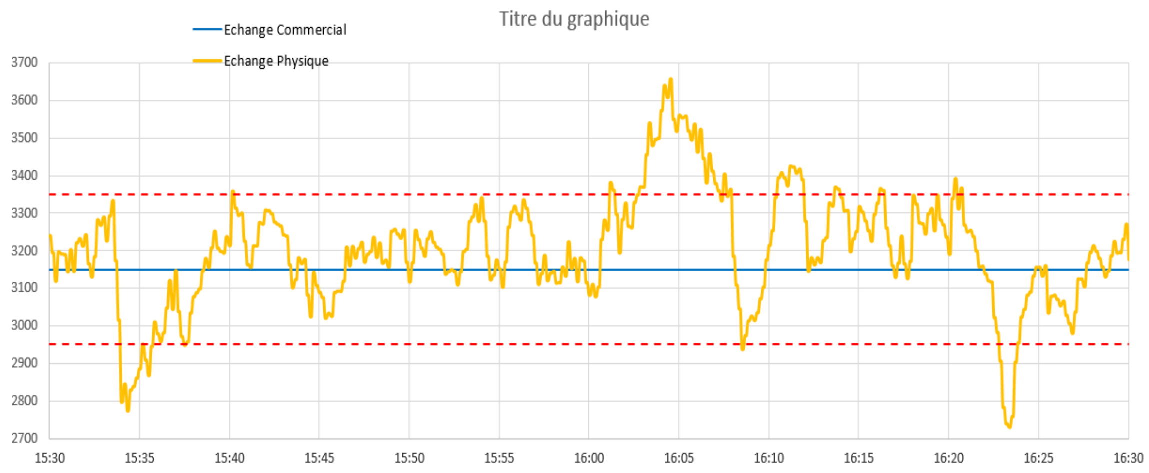

Figure 1 Commercial exchange (blue) vs physical exchange (yellow) due to unintended deviations

[1] For example, the primary frequency regulation systems of any loss in the Spanish/Portuguese system leads to a flow going from continental Europe through France to the Iberian Peninsula of around 85% of the loss. In addition to that, a 50 mHz frequency deviation of the central Europe (which can happen several times per day) leads to a 200 MW variation of the flow on the ES-FR border.

Uncertainties

The Coordinated NTC calculation methodology is based on different inputs (i.e. renewable energy generation, consumption, production plans or available network elements) provided by TSOs. These inputs are based on best available forecasts at the time of the capacity calculation and are likely to differ from the real-time situation.

This part of the reliability margin can be linked to the market time frame studied, as forecasting the value of some magnitudes in long-term time frames can be more difficult than in shorter term time frames.

4.1.1 TRM methodology proposed

Capacity calculation for long-term time frames (yearly, quarterly, monthly) has more uncertainties than capacity calculation for day-ahead, because it is more difficult for TSOs to estimate the different variables necessary to build the grid models. SWE DA&ID CC methodology provides a probability distribution function of the TRM for the D-2 calculation. This distribution represents both unintended deviations and uncertainties between D-2 and real time. For long-term time frames, it is necessary to add a second component that measures the uncertainties between the relevant long-term time frame and D-2 (e.g. for yearly time frame, uncertainties between yearly models and D-2 models).

Therefore, the TRM is defined as a chosen percentile of the convolution of two probability distribution functions:

a) probability distribution function of the TRM for the D-2 calculation. It is defined in the SWE DA&ID CC methodology, and explained in its corresponding explanatory note.
b) Probability distribution function of the TTC differences between long-term capacity calculation time frame and the capacity calculation for day-ahead time frame. It is defined in Annex I of this proposal. It covers uncertainties between the long-term time frame and the D-2 time frame.

To obtain the second function, historical TTC values from both long-term and D-2 capacity calculations are taken. At the time of writing of this document, SWE D-2 calculation is not gone live yet. This implies that TTCs available for day-ahead comes normally from weekly calculation, until D-2 calculation data is available during 2020.

4.1.2 Transitional period

This methodology will be applied with historical data to both year-ahead and month-ahead time frames. For quarter-ahead time frame (ES-PT border), TSOs do not have data to apply the methodology. For this case, The TRM value obtained for year-ahead time frame will be applied until two years of data are available.

4.1.3 Update of TRM percentile and TRM values

TRM values will be updated regularly by applying this methodology with new data available, according to Article 5 (5). Additionally, TSOs will assess the impact of the chosen percentile and will propose and agree with SWE NRAs new values of the percentile if it is considered an improvement in the forecast of the long-term capacity. A study will be provided to the SWE NRAs no later than Q3 2021.

4.2 Operational security limits and contingencies

Taking into consideration Article 12 of FCA Regulation, the common capacity calculation methodology shall include methodologies for operational security limits and contingencies which shall meet the requirements set out in Article 23(1) and (2) of CACM Regulation.

4.2.1 Critical network elements and contingencies

A CNE is a network element either within a bidding zone or between bidding zones monitored during the capacity calculation process. A CNEC is a CNE limiting the amount of power that can be exchanged, potentially associated to a contingency (see below the definition). Both CNEs and contingencies are determined by each SWE TSO for its own network according to agreed rules, described below.
The CNECs are defined by:

- A CNE: a line or a transformer whose flow is significantly impacted by cross-border exchanges; a node whose voltage is significantly impacted by cross-border exchanges; a line whose voltage phase angle difference is significantly impacted by cross-border exchanges after its trip.
- An "operational situation": base case (N regime) or contingency cases (N-1, N-2).

A contingency is defined as the trip of one single or several network elements that cannot be predicted in advance. For clarification, a scheduled outage is not a contingency. The normal type of contingency comprises the loss of a single element, which can be:

- a line
- a tie-line
- a DC link
- a generation unit
- distributed generation of a relevant size like a clustered wind farm, cogeneration, etc.
- a transformer (including Phase Shifter Transformers)
- a large voltage compensation installations.

Contingencies could result from the combined loss of several elements.

4.2.1.1 CNEC selection

The selection of contingencies and CNEs needs to be compatible with the selection methodology established in the SWE DA&ID CC methodology. Due to this reason, the lists of contingencies and CNEs that are being used in the day-ahead capacity calculation in the moment of the input collection, are considered[2].

[2] According to SWE DA&ID CC methodology Article 7 (version approved in November 2018), sensitivity thresholds equal or higher than 5% shall be used for CNEC selection methodologies.

Long-term capacity implies the possibility of studying future scenarios with new network elements or topologies. Therefore, TSOs can add elements to the lists by applying the selection methodology established in the SWE DA&ID CC methodology to the long-term IGMs, with the same thresholds.

Finally, TSOs have the possibility to consider additional CNEs that can be sensitive to cross border exchanges within a particular combination of outage(s), contingencie(s) and RA(s). These additional CNEs have to comply with the selection criteria after an ex-post analysis.

4.2.2 Definition of operational security limits

4.2.2.1 Maximum permanent and temporary current on a Critical Branch

The maximum permanent admissible current/power means the maximum loading that can be sustained on a transmission line, cable or transformer for an unlimited duration without risk to the equipment.

The temporary current/power limit means the maximum loading that can be sustained for a limited duration without risk to the equipment (e.g. 115% of permanent physical limit can be accepted during 20 minutes). Each individual TSO is responsible for deciding which values (permanent or temporary limit and duration of each overload) should be used, according to the corresponding legislation and security standards.

As thermal limits and protection settings can vary in function of weather conditions, different values are calculated and set for the different seasons within a year. These values can be also adapted by the concerned TSO if a specific weather condition is forecasted to highly deviate from the seasonal values.

4.2.2.2 Maximum/minimum voltage on a node of the network

If the voltage on a node is significantly impacted by cross-border exchanges, the voltage on this element shall be monitored in the capacity calculation. Each TSO shall specify the voltage limits for each element of its transmission system.

4.2.2.3 Voltage Phase Angles Differences

Following the opening or the outage of tie-lines a manual reclosure may be refused by Parallel Switching Devices (PSDs) in case of voltage phase angle difference exceeding the pre-set threshold of the device. The setting of the threshold depends on operational conditions in this respective area of the grid. Typically, the threshold chosen is around 30^0.

4.3 Generation and Load Shift Keys

Taking into consideration Article 13 of FCA Regulation, the common capacity calculation methodology shall include a methodology to determine generation shift keys which shall meet the requirements set out in Article 24 of CACM Regulation. This proposal includes the same generation shift keys methodology than SWE DA&ID CC methodology, given the specificities of each electrical system. Annex I of the methodology includes a technical description of how each approach works. The full specification is available in the public document ENTSO-E GLSK Implementation Guide. In the following two epigraphs, the choice for each electrical system of SWE region is explained.

4.3.1 The proportional to base case generation approach

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

4.3.2 The merit order list approach

This kind of shift approach will be implemented in REE and REN control areas. The main reason for this choice is that power flows in these control areas are very sensitive to different generation profiles and locations, especially due to high RES penetration. Therefore, for different generation profiles, different power flows in the grid elements are obtained. Consequently, different stress areas in the systems with potential impact in the NTC calculations can arise.

Some examples to illustrate that in these control areas the generation mix can be very different depending on some conditions:
- If the wind production is high, the marginal production is usually smaller than with low wind production;
- If the winter is wet, the marginal price of hydro power-plants is normally lower than the marginal price of thermal power-plants, and vice-versa for dry seasons.
- Depending on the primary sources' prices, the market behaviour is different and affect the location of the production.

4.4 Remedial Actions

During coordinated NTC calculation, SWE TSOs will take into account remedial actions. According to Article 14 of FCA Regulation, each TSO shall ensure that these remedial actions are technically available in real time operation and meet the requirements set out in Article 25 of CACM Regulation. TSOs will check the availability of the remedial actions according to their outage plans.

The general purpose of the application of RAs is to maintain the transmission system within the operational security limits during the capacity calculation process, where maximum power exchanges are reached, with the subsequent benefit of the market.

A RA can be:

- Changing the tap position of a PST.
- 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;
- Change of generator in-feed or load.
- Change the flow in the HVDC links France-Spain: use of the modulation modules
- Change the flow in a line using a FACTS.
- Change the voltage on a node by activating/deactivating reactance(s) or capacitor(s)

All explicit RAs applied for NTC calculation must be coordinated in line with article 25 of CACM Regulation. Prior to each calculation process, the TSOs of a bidding zone border shall agree on the list of remedial actions that can be shared between both in the capacity calculation. These shared remedial actions can only be used with prior consent of the neighbouring TSO since their activation have a significant impact on its control area.

4.5 Availability Plans

Each TSO will provide the coordinated capacity calculator with the latest version of their availability plans, which contains the list of coordinated planned outages on each of its borders, before every long-term calculation.

The coordinated planned outages list of assets identified as relevant for outage coordination in the SWE Region in accordance with the methodology for assessing the relevance of assets for outage coordination, referred in Article 84 of SOGL Regulation.

Before 1 November of each calendar year, each SWE TSOs shall provide to the neighbouring TSO(s), the preliminary year-ahead availability plans for the following calendar year, enabling a jointly coordination and validation of the year-ahead availability plans for capacity calculation. The yearly availability plans shall be updated, by the SWE TSOs, on a monthly basis until the 15th day of each month.

4.6 Common Grid Model

The methodology used to create the IGMs and to merge them into CGMs in this process is in line with the CGMM. In case the CGMM do not cover any capacity allocation time frame, SWE TSOs will define the scenarios to be considered.

The coordinated capacity calculator will establish, from the defined scenarios, a set of calculation scenarios by combining the common grid models with the outage planning, the operational security limits and the associated remedial actions.

4.6.1 Year-ahead scenarios

The scenarios that will be used in SWE region for year-ahead calculation are agreed according to the relevant Article of the CGMM.

4.6.2 Month-ahead scenarios

The scenarios that will be used in SWE region for month-ahead are agreed according to the relevant Article of the CGMM.

4.6.3 Quarter-ahead scenarios

At the time of submitting this proposal, the CGMM does not cover quarterly scenarios. Given that for this time frame TSOs have normally updated the outage planning, year-ahead scenarios corresponding to the relevant quarter will be used.

4.6.4 Individual Grid Model

Each TSO of SWE region shall determine an IGM for each of the scenarios mentioned above, using its best estimates of the following variables:

a) Network model;
b) electricity demand;
c) the conditions related to the contribution of renewable energy sources;
d) determined import/export positions, including agreed reference values allowing the merging task;
e) the generation pattern, with a fully available production park;
f) the year-ahead grid development;
g) outages covering whole calculation period.

4.6.5 Common Grid models

The individual TSOs' IGMs are merged to obtain a CGM according to the CGMM. The process of CGM creation is performed by the European Merging Function and comprises the following services:

a) Check the consistency of the IGMs (quality monitoring);
b) Merge IGMs and create a CGM;
c) Make the resulting CGM available to all TSOs.

The merging process is standardized across Europe as described in European Merging Function requirements.

5 Capacity Calculation Methodology

5.1 Time frames and calculation scenarios

Taking into consideration Article 9 of FCA Regulation, all TSOs in each capacity calculation region shall calculate the long-term cross-zonal capacity for each forward capacity allocation, and at least for yearly and monthly time frames. At the time of writing of this proposal, the following long-term allocations exist in SWE region:

1. Yearly allocation.
2. Monthly allocation.
3. Quarterly allocation, only for ES-PT border.

For a given time frame, the process described in section 0 is applied for each of the calculation scenarios. Calculation scenarios are defined by the product of combining the CGMs with the availability plans (planned outages), the seasonal operational security limits and the remedial actions sent by the TSOs.

5.2 General process

The capacity calculation process designed by the SWE CCR is represented by the schema below.

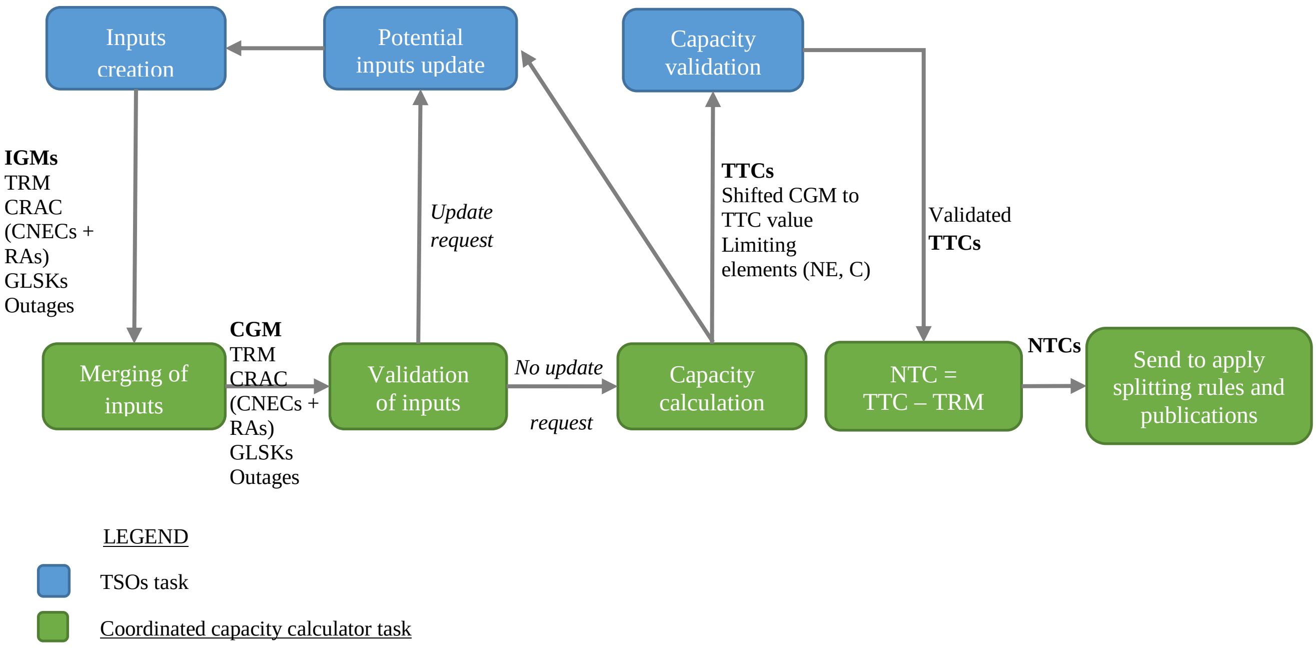

Figure 2 Capacity Calculation process

This process is divided into the following main phases:

1. TSOs prepare their inputs and send them to the coordinated capacity calculator.
2. The coordinated capacity calculator merges all the inputs.
3. The coordinated capacity calculator validates the merged inputs. If errors are detected, a request for updating the corresponding input is launched.
4. The capacity calculation is done for each calculation scenario.
5. The coordinated capacity calculator provides TSOs with the TTC values for each calculation scenario and the corresponding limiting CNECs.
6. TSOs can update the inputs and ask for launching a second calculation if they detect the opportunity to improve the calculation with new conditions that were not considered in the first version of the inputs.[3]
7. Each TSO validates the outputs given for each calculation scenario, updating them if necessary.
8. NTC values are calculated by subtracting TRM to TTC values.

[3] For example, one remedial action that was not included in the first version of the CRAC file could be given to improve the calculation.

9. NTC values are delivered for the corresponding auction specification (application of SWE splitting rules) and for TSOs transparency purposes (publications).

In the following sections, calculation and validation are explained. Inputs and TRM methodologies are explained in chapter 4. The way to merge IGM and create CGMs is out of the scope of this document, as it is done according to CGMM.

5.3 Dichotomy approach

The capacity calculation step can be described as a calculation by dichotomy.

The tool used by the coordinated capacity calculator will define a starting capacity level and check if this level of exchange allows the transmission system to be operated within its operational security limits by performing a security analysis.

If the level is secure, it will then test a higher value of TTC. Otherwise the coordinated capacity calculator will then test a TTC value in between the secure and unsecure TTC values until it reaches the last secure TTC. The dichotomy is set with a 50 MW step, the same used in the SWE DA&ID CC methodology.

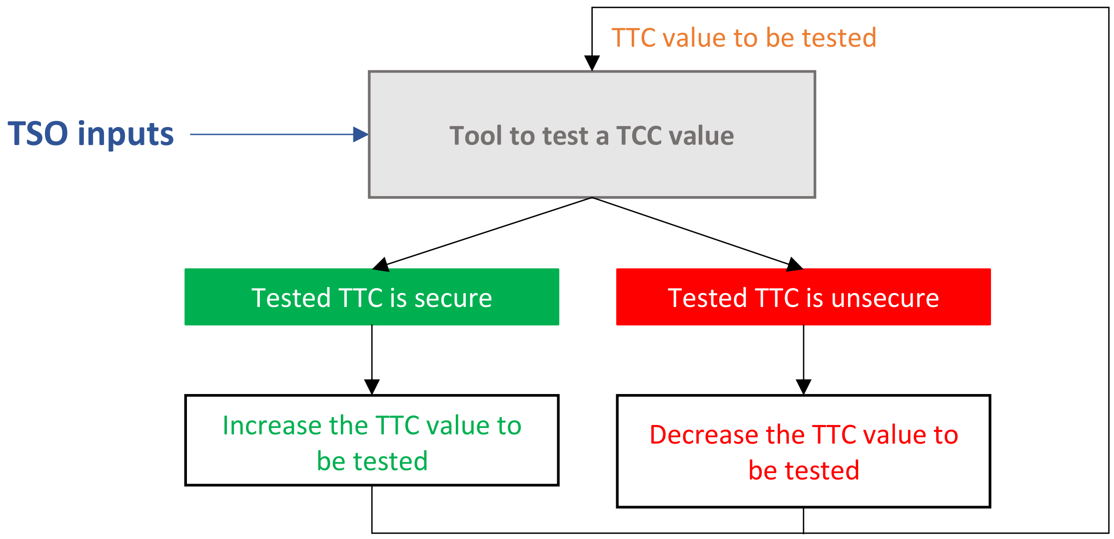

Figure 3 The dichotomy process

5.4 Security analysis

Power flows, voltage levels and voltage phase angle differences will be evaluated within the same sequence of the capacity calculation process. The calculation tool will monitor at each step of the calculation the maximum flows, the adequate voltage levels and the adequate voltage phase angle differences defined by the TSOs on all the CNEs in N situation and after applying each defined contingency. When finding a security violation, the tool uses a RAO to look for RAs able to solve the violation. This is explained in chapter 5.5.

At the time of writing of this explanatory note some features of the SWE capacity calculation tool are under development, as it is the cases of voltage levels and voltage phase angle difference assessments inside the RAO algorithm. While this feature is not implemented, the following temporary solutions will be applied.

5.4.1 Temporary voltage validation

After the flows assessment has been completed, it will be validated that after a set of contingencies the voltage level on some CNEs (nodes) is within a safety range based on the TSOs operational rules:

- If yes, the computation is over.
- If no, a list of specific remedial actions defined by the TSOs such as topological actions, activation of reactance(s), capacitor(s) and FACTS, can be applied.
- If these remedial topological actions relieve the constraint, the RAO is performed again if these remedial actions are preventive.
- If remedial actions other than topological ones relieve the constraint, the computation is over.

If it is not possible to ensure that the transmission system is maintained within the operational security limits with this level of exchange, the same process is performed decreasing the TTC value 50 MW. This process will be repeated until the TTC value ensures the operation of the transmission system within the operational security limits.

5.4.2 Temporary voltage phase angle difference validation

After flows and voltage assessments have been completed, the tool validates that after some particular contingencies the potential reclosure of the line would fulfil the requirements of voltage phase angle difference between the extremes of the line, agreed by SWE TSOs.

The tool will calculate the angle difference, compare it with the defined limit and validate it by applying the following rules:

- If lower, the computation is over.
- If higher, it can then apply a list of specific curative remedial actions defined by the TSOs such as redispatching or topological actions.
- If these remedial actions relieve the constraint, then the computation is over and the calculated TTC is confirmed.

If it is not possible to ensure that the transmission system is maintained within the operational security limits with this level of exchange, the tool then performs again the same process while decreasing the TTC value by 50 MW. It then repeats this process until the TTC value ensures the operation of the transmission system within the operational security limits.

5.5 Remedial action optimization

Some of the security constraints found during the security analysis can be relieved by using some remedial actions. The kernel of the calculation tool is the RAO algorithm. In this chapter it is explained how it works[4].

5.5.1 Theoretical description of the remedial action optimization

In the case of an electrical system where discrete changes can be done, a non-convex and non-linear situation is faced, dealing with topology changes on the network, which represent discrete actions by definition. Therefore, the problem treated by the RAO algorithm is a combinatory problem.

Branch and bound algorithms are commonly used for high complexity mathematical problems, containing combinatory and discrete aspects.

5.5.2 The inputs given to the RAO

TSOs, based on their expertise, associate RAs with the relevant CNECs. The RAO process allows the TSOs to do a pre-selection of associations that will both help the optimizer to find the best combinations (especially when a complex set of RAs is necessary to solve some particular constraints) and reduce the computation time. This ensures the efficiency of the calculation process in the allotted time.

5.5.3 The remedial actions handling

The remedial actions selection process of the RAO, taking advantage of the branch and bound algorithm used, let the opportunity to define usage rules for remedial actions. These usage rules can be seen as an availability assessment of the remedial action before branching.

The algorithm will assess which remedial actions are available at this stage based on usage rules, and only after that, it will enter the branching algorithm to test them individually. It can be seen as a mean to filter the remedial actions for the algorithm, or to control the usage of some remedial actions for specific constraints.

The RAO can deal with many different remedial actions such as those listed in chapter 4.4.

5.5.4 The computation

The RAO will monitor at each step of the calculation the maximum flows, the adequate voltage levels and the maximum voltage phase angle differences defined by the TSOs on all the CNEs. The margin for a given CNE is defined as the difference between the maximum flow/voltage/angle difference allowed on the CNE and the measured flow/voltage/angle difference on the element after simulating a load flow. In the case of under-voltage assessment, the margin is defined as the difference between the measured voltage and minimum voltage allowed on the CNE.

[4] Please be informed that the RAO methodology is under a continuous improvement process. The sections depicted in this chapter reflect current and foreseen status at the time of writing of this proposal.

In the SWE region a positive margin methodology is used, meaning that as soon as all the margins computed with a given TTC value are positive, the remedial actions optimization stops and moves directly to the next TTC value.

5.6 Methodology for the validation of cross-zonal capacity

Once the coordinated capacity calculator has calculated the TTC values for all the calculation scenarios, it provides the concerned TSOs with these values. Each TSO then has the opportunity to validate the TTC values calculated, or to modify them in case the centralized calculation could not see a particular constraint detected by the TSO at this stage.

Some constraints cannot be monitored by the centralized capacity calculation processes. Those constraints could be, but not limited to, dynamic behaviour of the grid, and unplanned outage that occurs after the deadline to update the inputs.

The TSOs requesting a capacity modification is required to provide a reason for this reduction, its location and the amount of MW to be modified.

Where one or more SWE TSOs do not validate the cross-zonal capacity calculated, the reason for the reduction can be:

a. dynamic behavior of the grid,
b. unplanned outage that occurs after the deadline to update the inputs and
c. incomplete input.

Where the two TSOs of a bidding zone border request a capacity modification on their common border, the coordinated capacity calculator will select the minimum value provided. The reason associated to this value will be the one taken into account in all reports required by relevant legislation.

5.7 Fallback procedure

5.7.1 Backups and replacement process

For all inputs related to the capacity calculation, standard backup communication process has been defined among SWE TSOs and the coordinated capacity calculator. Where inputs are not available for one of the parties at the expected time, back up procedures are applied until a critical deadline is reached, in order to get the associated inputs and carry on with the original process.

Where a critical deadline is reached and the inputs could not be provided to the concerned party on time, then fallback for capacity values described in section 5.7.2 is applied.

5.7.2 Fallback capacity values

If the SWE TSOs and the coordinated capacity calculator could not complete a coordinated capacity calculation within the allotted time for calculation, the following cases apply:

- For yearly time frame, capacity values from the year ahead calculation of the previous year shall be used.
- For any other time frame, capacity values from the corresponding superior long-term time frame shall be used.

Failure	Fallback NTC values in ES-FR	Fallback NTC values in ES-PT
Yearly calculation for year 2023	Values from yearly calculation for year 2022	
Quarterly calculation for Q2 2023	Not applicable	Q2 values calculated in yearly calculation for year 2023
Monthly calculation for April 2023	April values calculated in yearly calculation for year 2023	April values calculated in quarterly calculation for year 2023

Table 1 - Example of fallback NTC values

The coordinated capacity calculator uses these values as an input of the validation process described in section 5.6. The TSOs have then the opportunity to adjust these values following the rules of this process.

6 Transparency channels

6.1 ENTSO-E transparency platform

SWE TSOs shall fulfil the obligations from the Transparency Regulation 543/2013.

6.2 Individual TSO websites

According to Article 11.2 of Transparency Regulation 543/2013, each SWE TSO shall publish the NTC values on their respective websites no later than:

- For the year-ahead market time frame, one week before the yearly allocation process but no later than 15th December.
- For the quarter- and month-ahead market time frames, two working days before the quarterly and monthly allocation processes.

6.3 Reports toward SWE NRAs

The coordinated capacity calculator shall, every three months, report all reductions made during the validation of cross-zonal capacity to all SWE NRAs. This report shall include the location and amount of any reduction in cross-zonal capacity and shall give reasons for the reductions.

SWE TSOs shall, upon request, provide to SWE NRAs a report detailing how the value of long-term cross-zonal capacity for a specific long-term capacity calculation time frame has been obtained. The limiting element will be provided to SWE NRAs upon request.

The reasons for reductions can be:

1. dynamic behavior of the grid,
2. unplanned outage that occurs after the deadline to update the inputs and
3. incomplete input.

6.4 Public Reports

Once the methodology is implemented, TSOs will disclose every three months a public report as specified in Article 9.6 of the methodology.

6.5 ENTSO-E reports towards the Agency

SWE TSOs will participate in the elaboration of the ENTSO-E biennial report on capacity calculation and allocation, which will be provided each two years and updated under request of the relevant authorities, according to Article 26 of FCA Regulation. For SWE region, this report will contain the capacity calculation approach used, statistical indicators on reliability margins, statistical indicators of cross-zonal capacity, quality indicators for the information used for the capacity calculation and, if appropriate, proposed measures to improve capacity calculation.

After consulting the Agency, all SWE TSOs shall jointly agree on the statistical and quality indicators for the report. The Agency may require the amendment of those indicators, prior to the agreement by the TSOs or during their application.

The Agency shall decide whether to publish all or part of this report.

7 Timescale for the CCM Implementation

7.1 Prerequisites

When the new Capacity Calculation (CC) goes live, the calculation will be performed by the coordinated capacity calculator based on input provided by the TSOs, and finally validated by the TSOs. Some crucial elements in this process are:

a. TSOs' input provision;
b. Common Grid Model (CGM);
c. Industrialized Capacity Calculation Tool.

CGM is not developed by the SWE CCM project, but by a coordinated project of all ENTSO-E TSOs. The industrialized capacity calculation tool is being developed by the coordinated capacity calculator.

All these prerequisites shall be implemented before the "go-live" of the CCM.

While the SWE long-term capacity calculation process is not implemented, the current bilateral long-term capacity calculation will keep working, so long-term capacity values are guaranteed in the region. SWE TSOs can implement the TRM methodology on the current long-term bilateral calculation processes if agreed with SWE NRAs, in coordination with the implementation of the SWE Splitting Rules methodology for 2022 long-term auctions.

7.2 Timeline for implementation of the CCM

The following timeline is estimated for the implementation of the process:

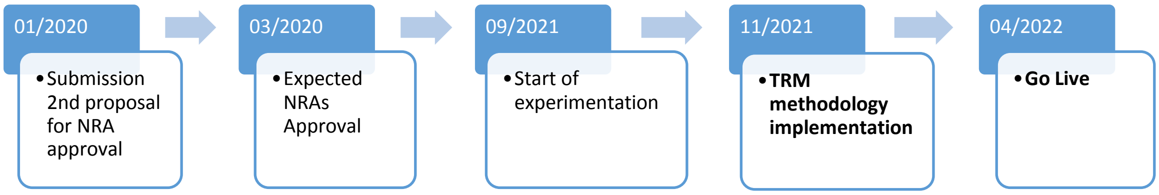

Figure 4 Implementation plan