Allegato A

REPORT ON THE IMPLEMENTATION OF THE MINIMUM LEVEL OF AVAILABLE CAPACITY FOR CROSS-ZONAL TRADE (70%) ON THE ITALIAN BORDERS FOR YEAR 2023

5 November 2024

SUMMARY

1 Premise

1.1 According to Article 16(8) of Regulation (EU) 2019/943[1], starting from 1st January 2020 Transmission System Operators (in the following: TSOs) are requested to make available a minimum level of capacity for cross-zonal trade (so called 70% rule).

1.2 A TSO is allowed not to match the minimum level of capacity when one of the following situations occurs:

i) the competent Member States has adopted an action plan pursuant to Article 15 of Regulation (EU) 2019/943; in this case, the minimum level of capacity (70%) shall be reached by 31 December 2025 and, in the meanwhile, a linear trajectory shall be matched;

ii) the competent National Regulatory Authority has granted a derogation on foreseeable grounds where necessary for maintaining operational security pursuant to Article 16(9) of Regulation (EU) 2019/943;

iii) the regional coordination centre, while performing the capacity calculation process, concludes that there are not enough remedial actions to reach the minimum level of capacity and thus reduces the capacity accordingly pursuant to Article 16(3) of Regulation (EU) 2019/943; this reduction applies also where an action plan is in place, by allowing a TSO to not match the linear trajectory in case of insufficient remedial actions.

1.3 On the verge of the entry into force of the 70% rule, in July 2019 ACER issued the Recommendation 01/2019[2] (in the following: ACER Recommendation) giving some criteria on how to compute the level of capacity for cross-zonal trade. The proposal is self-standing for the regions implementing a flow based capacity calculation, while for the regions implementing a coordinated net transmission capacity (in the following: cNTC), ACER proposed an explicit calculation for the limiting elements[3] only, mandating the TSOs to develop a proper methodology to compute the level of cross-zonal capacity on all the other network elements.

1.4 Based on criteria reported in the Recommendation and on the data provided by the TSOs and the regional coordination centres, ACER publishes a yearly report presenting the level of cross-zonal capacity offered on each border and pointing out whether this level is consistent with the 70% requirement. ACER reports have nonetheless only a monitoring scope: assessing the effective compliance of each TSO against the 70% rule is, in fact, a task reserved to the competent national regulatory authority.

1.5 ARERA approved the assessment of the status of the 70% rule for year 2020 with Decision 420/2021/R/eel[4], the assessment for year 2021 with Decision 543/2022/R/eel[5] and the assessment for the year 2022 with Decision 503/2023/R/eel[6].

[1] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the Internal Market for Electricity (recast)

[2] Recommendation No 01/2019 of the European Union Agency for the Cooperation of Energy Regulators of 08 August 2019 on the implementation of the minimum margin available for cross-zonal trade pursuant to Article 16(8) of Regulation (EU) 2019/943

[3] A limiting element is a transmission element that effectively limits the cross-zonal capacity.

[4] Deliberazione 12 ottobre 2021 420/2021/R/eel - Valutazione del livello minimo di capacità (70% rule) per i confini italiani con riferimento all'anno 2020

[5] Deliberazione 2 novembre 2022 543/2022/R/eel - Valutazione del livello minimo di capacità (70% rule) per i confini italiani con riferimento all'anno 2021

[6] Deliberazione 7 novembre 2023 503/2023/R/eel - Valutazione del livello minimo di capacità (70% rule) per i confini italiani con riferimento all'anno 2022

1.6 The current document presents the assessment for year 2023. Chapter 2 summarizes the content of the ACER Recommendation for a cNTC environment. Chapter 3 illustrates the results for the Northern borders (Italy North CCR), while Chapter 4 is focused on the Greek border and the Italian internal bidding zone borders (Greece-Italy CCR). Within each chapter a specific section is devoted to explain the criteria adopted by Arera to assess the 70% rule in the related region. Finally, Chapter 5 reports some conclusions.

1.7 It is worth underlining that the monitoring is limited to the day ahead process only.

2 ACER Recommendation for cNTC environment

2.1 ACER recommends computing the Margin Available for Cross-Zonal Trade ($MACZT_i$) for each critical network element and contingency (CNEC)[7] *i* based on the following criteria:

$$MACZT_i = MCCC_i + MNCC_i$$

where:

- $MCCC_i$is the Margin from Coordinated Capacity Calculation on CNEC *i*;
- $MNCC_i$ is the Margin from Non-Coordinated Capacity Calculation on CNEC *i*.

2.2 $MCCC_i$ is computed for each coordination area, i.e. for each set of borders on which the cross-zonal capacity is computed in a coordinated manner.

2.3 For cNTC areas ACER proposes computing $MCCC_i$ as follows:

$$MCCC_i = \sum_b pPTDF_i^b \cdot NTC_b$$

where:

- $pPTDF_i^b$ is the positive PTDF[8] of CNEC *i* in the direction associated to border *b*;
- NTC_b is the net transmission capacity computed in the capacity calculation process for border *b*;
- the sum is extended to all the borders within the coordination area.

2.4 ACER points out that the formula for $MCCC_i$ in cNTC areas provides a reliable estimation only for the limiting CNECs, while for all the other CNECs the formula underestimates the $MCCC_i$ since it doesn't consider the quota of the capacity that remains unused because of the law of physics in a meshed system.

2.5 $MNCC_i$ is computed by multiplying the corresponding zone related PTDF with the net position associated to each bidding zone. Before the computation the net position is adjusted in order to filter out the exchanges within the coordination area that are taken into account in the $MCCC_i$.

[7] According to N-1 security criteria, the network shall be operated such that the trigger of one element does not lead to any violations of operational security limits. To this extent the capacity calculation process monitors all the different combination of network elements and contingencies: in other terms the flows resulting on each network element are checked with full network (N state) and with a contingency leading one element out of service (N-1 state). These combinations are called CNEC. For N state, CNEC are considered without any contingency attached.

[8] PTDF (Power Transfer Distribution Factor) can be border related or zone related; a border related PTDF measures the flow on a given network element induced by 1 MW exchange on the considered border; a zone related PTDF measures the flow on a given network element induced by 1 MW net position on the considered zone (there is an opposite net position in the slack zone).

2.6 PTDFs and net positions are computed according to the common grid model used for the capacity calculation process.

2.7 In case of borders consisting only of HVDC, the computation can be simplified: since the flows on HVDC are usually fully controllable, $MNCC_i$is equal to zero (i.e. no flows on the HVDC due to exchange outside the coordination area) and $MCCC_i$ is equal to the NTC_b on the considered border.

3 Assessment for Italy North CCR

3.a Capacity calculation process

3.1 Italy North CCR encompasses the borders with France, Austria and Slovenia; the border with Switzerland is not formally included in the region, nonetheless, because of a strict interdependency with the other ones, this border has always been considered within the capacity calculation process.

3.2 Italy North TSOs are currently using a cNTC approach: the cross-zonal capacity in the import direction is computed on the entire Northern borders (i.e. an equivalent border across all the Alps is considered) by increasing the injections in France, Switzerland, Austria and Slovenia and by decreasing the injections in Italy. The original methodology, developed on a voluntary basis, was modified to make it compliant with the CACM Regulation[9]: the revised approach has been into force in the day-ahead timeframe since 2020 and in the intraday timeframe since late 2019. After the entry into force of Regulation (EU) 2019/943, the TSOs further modified the capacity calculation methodology to incorporate a 70% adjustment process. The proposal was approved by the competent NRAs in July 2020 and the 70% adjustment process entered into force on 29 October 2021.

3.3 The calculation is delegated to the two regional coordination centres active in the Central Europe System Operation Region which the Italy North CCR belongs to, namely Coreso and TSCNET.

3.4 Only the import capacity is currently computed for all the market time units. Up to 18 June 2024 (i.e. for the entire 2023), the export capacity was estimated on a yearly basis. On 19 June 2024 the so called export corner concept went live: since then the cross-zonal capacity in the export direction has been evaluated on borders on which export are likely to occur[10].

3.5 The overall import capacity may be limited by specific allocation constraints introduced by the Italian TSO Terna to take into account the voltage and stability issues of the whole Italian system. More in details, the system needs a certain amount of regulating resources to ensure voltage regulation and a proper inertia. In standard conditions, when the sum of these resources plus the non-dispatchable production and the full import capacity is lower than the load, all the regulating resources can be effectively dispatched[11]. On the contrary with low load and significant non-dispatchable production, dispatching all the regulating resources with a full

[9] Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

[10] If no export is likely, the export corner is not run and the overall import capacity is computed. In this case the market is provided with the standard export capacity based on yearly estimation.

[11] Either from the energy market or within the ancillary service market.

import capacity would lead to an overgeneration: in these situations (typical in spring months) limiting the import capacity allows enough space for the regulating resources to be dispatched.

3.6 The allocation constraints had been modelled as ex-ante reduction of the cross-border capacity for years. Since 17 February 2022 ex-ante reductions have been no longer applied and the market coupling algorithm has been tasked to ensure that Italy is not globally importing on its northern borders more than what is allowed by the allocation constraint.

3.7 The TSOs check also the so called ramping constraints aimed to mitigate the differences of the NTC values across the market time units. If needed, these constraints cause ex ante reductions of the transmission capacity. For these constraints a shift into the market coupling algorithm was envisaged as well, but it was not deemed feasible and thus was put on hold.

3.8 In Q4 2021 a dedicated agreement between the EU TSOs and Swissgrid (in the following: Swiss agreement) was stipulated, stating that Swissgrid is bound by the same duties as the EU TSOs in all the technical processes run for Italy North CCR. This contractual agreement complements the specific technical agreements already developed for the day-ahead and intraday capacity calculation processes, providing the general framework of cooperation for Italy North CCR. The agreement was positively verified by the Italy North CCR national regulatory authorities.

3.b 2023 derogations

3.9 For the year 2023 Terna asked for a derogation according to the article 16(9) of the Regulation (EU) 2019/943:

- on import capacity for all the market time units impacted by allocation constraints: their presence might, in fact, lead to a cross-zonal capacity below the minimum 70% level;
- on export capacity on all the market time units pending the implementation of the export corner.

3.10 ARERA approved Terna's request in December 2022 with Decision 706/2022/R/eel[12]: the TSO committed to provide ARERA with all the information needed for monitoring the level of cross border capacity offered on the northern borders.

3.c 70% adjustment

3.11 In a cNTC area as Italy North CCR currently is, NTC is usually computed by adopting and iterative approach, evaluating at each step the exchange across the border by the mean of a full AC load flow (i.e., taking into account the transmission losses and the voltage profile): the process ends when a constraint is detected. The maximum exchange without hitting any constraints is assumed as the Total Transmission Capacity TTC_b on the considered border *b*.

3.12 Let F_i^{last} be the flow on the CNEC *i* at the very last step of the cNTC process, i.e. in the iteration when the gross cross-zonal capacity TTC_b is identified. Let $PTDF_i^b$ be the PTDF associated to the CNEC *i* because of flows induced by the exchange on the border *b* withing the coordination area. $PTDF_i^b$ is evaluated at the very last step of the cNTC process as well.

3.13 Mimicking the linear approximation adopted in a flow based approach, the flow F_i^0 on the CNEC *i* with no exchanges within the coordinated area can be computed as:

[12] Deliberazione 20 dicembre 2022, 706/2022/R/eel, "Approvazione della richiesta di deroga per il rispetto del livello minimo di capacità da rendere disponibile per gli scambi tra zone di mercato presentata da Terna S.p.A. con riferimento alla regione Italy North per l'anno 2023"

$$F_i^0 = F_i^{last} - \sum_b PTDF_i^b \cdot TTC_b$$

3.14 Then, keeping mimicking the flow based approach that assumes $MCCC_i$ equal to the remaining available margin:

$$MCCC_i = RAM_i = F_i^{max} - F_i^0 - FRM_i = F_i^{max} - F_i^{last} + \sum_b PTDF_i^b \cdot TTC_b - FRM_i$$

where

- FRM_i is the flow reliability margin on the CNEC *i*.

3.15 FRM_i and the transmission reliability margin for the border *b* TRM_b are related as follows:

$$FRM_i = \sum_b PTDF_i^b \cdot TRM_b$$

hence:

$$MCCC_i = F_i^{max} - F_i^{last} + \sum_b PTDF_i^b \cdot TTC_b - FRM_i =$$

$$= F_i^{max} - F_i^{last} + \sum_b PTDF_i^b \cdot (TTC_b - TRM_b)$$

3.16 Since

$$NTC_b = TTC_b - TRM_b$$

it is possible to achieve:

$$MCCC_i = F_i^{max} - F_i^{last} + \sum_b PTDF_i^b \cdot NTC_b$$

3.17 Let's assume that the original computation process ends because of a current constraint, i.e. because a subset of CNECs results fully loaded. This is the common situation for the Italian northern borders.

3.18 For these CNECs (in the following: fully loaded CNECs), $F_i^{last} = F_i^{max}$ hence[13]:

$$MCCC_i = F_i^{max} - F_i^{max} + \sum_b PTDF_i^b \cdot NTC_b = \sum_b PTDF_i^b \cdot NTC_b = MCCC_i^{ACER}$$

3.19 For all the other CNECs, instead:

$$MCCC_i = F_i^{max} - F_i^{last} + \sum_b PTDF_i^b \cdot NTC_b \geq \sum_b PTDF_i^b \cdot NTC_b = MCCC_i^{ACER}$$

3.20 This proves that the formula proposed by ACER underestimates the level of capacity for all the not fully loaded CNECs. The limiting CNECs in ACER Recommendation shall thus be intended as fully loaded CNECs.

[13] For fully loaded CNECs $PTDF_i^b$ is always positive, otherwise the element would not result fully loaded.

3.21 Keeping mimicking the flow based approach and neglecting the previously allocated and nominated capacities[14], the Adjusted Margin AMR_i and the final margin RAM_i^{adj} on the CNEC *i* can be computed as:

$$AMR_i = \max(0{,}7 - MACZT_i; 0)$$

$$RAM_i^{adj} = RAM_i + AMR_i = F_i^{max} - F_i^{last} + \sum_b PTDF_i^b \cdot NTC_b + AMR_i$$

3.22 For sake of simplicity, let the coordination area be composed by a single border. The assumption pretty represents the effectiveness of the Italian northern borders.

3.23 Given what above, the computation of the final margin is simplified as follows:

$$RAM_i^{adj} = RAM_i + AMR_i = F_i^{max} - F_i^{last} + PTDF_i^b \cdot NTC_b + AMR_i$$

3.24 For each CNEC *i* it's then possible to compute the equivalent $NTC_{b,i}^{eq}$ that would fully exploit the RAM_i^{adj}:

$$NTC_{b,i}^{eq} = \frac{RAM_i^{adj}}{PTDF_i^b} = \frac{F_i^{max} - F_i^{last} + PTDF_i^b \cdot NTC_b + AMR_i}{PTDF_i^b}$$
$$= NTC_b + \frac{F_i^{max} - F_i^{last} + AMR_i}{PTDF_i^b} = NTC_b + \Delta NTC_{b,i}^{nused} + \Delta NTC_{b,i}^{AMR}$$

where:

- $\Delta NTC_{b,i}^{nused} = \frac{F_i^{max} - F_i^{last}}{PTDF_i^b}$ is the increase of the cross-zonal capacity associated to the exploitation of the entire thermal capacity on the CNEC *i*;
- $\Delta NTC_{b,i}^{AMR} = \frac{AMR_i}{PTDF_i^b}$ is the increase of the cross-zonal capacity associated to the adjusted margin on the CNEC *i*.

3.25 Eventually, the adjusted cross-zonal capacity NTC_b^{adj} can be computed as:

$$NTC_b^{adj} = \min\left(NTC_{b,i}^{eq}\right) = NTC_b + \Delta NTC_b$$

3.26 The network element *i* having $NTC_{b,i}^{eq} = NTC_b^{adj}$ is considered as the limiting CNEC. On this element $MAZCT_i^{adj} = 0.7$ by definition.

3.27 For each CNEC *i* the flow F_i^{adj} should be calculated by the mean of an AC load flow assuming an exchange equal to $TTC_b^{adj} = NTC_b^{adj} + TRM_b$. Anyhow for sake of simplicity the linear approximation can be kept, since the overall error is negligible. This means:

$$F_i^{adj} = F_i^0 + \sum_b PTDF_i^b \cdot TTC_b^{adj} = F_i^{last} - \sum_b PTDF_i^b \cdot TTC_b + \sum_b PTDF_i^b \cdot TTC_b^{adj}$$
$$= F_i^{last} + \sum_b PTDF_i^b \cdot \left(TTC_b^{adj} - TTC_b\right) \geq F_i^{last}$$

[14] In a cNTC environment, the NTC can be computed neglecting the previously allocated capacities: this means that the NTC represents the whole capacity available on the considered border. The effective capacity offered to the market is then computed deducting the previously allocated one.

3.28 Clearly, some overloads may occur. This is unavoidable if the difference $F_i^{adj} - F_i^{last}$ exceeds the FRM_i on a fully loaded CNEC i, or the sum of the unused capacity plus the FRM_i on the other CNECs: proper remedial actions shall be applied to cope with it.

3.29 Let's consider the case with $\Delta NTC_b = 0$, meaning that at least one CNEC i shows $\Delta NTC_{b,i}^{nused} = \Delta NTC_{b,i}^{AMR} = 0$. It's the case of a fully loaded CNEC (no adjustment associated to full exploitation) already matching the 70% rule (no margin adjustment needed). In other terms, if a fully loaded CNECs matches the 70% rule in the original computation process, there is no need to perform any adjustment process.

3.30 In case no fully loaded CNECs match the 70% rule in the original computation, the adjustment leads to $\Delta NTC_b > 0$. Theoretically, in this case, in order to identify the proper NTC_b^{adj}, all CNECs should be monitored, since each CNEC could turn to be the limiting one.

3.31 For sake of simplicity let the attention be focused only on the fully loaded CNECs. Let $NTC_b^{*adj} = NTC_b + \min \Delta NTC_{b,i,fully}^{AMR} = NTC_b + \Delta NTC_b^*$ be the adjusted NTC value computed looking only at the fully loaded CNECs[15]. This value can either be equal to NTC_b^{adj} (in case $\Delta NTC_b = \Delta NTC_b^* = \min \Delta NTC_{b,i,fully}^{AMR}$) or above NTC_b^{adj} (in case $\Delta NTC_b^* > \Delta NTC_b$).

3.32 Clearly if $NTC_b^{*adj} > NTC_b^{adj}$, the overloads on the CNECs turn to be greater, requiring more remedial actions to be applied. This increases a bit the risk for the TSOs, but it comes with a significantly simpler 70% adjustment process (monitoring only a subset of CNECs).

3.d ***70% validation***

3.33 The NTC_b^{adj} deriving from the adjustment process is subject to a validation process.

3.34 If there was an adjustment to cope with the 70%, firstly a coordinated validation is performed by the regional coordination centre with the aim to check whether there is a proper level of remedial actions to sustain the resulting (increased) transmission capacity. If not, the NTC_b^{adj} is reduced accordingly. In general, thus, the coordinated validation leads to a $NTC_b^{coord} \leq NTC_b^{adj}$.

3.35 The coordinated validation is not needed in case no adjustment is performed, since the AC load flow and the remedial actions optimization process built in with the initial capacity calculation process already ensure the sustainability of the initial NTC_b value. In this case $NTC_b^{coord} = NTC_b$

3.36 The NTC_b^{coord} value is then subject to an individual validation: each involved TSO may ask for a reduction for operational security reasons, indicating the new NTC value that it can sustain. The minimum of the NTC indicated by the TSOs is assumed as the final NTC_b^{valid}.

3.e ***70% assessment***

3.37 If the NTC_b^{adj} stemming out from the 70% adjustment process is confirmed (i.e. no reduction has been applied either in the coordinated or in the individual validation), all the CNECs can be considered compliant with the 70% rule. For all of them an adjusted margin $MACZT_i^{adj} \geq 0.7$ is indeed made available: in some cases it's fully exploited while in other cases not. A

[15] Being fully loaded CNECs, $\Delta NTC_{b,i}^{nused}$ is null by definition.

partial or full exploitation of the margins happens in the flow based environment as well since the allocation phase optimizes the social welfare by identifying the most efficient solution (i.e., the CNECs to fully exploit) within the flow based domain.

3.38 If the NTC_b^{adj} value is reduced in the coordinated validation and the NTC_b^{coord} is confirmed (i.e. no reduction has been asked for in the individual validation by each involved TSO), the 70% rule cannot be considered fulfilled since the limiting CNEC turns to have a final $MACZT_i^{fin} < 0.7$. This situation is explicitly allowed by Article 16(3) of the Regulation (EU) 2019/943: nonetheless the regional coordination centres shall report these kind of reductions. To this extent the effective level of cross-border capacity can be computed as follows:

$$MACZT_i^{fin} = MCCC_i^{fin} + MNCC_i$$

$$MCCC_i^{fin} = \frac{NTC_b^{fin}}{NTC_b^{adj}} MCCC_i^{adj} = \frac{NTC_b^{coord}}{NTC_b^{adj}} MCCC_i^{adj}$$

3.39 If $NTC_b^{valid} < NTC_b^{coord} = NTC_b^{adj}$. (i.e. no reduction has been applied in the coordinated validation, but at least one TSO has asked for a reduction in the individual validation), the 70% rule cannot be considered fulfilled as well, but in this case only the TSOs having asked for the reduction in the individual validation shall be blamed for not matching the 70% rule, all the others being considered compliant since fine with the initial NTC_b^{adj} value. For the blamed TSOs, the $MACZT_i^{fin}$ on the limiting CNEC *i* can be considered as the effective level of cross-zonal capacity made available for cross-border trade. For each TSO this value can be computed as follows:

$$MACZT_i^{TSO} = MCCC_i^{TSO} + MNCC_i$$

$$MCCC_i^{TSO} = \frac{NTC_b^{TSO}}{NTC_b^{adj}} MCCC_i^{adj}$$

where the NTC_b^{TSO} is the NTC value indicated by the involved TSOs in the individual validation.

3.40 In case a reduction is applied both in the coordinated and in the individual validation, the TSOs asking for an individual validation shall be considered responsible for not fulfilling the 70% rule, with:

$$MCCC_i^{TSO} = \frac{NTC_b^{TSO}}{NTC_b^{adj}} MCCC_i^{adj}$$

3.41 For all the other TSOs Article 16(3) of the Regulation (EU) 2019/943 applies.

3.f ***Allocation constraints***

3.42 The allocation constraints are managed directly within the market coupling algorithm. The capacity calculation process is thus not affected and an unconstrained NTC value can be determined (including the 70% adjustment if needed), associated with the corresponding limiting CNEC.

3.43 Eventually the effective level of cross-border capacity made available because of the allocation constraints shall be computed according to the extent of the allocation constraint.

3.44 In particular for Italy North CCR the allocation constraint sets the maximum value NTC_b^{all} of the capacity that can be imported to Italy: since all the borders are considered as a single equivalent one for the capacity calculation process, applying the allocation constraint means limiting the overall capacity on that equivalent border. When an allocation constraint applies, Terna, as the TSO having requested the allocation constraint, shall be assigned:

$$MCCC_i^{all} = \frac{NTC_b^{all}}{NTC_b^{adj}} MCCC_i^{adj}$$

All the others TSOs are instead assigned the value resulting from the assessment of the unconstrained capacity.

3.g <u>ACER monitoring</u>

3.45 For 2023, the Italy North CCR data relevant for the 70% rule were provided by Coreso on behalf of all the TSOs of the region: only the information on the limiting CNEC, along with a proper estimation of MACZT, MCCC and MNCC computed according to ACER Recommendation, was sent. Besides, all the data referred to the import capacity only, while no monitoring on the export capacity was possible, pending the implementation of the export corner.

3.46 Third country flows can be considered against the 70% only in case there is an agreement between the TSOs subject to the approval of the EU NRAs fulfilling all the preconditions set in the letter by European Commission dated 16 July 2019 stipulating at least that:

- third countries network elements are monitored while computing the cross border capacity on EU borders;
- EU network elements are monitored while computing the cross border capacity on third country borders;
- cost sharing rules are in place to split the costs associated to the remedial actions between EU and third country TSOs.

3.47 Figure 1 summarizes the outcome of ACER monitoring for year 2023. ACER published only the data considering the flows induced by third country exchanges (i.e. Switzerland) since it concluded that the agreement signed in late 2021 by the TSOs of the CCR with Swiss TSOs fulfils all the above mentioned preconditions. This represents a significant improvement with respect to the previous monitoring exercises when ACER published the data with and without the third country flows, since it considered that the agreement with Swissgrid was only positively verified and not formally approved by the EU NRAs. For the 2023 monitoring ACER realized that the positive verification can be considered equivalent to the approval foreseeing in the EU Commission letter since a formal approval process can be pursued because not all the NRAs have the power at national level to approve contracts.

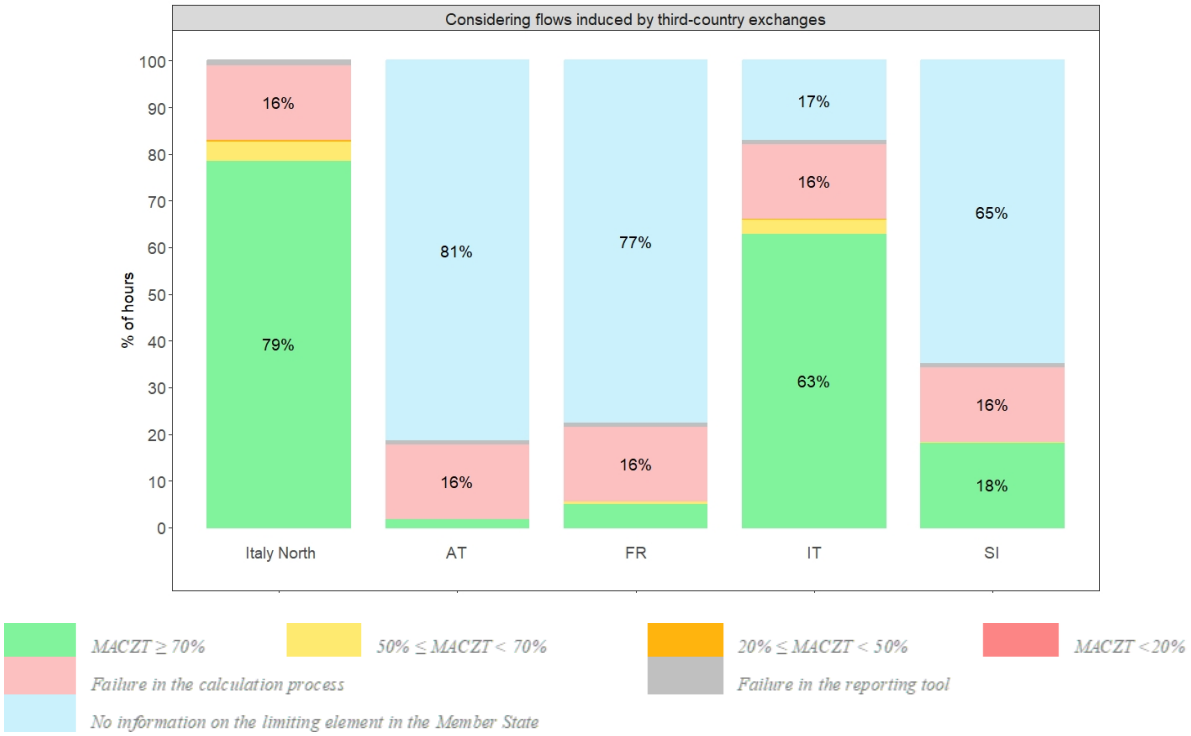

Figure 1 – ACER assessment for Italy North CCR for 2023 – source: ACER report

3.48 Failures occur in 16% of the cases: these includes the market time units for which no data are sent by Coreso because of issues in the capacity calculation process. Some flaws occurred in the reporting tool as well, but they were negligible.

3.49 A global plot of the overall region is given for the first time as well: this is a further significant improvement recognizing that the capacity calculation is a fully coordinated process involving all the borders, and not each single TSO. ACER nonetheless continues providing plots separated for each country in order to show how frequent the limiting CNEC is located in each country,

3.50 Looking at the overall performances, the 70% rule is matched in 79% of the market time units, practically almost all the ones for which the process successfully ran. In 67% of the market time units the limiting CNEC is located within Italy[16], while in 18% in Slovenia. Only in few market time units the limiting CNEC is located in France or in Austria. No data are given for Switzerland since it is not a EU country. It should be noted that in case of interconnectors the limiting CNEC counts twice, one for each country: for this reason the sum of the country percentages overcomes 100%.

3.51 Coreso data refer to the unconstrained capacity that is always computed independent of the presence of an allocation constraint. The impact of these constraints are thus separately evaluated by ACER that concludes that in 73% of the market time units the allocation constraints were not affecting the fulfilment of the 70% rule.

3.h ***ARERA assessment***

3.52 ARERA bases its national assessment of the 70% rule on joint information defined by all the TSOs of the CCR or by the competent RCCs. Namely the following set of data are used:

- the data sent by Coreso to ACER for the 70% monitoring, related to the entire year;

[16] Including the interconnectors.

- the list of the allocation constraints applied in the joint calculation process, provided by Terna to ARERA, related to the entire year;
- the report on the coordinated validation and individual validation submitted by TSCNET to ACER and the national regulatory authorities pursuant to Article 16(3) of Regulation (EU) 2019/943; these reports summarize the reasons behind each reduction of the cross-border capacity, pointing out whether the reduction is due to a coordinated validation or to an individual validation; in the latter case the list of the TSOs asking for the reduction is given as well.

3.53 First the level of cross-border capacity is evaluated looking at all the borders as an equivalent one: the level of cross-zonal capacity made available on the limiting CNEC is depicted, independent of the geographical location of this CNEC. The outcome is reported in Figure 2 (for unconstrained capacity without the information about the allocation constraints, Coreso data are used) and in Figure 3 (highlighting the presence of the allocation constraints for the market time units where the 70% rule is not matched, Coreso data complemented by Terna list about allocation constraints are used).

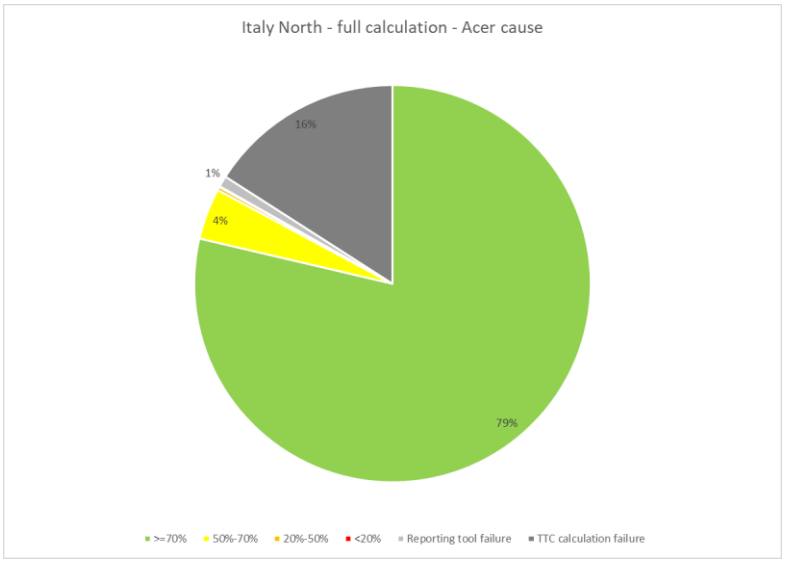

Figure 2 – ARERA assessment for Italy North CCR for 2023 – source: ARERA rielaboration based on Coreso data

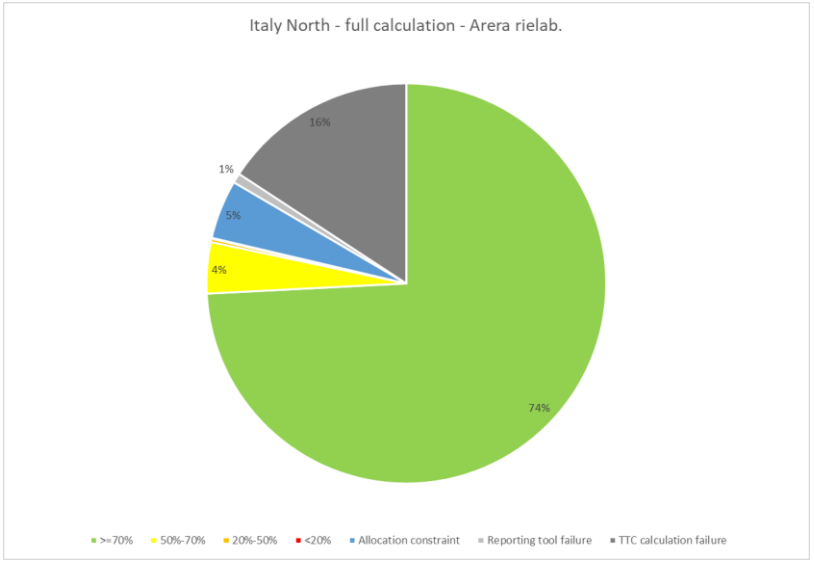

Figure 3 – Assessment with allocation constraints - source: ARERA rielaboration based on Coreso and Terna data

3.54 The 70% rule is respected in 79% of the market time units in case of unconstrained capacity: the data resembles the ACER monitoring exercise, being the initial data the same.

3.55 The allocation constraints limited the cross border capacity in 5% of the market time units. As reflected in Figure 3, the allocation constraints mainly applied when the unconstrained capacity was matching the 70% rule.

3.56 Moving forward, ARERA investigates the reasons behind the level of cross-border capacity below the 70%: looking at the reduction report, it's assessed whether the reduction is due to a coordinated validation or to an individual validation by a specific TSO. The outcome is reported in Figure 4 (no allocation constraints information) and in Figure 5 (with information on allocation constraints).

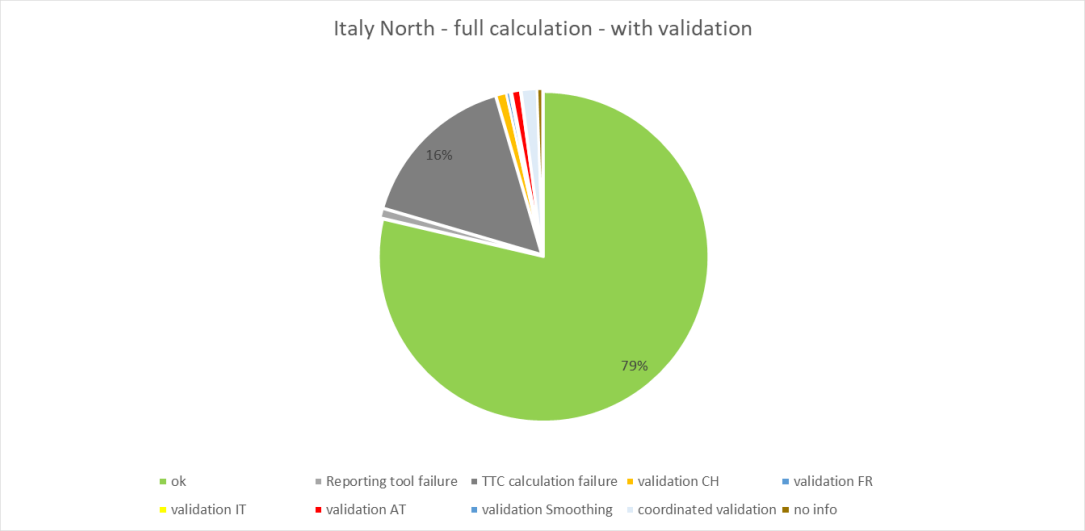

Figure 4 – Validation for Italy North CCR for 2023 – source: ARERA rielaboration based on reduction reports data

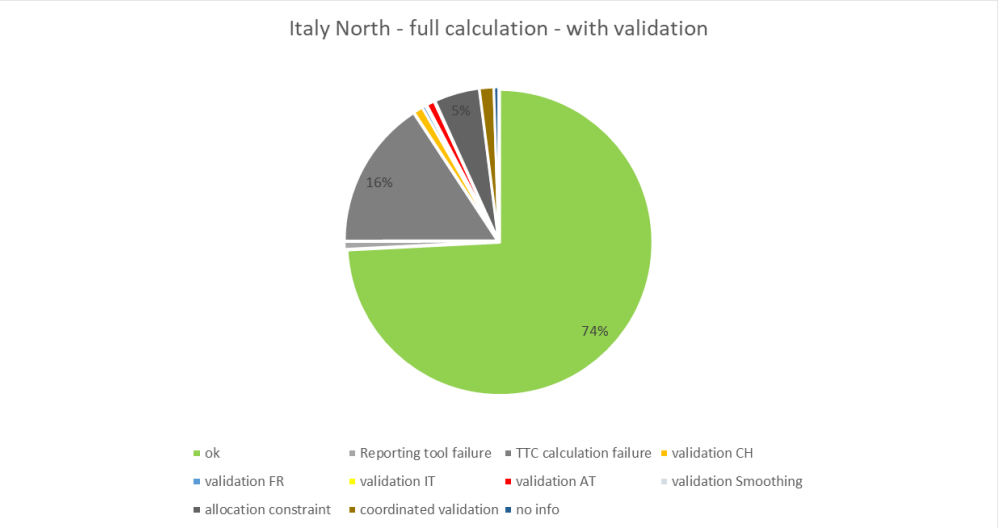

Figure 5 – Validation with allocation constraints – source: ARERA rielaboration based on reduction reports data

3.57 The reductions are mainly due to coordinated validation or to a validation requested by the Swiss TSO or the Austrian TSO (yellow), while negligible validation below the 70% minimum level was requested by the Italian and French TSOs. No individual validations seem to be requested by the Slovenian TSOs.

3.58 The situation does not change considering the impact of the allocation constraints.

3.i ***A comparison between the reports***

3.59 The set of data provided by Coreso allows a comprehensive assessment of the level of cross-border capacity for the Italy North CCR, without the need to account for unilateral estimation by Terna.

3.60 The consistency between the ACER report and the national one is thus ensured. There are nonetheless some differences:

i) ACER performs a separated monitoring of the allocation constraints, while ARERA combines the information about the allocation constraints with the information on the unconstrained capacity, providing a more comprehensive view of the effective impact of such constraints;

ii) ARERA does not limit the assessment at the monitoring of the level of the cross-zonal capacity made available by the TSOs, but it tries understanding the reasons behind level of capacity below the 70%; this investigation is fundamental to identify the TSOs to blame for not offering a proper level of cross-zonal capacity.

3.61 Given what above, Table I summarizes the main findings in terms of responsibilities, taking into account the allocation constraints.

TABLE I – FINDINGS FOR RESPONSIBILITIES IN ITALY NORTH CCR

	70% rule matched	16(3) 70% reduction	IT 70% reduction	FR 70% reduction	AT 70% reduction	CH 70% reduction	Allocation constraints	No info available	Calculation failures	Reporting failures
MTUs	6499	132	15	32	73	87	418	44	1382	69
%	74,19%	1,51%	0,17%	0,37%	0.83%	0,99%	4,77%	0,50%	15,78%	0,79%

3.62 Terna is surely compliant in the green cells because either the 70% is matched by the limiting CNEC (and thus by all the CNECs) or there is an allocation constraint that is covered by the derogation granted by ARERA.

3.63 In the light green cells the level of cross-border capacity is below the 70%, but this is due to a lack of remedial actions (coordinated validation) or by a reduction requested by another TSO. In the former case the reduction is allowed by Article 16(3) of Regulation 2019/943, hence no TSOs can be blamed, while in the latter case Terna can be considered compliant because it accepts the value stemming out from the capacity calculation process and consistent with the 70% rule.

3.64 Terna is surely responsible in the red cell: it asks for a reduction during the individual validation.

3.65 The yellow cell would require a deeper investigation.

3.66 To conclude, Terna is compliant with the provisions of the Regulation 2019/943 in 82,66% of the market time units, while only in the 0,17% surely offered a level of cross-border capacity below the 70%. In the remaining market time units a proper assessment is impossible to achieve because of lack of information or failures in the processes.

3.67 Fulfilling the 70% rule may induce some redispatching to cope with potential overloads in real time. These can be solved firstly by the mean of non-costly remedial actions (e.g. changing the PST taps) and secondly by the mean of costly remedial actions (e.g. redispatching). In particular, according to the estimation sent by Terna to ARERA, a coordinated activation of costly remedial actions was needed only in 8 market time units, with an overall netted cost[17] slightly less than 1 M€; according to the cost sharing rules in place, Terna bore 50% of this cost, while the other 50% is split between the other TSOs, including the Swiss one.

[17] The netted cost comes from the expenses borne for upward calls and the incomes gained from downward calls.

4 Greece-Italy CCR

4.a Capacity calculation process

4.1 Greece-Italy CCR implements a capacity calculation process based on a cNTC approach. The computation is delegated to SEleNe that acts through its regional desk Esperia based in Rome.

4.2 Namely, for the Italy – Greece border the computation is simplified being this border a pure DC interconnection[18]: the full thermal capacity (500 MW) is usually offered to the market, while lower values are made available only in case of congestions in the AC networks in Italy or in Greece.

4.3 For the Italian internal bidding zone borders, a full cNTC approach based on AC flows has been in place since the opening of the electricity market in 2004 monitoring both the current and the voltage constraints. In specific sections (e.g. borders with Sicily) dynamic stability has been considered as well.

4.4 Before the entry into force of the CACM Regulation, NTC values were estimated on a yearly basis and adjusted on a daily basis in case of significant outages or to take into account the expected load and renewable production levels by the mean of proper sensitivities.

4.5 With the entry into force of the CACM Regulation, the capacity calculation process was adjusted to be compliant with the new regulatory framework foreseeing a daily computation. The first version of the capacity calculation methodology was approved in July 2018. During the implementation phase the methodology was further amended to take into account the 70% rule: the final version of the methodology was approved in December 2020 and its implementation ended on 3 August 2021.

4.b 70% adjustment

4.6 There is no 70% adjustment in place for the Greece-Italy border: the capacity offered on this interconnection is reduced only as a last resort measure when the congestion on the AC network in Greece or Italy cannot be solved with other remedial actions.

4.7 For the Italian internal bidding zone border, the capacity calculation process computes the MCCC on all CNECs. MNCC is, instead, alwasy assumed equal to zero: Italy has, in fact, a pretty radial bidding zone configuration, and the capacity on each border can be assumed as independent of the capacity on other borders.

4.8 At each iteration current constraints are monitored only on the CNECs i having a $MCCC_i$ greater than 70%: this ensures that a fully loaded CNEC is always matching the 70% rule already during the initial calculation process without the need to introduce a specific 70% adjustment as the one in place for Italy North CCR. The CNECs with lower $MCCC_i$ can thus result overloaded during the calculation process: these violations are then solved by the mean of redispatching within the integrated scheduling process[19].

4.9 The capacity calculation process may also stop in case a voltage or stability constraint is hit.

[18] There is one DC cable from Galatina in Italy to Arachthos in Greece.

[19] Italy is adopting a central dispatch approach. There is an integrated scheduling process for the optimization of redispatching and the procurement of the ancillary service market. Until 2024 the integrated scheduling process is run within the so called Mercato per il Servizio di Dispacciamento (MSD) that has been in place since the opening of the electricity market in 2004. On 1st January 2025 MSD will evolve into a Balancing and Redispatching Market, coordinating the integrated scheduling process and the balancing platforms developed at EU level.

4.10 From a theoretical point of view, in those cases, the level of cross-zonal capacity should be monitored by looking at all the CNECs: a proper formula should be developed in order to take into account the unused capacity on each CNEC. If no CNECs match the 70% rule, an adjustment process should be run and a proper NTC increase determined. Practically in these cases the 70% adjustment process cannot be performed. When voltage and stability issues occur, the system has already been optimized: this means that an increase of the transmission capacity cannot be sustained because of lack of further regulating capacities. In other terms in those cases only checking the effective level of transmission capacity made available to the market is possible, while any further adjustment is usually out of scope and the TSOs should live with the NTC value coming out from original capacity calculation process.

4.11 In those cases, moreover, the lack of further regulating resources can be assimilated to a lack of proper remedial actions triggering the activation of Article 16(3) of the Regulation (EU) 2019/943, allowing for a reduction of the level of cross-border capacity below 70%.

4.c ***ACER monitoring***

4.12 Figure 6 reports the ACER assessment for Greece-Italy CCR. Differently from the previous reports, ACER grouped the DC Borders within the CCR they belong to. Hence there is a single plot with all the internal bidding zone borders and the Greece-Italy interconnection; the latter is reported twice, one based on the data made available on the Italian side and the other based on the data made available on Greek side[20].

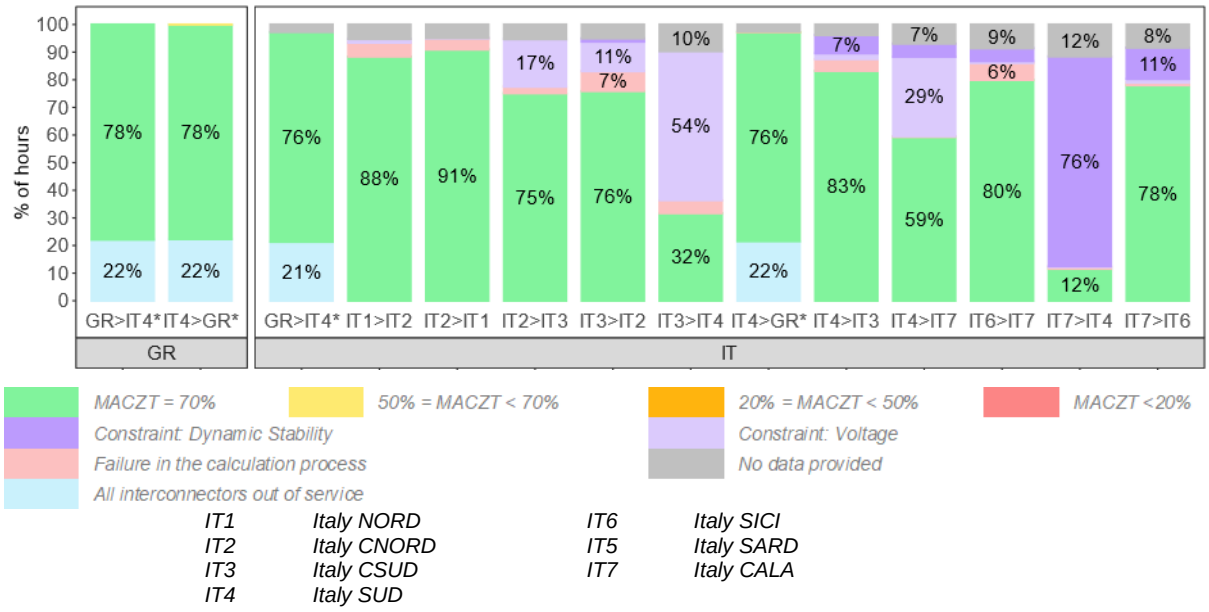

Figure 6 – ACER assessment for Greece-Italy CCR for 2023 – source: ACER report

4.13 Greece Italy interconnection underwent the usual planned maintenance during May and June and was occasionally disconnected for other minor maintenances during the year. Looking at Greek data the 70% rule was fully fulfilled whenever the cable was in operation, while the Italian data lack some market time units (see grey area on top).

4.14 The borders with Sardinia (IT5) are not considered, since for them no MACZT information was given because the related cross-zonal capacity is always limited by the operational stability of the Sardinia network.

[20] Unfortunately for this interconnection the data are still sent in an uncoordinated manner.

4.15 Neglecting the grey (missing data), pink (failure), light and dark purple (voltage and stability constraints) areas, the 70% rule is matched almost everywhere.

4.d ***ARERA assessment***

4.16 ARERA bases its own assessment on the specific reports sent by Terna that resemble the same database sent by Esperia to ACER. The results are depicted in Figure 7.

4.17 10 days (240 market time units) are missing for the Italian internal bidding zone borders because of issues in the input data preparation and in the communication between Terna and the competent regional coordination centre. Similar issues occurred for the Greece-Italy interconnection in 11 days (264 market time units).

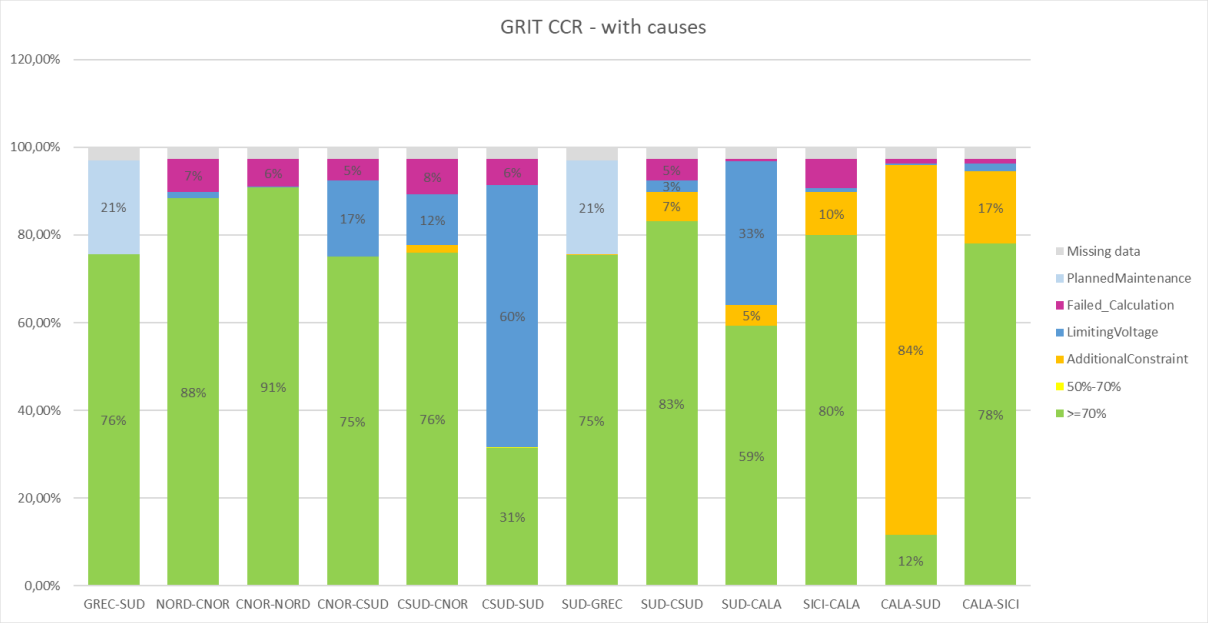

Figure 7 – ARERA assessment for Greece-Italy CCR for 2023 – ARERA rielaboration based on Esperia data

4.18 In the Italy-Greece direction the results are pretty similar to ACER findings. It is only worth noticing that some reduction occurred in 18 market time units because of congestions occurring in the Italian network close to the Italian cable station. These reductions are a last resort measure adopted because of lack of remedial actions: hence Article 16/3) of the Regulation (EU) 2019/943 applies, hence no TSOs can be blamed.

4.19 For Italian internal bidding zone borders the green area (70% rule fulfilled) are fully consistent with ACER report, while some differences arise when looking at the voltage and additional (mainly stability) constraints. It seems that ACER has a slight different classification of these kind of constraints, but the sum of the blue (voltage) and orange (stability/additional constraint) are pretty the same.

4.20 More in details in some borders (e.g. CSUD-SUD) the voltage constraints (blue) are quite relevant, while for other borders (e.g. CALA-SUD) other additional constraints (orange) play the most relevant role. In both cases these constraints can be related to lack of proper regulating capacities, witnessing that no alternative remedial actions could be introduced to further increase the level of the cross-border capacity.

4.21 Terna can be thus considered compliant in almost all the market time units, with only 25 cases not matching the 70% rule.

4.22 For each market time unit and border, Terna evaluated the maximum sustainable NTC, i.e the cross-zonal capacity without the application of the 70% rule respecting all the operational

security constraints without any violations. In general there is no significant difference with the value fulfilling the 70% rule, but there are a few market time units, especially on the CSUD-SUD border, where the application of the 70% rule leaded to a cross-zonal capacity significantly higher than the maximum sustainable NTC.

4.23 In most cases, nonetheless, the flows resulting from the market results were below the maximum sustainable NTC[21] Only in few cases on the borders NORD-CNORD, CNORD-CSUD, CSUD-CNORD, SUD-CSUD, CALA-SUD, CALA-SICI the market flows exceeded the maximum sustainable NTC, triggering the activation of proper remedial actions. Terna nonetheless stated that the overall cost for these remedial actions was not relevant.

5 Conclusions

5.1 From a pure legal perspective, the granting of a derogation for Italy North CCR exempted Terna from any obligation stemming from the application of the 70% rule on Northern borders in all the market time units with allocation constraints.

5.2 In the above-mentioned situations, Terna legal compliance is thus guaranteed by definition, while in all the other cases (Italy – Greece border, Italian internal bidding zone borders and Italy North without allocation constraints) the 70% compliance shall be properly assessed.

5.3 In Italy North CCR the analysis of the reduction reports allows to better understand the reasons behind a missing 70% rule fulfilment. Terna gets a positive assessment (including the allocation constraints) in more than 82% of the market time units, being surely responsible for not fulfilling the 70% rule in only 0,17% of the time. In all the other market time units the assessment is not possible due to failure in the reporting tool or within the capacity calculation process.

5.4 In Greece-Italy CCR, the Greece-Italy border performed quite well with almost all of the market time units matching the 70% rule. There are also 264 market time units with missing data (on Italian side), much more than in the previous years.

5.5 For the Italian internal bidding zone borders the 70% adjustment within the capacity calculation process ensured the fulfilment of the 70% rule in almost all the cases. Due to specificities of the Italian transmission network, voltage and stability constraints play a significant role in a number of borders; anyhow in all these cases, Article 16(3) of the Regulation 2019/943 applies and a reduction below the 70% is allowed because these constraints indicate a lack of alternative remedial actions. Hence the overall performance by Terna is outstanding, practically leaving the problems only to the missing data and failed calculation.

5.6 Coming to a comparison between ACER and ARERA results, when relying on consistent datasets the two entities get pretty similar results.

5.7 Nonetheless some differences pop up. In particular ARERA investigates the reasons behind the missing 70% rule fulfilment, while ACER limits pointing out the low level of cross-zonal capacity made available by the TSOs without any further investigations.

5.8 For the future, ARERA is satisfied with the very good performances shown by Terna in fulfilling the 70% rule. Nonetheless there are still a significant number of market time units with missing data or failure in the capacity calculation process or in the reporting tool. Terna should cooperate with the competent regional coordination centres to reduce the extent of these situations.

[21] For example, market flows were usually from SUD to CSUD, not exploiting the NTC on CSUD-SUD border.