

**DECISION No 07/2021
OF THE EUROPEAN UNION AGENCY
FOR THE COOPERATION OF ENERGY REGULATORS**

of 14 June 2021

**on the Amendment of the Methodology for Coordinating Operational
Security Analysis**

THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY
REGULATORS,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators¹, and, in particular, Article 5(2) thereof,

Having regard to Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation², and, in particular, Article 6(2)(c) and Article 7(4) thereof,

Having regard to the outcome of the consultation with all national regulatory authorities and transmission system operators,

Having regard to the outcome of the consultation with ACER's Electricity Working Group ('AEWG'),

Having regard to the favourable opinion of the Board of Regulators of 1 June 2021, delivered pursuant to Article 22(5)(a) of Regulation (EU) 2019/942,

Whereas:

¹ OJ L158, 14.6.2019, p. 22.

² OJ L 220, 25.8.2017, p. 1.

1. INTRODUCTION

- (1) Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (the ‘SO Regulation’) laid down a range of requirements for operational security analysis coordination, including requirements for the development of a methodology for coordinating operational security analysis (‘CSAM’) in accordance with Article 75 of the SO Regulation.
- (2) On 19 June 2019, ACER issued its Decision No 07/2019 on the all transmission system operators’ (‘TSOs’) proposal for a methodology for coordinating operational security analysis³. In accordance with this decision, no later than 18 months after the adoption of the CSAM, all TSOs had to jointly develop a proposal for amendments to Articles 21 and 27 of the CSAM in accordance with Article 7(4) and pursuant to Article 75 of the SO Regulation. Pursuant to Article 5(2) of Regulation (EU) 2019/942, where proposals for common terms and conditions or methodologies or their amendments, as the case might be, require the approval of all regulatory authorities, those proposals shall be submitted to ACER for revision and approval.
- (3) Accordingly, on 18 December 2020, all TSOs submitted to ACER a proposal for amendment to the CSAM (‘proposal for amendment’). The present Decision revises and approves the proposal for amendment. Annex I to this Decision sets out the amended CSAM, pursuant to Article 75 of the SO Regulation.

2. PROCEDURE

2.1. Proceedings before ACER

- (4) On 13 August 2020, all TSOs published the proposed amendments⁴ to Articles 21 and 27 of the CSAM developed in accordance with Article 75(1) of the SO Regulation for public consultation, in accordance with Articles 7(4) and 11 of the SO Regulation. The consultation lasted from 13 August 2020 until 23 September 2020.
- (5) On 18 December 2020, all TSOs submitted their proposal for amendment to the CSAM to ACER for decision. During the decision making process, ACER closely cooperated with all regulatory authorities and TSOs and further consulted on the proposed

³ ACER Decision No 07/2019

https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2007-2019%20on%20all%20TSOs%27%20proposal%20for%20CSAM.pdf

and

https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/ANNEXESTODECISIONOFTHEAGENCYNo072019/Annex%20I%20-%20ACER%20Decision%20on%20CSAM.pdf

⁴ [Amendments to the Coordinated Security Analysis methodology \(SO GL Art. 75\) - European Network of Transmission System Operators for Electricity - Citizen Space \(entsoe.eu\)](#)

amendments during teleconferences, virtual meetings and through exchanges of textual amendments via emails. In particular, the following procedural steps were taken:

- 20 January 2021: teleconference with all regulatory authorities and TSOs;
- 28 January 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 27 January 2021: teleconference with all regulatory authorities and TSOs;
- 2 February 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 3 February 2021: teleconference with all regulatory authorities and TSOs;
- 17 February 2021: teleconference with all regulatory authorities and TSOs;
- 19 February 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 25 February 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 4 March 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 10 March 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 11 March 2021: discussion with all regulatory authorities in the framework of the SOGC Task Force;
- 16 March 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 17 March 2021: teleconference with all regulatory authorities and TSOs;
- 24 March 2021: teleconference with all regulatory authorities and TSOs to discuss mapping;
- 31 March 2021: teleconference with all regulatory authorities and TSOs;
- 15 April 2021: Oral hearing with all regulatory authorities and TSOs;
- 19 April 2021: Oral hearing with RTE and Terna;
- 20 April 2021: Oral hearing with CREG;

- 11 May 2019: discussion with all regulatory authorities at the Electricity Working Group meeting.

(6) The AEWG submitted its advice on 14 May 2021, endorsing the draft ACER Decision. The AEWG stated that the Decision was discussed extensively within the System Operation Coordination Group (SOCG) and that a final discussion took place at the 11 May AEWG meeting. The AEWG's advice also stated that no comments on the content were submitted during the meeting or submitted during the commenting phase.

3. THE AGENCY'S COMPETENCE TO DECIDE ON THE PROPOSAL FOR AMENDMENT

(7) According to Article 7(4) of the SO Regulation, TSOs responsible for developing a proposal for terms and conditions or methodologies may propose amendments of these terms and conditions or methodologies, and those proposals for amendments shall be approved in accordance with the procedure set out in Articles 5 and 6 of the same Regulation.

(8) According to Article 6(2)(c) of the SO Regulation, proposals related to coordinating operational security analysis shall be subject to approval by ACER.

(9) According to Article 5(2)(b) of Regulation (EU) 2019/942, proposals for terms and conditions or methodologies, based on network codes and guidelines adopted before 4 July 2019 (i.e. the SO Regulation), which require the approval of all regulatory authorities, shall be submitted to ACER for revision and approval.

(10) Therefore, on the basis of those legal provisions, ACER is competent to adopt a decision on the proposed amendments of the CSAM submitted on 18 December 2020 by all TSOs to ACER for revision and approval.

4. SUMMARY OF THE PROPOSAL FOR AMENDMENT

(11) The proposal for amendment includes the following elements:

- a. General additional recommendations to be included in CSAM's Recitals;
- b. Proposal for an additional definition to be added to Definitions and Interpretations
- c. Remedial action inclusion in individual grid models in Article 21;
- d. Rules for overlapping zones, cross-border relevant network elements ('XNEs') and cross-border relevant remedial actions ('XRAs') in Article 27;
- e. Rules for the remaining available margin of an overlapping XNE in Annex II.

(12) The proposal for amendment therefore consists of the following amendments of the CSAM previously approved by ACER:

- a. Addition of a paragraph to the Recitals referring to the establishment of regional coordination centres;
- b. Addition of a paragraph in Article 2 with a new definition on ‘Setpoint’;
- c. Addition of several paragraphs in Article 21 on inclusion of remedial actions in individual grid models;
- d. Addition of several paragraphs in Article 27 on overlapping zones, cross-border relevant network elements (‘XNEs’) and cross-border relevant remedial actions (‘XRAs’);
- e. Addition of an Annex II providing the rules for the remaining available margin on an overlapping XNE with the conservative approach.

5. SUMMARY OF THE OBSERVATIONS RECEIVED BY THE AGENCY

5.1. Consultation of regulatory authorities and TSOs

(13) ACER, in close cooperation and consultation with all regulatory authorities and TSOs as detailed in paragraph (5) above, and beyond the above-mentioned issues:

- a. discussed ACER’s suggestion to remove paragraph 5 of Article 21 because it does not seem to set out a clear rule;
- b. discussed editorial changes to paragraphs 7, 8, 9 and 10 of Article 21, aiming at improving clarity;
- c. clarified the details about the appointment of overlapping XNEs and overlapping XRAs;
- d. discussed the application of day-ahead and intra-day coordinated regional operational security assessment and the requirements to the conservative approach at CCR level, or a cross-regional process. ACER, regulatory authorities and TSOs also discussed and refined the differences in treatment of overlapping and non-overlapping XNEs at the cross-regional process;
- e. discussed and refined the solution of mapping the cross-regional process’ costs to overlapping XNEs, which includes the simulations and a mathematical formulation. ACER, regulatory authorities and TSOs also discussed and agreed on sharing of these costs among the involved CCRs; and
- f. discussed possible solutions of cross-regional process’ costs sharing within each CCR, and found the plausible solution suitable for all TSOs.

5.2. Hearing phase

(14) ACER initiated the hearing phase on 7 April 2021 by providing all TSOs and regulatory authorities with a near final draft of Annex I to this Decision, as well as the reasoning for

the introduced changes to the proposed amendments. The hearing phase lasted until 21 April 2021. During this time, ACER organised an oral hearing on 15 April 2021 with regulatory authorities and TSOs and received written responses from BNetzA CREG, Terna, RTE and, PSE. Upon request, ACER also organised a joint oral hearing with Terna and RTE and an oral hearing with CREG.

- (15) The written submissions received provided amendments to the text for clarity, as well as covered the following topics:
- a. BNetzA demonstrated support for the CSAM revisions introduced by ACER; BNetzA suggested that the methodology for the identification of overlapping XNEs would have to be assessed/ evaluated sometime after the implementation (e.g. 24 months) in order to increase transparency and manage expectations.
 - b. PSE emphasised that the CSAM is a pan-European methodology and should be a source of requirements for regional methodologies and that reference to the provisions of the regional methodologies in accordance with article 76 of the SO Regulation (as in article 21(6) and, related to it, 21(4)) contradicts these assumptions and allows different approaches in individual CCRs. PSE stated that the proposed article 21(5) does not take into account TSOs using the central dispatching model and proposed amendments to this article. PSE added that Article 21 does not define if and how the injections and withdrawals shall be modified in subsequent IGMs in case of change in the market outcome (including integrated scheduling process) and that there is no clear way to proceed in a situation where a generating unit, which is used as an XRA, changes its operating point due to the market activities (which includes integrated scheduling process). Furthermore, PSE argued that it is necessary to ensure in the CSA process a distinction between TSOs internal congestions (non-cross-border relevant congestions) and congestions which have cross-border relevance, and that internal congestions should be solved before the regional optimisation.
 - c. CREG proposed two additional changes to the CSAM which were not discussed during the oral hearing because they did not fit the scope of the amendments discussed: the first suggested change was to remove Article 15(2) of the CSAM, which stipulates that the ROSC shall define the rules/criteria to establish XNEs which are eligible for cost sharing or not; the second suggested change proposed to refer to the provision of Article 75(6) of the SO Regulation in the CSAM, of Article 37 (forecast of intermittent generation) and of Article 38 (forecast of load) to provide a basis for ensuring compliance by TSOs on this point. On the changes proposed by CREG, ACER clarified that introducing these amendments would require proper discussion and consultation; nevertheless, ACER remains conscious of the issue and intends to request this amendment from TSOs at a suitable time.
 - d. RTE and TERNA jointly commented Article 27(6), namely regarding the conservative approach. RTE and TERNA explained that this should be

supported only for the intraday timeframe and not for the day-ahead timeframe, since this would add strong restrictions for optimising the XRAs, lead to unfeasible optimisation in certain cases and increase the related expenses. RTE and TERNAL suggested the rewording of Article 27(6) with a goal to apply the current coordination mechanisms in the interim period (after the application of CROSAs and before the application of cross-regional process), where TSOs would be able to define limitations in neighbouring CCRs in order to limit the risks of residual congestions.

(16) During the oral hearing of 15 April 2021, participants discussed the points raised by RTE and TERNAL, mainly regarding ACER's proposed revisions to Article 21(3) and Article 27(6), (9), (14) and (19):

- Regarding Article 21(3), participants discussed the possible deletion of this paragraph.
- Regarding Article 27(6), some participants mentioned that the conservative approach could be too constraining if applied also in the day-ahead timeframe, and discussed a compromise solution that, in that interim period (after the implementation of regional ROSCs and before the implementation of the cross-regional process), the currently applied processes of managing the residual congestions at day-ahead level can take place.
- Regarding Article 27(9), participants discussed the possibility to include the non-overlapping XNEs in the cross-regional process.
- Regarding Article 27(14), participants supported ACER's revisions regarding the need to assign the eventual portion of overload unresolved at the regional CROSA, to the native CCR.
- Regarding Article 27(19), on the basis of the previous discussions (also under paragraph (6)), participants suggested to shorten the implementation timeline to 6 months (instead of 18 months).

(17) During the oral hearing with Terna and RTE on 19 April 2021, participants discussed some of the same points that were covered in the oral hearing of 15 April, namely covering topics of concern regarding Article 27(6), and in particular regarding the conservative approach; RTE and Terna suggested that all TSOs and regulatory authorities agree on the target solution and reduce the interim period of time to reach this preferred solution.

(18) During the oral hearing with CREG on 20 April 2021, CREG raised a point that had not been discussed in the context of the discussions between ACER and regulatory authorities and TSOs. ACER clarified that this decision was about a scheduled amendment of the CSAM limited in scope to Articles 21 and 27 and that any other amendments to the CSAM within this process would require proper discussion and

consultation; nevertheless, ACER remains conscious of the issue and intends to request this amendment from TSOs at a suitable time.

6. ASSESSMENT OF THE PROPOSAL FOR AMENDMENT

6.1. Legal framework

- (19) Articles 5(1), 5(2) and 6(2)(c) of the SO Regulation require all TSOs to propose a methodology for coordinating operational security analysis in accordance with Article 75(1) of the SO Regulation for regulatory approval, and Article 7(4) of the same Regulation allows those TSOs to propose amendments to the approved methodology for regulatory approval.
- (20) Article 7 of the SO Regulation provides that the TSOs responsible for developing a proposal for terms and conditions or methodologies may propose amendments to regulatory authorities and ACER, and that proposals for amendment to the terms and conditions or methodologies shall be approved in accordance with the procedure set out in Articles 5 and 6 of the SO Regulation.
- (21) Article 4 of the SO Regulation lists the objectives and regulatory aspects which are relevant for this proposal for amendment.
- (22) Article 20 of the SO Regulation introduces remedial actions as a means to manage operational security violations. Remedial actions that will relieve operational security violations are part of the outcome of the coordinated operational security analysis.
- (23) Articles 21 and 22 of the SO Regulation set out the principles for activating and coordinating remedial actions, as well as the criteria for selecting the appropriate remedial actions and introduce categories for remedial actions. These principles, criteria and categories need to be respected during the coordinated operational security analysis.
- (24) Article 70 of the SO Regulation contains provisions for the development of the methodology for building day-ahead and intraday common grid models.
- (25) Article 76 of the SO Regulation lays down the requirements for the proposal for regional security coordination which will be established by TSOs of the different capacity calculation regions ('CCRs') after the approval of the Proposal.
- (26) Article 21 of the CSAM introduces the requirements for remedial actions inclusion in individual grid models; Article 21(6) provides that no later than eighteen months after the adoption of the CSAM all TSOs shall jointly develop a proposal for its amendment in accordance with Article 7(4) of the SO Regulation, and lays down the rules for the proposal to complement the CSAM.
- (27) Article 27 of the CSAM provides the rules for the overlapping zones, XNEs and XRAs; Article 27(3) provides that no later than eighteen months after the adoption of the CSAM,

all TSOs shall jointly develop a proposal for its amendment in accordance with Article 7(4) of the SO Regulation, and lays down the rules for the proposal to complement the CSAM.

- (28) As a general requirement, Article 6(6) of the SO Regulation requires that the proposal for terms and conditions or methodologies include a proposed timescale for their implementation and a description of their impact on the objectives of the same Regulation.

6.2. Assessment of the legal requirements

6.2.1. Assessment of the requirements for the development and for the content of the proposal for amendment

6.2.1.1. Development of the proposal for amendment

- (29) The Proposal fulfils the requirements of Articles 5(1), 5(2) and 6(2)(c) of the SO Regulation, as all TSOs jointly developed and submitted the agreed proposal for amendment to ACER for approval and revision. This is also in accordance with Article 5(2) of Regulation (EU) 2019/942.

- (30) The Proposal fulfils the requirements of Article 21 and 27 of the CSAM approved by ACER in June 2019, as the proposal for amendment, was submitted by all TSOs on 18 December 2020, which is within the eighteen months submission deadline.

- (31) The Proposal was subject to consultation as described in Section 2.1 above thereby fulfilling the requirements of Articles 7(4) and 11 of the SO Regulation.

6.2.1.2. Required content of the proposal for amendment of Article 21

- (32) The proposal for amendment fulfils the requirements of Article 21(6) of the CSAM approved by ACER in June 2019, as the proposal for amendment complements the methodology with rules on distinguishing between:

- a. up-to-date load and generation forecasts and network topology considered within the individual grid model which are not aiming at addressing expected operational security violations identified during the local preliminary assessment and are therefore not considered as remedial actions; and
- b. the expected generation and load, as well as, network topology considered within the individual grid model, which are aiming at addressing expected operational security violations identified during the local preliminary assessment and are therefore considered as remedial actions.

6.2.1.3. Required content of the proposal for amendment of Article 27

- (33) The proposal for amendment fulfils the requirements of Article 27(3) of the CSAM approved by ACER in June 2019, as it complements the methodology with:

- a. rules for the identification and definition of overlapping XNEs, overlapping zones and impacting CCRs;
 - b. rules for the identification of an impacting CCR and the competent RSC(s) that shall be responsible to first address operational security violations on overlapping XNEs at a regional level (so-called ‘native CCR’). ACER refined the proposal for amendment with details of appointing different overlapping XNEs to the native CCR, and rules for reassessment of this appointment. Shared responsibility was not incorporated in the CSAM amendment, but the entire responsibility for the addressing of operational security violations is appointed to a single (native) CCR;
 - c. rules for the identification of overlapping XRAs that may be used to address residual operational security violations;
- (34) The proposal for amendment partially fulfils the requirements of Article 27(3) of the CSAM approved by ACER in June 2019, as it complements the methodology with the principles and rules for consistent interaction between coordinated regional and cross-regional operational security assessments and the rules for the identification of the most economically efficient remedial actions to address residual operational security violations at cross-regional level. ACER revised these provisions by:
- a. further explaining the possibilities for the application of the conservative approach at regional level;
 - b. introducing regular interactions among the CCRs in the interim period before the implementation of cross regional process; and
 - c. narrowing the application of cross-regional process solely to the overlapping XNEs.
- (35) The proposal for amendment partially fulfils the requirements of Article 27(3) of the CSAM approved by ACER in June 2019, as it complements the CSAM with the rules for the sharing of costs of the overlapping XRAs activated to address the residual operational security violations by assigning the shares of costs to individual overlapping XNEs and to individual impacting CCRs. In cooperation with the regulatory authorities and TSOs, the methodology for mapping the cross-regional costs to the overlapping XNEs has been defined in a form suitable for the cross-regional process. Also the rules for sharing the cross-regional costs among CCRs and within each CCR are detailed and refined in Article 27, at paragraphs (13) – (17).
- 6.2.1.4. Proposed timescale for implementation*
- (36) The proposal for amendment does not contain specific timelines for implementation though the CSAM approved by ACER in June 2019 does so in Articles 46(2) and 46(8). Therefore, in the absence of any specific timescale for implementation in the proposal for amendment, ACER considers it appropriate that the timelines for implementation similar to the ones for the CSAM approved by ACER in June 2019 apply.

- (37) However, for the implementation of Articles 27 of the proposal for amendment and Article 30 of the CSAM approved by ACER in June 2019 a different timeline is required, in accordance with Article 46(8) of the CSAM approved by ACER in June 2019. In cooperation with regulatory authorities and TSOs, it has been agreed to implement the requirements of Articles 27 and 30 among CCRs with mutual impact, 18 months after the last CCR applies the Regional Operational Security Coordination pursuant to Article 76 of the SO Regulation. The shorter timescale has been discussed as well, however after further discussions and considerations, ACER proposed to leave the originally envisaged implementation time of 18 months. Although TSOs announce readiness for a shorter implementation timeline, ACER is of the opinion that a short timeline for the cross-regional process implementation would inevitably lead to starting the preparation of cross-regional implementation already in parallel with the final phase of regional ROSC implementation. Such parallelism might interfere and slow down the regional ROSC preparation, which is highly undesirable. Due to the formulation, which allows the implementation for “not later than 18 months”, if there were such conditions, TSOs might apply the cross-regional earlier.

6.2.1.5. Expected impact of the methodology

- (38) The proposal for amendment provides an explanation of the proposed changes to Articles 21 and 27 in its explanatory note; no further recitals were included by TSOs in the proposal for amendment. ACER considers that all the relevant objectives of the SO Regulation have already been addressed in the recitals of the CSAM approved by ACER in June 2019, and since the proposal for amendments does not alter or impact the fulfilment of these objectives, ACER considers that no further additions to the existing recitals of the CSAM approved by ACER in June 2019 would be necessary.

6.3. ACER revisions of the proposal for amendment with regard to Article 21

- (39) Paragraph 4 of Article 21 of the proposal for amendment details that it is possible to include some XRAs in the initial Day-Ahead IGM after local preliminary assessment, but XRAs can be included to subsequent IGMs only if agreed upon through a coordinated process in accordance with paragraph 6 of Article 21 of the proposal for amendment.
- (40) Paragraph 3 of Article 21 of the proposal for amendment deals with a local preliminary assessment; however, it fails to provide clear rules for the implementation and speaks only of unrestricted possibilities available to TSOs. Upon the agreement with the TSOs and regulatory authorities, ACER chose to remove this paragraph.
- (41) In paragraph 5 of Article 21 of the proposal for amendment, a clear reference to the latest market schedules and Load/RES forecasts is provided as a basis to determine injections and withdrawals. Any deviations from these latest assumptions inserted by TSOs in their IGMs will be considered and tracked as ‘remedial actions’. While not changing the meaning of the TSOs’ proposal for amendment, ACER clarified in the second sentence of the provision that it is the TSOs that need to determine the injections and withdrawals based on the latest market schedules and forecasts or schedules from the integrated scheduling process. This is to take into account the cases where integrated scheduling

processes exist, and in this regard, ACER also removed the reference to ROSC methodologies.

- (42) Also, concerning the preparation of the individual grid models in the day-ahead timeframe, as set out in paragraph 6 of Article 21 of the proposal for amendment, ACER removed the reference to the ROSC methodologies developed in accordance with Article 76(1) of the SO Regulation because the CSAM is a source of requirements for regional methodologies and not the other way around.
- (43) Regarding the network topology considered within the first day-ahead individual grid models, no distinction is made between forecast and remedial action for the status or set point of network elements. Such a remedial action can only be determined when a clear reference status is defined based on external parameters and in particular after the merging of the individual grid models. This is prescribed in paragraph 7 of Article 21 of the proposal for amendment.
- (44) ACER improved the readability of paragraph 6 of Article 21 of the proposal for amendment without changing the meaning. This paragraph details that all subsequent individual grid models in the day-ahead and intraday timeframes shall modify or include new XRAs, compared to the previous IGMs, on topology, setpoints, injections or withdrawals, only if:
- a. these XRAs are agreed upon in the latest ROSC according to the methodology pursuant to Article 76 of the SO Regulation; or
 - b. the change is related to the XRAs, which they are no longer technically available.

6.4. ACER revisions of the proposal for amendment with regard to Article 27

6.4.1. Appointment of overlapping XNEs and overlapping XRAs

- (45) In paragraph 2 of Article 27, ACER explicitly defined how the different types of XNEs are treated regarding the appointment to a native CCR, where the congestions are resolved first, at regional level. The solution for the eventual revision of such appointment has also been defined.
- (46) In paragraph 5 of Article 27, on the basis of the proposal of the German regulatory authority, in agreement with all regulatory authorities and TSOs, the obligation to reassess the methodology and the list of overlapping XNEs and overlapping XRAs has been defined.

6.4.2. Coordinated regional operational security assessment and cross-regional coordination process

- (47) ACER amended the proposal for amendment on the application of CROSA at day-ahead level, by adding in paragraph 6 the possibility that a conservative approach can be applied in the interim period before the application of cross-regional process, in case that a

connecting TSO of an overlapping XNE faces severe residual congestions or excessive redispatching costs.

- (48) ACER re-shaped the previous Annex 2 from the proposal for amendment into a new paragraph 8, explaining the principles of the conservative approach. In this paragraph, the term “remaining available margin” has been replaced with “remaining margin” of an actually available capacity of an XNE up to its maximum flow.
- (49) In paragraph 9, ACER changed the proposal for amendment by defining the cross-regional process solely focused on overlapping XNEs, without the inclusion of non-overlapping XNEs. ACER’s position on overloads at non-overlapping XNEs is that they should be left for the subsequent regional CROSAs. High residual overloads can be expected only at overlapping XNEs, other overloads are expected to be small since they would be related to modelling inconsistencies, non-linearity or similar causes. An important reason for this position is that the cross-regional process should be limited to the overlapping area, with minimal number of XNEs (i.e. overlapping XNEs only) and thus the minimal processing time. This is expected to shorten the time of the whole cross-regional process and to facilitate its inclusion in the operational planning sequence.
- (50) In paragraph 11, ACER re-ordered the priority of criteria of the cross-regional process. The main criteria is the removal of overloads without creating new overloads, after the redispatching costs minimisation, and only then the request to minimally alter the results of regional CROSAs.

6.4.3. Sharing of cross-regional coordination costs among CCRs

- (51) During ACER’s extensive discussions with TSOs and regulatory authorities, the methodology of mapping the cross-regional process costs to the overlapping XNEs has been elaborated. The principles of this methodology follow the pattern of similar methodology applied in the ROSC methodologies for CCR Core and CCR of South East Europe, with the additional recognition of shifting the congestions by the linear non-costly remedial actions, such as phase shifting transformers and HVDC lines. The mapping methodology is provided in the Appendix of Article 27.
- (52) ACER improved the description and readability of the cost sharing principles of cross-regional costs among the CCRs, by adding the mathematical formulation in paragraph 14, which has been analysed and verified through the examples.
- (53) In paragraph 15:
- a. according to the proposal by the Slovenian TSO and in agreement with all TSOs and national regulatory authorities, the previously defined threshold of 5% for the inclusion of overlapping XRAs in the cost sharing has been removed;

- b. the additional details have been added on treatment of situations of inconsistent inclusion of agreed XRAs in the subsequent common grid model used for the cross-regional process and related cost sharing.

6.4.4. Sharing of cross-regional coordination costs within each CCR

- (54) After the extensive discussion during the common proceedings, mainly between ACER and the TSOs of Austria, France, Italy and Slovenia, in agreement with all regulatory authorities and TSOs, the solution for the sharing of cross-regional process' costs among the TSOs of each CCR has been defined. ACER facilitated the discussion and the final solution in which the XRAs applied at the regional CROSAs are considered as the causers of residual congestions at overlapping XNEs. The cost sharing process first addresses the costs to the XNEs originally overloaded at the regional processes, after which the costs are shared according to the regional cost sharing methodologies.

7. **CONCLUSION**

- (55) For all the above reasons, ACER considers that the proposal for amendment is in line with the requirements of the SO Regulation, provided that the revisions described in this Decision are integrated in the proposal for amendment, as presented in Annex I. The revisions ensure that the proposal for amendment is in line with the purpose of the SO Regulation and contributes to market integration, non-discrimination, effective competition and the proper functioning of the market. They also implement editorial adjustments.
- (56) Therefore, ACER approves the proposal for amendment subject to the necessary revisions. To provide clarity, Annex I to this Decision sets out the Proposal as revised and approved by ACER,

HAS ADOPTED THIS DECISION:

Article 1

The amendment of the methodology for coordinating operational security analysis according to Article 75 of Commission Regulation (EU) 2017/1485, approved by ACER Decision No 07/2019 of 19 June 2019, is approved as set out in Annex I to this Decision.

Article 2

This Decision is addressed to the following TSOs:

APG - Austrian Power Grid AG
VUEN - Vorarlberger Übertragungsnetz GmbH
Elia - Elia Transmission Belgium SA/NV
ESO - Electroenergien Systemen Operator EAD
HOPS - Croatian Transmission System Operator Ltd
ČEPS - ČEPS a.s.
Energinet – Energinet
Elering – Elering AS
Fingrid – Fingrid Oyj
Kraftnät Åland - Kraftnät Åland Ab
RTE - Réseau de Transport d'Electricité, S.A
Amprion - Amprion GmbH
TransnetBW - TransnetBW GmbH
TenneT GER - TenneT TSO GmbH
50Hertz - 50Hertz Transmission GmbH
Independent Power Transmission Operator S.A. ("IPTO" or "ADMIE")
MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő
Részvénytársaság
EirGrid - EirGrid plc
Terna - Terna Rete Elettrica Nazionale S.p.A.
Augstsprieguma tīkls - AS Augstsprieguma tīkls
LITGRID - Litgrid AB
Creos Luxembourg S.A.
TenneT TSO - TenneT TSO B.V.
PSE - Polskie Sieci Elektroenergetyczne S.A.
REN - Rede Eléctrica Nacional, S.A.
Transelectrica - National Power Grid Company Transelectrica S.A.
SEPS - Slovenská elektrizačná prenosová sústava, a.s.
ELES - ELES, d.o.o. Sistemski operater prenosnega elektroenergetskega omrežja
REE - Red Eléctrica de España S.A.
Svenska Kraftnät - Affärsverket svenska kraftnät
SONI - System Operator for Northern Ireland Ltd

Done at Ljubljana, on 14 June 2021.

- SIGNED -

*For the Agency
The Director*

C. ZINGLERSEN

Annexes:

Annex I – Amendment of the methodology for coordinating operational security analysis

Annex Ia (for information only) – Amendment of the methodology for coordinating operational security analysis with track-changes

In accordance with Article 28 of Regulation (EU) 2019/942, the addressees may appeal against this Decision by filing an appeal, together with the statement of grounds, in writing at the Board of Appeal of the Agency within two months of the day of notification of this Decision.

In accordance with Article 29 of Regulation (EU) 2019/942, the addressees may bring an action for the annulment before the Court of Justice only after the exhaustion of the appeal procedure referred to in Article 28 of that Regulation.

**ACER Decision on the Amendment of the Methodology for Coordinating Operational
Security Analysis: Annex I**

**Amendment of the Methodology for Coordinating
Operational Security Analysis**

in accordance with Article 75 of the Commission Regulation (EU) 2017/1485 of 2 August 2017
establishing a guideline on electricity transmission system operation

14 June 2021

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Whereas

(1) This document amends the methodology for coordinating operational security analysis (CSAM) in accordance with Article 75 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation ('SO Regulation') of 19 June 2019 (approved by Decision No 07/2019 of the Agency for the Cooperation of Energy Regulators of 19 June 2019 on the all TSOs' proposal for the Methodology for coordinating operational security analysis). This document is hereafter referred to as the 'Amendment to the CSAM'.

Article 1

Amendment to the CSAM

1. The methodology for coordinating operational security analysis (CSAM) in accordance with Article 75 of the SO Regulation of 19 June 2019 (approved by Decision No 07/2019 of the Agency for the Cooperation of Energy Regulators of 19 June 2019 on the all TSOs' proposal for the Methodology for coordinating operational security analysis) is amended as follows:
 - i. A recital, numbered (x) is added to the CSAM recitals and shall read as follows:

“(x) In accordance with Article 35(2) of Regulation 2019/943 of the European Parliament and of the Council on the internal market for electricity (hereafter referred to as “Electricity Regulation”), the regional coordination centres ('RCCs') shall replace the RSCs established pursuant to the SO Regulation and shall enter into operation by 1 July 2022.”
 - ii. In Article 2 of the CSAM, the following definitions and abbreviations shall be added:
 - a. 'native CCR' means a CCR to which an XNE is attributed within the ROSC process
 - b. 'non-native CCR' means a CCR to which an XNE is not attributed within the ROSC process
 - c. the abbreviation 'RAIF' is added, for remedial action influence factor,
 - d. the abbreviation 'CROSA' is added, for coordinated regional operational security assessment.
 - e. 'Setpoint' means a state or target value of an individual network element or set of network elements to impact active power flows and/or control voltage and/or manage reactive power, such as but not limited to a Phase-Shifting Transformer (PST), a HVDC system or a Flexible Alternating Current Transmission System (FACTS).
 - iii. Article 21 of the CSAM shall be amended as follows:

**“Article 21
Remedial actions inclusion in individual grid models**

1. When preparing individual grid models (IGM) pursuant to Article 70 of the SO Regulation, each TSO shall include all remedial actions already agreed as a result of previous coordinated operational security analyses in accordance with Article 17(1) and Article 18(4) or previous coordinated regional operational security assessments (CROSA) in accordance with Regional Operational Security (ROSC) methodologies pursuant to the Article 76 of the SO Regulation.
 2. When preparing individual grid models pursuant to Article 70 of the SO Regulation, each TSO shall have the right to perform a local preliminary assessment.
 3. When preparing individual grid models pursuant to Article 70 of the SO Regulation, in addition to the remedial actions referred to in paragraph (1) and taking into account where applicable the results of the local preliminary assessment referred to in paragraph (2), each TSO may include in the individual grid model any XRA in accordance with paragraph (5) or any non-XRA in accordance with Article 21(1)(a) of the SO Regulation.
 4. Remedial actions included pursuant to paragraphs (1) and (3) shall be clearly distinguishable from the injections and withdrawals established in accordance with Article 40(4) of the SO Regulation and the network topology without remedial actions applied. The injections and withdrawals shall by default be determined by each TSO based on the latest market schedules and forecasts of load and intermittent generation in accordance with Articles 38 and 37, respectively. Any deviation from these default assumptions shall be considered as a remedial action.
 5. In the day-ahead timeframe, when preparing the IGMs referred to in Article 33(1)(a), for the topology or setpoint of any network element, injections and withdrawals, each TSO shall include the best-forecast of the operational situation or schedules from the integrated scheduling process, in accordance with Articles 67(1) and 70(1) of the SO Regulation and in accordance with the paragraphs (1), (2), (3) and (4).
 6. In addition to paragraph (5), any topology and setpoint of any network element included in the day-ahead IGMs referred to in Article 33(1)(a) shall be considered as forecast topology or setpoint and no remedial actions on topology or setpoints shall be determined at this stage.
 7. All subsequent IGMs, which include IGMs updated in the day-ahead timeframe and IGMs in intraday timeframe, shall modify or include new XRAs, compared to the previous IGMs, on topology, setpoints, injections or withdrawals, only if:
 - a) these XRAs are agreed in the latest ROSC according to the methodology pursuant to Article 76 of the SO Regulation; or
 - b) the change is related to the XRAs which are no longer technically available.
 8. If required by at least one TSO from the concerned CCRs, TSOs of a concerned CCR shall agree on detailed rules on how to meet the best-forecast approach of the topology or set-point of any network element pursuant to paragraph (6).
 9. RSCs shall monitor topology and setpoints included in the IGMs as a solution for the improvement of forecasts and to prevent unfair behaviour of TSOs that could impact the operational security and economic efficiency.
- iv. Article 27 of the CSAM shall be amended as follows:

**“Article 27
Overlapping zones, XNEs and XRAs**

1. Where a network element has been defined as an XNE and where the physical flows on this XNE are significantly impacted by activation of XRAs in two or more CCRs as referred in paragraph (4), this XNE shall be defined as overlapping XNE. Such overlapping XNEs shall be grouped into overlapping zones and the concerned CCRs shall be considered as impacting CCRs for these overlapping zones.
2. The operational security violations on an overlapping XNE, as defined in paragraph (4), shall be addressed at a regional level first, in its native CCR, together with other XNEs of this CCR:
 - a) In case an overlapping XNE is a cross-zonal network element, the native CCR is the CCR to which the concerned bidding zone border is attributed;
 - b) In case an overlapping XNE is an internal CNE used in capacity calculation in only one CCR, this CCR shall be the native CCR;
 - c) In case an overlapping XNE is an internal XNE not covered by point (b), the XNE connecting TSO shall perform an analysis to identify a native CCR such that the operational security violations on such XNE can be addressed the most effectively and economically efficient.

In case of a reasoned objection and request from any TSO of the concerned CCRs on the analysis or appointment of the XNE pursuant to (c), the XNE connecting TSO shall demonstrate that the operational security violations on the concerned XNE can be addressed the most effectively and economically efficient within the originally appointed native CCR. If this cannot be demonstrated, RSCs and TSOs of concerned CCRs shall cooperate and agree on the native CCR of such an XNE.

3. The XRA connecting TSO(s) shall appoint each individual XRA to a single impacting CCR. When doing so, TSO(s) shall take into account the assumptions on remedial actions considered in the capacity calculation methodologies established pursuant to Articles 20 and 21 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM Regulation).
4. Overlapping XNEs shall be assessed through a quantitative approach by TSOs with support from RSCs, according to the following process:
 - a) Individual remedial action influence factor shall be computed for each XRA appointed to a given CCR (a non-native CCR) against all XNECs which are appointed to a different CCR (their native CCR) according to paragraph (2);
 - b) XRAs consisting of a combination of multiple devices operated simultaneously in a common way (e.g. parallel PSTs operated with same tap position) shall be considered as an individual XRA and are therefore associated to an individual remedial action influence factor, in accordance with Article 14 of CSAM. Such XRAs consisting of a combination of multiple devices shall be defined by the XRA connecting TSO;
 - c) All XRAs that have an individual remedial action influence factor (at maximum range) below 1% shall be discarded. The remaining XRAs shall be grouped per CCR in accordance to paragraph (3);

- d) The maximum potential impact of XRAs from a non-native CCR, upon the XNECs appointed to their native CCR according to sub-paragraph (c), is computed as a sum of the absolute values of the remedial action influence factors of the group of XRAs of the considered non-native CCR;
 - e) If the maximum potential impact of XRAs from a non-native CCR on at least one XNEC with contingencies (appointed to a different, its native CCR) is higher than or equal to 5%, this XNE is labelled as overlapping XNE and its native CCR is labelled as impacted by the considered non-native CCR; and
 - f) The XRAs from point e) used to identify overlapping XNEs are defined as overlapping XRAs.
5. Overlapping XNEs are assessed on a yearly basis using the CGMs built for the year ahead scenarios established according to article 65 of SO Regulation and on TSO request in case of significant changes occurred in the grid (e.g. commissioning/decommissioning of relevant network elements, forced outages, etc.), using updated year-ahead common grid models in accordance with Article 68 of the SO Regulation. Requesting TSO shall provide a sound justification for such a reassessment. If an XNE is identified as overlapping XNE during the assessment of at least one of the models, this XNE becomes an overlapping XNE as long as there is no new yearly assessment and it participates in further steps of the cross-regional coordination process. Methodology for the appointment of overlapping XNEs and overlapping XRAs shall be re-evaluated and if needed amended on a biennial basis.
 6. For the day-ahead timeframe, the residual operational security violations, remaining after each CROSA is finalised, shall be addressed with a common cross-regional coordination process involving TSOs and RSCs of all impacting CCRs. In the period after the implementation of regional ROSCs and before the implementation of cross-regional process, the currently applied processes of managing the residual congestions shall be kept. In case of severe grid violations on overlapping XNEs or repeated issues of residual congestions related to excessive redispatching costs at overlapping XNEs, a concerned connecting TSO may trigger the application of the conservative approach pursuant to paragraph (8) as a last resort measure, previously demonstrating that there are no other viable alternatives.
 7. For intraday timeframe, the default approach is to perform a cross-regional coordination process to address residual operational security violations, in accordance with Article 30, after any intraday coordinated regional operational security assessment. The TSOs from a CCR shall communicate to relevant RSCs, at least on a yearly basis, if intraday CROSA is not followed by a cross-regional coordination process due to time constraints or according to an agreement between concerned CCRs. In this case, a conservative approach shall be implemented for intraday CROSA, pursuant to paragraph (8).
 8. Under the conservative approach the related regional CROSA process shall ensure that the loading of each overlapping XNEC is not increased more than a maximum percentage of the remaining margin obtained in the CGM to reach its current limit. When the overlapping XNEC is not overloaded, the remaining margin of an overlapping XNE is the absolute value of the difference between the thermal limit (in Amperes and assumed positive) and the absolute value of the active current flow (in Amperes) on this overlapping XNE in the last intraday CGM before the next intraday CROSA is performed. The remaining margin shall be set to zero in case the overlapping XNE is already overloaded.

The maximum percentage appointed to a non-native CCR shall by default be 10% of the remaining margin. This maximum percentage of the remaining margin can be reassessed during

the implementation or also at a later stage upon agreement of all TSOs. ENTSO-E shall publish the final value.

9. When residual overloads are identified during the common cross-regional coordination process:
 - a) If violations are located on overlapping XNEs as referred to in paragraph (4)(e), the effective XRAs (i.e. overlapping XRAs) of the impacting CCRs shall be used to solve these violations;
 - b) RSCs may propose additional remedial actions in accordance with Article 31.
10. To ensure consistent interaction between CROSAs and coordinated cross-regional operational security assessment, residual violations shall be identified by RSCs with application of the contingency list from each CCR and the inclusion of all XRAs agreed within each CROSA. All XRAs agreed during each CROSA can be re-evaluated during the coordinated cross-regional operational security assessment.
11. RSCs of the concerned CCRs shall identify and propose solutions to manage residual violations with at least the available input data and RSCs' supporting tools, and with respect to the time constraints of day-ahead and intraday processes. The identification of technically and economically efficient remedial actions to address residual operational security violations at cross-regional level shall be done with the aim to solve residual overloads while:
 - a) not generating new overloads on any XNE;
 - b) minimizing the costs of remedial actions;
 - c) respecting the technical, operational, procedural and legal constraints defined by each TSO within the CROSA; and
 - d) minimizing changes of agreed XRAs within each CROSA.

The XRA affected TSOs shall evaluate the resulting recommended XRAs in accordance with Article 17(6) and 17(7).

12. In the implementation of Articles 78, 80 and 81 of the SO Regulation, RSCs and TSOs shall take into account the agreements reached in accordance with paragraphs (1) to (11).
13. The rules for sharing of costs of overlapping XRAs activated to address the residual operational security violations by assigning the shares of costs to individual overlapping XNEs i.e. the mapping process, are provided in the Appendix to this Article. An outcome of the mapping process are the portions of costs of overlapping XRAs appointed to each overlapping XNE.
14. The costs resulting from solving residual violations on overlapping XNEs during the coordinated cross-regional operational security assessment shall be subject to cost-sharing process among CCRs. The costs appointed to each overlapping XNE shall be shared proportionally to the burdening flows created by activation of XRAs in all concerned CCRs (including as well the native CCR) during their CROSAs. The burdening flows induced by a CCR on an overlapping XNE are computed as the maximum between zero and the difference between the absolute value of the flow (in Amperes) calculated in the CGM after CROSA in this CCR and the absolute value of the flow (in Amperes) calculated in the initial CGM before any CROSA has taken place. For the native CCR, the burdening flow is increased by the remaining overload after its CROSA, if any.

$$c_{i,r} = \frac{\Delta f_{i,r}}{\sum_r \Delta f_{i,r}} c_i \quad (2.1)$$

$$\Delta f_{i,r} = \begin{cases} \max(0; |f_{i,r}^{afterCROSA}| - |f_i^{beforeCROSA}|) + \Delta f_{i,r}^{remaining}, & \text{if } r \text{ is a native CCR} \\ \max(0; |f_{i,r}^{afterCROSA}| - |f_i^{beforeCROSA}|) & \text{if } r \text{ is a non - native CCR} \end{cases} \quad (2.2)$$

$$\Delta f_{i,r}^{remaining} = \max(0; |f_{i,r}^{afterCROSA}| - I_{max,i}) \quad (2.3)$$

c_i	Share of total costs of all XRAs applied at cross-regional process, attributed to overlapping XNEC i [€]
$c_{i,r}$	Share of costs c_i attributed to overlapping XNEC i , further attributed to CCR r [€]
$\Delta f_{i,r}$	Additional burdening flow at overlapping XNEC i induced by CROSA applied in CCR r [A]
$f_{i,r}^{afterCROSA}$	Absolute flow at overlapping XNEC i induced by CROSA applied in CCR r [A]
$f_i^{beforeCROSA}$	Absolute flow at overlapping XNEC i before CROSAs [A]
$\Delta f_{i,r}^{remaining}$	Remaining overload after the CROSA in a native CCR
$I_{max,i}$	Permanent thermal limit (PATL) of an overlapping XNEC i [A], assumed positive

15. The cross-regional process and related cost-sharing process among CCRs described in paragraph (14) shall apply for a given overlapping XNE with all the XRAs agreed at regional level consistently included in the CGM used for the cross-regional process for the concerned CCRs. If this is not the case, the cost resulting from solving the residual operational security violations on the overlapping XNE shall be allocated to the native CCR. The cases of failing in the provision from the first sentence shall be closely monitored by the TSOs and RSCs from the concerned CCRs.
16. Any XRA agreed outside the coordinated cross-regional operational security assessment or any XRA agreed to solve a constraint on an XNE which is not an overlapping XNE cannot impose cost sharing among CCRs.
17. The process described under paragraphs (13) to (16) shall determine the costs allocated to each concerned CCR to solve operational security violations on overlapping XNEs during the cross-regional operational security assessment. As a subsequent step, identification of regional XRAs which caused residual overloads on overlapping XNEs shall be performed, in order to appoint the cross-regional coordination costs to XNEs whose overloads were resolved by these XRAs during the regional CROSAs.

At each overlapping XNEC with residual overloads, and for each CCR separately, the following steps shall be applied:

- a) The XRAs with linear characteristic shall be taken into account. This includes costly remedial actions, as well as non-costly remedial actions with characteristic close to linear, such as PST and HVDC;
- b) The burdening and relieving flows caused by the XRAs on an overlapping XNEC during regional CROSA shall be calculated, where only the XRAs defined under (a) are taken into account. These flows shall be calculated on the CGM with applied topology changes;

- c) The burdening flows by XRAs are normalised with their total sum of burdening flows at each overlapping XNE, as provided in the equation 3.1;
- d) The cross-regional costs on XNECs appointed to each CCR pursuant to paragraph (14) are assigned to individual XRAs applied at regional CROSAs, proportionally to their normalised burdening effect from point (c), as provided in the equation 3.2;
- e) The costs from point (d) are assigned to the XNECs whose congestions were relieved by the individual XRAs at the regional CROSAs, pursuant to the mapping process applied in each CCR; and
- f) Regional cost-sharing methodologies shall then be applied for the costs by the regional CROSAs and the additional costs from the cross-regional optimisation pursuant to paragraph (17).

$$\Delta f_{i,r,x}^{normalised} = \frac{\Delta f_{i,r,x}}{\sum_{r,x} \Delta f_{i,r,x}} \quad (3.1)$$

$$c_x = \sum_i \Delta f_{i,r,x}^{normalised} * c_{i,r} \quad (3.2)$$

$\Delta f_{i,r,x}$	Burdening flow at overlapping XNEC i induced by regional XRA x (<i>only the linearized non-costly XRAs</i>) applied in CCR r [A]
$\Delta f_{i,r,x}^{normalised}$	Normalised burdening flow at overlapping XNEC i induced by regional XRA x applied in CCR r [A]
$c_{i,r}$	Share of total costs of cross-regional process, attributed to overlapping XNEC i , further attributed to CCR r [€]
c_x	Share of total costs of cross-regional process, attributed to regional XRA x [€]

”

- 18. The cross-regional methodology for the overlapping XNEs each group of CCRs pursuant to paragraph (1) shall be applied not later than 18 months after the last among the concerned CCR apply the implementation of the target solution of ROSC Methodology pursuant to the Article 76 of the SO Regulation. The determination of the mutually impacted CCRs shall be performed during the 1st month of the implementation period.”

- v. An Annex II shall be added to the CSAM as an appendix to Article 27, and it shall read as follows:

“Appendix to Article 27: Mapping of inter-regional XRA costs

- 1. All TSOs shall distribute the costs and revenues of cross-border relevant redispatching and countertrading actions eligible for cost sharing, arising during the common cross-regional coordination process, to each hour and each individual XNE eligible for cost sharing associated with a single reference contingency (or N-situation) that represents the worst contingency to be determined and agreed among TSOs. Any reference to XNEC in the remainder of this Appendix

shall be understood as referring to XNE with this single reference contingency (or N-situation) unless otherwise defined in paragraph 5.

2. The costs and revenues of each XRA eligible for costs sharing pursuant to paragraph 1 shall first be split into hourly costs using the following principles:
 - (a) The costs and revenues of an XRA, which are attributed clearly to a specific hour (such as activated redispatching energy), shall remain associated only to that hour;
 - (b) The costs and revenues of an XRA, which cannot be attributed clearly only to one specific hour, shall be split equally between the multiple hours to which these costs are attributed;
 - (c) The costs and revenues of an XRA, which have been attributed to hours in which there was no congestion in the CCR, shall be set to zero; the costs and revenues of such XRA in other hours (considered in the same RAO) in which there was a congestion in the CCR, shall be increased proportionally for the same amount; and
 - (d) The incurred costs of curative XRAs shall be considered when the associated contingency materializes, otherwise they shall be equal to zero. Further, curative XRAs shall be considered in paragraph 3 and 4(e)(ii) only when they are associated to the eligible XNECs.
3. Subsequently, the costs and revenues of all XRAs for a specific hour as determined pursuant to paragraph 2 shall be summed up and split between all XNECs eligible for cost sharing in accordance with the following formula (all variables are applicable for the specific hour h):

$$C^{all} = \sum_j C_j \quad (1.1)$$

$$c_i = \frac{r_i}{\sum_i r_i} C^{all} \quad (1.2)$$

$$r_i = r_i^{direct} + r_i^{indirect} \quad (1.3)$$

$$r_i^{direct} = \sum_j \alpha_{i,j}^{norm} C_j \quad (1.4)$$

$$\alpha_{i,j}^{norm} = \begin{cases} 0 & \text{if } \sum_i \alpha_{i,j} = 0 \\ \frac{\alpha_{i,j}}{\sum_i \alpha_{i,j}} & \text{if } \sum_i \alpha_{i,j} > 0 \end{cases} \quad (1.5)$$

and $\alpha_{i,j}$ is calculated by solving the following optimisation (Equations (1.6) to (1.11)) for all XNECs for which the condition $|F'_{b,i}| > |F'_{max,i}|$ is valid:

$$\min_{\alpha, \beta} \left(\sum_j \alpha_{i,j} C_j + \sum_k c_p T_k \beta_{i,k} \right) \quad (1.6)$$

$$0 \leq \alpha_{i,j} \leq 1 \quad (1.7)$$

$$0 \leq \beta_{i,k} \leq 1 \quad (1.8)$$

$$\sum_{j \in RDCT} \alpha_{i,j} V_j = 0 \quad (1.9)$$

$$\sum_j \alpha_{i,j} V_j PTDF_{i,j} + \sum_k \beta_{i,k} T_k PSDF_{i,k} = F_{limit,i} - F'_{b,i} \quad (1.10)$$

$$F_{limit,i} = \begin{cases} F_{max,i} & \text{if } 0 \leq F_{a,i} \leq F_{max,i} \leq F'_{b,i} \\ -F_{max,i} & \text{if } F'_{b,i} \leq -F_{max,i} \leq F_{a,i} < 0 \\ F_{a,i} & \text{if } F_{max,i} \leq |F_{a,i}| \leq |F'_{b,i}| \\ F'_{b,i} & \text{if } F_{max,i} \leq |F'_{b,i}| < |F_{a,i}| \end{cases} \quad (1.11)$$

with

c_i	Share of total costs of all XRAs attributed to XNEC i [€]
r_i	Relative weight of XNEC i in cost sharing [€]
r_i^{direct}	Relative weight of XNEC i in cost sharing, due to direct costs [€]
$r_i^{indirect}$	Relative weight of XNEC i in cost sharing, due to indirect costs [€]
C^{all}	Total costs or revenues of all ordered XRAs at a given CROSA [€]
$\alpha_{i,j}$	Optimisation variable representing a fraction of optimal volume V_j of XRA j (consisting of redispatching or countertrading) determined by RAO which is needed to solve the congestion on XNEC i
$\alpha_{i,j}^{norm}$	Normalised optimisation variable $\alpha_{i,j}$
$\beta_{i,k}$	Optimisation variable representing a fraction of the T_k determined by RAO which is needed to solve the congestion on XNEC i
C_j	Total cost or revenue of applied XRA j [€]
V_j	The optimal volume of ordered XRA j (consisting of redispatching or countertrading) determined by RAO at a given CROSA and for the considered contingency [MW]
T_k	The optimal change of tap of ordered XRA k (consisting of PSTs), which is the difference between the tap of this XRA before the RAO and the optimal tap determined by RAO at a given CROSA and for the considered contingency
$PTDF_{i,j}$	Power transfer distribution factor describing the impact of a change of 1 MW of XRA j on the physical flow on XNEC i
$PSDF_{i,k}$	Phase shifting distribution factor describing the impact of a change of 1 tap position of PST k on the physical flow on XNEC i [MW]
$F'_{b,i}$	Adjusted total flow on XNEC i [MW]
$F_{max,i}$	Maximum flow on XNEC i [MW]
$F_{a,i}$	Total flow on XNEC i calculated after RAO, which includes the impact of all XRAs [MW]
c_p	Small fictious penalty cost for the activation of a tap of a PST [€]. Such value shall be small enough to not impact the selection of the ordered XRA j (consisting of redispatching or countertrading). c_p is proposed to be equal to 0,01 and could be reassessed during Implementation.

It is set $r_i^{direct} = 0$ for all XNECs for which the condition $|F'_{b,i}| \leq |F_{max,i}|$ is valid.

The effects of the PSTs on the XNECs are calculated as follows:

$$\delta_{i,k} = PSDF_{i,k} \cdot T_k \quad (1.12)$$

$$\delta_{i,k}^{burd.} = \begin{cases} 0 & \text{if } \delta_{i,k} \cdot F'_{b,i} \leq 0 \\ \delta_{i,k} & \text{if } \delta_{i,k} \cdot F'_{b,i} > 0 \end{cases} \quad (1.13)$$

$$\delta_{i,k}^{rel.} = \begin{cases} \delta_{i,k} & \text{if } \delta_{i,k} \cdot F'_{b,i} \leq 0 \\ 0 & \text{if } \delta_{i,k} \cdot F'_{b,i} > 0 \end{cases} \quad (1.14)$$

The first step for calculating the indirect relative weights of each XNEC is to calculate the virtual relative weights $r_i^{virtual}$ for the XNECs which are overloaded when considering the PSTs burdening effects, as follows:

$$r_i^{virtual} = \sum_j \alpha_{i,j}^{norm-PST-adj} C_j \quad (1.15)$$

$$\alpha_{i,j}^{norm-PST-adj} = \begin{cases} 0 & \text{if } \sum_i \alpha_{i,j}^{PST-adj} = 0 \\ \frac{\alpha_{i,j}^{PST-adj}}{\sum_i \alpha_{i,j}^{PST-adj}} & \text{if } \sum_i \alpha_{i,j}^{PST-adj} > 0 \end{cases} \quad (1.16)$$

and $\alpha_{i,j}^{PST-adj}$ is calculated by solving the following optimisation (Equations (1.17) to (1.23)) for the XNECs for which the condition $|F_{b,i}^{PST-adj}| > |F_{max,i}|$ is valid:

$$\min_{\alpha,\beta} \left(\sum_j \alpha_{i,j}^{PST-adj} C_j + \sum_k c_p \cdot T_k \cdot \beta_{i,k}^{PST-adj} \right) \quad (1.17)$$

$$0 \leq \alpha_{i,j}^{PST-adj} \leq 1 \quad (1.18)$$

$$0 \leq \beta_{i,k}^{PST-adj} \leq 1 \quad (1.19)$$

$$\sum_{j \in RDCT} \alpha_{i,j}^{PST-adj} V_j = 0 \quad (1.20)$$

$$\sum_j \alpha_{i,j}^{PST-adj} V_j PTD F_{i,j} + \sum_k \beta_{i,k}^{PST-adj} T_k PSD F_{i,k} = F_{limit,i} - F_{b,i}^{PST-adj} \quad (1.21)$$

$$F_{limit,i} = \begin{cases} F_{max,i} & \text{if } 0 \leq F_{a,i} \leq F_{max,i} \leq F_{b,i}^{PST-adj} \\ -F_{max,i} & \text{if } F_{b,i}^{PST-adj} \leq -F_{max,i} \leq F_{a,i} < 0 \\ F_{a,i} & \text{if } F_{max,i} \leq |F_{a,i}| \leq |F_{b,i}^{PST-adj}| \\ F_{b,i}^{PST-adj} & \text{if } F_{max,i} \leq |F_{b,i}^{PST-adj}| < |F_{a,i}| \end{cases} \quad (1.22)$$

$$F_{b,i}^{PST-adj} = F'_{b,i} + \sum_k \delta_{i,k}^{burd.} \quad (1.23)$$

It is set $r_i^{virtual} = 0$ for all XNECs for which the condition $|F_{b,i}^{PST-adj}| \leq |F_{max,i}|$ is valid.

The PSTs' virtual costs are then calculated as follows:

$$\gamma_{i,k}^{burd} = \begin{cases} 0 & \text{if } \sum_k \delta_{i,k}^{burd.} = 0 \\ \frac{\delta_{i,k}^{burd.}}{\sum_k \delta_{i,k}^{burd.}} & \text{if } \sum_k \delta_{i,k}^{burd.} \neq 0 \end{cases} \quad (1.24)$$

$$C_k^{virtual} = \sum_i \gamma_{i,k}^{burd} \cdot (r_i^{virtual} - r_i^{direct}) \quad (1.25)$$

The relative weight due to indirect costs is obtained with the distribution of the PSTs' virtual costs to the XNECs according to the following equations:

$$\beta'_{i,k} = \begin{cases} 0 & \text{if } \sum_i (\beta_{i,k} \cdot \delta_{i,k}^{rel.}) = 0 \\ \frac{\beta_{i,k} \cdot \delta_{i,k}^{rel.}}{\sum_i (\beta_{i,k} \cdot \delta_{i,k}^{rel.})} & \text{if } \sum_i (\beta_{i,k} \cdot \delta_{i,k}^{rel.}) \neq 0 \end{cases} \quad (1.26)$$

$$r_i^{indirect} = \sum_k \beta'_{i,k} C_k^{virtual} \quad (1.27)$$

with

$\alpha_{i,j}^{PST-adj}$	PST-adjusted optimisation variable representing a fraction of optimal volume V_j of XRA j (consisting of redispatching or countertrading) determined by RAO which is needed to solve the congestion on XNEC i
$\beta_{i,k}^{PST-adj}$	PST-adjusted optimisation variable representing a fraction of the T_k determined by RAO which is needed to solve the congestion on XNEC i
$F_{b,i}^{PST-adj}$	PST-adjusted total flow on XNEC i [MW]
$\delta_{i,k}$	Effect of PST k on XNEC i [MW]
$\delta_{i,k}^{burd.}$	Burdening effect of PST k on XNEC i [MW]
$\delta_{i,k}^{rel.}$	Relieving effect of PST k on XNEC i [MW]
$\beta'_{i,k}$	Relative optimisation variable of optimal T_k and XNEC i
$r_i^{virtual}$	Virtual relative weight of XNEC i due to the burdening effect of PSTs [€]
$\gamma_{i,k}^{burd}$	Relative burdening effect of PST k on XNEC i
$C_k^{virtual}$	Virtual cost associated to PST k

The principles detailed above to take into account burdening effect of PSTs and their associated virtual costs shall be extended to linear non-costly Remedial Actions (such as HVDC for example) with a similar approach to the one described here for PSTs. The adaptation needed to meet this requirement are not described in this annex but shall be developed during implementation phase by sticking to the PST approach.

4. The following additional rules shall apply for the calculation of variables in paragraph 3:
 - (a) If C^{all} is positive/negative and less than half of relative weights r_i of XNECs are lower/higher than 0, these weights shall be set to 0 before applying the Equation 1.2;

- (b) If C^{all} is positive/negative and half or more of relative weights r_i of XNEC i are lower/higher than 0, the positive/negative value of the lowest/highest negative/positive weight shall be added to all weights of all XNECs before applying the Equation 1.2;
- (c) If C^{all} is positive/negative and all relative weights r_i of XNEC i are 0, new weights shall be calculated and shall be equal to the absolute value of the right side of Equation 1.10 or 1.21, depending on the considered step;
- (d) In case the absolute value of the right side of the Equation 1.10 or 1.21, depending on the considered step, is higher than the absolute value of the left side of this equation when all $\alpha_{i,j}$ and $\beta_{i,k}$ are set to 1, the right side of this equation shall be set equal to the left side of this equation when all $\alpha_{i,j}$ and $\beta_{i,k}$ are set to 1;
- (e) Adjusted total flow on XNEC $F'_{b,i}$ shall be calculated as the one among the two values below with the lowest absolute value:
- i. flow from the input CGM for the common cross-regional coordination process, including all XRAs agreed within each coordinated regional operational security assessment; and
 - ii. flow from the input CGM for the common cross-regional coordination process, including all XRAs agreed within each coordinated regional operational security assessment, with included non-costly XRAs agreed during cross-regional coordination except PSTs and costly ANORAs.

The rules (a) to (c) are also explained in the following table:

C^{all}	relative weights r_i	treatment of relative weights r_i
>0	Less than half are < 0	Set negative weights to zero before applying Equation 1.2
<0	Less than half are > 0	Set positive weights to zero before applying Equation 1.2
>0	Half or more are < 0	Opposite (i.e. positive) value of the lowest negative weight is added to all weights before applying Equation 1.2
<0	Half or more are > 0	Opposite (i.e. negative) value of the highest positive weight is added to all weights before applying Equation 1.2
Any	All are equal to 0	Weights are equal to the absolute value of right side of Equation 1.10 or 1.21, depending on the considered step, i.e.: $r_i = F_{limit,i} - F'_{b,i} $ or $r_i = F_{limit,i} - F_{b,i}^{PST-adj} $

”

Article 2

Publication of the Amendment to the CSAM

All TSOs shall publish this Amendment to the CSAM without undue delay after the decision has been taken by the European Union Agency for the Cooperation of Energy Regulators in accordance with Article 6(2)(c) and Article 7(4) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

ACER Decision on the Amendment of the Methodology for Coordinating Operational
Security Analysis: Annex I

Amendment of the ~~CSA Methodology – Amendments Article 21 and
27~~

**Methodology for coordinating operational
security analysis**

in accordance with Article 75 of ~~the~~ Commission Regulation (EU) 2017/1485 of
2 August 2017 establishing a guideline on electricity transmission system
operation

14 June 2021

Contents

|

Whereas

(1) This document amends the methodology for coordinating operational security analysis (CSAM) in accordance with Article 75 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation ('SO Regulation') of 19 June 2019 (approved by Decision No 07/2019 of the Agency for the Cooperation of Energy Regulators of 19 June 2019 on the all TSOs' proposal for the Methodology for coordinating operational security analysis). This document is hereafter referred to as the 'Amendment to the CSAM'.

Article 1

Amendment to the CSAM

1. The methodology for coordinating operational security analysis (CSAM) in accordance with Article 75 of the SO Regulation of 19 June 2019 (approved by Decision No 07/2019 of the Agency for the Cooperation of Energy Regulators of 19 June 2019 on the all TSOs' proposal for the Methodology for coordinating operational security analysis) is amended as follows:

i. A recital, numbered (x) is added to the CSAM recitals and shall read as follows:

~~"(x) General additional Recommendations to be included in CSA Methodology Whereas:~~

(1) In accordance with Article 35(2) of Regulation 2019/943 of the European Parliament and of the Council on the internal market for electricity (hereafter referred to as "Electricity Regulation"), the regional coordination centres ('RCCs') shall replace the RSCs established pursuant to the SO Regulation and shall enter into operation by 1 July 2022."

~~In Proposal for an additional definition to be added in paragraph 1 from Article 2 of the CSAM, the following Definitions and abbreviations shall be added: Interpretations~~

- a. 'native CCR' means a CCR to which an XNE is attributed within the ROSC process
- b. 'non-native CCR' means a CCR to which an XNE is not attributed within the ROSC process
- c. the abbreviation 'RAIF' is added, for remedial action influence factor,
- d. the abbreviation 'CROSA' is added, for coordinated regional operational security assessment.

~~(26)~~ ‘Setpoint’ means a state or target value of an individual network element or set of network elements to impact active power flows and/or control voltage and/or manage reactive power, such as but not limited to a Phase-Shifting Transformer (PST), a HVDC system or a Flexible Alternating Current Transmission System (FACTS).

Article 21 of the CSAM shall be amended as follows:

“Article 21

Remedial actions inclusion in individual grid models

~~1-~~ When preparing individual grid models (IGM) pursuant to Article 70 of the SO Regulation, each TSO shall include all remedial actions already agreed as a result of previous coordinated operational security analyses in accordance with Article 17(1) and Article 18(4) or previous coordinated regional operational security assessments (CROSA) in accordance with Regional Operational Security (ROSC) methodologies pursuant to the Article ~~76~~⁷⁸ of the SO Regulation.

~~2-~~ When preparing individual grid models pursuant to Article 70 of the SO Regulation, each TSO shall have the right to perform a local preliminary assessment.

~~3-~~ ~~When performing a local preliminary assessment, and provided this is consistent with the common provisions developed as required by Article 76(1) of the SO Regulation, each TSO may choose whether or not to relieve operational security limit violations on:~~

- ~~(a) network elements identified in accordance with Article 20(1) if the TSO expects it to be relieved during the subsequent coordinated regional operational security assessment;~~
- ~~(b) any other network elements provided those operational security limit violations are likely to be solved by non-cross border relevant remedial actions;~~
- ~~(c) any other network elements provided those operational security limit violations are likely to be relieved by subsequent coordinated regional operational security assessment.~~

~~4-~~ When preparing individual grid models pursuant to Article 70 of the SO Regulation, in addition to the remedial actions referred to in paragraph ~~(1)~~ and taking into account where applicable the results of the local preliminary assessment referred to in paragraph ~~(2)~~, each TSO may include in the individual grid model any ~~XRAcross-border relevant remedial action~~ in accordance with paragraph ~~(5)~~⁶ or any non-~~XRAcross-border relevant remedial actions~~ in accordance with Article 21(1)(a) of the SO Regulation.

~~5-~~ Remedial actions included pursuant to paragraphs ~~(1)~~ and ~~(3)~~⁴ shall be clearly distinguishable from the injections and withdrawals established in accordance with Article 40(4) of the SO Regulation and the network topology without remedial actions applied. The Injections and withdrawals shall by default be determined by each TSO based on~~reflect~~ the latest market schedules and ~~load/RES~~ forecasts of load and intermittent generation in accordance with Articles 38 and 37, respectively~~available~~. Any deviation from these default assumptions shall be considered as a Remedial Action.

~~6-~~ In the day-ahead timeframe~~Day Ahead~~ when preparing the IGMs~~Individual Grid Models~~ referred to in Article 33(1)(a), for the topology or setpoint of any network element, injections and withdrawals, each TSO shall include the best-forecast of the operational situation or schedules from the integrated scheduling process, in accordance with Articles 67(1) and 70(1) of the SO Regulation ~~establishing a guideline on electricity transmission system operation, consistent with the common provisions~~

~~developed as required by Article 76(1) of the SO Regulation and in accordance with the paragraphs (1), (2), (3) and (4), until 5.~~

~~1. In addition to paragraph (5), any topology and setpoint of any network element included in All the day-ahead IGMs referred to in Article 33(1)(a) shall be considered as forecast topology or setpoint and no remedial actions on topology or setpoints shall be determined at this stage.~~

~~2. All subsequent IGMs, which include IGMs updated in the day-ahead later on, in Day Ahead or Intra-Day timeframe and IGMs in intraday timeframe, shall modify or not include new or modified XRAs, compared to the previous IGMs IGM version, on topology, setpoints, injections or withdrawals, only if:~~

~~a) these XRAs are unless it is agreed in the latest ROSC according to the methodology pursuant to coordinated operational security assessment or coordinated process defined in methodologies developed as required by Article 76 of the SO Regulation; or~~

~~the change is related to the XRAs which are no longer they are not technically available anymore.~~

~~7. In addition to paragraph 5, for topology and setpoint of any network element, no distinction is made between remedial actions and forecasts within the Day Ahead Individual Grid Models referred to in Article 33(1)(a).~~

~~8. If required by at least one TSO from the concerned CCRs, XRA affected TSOs of a concerned CCR shall agree at CCR level on detailed rules on how to meet the best-forecast approach of the topology or set-point of any for a specific network element pursuant to paragraph (6). The concerned CCR is the CCR to which the remedial action is appointed in accordance with Article 27(9).~~

~~RSCs shall monitor~~

~~9. Monitoring of topology and setpoints included in the IGMs shall be performed by RSCs as a solution for the improvement of forecasts and to prevent unfair behaviour of TSOs that could impact the operational security and economic efficiency.~~

Article 27 of the CSAM shall be amended as follows:

“Article 27

Overlapping zones, XNEs and XRAs

~~1. Where a network element has been defined as an XNE in a Bidding Zone and where the physical flows on this XNE are significantly impacted by activation of XRAs in two or more CCRs as referred in paragraph (4), this XNE shall be defined as overlapping XNE. Such overlapping XNEs shall be grouped into overlapping zones and the concerned CCRs shall be considered as impacting CCRs for these overlapping zones.~~

~~1. 2. In case the Overlapping XNE is an XNE located in a Bidding Zone of a TSO belonging to more than one CCR, the operational security violations on an overlapping XNE, as defined in paragraph (4), shall be addressed at a regional level first, in its native a single CCR, together with other XNEs of this CCR;~~

~~a) In . This single CCR shall be appointed by the overlapping XNE connecting TSO(s), ensuring consistency with the choices made during the capacity calculation process in~~

case ~~as such~~ overlapping XNE is a cross-zonal network element, the native CCR is the CCR to which the concerned bidding zone border is attributed;

b) In case an overlapping XNE is an internal also a CNE used in capacity calculation in only one CCR, this CCR shall be the native CCR;

c) ~~In case of an overlapping XNE is an internal XNE not covered by point (b), objection from any TSO of the concerned CCRs,~~ the XNE connecting TSO(s) shall perform an analysis to identify a native CCR such demonstrate that the operational security violations on ~~such the concerned~~ XNE can ~~most efficiently~~ be addressed the most effectively and economically efficient.

~~in the appointed CCR. In case of an XNE is not a reasoned objection and CNE from the CCR it is appointed to, on request from any TSO of the concerned CCRs on the analysis or appointment of the XNE pursuant to (c), any TSO the XNE connecting TSO shall demonstrate that the operational security violations on the concerned XNE can be addressed the most effectively and economically efficient within the originally appointed native CCR. If this cannot be demonstrated, RSCs and TSOs of concerned CCRs shall cooperate and agree on the native CCR of such an XNE. efficiently be addressed within the appointed CCR, if not such an XNE should not be declared as XNE in such a CCR. In case an Overlapping XNE is a cross-zonal line, this overlapping XNE shall be appointed to the CCR the bidding zone border belongs to. Subsequently, in Day Ahead timeframe the residual operational security violations, resulting after each coordinated regional operational security assessment is finalised, shall be addressed with a common cross-regional coordination process involving TSOs and RSCs of all impacting CCRs.~~

2. The XRA connecting TSO(s) shall appoint each individual XRA to a single impacting CCR. When doing so, TSO(s) shall take into account the assumptions on remedial actions considered in the capacity calculation methodologies established pursuant to Articles 20 and 21 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM Regulation).

~~3. For intraday timeframe, the default approach is to run a cross-regional coordination process to address residual operational violations, in accordance with Article 30, after any intraday coordinated regional operational security assessment. The TSOs from a CCR shall communicate to relevant RSCs, at least on a yearly basis, if coordinated regional operational security assessment is not followed by a cross-regional coordination process due to time constraints or according to an agreement between concerned CCRs. In this case, a conservative approach shall be implemented for intraday coordinated regional operational security assessment. This conservative approach for the intraday coordinated regional operational security assessment shall ensure that the loading of each overlapping XNE appointed to a different CCR is not increased more than a maximum percentage of the remaining available margin obtained in the CGM to reach its current limit (defined and further described in Annex II).~~

~~4. Overlapping XNEs shall be assessed through a quantitative approach by TSOs with support from RSCs, according to the following process:~~

- ~~a) Individual remedial action influence factor shall be computed for each XRA appointed to a given CCR (a non-native CCR)A against all XNECs the XNEs with contingencies which are appointed to a different CCR (their native CCR)B according to paragraph (2);~~
- ~~b) XRAs consisting of a combination of multiple devices operated simultaneously in a common way (e.g. parallel PSTs operated with same tap position) shall be considered as an individual XRA and are therefore associated to an individual remedial action influence factor, in accordance with Article 14 of CSAM. Such XRAs consisting of a combination of multiple devices shall be defined by the XRA connecting TSOs;~~

- c) All XRAs that have an individual remedial action influence factor (at maximum range) below 1% shall be discarded. The remaining XRAs shall be grouped per CCR in accordance to Article 27 paragraph (3);
- d) The maximum potential ~~XRAs~~ impact of XRAs from a non-native given CCR, upon the XNECs A on XNEs with contingencies which are appointed to their native a different CCR B according to sub-paragraph (c), is computed as the sum of the absolute values of the remedial action influence factors of the group of XRAs of the considered non-native CCR CCR-A;
- e) If the maximum potential ~~XRAs~~ impact of XRAs from a non-native given CCR A on at least one XNE XNE with contingencies (appointed to a different, its native CCR B) is higher than or equal to 5%, this XNE is labelled as Overlapping XNE and its native CCR B is labelled as impacted by the considered non-native CCR; and A-
- f) The XRAs ~~from used in~~ point e) used to identify Overlapping XNEs are defined as Overlapping XRAs.

~~5.~~ Overlapping XNEs are assessed on a yearly basis using the CGMs built for the year ahead scenarios established according to article 65 of SO Regulation and on TSO request in case of significant changes occurred in the grid (e.g. commissioning/decommissioning of relevant network elements, forced outages, etc.), using updated year-ahead common grid models in accordance with Article 68 of the SO Regulation. Requesting TSO shall provide a sound justification for such a reassessment. If an XNE is identified as overlapping XNE during the assessment of at least one of the models, this XNE becomes an overlapping XNE as long as there is no new yearly assessment and it participates in further steps of the cross-regional coordination process. Methodology for the appointment of overlapping XNEs and overlapping XRAs shall be re-evaluated and if needed amended on a biennial basis.

- 3. For the day-ahead timeframe, the residual operational security violations, remaining after each CROSA is finalised, shall be addressed with a common cross-regional coordination process involving TSOs and RSCs of all impacting CCRs. In the period after the implementation of regional ROSCs and before the implementation of cross-regional process, the currently applied processes of managing the residual congestions shall be kept. In case of severe grid violations on overlapping XNEs or repeated issues of residual congestions related to excessive redispatching costs at overlapping XNEs, a concerned connecting TSO may trigger the application of the conservative approach pursuant to paragraph (8) as a last resort measure, previously demonstrating that there are no other viable alternatives.
- 4. For intraday timeframe, the default approach is to perform a cross-regional coordination process to address residual operational security violations, in accordance with Article 30, after any intraday coordinated regional operational security assessment. The TSOs from a CCR shall communicate to relevant RSCs, at least on a yearly basis, if intraday CROSA is not followed by a cross-regional coordination process due to time constraints or according to an agreement between concerned CCRs. In this case, a conservative approach shall be implemented for intraday CROSA, pursuant to paragraph (8).
- 5. Under the conservative approach the related regional CROSA process shall ensure that the loading of each overlapping XNEC is not increased more than a maximum percentage of the remaining margin obtained in the CGM to reach its current limit. When the overlapping XNEC is not overloaded, the remaining margin of an overlapping XNE is the absolute value of the difference between the thermal limit (in Amperes and assumed positive) and the absolute value of the active current flow (in Amperes) on this overlapping XNE in the last intraday CGM before the next intraday CROSA is performed. The remaining margin shall be set to zero in case the overlapping XNE is already overloaded.

The maximum percentage appointed to a non-native CCR shall by default be 10% of the remaining margin. This maximum percentage of the remaining margin can be reassessed during the implementation or also at a later stage upon agreement of all TSOs. ENTSO-E shall publish the final value.

6. When residual overloads are identified during the common cross-regional coordination process:

~~6. When residual violations are identified during the common cross-regional coordination process:~~

- a) ~~If the violations are located on Overlapping XNEs as referred to in paragraph (4)(e), the effective XRAs (i.e. Overlapping XRAs) of the impacting CCRs shall be used to solve these such violations;~~
 - b) ~~If the violations are on XNEs which are not Overlapping XNEs as referred to in paragraph (4)(e), the effective XRAs made available in the CCR to which the XNE is assigned according to paragraph 2 should be used.~~
 - e) ~~If the violations are located on both Overlapping XNEs and not Overlapping XNEs, all the XRAs that were made available in concerned CCRs should be used to solve such violations.~~
- ~~b)~~ RSCs may propose additional Remedial Actions in accordance with Article 31.

~~7. To ensure a consistent interaction between CROSA coordinated regional operational security assessment and coordinated cross-regional operational security assessment, residual violations shall be identified by RSCs with application of the contingency list from each CCR and the inclusion of all XRAs agreed within each CROSA coordinated regional operational security assessment. All the XRAs agreed during each CROSA coordinated regional operational security assessment can be re-evaluated during the coordinated cross-regional operational security assessment.~~

~~8. RSCs of the concerned CCRs shall identify and propose solutions to manage residual violations with at least the available input data and RSCs' RSC's supporting tools, and with respect to the time constraints of Day-Ahead and intraday processes. The identification of technically and economically efficient remedial actions to address residual operational security violations at cross-regional level shall be done with the aim to solve residual overloads minimize changes of agreed XRAs within each coordinated regional operational security assessment while:~~

- ~~a) Solving the residual overloads~~
 - ~~b) a) Not generating new overloads on any XNE;~~
 - ~~e) b) Minimizing the costs of remedial actions;~~
 - ~~d) c) Respecting the technical, operational, procedural and legal constraints defined by each TSO within the CROSA; and coordinated regional operational security assessment.~~
- d) minimizing changes of agreed XRAs within each CROSA.

The XRA affected TSOs shall evaluate the resulting recommended XRAs in accordance with Article 17(6) and 17(7).

~~9. When considering an individual XRA, the XRA connecting TSO(s) shall decide on a single impacting CCR to which it shall provide this individual XRA. This decision shall take account of the assumptions on remedial actions considered in capacity calculation methodologies established pursuant to Articles 20 and 21 of the CACM Regulation.~~

~~10. In the implementation of Articles 78, 80 and 81 of the SO Regulation, RSCs and TSOs shall take into account the agreements reached in accordance with paragraphs (1) to (11).&~~

7. The rules for sharing of costs of overlapping XRAs activated to address the residual operational security violations by assigning the shares of costs to individual overlapping XNEs i.e. the

mapping process, are provided in the Appendix to this Article. An outcome of the mapping process are the portions of costs of overlapping XRAs appointed to each overlapping XNE.

~~11-~~The costs resulting from solving residual violations on overlapping XNEs during the coordinated cross-regional operational security assessment shall~~will~~ be subject to ~~a~~ cost-sharing process among CCRs. The costs appointed to each overlapping XNE shall~~cost sharing will~~ be shared proportionally~~proportional~~ to the burdening flows created by activation of XRAs in all concerned the CCRs (including as well on the native CCR) overlapping XNEs during their CROSAs.~~coordinated regional operational security assessment.~~ The burdening flows induced by ~~one~~ CCR on an overlapping ~~XNE~~XNEs are computed as the maximum between zero and the difference between the absolute value of the flow (in Amperes) calculated in the CGM after ~~CROSA~~coordinated regional operational security assessment in this CCR and the absolute value of the flow (in Amperes) calculated in the initial CGM before any ~~CROSA~~coordinated regional operational security assessment has taken place. For the native CCR~~where the operational security violations on the overlapping XNEs are addressed at a regional level first,~~ the burdening flow is increased by the remaining overload after its CROSA~~the coordinated regional operational security assessment,~~ if any.

The cross-regional process and related~~12-~~ The cost-sharing process among CCRs described in paragraph (14) shall~~11 does not~~ apply for a given overlapping XNE with:

- ~~a) in case not~~ all the XRAs agreed at regional level ~~were~~ consistently included in the CGM used for the cross-regional process for the concerned CCRs. if
- ~~b) in case the agreed XRAs from one neighbouring CCR have an impact lower than 5% over the concerned overlapping XNE~~

~~In~~ this is not the case, the cost resulting from solving the residual operational security violations on the overlapping XNE shall be~~are~~ allocated to the native CCR. The cases of failing in~~where~~ the provision from the first sentence shall be closely monitored by the TSOs and RSCs from the concerned CCR~~overlapping XNE is managed at a regional level.~~

~~13-~~Any XRA agreed outside the coordinated cross-regional operational security assessment or any XRA agreed to solve a constraint on an XNE which is not an Overlapping XNE cannot impose~~trigger any~~ cost sharing among~~between~~ CCRs.

~~14. No later than twelve months after the adoption of this methodology, all TSOs shall jointly develop a proposal for amendment of this methodology in accordance with Article 7(4) of the SO Regulation. The proposal shall complement this methodology with rules for the sharing of costs of the overlapping XRAs activated to address the residual operational security violations by assigning the shares of costs to individual overlapping XNEs (i.e. mapping process).~~

8. ~~15-~~The process described under paragraphs (13) to (16) shall determine the~~paragraph 11-14 will result in~~ costs allocated to each concerned~~at~~ CCR level to solve operational security violations on overlapping XNEs during the cross-regional operational security assessment. As a subsequent step, identification of regional XRAs which caused residual overloads on overlapping XNEs shall be performed, in order to appoint the Regional cost sharing methodology will then apply for splitting these costs within the TSOs of the CCR. Regional Cost Sharing Methodologies shall make sure that XNEs labelled as overlapping XNEs are properly considered. The regional Cost sharing methodologies might use different principles for costs originating from cross-regional coordination costs to XNEs whose overloads were resolved by these XRAs during the regional CROSAs.

At each overlapping XNEC with residual overloads, and for each CCR separately, the following steps shall be operational security assessment compared to the ones applied; for costs originating from coordinated regional operational security assessment:

- a) The XRAs with linear characteristic shall be taken into account. This includes costly remedial actions, as well as non-costly remedial actions with characteristic close to linear, such as PST and HVDC;

The burdening and relieving flows caused by the XRAs on

Annex II

- b) In accordance with Article 27, the remaining available margin of an Overlapping XNEC during regional CROSA shall be calculated, where only the XRAs defined under (a) are taken into account. These flows shall be calculated on the CGM with applied topology changes;
- c) The burdening flows by XRAs are normalised with their total sum of burdening flows at each overlapping XNE, as provided in the equation 3.1;
- d) The cross-regional costs on XNECs appointed to each CCR pursuant to paragraph (14) are assigned to individual XRAs applied at regional CROSAs, proportionally to their normalised burdening effect from point (c), as provided in the equation 3.2;
- e) The costs from point (d) are assigned to the XNECs whose congestions were relieved by the individual XRAs at the regional CROSAs, pursuant to the mapping process applied in each CCR; and
- f) Regional cost-sharing methodologies shall then be applied for the costs by the regional CROSAs and the additional costs from the cross-regional optimisation pursuant to paragraph (17).

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- 9. The cross-regional methodology for the overlapping XNEs each group of CCRs pursuant to paragraph (1) shall be applied not later than 18 months after the last among the concerned CCR apply the implementation of the target solution of ROSC Methodology pursuant to the Article 76 of the SO Regulation. The determination of the mutually impacted CCRs shall be performed during the 1st month of the implementation period.”

- ii. An Annex II shall be added to the CSAM as an appendix to Article 27, and it shall read as follows:

“Appendix to Article 27: Mapping of inter-regional XRA costs

1. All TSOs shall distribute the costs and revenues of cross-border relevant redispatching and countertrading actions eligible for cost sharing, arising during the common cross-regional coordination process, to each hour and each individual XNE eligible for cost sharing associated with a single reference contingency (or N-situation) that represents the worst contingency to be determined and agreed among TSOs. Any reference to XNEC in the remainder of this Appendix shall be understood as referring to XNE with this single reference contingency (or N-situation) unless otherwise defined in paragraph 5.
2. The costs and revenues of each XRA eligible for costs sharing pursuant to paragraph 1 shall first be split into hourly costs using the following principles:
 - (a) The costs and revenues of an XRA, which are attributed clearly to a specific hour (such as activated redispatching energy), shall remain associated only to that hour;
 - (b) The costs and revenues of an XRA, which cannot be attributed clearly only to one specific hour, shall be split equally between the multiple hours to which these costs are attributed;
 - (c) The costs and revenues of an XRA, which have been attributed to hours in which there was no congestion in the CCR, shall be set to zero; the costs and revenues of such XRA in other hours (considered in the same RAO) in which there was a congestion in the CCR, shall be increased proportionally for the same amount; and
 - (d) The incurred costs of curative XRAs shall be considered ~~XNE is the absolute value of the difference~~, when the associated contingency materializes, otherwise they shall be equal to zero. Further, curative XRAs shall be considered in paragraph 3 and 4(e)(ii) only when they are associated to the eligible XNECs.
3. Subsequently, the costs and revenues of all XRAs for a specific hour as determined pursuant to paragraph 2 shall be summed up and split between all XNECs eligible for cost sharing in accordance with the following formula (all variables are applicable for the specific hour h):

$$C^{all} = \sum_j C_j \quad (1.1)$$

$$c_i = \frac{r_i}{\sum_i r_i} C^{all} \quad (1.2)$$

$$r_i = r_i^{direct} + r_i^{indirect} \quad (1.3)$$

$$r_i^{direct} = \sum_j \alpha_{i,j}^{norm} C_j \quad (1.4)$$

$$\alpha_{i,j}^{norm} = \begin{cases} 0 & \text{if } \sum_i \alpha_{i,j} = 0 \\ \frac{\alpha_{i,j}}{\sum_i \alpha_{i,j}} & \text{if } \sum_i \alpha_{i,j} > 0 \end{cases} \quad (1.5)$$

and $\alpha_{i,j}$ is calculated by solving the following optimisation (Equations to) for all XNECs for which the condition $|F'_{b,i}| > |F_{max,i}|$ is valid:

with

It is set $r_i^{direct} = 0$ for all XNECs for which the condition $|F'_{b,i}| \leq |F_{max,i}|$ is valid.

The effects of the PSTs on the XNECs are calculated as follows:

The first step for calculating the indirect relative weights of each XNEC is to calculate the virtual relative weights $r_i^{virtual}$ for the XNECs which are ~~Overlapping XNE~~ is not overloaded when considering the PSTs burdening effects, as follows:

$$r_i^{virtual} = \sum_j \alpha_{i,j}^{norm-PST-adj} C_j \quad (1.6)$$

$$\alpha_{i,j}^{norm-PST-adj} = \begin{cases} 0 & \text{if } \sum_i \alpha_{i,j}^{PST-adj} = 0 \\ \frac{\alpha_{i,j}^{PST-adj}}{\sum_i \alpha_{i,j}^{PST-adj}} & \text{if } \sum_i \alpha_{i,j}^{PST-adj} > 0 \end{cases} \quad (1.7)$$

and $\alpha_{i,j}^{PST-adj}$ is calculated by solving the following optimisation (Equations to) for the XNECs for which the condition $|F_{b,i}^{PST-adj}| > |F_{max,i}|$ is valid:

It is set $r_i^{virtual} = 0$ for all XNECs for which the condition $|F_{b,i}^{PST-adj}| \leq |F_{max,i}|$ is valid.

The PSTs' virtual costs are then calculated as follows:

The relative weight due to indirect costs is obtained with the distribution of the PSTs' virtual costs to the XNECs according to the following equations:

with

The principles detailed above to take into account burdening effect of PSTs and their associated virtual costs shall be extended to linear non-costly Remedial Actions (such as HVDC for example) with a similar approach to the one described here for PSTs. The adaptation needed to meet this requirement are not described in this annex but shall be developed during implementation phase by sticking to the PST approach.

4. The following additional rules shall apply for the calculation of variables in paragraph 3:

- (a) If C^{all} is, between PATL (in Amperes and assumed positive/negative and less than half of relative weights r_i of XNECs are lower/higher than 0, these weights shall be set to 0 before applying the Equation 1.2;
- (b) If C^{all} is positive/negative and half or more of relative weights r_i of XNEC i are lower/higher than 0, the positive/negative value of the lowest/highest negative/positive weight shall be added to all weights of all XNECs before applying the Equation 1.2;
- (c) If C^{all} is positive/negative and all relative weights r_i of XNEC i are 0, new weights shall be calculated and shall be equal to the absolute value of the right side of Equation 1.10 or 1.21, depending on the considered step;
- (d) In case the ~~)~~ and the absolute value of the right side of the Equation 1.10 or 1.21, depending on the considered step, is higher than the absolute value of the left side of this equation when all $\alpha_{i,j}$ and $\beta_{i,k}$ are set to 1, the right side of this equation shall be set equal to the left side of this equation when all $\alpha_{i,j}$ and $\beta_{i,k}$ are set to 1;
- (e) Adjusted total flow on XNEC $F'_{b,i}$ shall be calculated as the one among the two values below with the lowest absolute value:
- i. flow from the input CGM for the common cross-regional coordination process, including all XRAs agreed within each coordinated regional operational security assessment; and

flow from the input CGM for the common cross-regional coordination process, including all XRAs agreed within each active current flow (in Amperes) on this Overlapping XNE in the last intraday CGM before the next intraday coordinated regional operational security assessment, with included non-costly XRAs agreed during cross-regional coordination except PSTs and costly ANORAs is run. The remaining available margin is set to zero in case the overlapping XNE is already overloaded.

The rules (a) to (c) are also explained in the following table:

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Article 2

Publication of the Amendment to the CSAM

All TSOs shall publish this Amendment to the CSAM without undue delay after the decision has been taken by the European Union Agency for the Cooperation of Energy Regulators in accordance with Article 6(2)(c) and Article 7(4) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

~~The maximum percentage of this remaining available margin is 10 % for the conservative approach within Intraday timeframe. The maximum percentage of this remaining available margin can be reassessed during the Implementation phase or also at a later stage upon agreement of all TSOs. ENTSO-E shall publish the final value on its website.~~