All TSOs' proposal for a methodology for coordinating operational security analysis in accordance with Article 75 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

26 February 2018

Disclaimer

This document, provided by all Transmission System Operators (TSOs), is the draft for stakeholder consultation of the all TSOs' proposal for the methodology for coordinating operational security analysis in accordance with article 75 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

All TSOs, taking into account the following:

Whereas

(1) This document is a common proposal developed by all Transmission System Operators (hereafter referred to as “TSOs”) regarding the development of a proposal for a Methodology for coordinating operational security analysis (hereafter referred to as "CSA Proposal" or “Methodology”).

(2) This Methodology takes into account the general principles and goals set in Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as “SO GL”) as well as 2015/1222 establishing a guideline on capacity allocation and congestion management (hereafter referred to as “Regulation 2015/1222”), and Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity (hereafter referred to as “Regulation (EC) No 714/2009”). The goal of SO GL is to safeguard operational security, frequency quality and the efficient use of the interconnected system and resources. To facilitate these aims, it is necessary to enhance standardisation of operational security analysis at least per synchronous area. Standardisation shall be achieved through a common methodology for coordinating operational security analysis.

Article 75 of SO GL constitutes the legal basis for the CSA Proposal and defines several specific requirements that it should include at least: (a) methods for assessing the influence of transmission system elements and SGUs located outside of a TSO's control area in order to identify those elements included in the TSO's observability area and the contingency influence thresholds above which contingencies of those elements constitute external contingencies; (b) principles for common risk assessment, covering at least, for the contingencies referred to in Article 33: (i) associated probability; (ii) transitory admissible overloads; and (iii) impact of contingencies; (c) principles for assessing and dealing with uncertainties of generation and load, taking into account a reliability margin in line with Article 22 of Regulation (EU) 2015/1222; (d) requirements on coordination and information exchange between regional security coordinators in relation to the tasks listed in Article 77(3); (e) role of ENTSO for Electricity in the governance of common tools, data quality rules improvement, monitoring of the methodology for coordinated operational security analysis and of the common provisions for regional operational security coordination in each capacity calculation region.

(3) With consideration of effective needs for standardisation, the CSA Proposal also contains provisions: (i) to identify remedial actions which need to be coordinated between TSOs and to facilitate efficient remedial actions coordination at the regional level in accordance with the regional methodology to be developed later by all TSOs of a capacity calculation region pursuant to Article 76(1)(b) of SO GL; (ii) to ensure efficient realisation of the operational security analysis for different timeframes under Articles 72 to 74 of SO GL; and (iii) to ensure efficient and timely implementation of relevance assessment of outage coordination assets pursuant to the methodology under Article 84 of SO GL and its necessary coordination with the common influence computation method under Article 75(1)(a) of SO GL.

(4) In accordance with Article 84(3) of SO GL, the provisions of the CSA Proposal, as regards the definition of the common influence computation method pursuant to Article 75(1)(a), are closely

aligned with the common influence computation method provided in the proposal of methodology for Outage Coordination Asset Assessment developed under Article 84(1) of SO GL.

(5) According to Article 6 (6) of the SO GL, the expected impact of the CSA Proposal on the objective of the SO GL has to be described. It is presented below. The CSA Proposal generally contributes to the achievement of the objectives of the SO GL. In particular the CSA Proposal serves the objective of maintaining operational security throughout the Union, specifically coordination of system operation and operational planning; transparency and reliability of information on transmission system operation; and the efficient operation of the electricity transmission system in the Union.

(6) Furthermore, the CSA Proposal shall ensure application of the principles of proportionality and non-discrimination; transparency; optimisation between the highest overall efficiency and lowest total costs for all parties involved; and use of market-based mechanisms as far as possible, to ensure network security and stability.

(7) In conclusion, the CSA Proposal shall contribute to the general objectives of the SO GL to the benefit of all TSOs, the Agency, regulatory authorities and market participants.

SUBMIT THE FOLLOWING CSA PROPOSAL TO ALL REGULATORY AUTHORITIES:

TITLE 1
General Provisions

Article 1 Subject matter and scope

1. The methodology described in this proposal is the common proposal of all TSOs in accordance with Article 75 of SO GL.
2. This methodology shall cover the coordinated operational security analysis at Pan-European level and it applies to all TSOs, RSCs, DSOs, CDSOs and SGUs as defined in Article 2 of SO GL.
3. TSOs from jurisdictions outside the area referred to in Article 2(2) of SO GL may participate in the coordinated security analysis on a voluntary basis, provided that
    a. for them to do so is technically feasible and compatible with the requirements of SO GL;
    b. they agree that they shall have the same rights and responsibilities with respect to the coordinated security analysis as the TSOs referred to in paragraph 2;
    c. they accept any other conditions related to the voluntary nature of their participation in the coordinated security analysis that the TSOs referred to in paragraph 2 may set;
    d. the TSOs referred to in paragraph 2 have concluded an agreement governing the terms of the voluntary participation with the TSOs referred to in this paragraph;
    e. once TSOs participating in the coordinated security analysis on a voluntary basis have demonstrated objective compliance with the requirements set out in (a), (b), (c), and (d), the TSOs referred to in paragraph 2, after checking that the criteria in (a), (b), (c), and (d) are met, have approved an application from the TSO wishing to participate on a voluntary basis in accordance with the procedure set out in Article 5(3) of the SO GL.

4. The TSOs referred to in paragraph 2 shall monitor that TSOs participating in coordinated security analysis on a voluntary basis pursuant to paragraph 3 respect their obligations. If a TSO participating in the coordinated security analysis pursuant to paragraph 3 does not respect its essential obligations in a way that significantly endangers the implementation and operation of SO GL, the TSOs referred to in paragraph 2 shall terminate that TSO's voluntary participation in the coordinated security analysis process in accordance with the procedure set out in Article 5(3) of SO GL.

Article 2
Definitions and interpretation

1. For the purposes of this proposal, the terms used shall have the meaning of the definitions included in Article 3 of SO GL, Article 2 of Regulation 2015/1222 and the other items of legislation referenced therein. In addition, the following definitions shall apply:

   'reference load' means the average load defined as total consumption energy in the control area divided by the number of hours composing the year.

   'permanent occurrence increasing factor' means a factor that explains a permanent increase of the probability of occurrence of an exceptional contingency.

   'temporary occurrence increasing factor' means a factor that explains a temporary increase of the probability of occurrence of an exceptional contingency.

   'evolving contingency' means the loss of several grid elements and/or grid users resulting from the occurrence of a contingency from the contingency list followed by the automatic or manual tripping of additional grid elements which are in violation of their operational security limits.

   'verifiable evolving contingency' means an evolving contingency for which each and every step subsequent to the initial contingency can be simulated until a stable state is reached.

   'preventive remedial action' means a remedial action that is the result of an operational planning process and needs to be activated prior to the investigated timeframe for compliance with the (N-1) criterion.

   'curative remedial action' means a remedial action that is the result of an operational planning process and is activated straight subsequent to the occurrence of the respective contingency for compliance with the (N-1) criterion.

   'restoring remedial action' means a remedial action that is activated subsequent to the occurrence of an alert state for returning the transmission system into normal state again.

   'set of remedial actions' means a combination of remedial actions that are to be applied as a whole to maintain operational security.

   'cross-border impact' means the effect in term of a change of power flows or voltage on a transmission system element located outside of the TSO's control area resulting from the activation of a remedial action in the TSO's control area.

   'cross-border impacting remedial action' means a remedial action whose application has a significant influence on at least one TSO that is not involved in its application.

‘cross-RSC impacting remedial action’ means a cross-border impacting remedial action to be applied by a TSO served by a RSC whose application has a significant influence on at least one TSO that is not involved in its application and that is served by another RSC.

‘served TSO’ mean a TSO which has delegated tasks to a RSC in accordance with Article 77(3).

‘local preliminary assessment’ means an operational security analysis performed by a TSO on an individual grid model.

‘coordinated operational security analysis’ means an operational security analysis performed by a TSO on a common grid model.

‘coordinated regional operational security analysis’ means an operational security analysis performed by a RSC on a common grid model.

‘RA influence factor’ means a numerical value used to quantify the cross-border impact of a remedial action or of a set of remedial actions.

2. Where this Methodology refers to grid elements, it includes HVDC systems and HVDC interconnectors.
3. ‘IGM’ and ‘CGM’ respectively stand for ‘individual grid model’ and ‘common grid model’.

TITLE 2
Determination of influencing elements

Chapter 1
Influence factor determination

Article 3
Influence computation method

1. The influence computation method has the following characteristics:
    a. It is able to characterize the influence of the absence of one network element, being a grid element, a power generation module, a demand facility connected to a TSO or transmission-connected DSO/CDSO network on the power flow or voltage of another grid element
    b. It is applicable on network models such as a year-ahead common grid model developed in accordance to Article 67 of SO GL or on other similar network models in terms of needed data
    c. The influence is characterized with respect to the relative or absolute value of power flow or voltage variation and the result is able to be compared against thresholds
2. Each TSO shall apply the influence computation method provided in Annex I for computing power flow influence factors on its control area of grid elements, power generating modules, and demand facilities located outside the TSO’s control area, at least for those grid elements, power generating modules, and demand facilities connected to a transmission system.

3. Each TSO shall have the right to use voltage influence factors in the determination of its observability area, external contingency list and/or proposal of relevant asset list.

4. Where applicable according to paragraph 3, each TSO shall apply the influence computation method provided in Annex I for computing voltage influence factors on its control area of grid elements, power generating modules, and demand facilities located outside its control area.

5. TSOs may agree to use dynamic studies for assessing influence of the grid elements, power generating modules, and demand facilities located outside their control areas. In such case, they shall define models, studies and criteria to be used for the assessment and inform their NRAs about their agreement. These models and studies shall be consistent with those developed in application of Articles 38 or 39 of SO GL.

6. Each TSO may decide to use dynamic studies to assess influence of the grid elements, power generating modules, and demand facilities located in transmission-connected DSOs/CDSOs grids. In such a case, the TSO shall use models, studies and criteria, consistent with those developed in application of Articles 38 or 39 of SO GL, and in the case where one or more elements are identified as relevant, the concerned TSO shall inform its NRA of the elements identified with reasoning supporting this result.

7. Each TSO shall inform the concerned transmission-connected DSOs/CDSOs about the decision to compute power flow and/or voltage influence factor of grid elements of their systems or of power generating modules and demand facilities connected to these DSO/CDSO systems, and shall be entitled to ask these DSOs/ CDSOs for technical parameters and data that can allow the inclusion of at least part of their grids in the TSO's grid models.

8. Each TSO shall inform the concerned transmission-connected DSOs/CDSOs about the decision to use dynamic studies to assess influence of the grid elements, power generating modules, and demand facilities located in transmission-connected DSOs/CDSOs grids and shall be entitled to ask these DSOs/ CDSOs for the corresponding technical parameters and data.

9. When requested according to paragraphs 7 or 8, each transmission-connected DSO/CDSO shall provide a coherent set of data to enable the connecting TSO to incorporate the required part of their systems in its national grid models or in its individual grid models established pursuant to paragraph 12.

10. Each TSO shall use the common grid models established according to Article 67 of the System Operation Guidelines, and complemented as needed pursuant to paragraph 12, when computing power flow and/or voltage influence factors of grid elements, power generating modules and demand facilities connected directly or through a DSO/CDSO to another TSO's control area.

11. When computing the influence of grid elements, power generating modules, and demand facilities located in transmission-connected DSOs/CDSOs which are connected to its control area, in order to determine whether they are part of its observability area, each TSO shall use either the common grid models established according to Article 67 of the System Operation Guidelines, or national grid models; in both cases, these models shall be complemented as needed pursuant to paragraph 7.

12. Each TSO shall include in its individual grid model relevant data model required according to paragraphs 9 and 10 which it identifies as necessary for computation of influence factors by another TSO.

Chapter 2
Identification of influencing elements

Article 4
Identification of observability area elements

1. By 3 months after the approval of this methodology, each TSO shall define its observability area in accordance with Article 3 and the following paragraphs.
2. Each TSO shall have the right to decide in cooperation with each transmission-connected DSO/CDSO of its control area what are their grid elements and power generating modules and demand facilities connected to this DSO/CDSO which will be part of its observability area based on qualitative assessment.
3. Where deemed necessary by the TSO, this TSO shall decide in cooperation with each non-transmission-connected DSO/CDSO of its control area and its connecting DSO what are their grid elements and power generating modules and demand facilities connected to this DSO/CDSO which will be part of its observability area based on qualitative assessment.
4. If the TSO and the concerned transmission-connected DSO/CDSO do not agree, the identification of elements will be done in accordance to Article 3.
5. Each TSO shall select threshold values inside the range of observability thresholds listed in Annex 1 that it shall use to determine its observability area in application of paragraph 6 and 7. The TSO shall publish on its web site those threshold values in time with the application of paragraph 1.
6. Each TSO shall include in its observability area:
    a. all grid elements outside its control area which have an influence factor higher than the correspondent observability influence threshold values selected pursuant to paragraph 5;
    b. all grid elements of transmission-connected DSOs/CDSOs of its control area, identified in accordance to paragraph 2 or all grid elements of transmission-connected DSOs/CDSOs identified in accordance to paragraph 4 that have at least one influence factor higher than the correspondent observability influence threshold listed in Annex 1;
    c. all grid elements of non-transmission-connected DSOs/CDSOs of its control area, identified in accordance to paragraph 3;
    d. all grid elements connecting this TSO’s control area to another TSO’s control area;
    e. additional grid elements which are necessary to obtain a fully connected observability area;
    f. elements identified in application of Article 3(3) to Article 3(8), where applicable;
    g. busbars to which the grid elements previously identified in accordance with points a to f can be connected.
7. A TSO shall have the right to discard some grid elements identified in accordance with paragraph 6.a, provided their influence factor is not higher than the maximum value of the range of thresholds defined in Annex 1.

8. In addition, each TSO shall include in its observability area all power generating modules and demand facilities which are SGUs and connected to the busbars identified in paragraph 6.

9. In case that a TSO intends to include in its observability area grid elements, power generating modules or demand facilities that are connected to the transmission system and not identified in accordance with paragraph 6 or 8, this TSO shall send a request to the concerned TSOs. The TSOs which receive the request are entitled to accept or reject it.

10. TSOs shall have the right to agree to keep existing data exchange for elements which are not identified in application of paragraph 6.

11. TSOs and DSOs shall have the right to agree to keep existing data exchange for elements which are not identified in application of paragraph 4 and 6.

12. Each TSO of a synchronous area shall re-assess its observability area in accordance with paragraph 2 to 9 at least once every 5 years.

13. Between two mandatory assessments in accordance with paragraph 12, any new element commissioned inside a TSO's observability area shall be included in its observability area.

Article 5
Identification of external contingencies

1. By 3 months after the approval of this methodology, each TSO shall define its external contingency list in accordance with Article 3.

2. Each TSO shall select threshold values inside the range of external contingency thresholds listed in Annex 1 that it shall use to determine its external contingency list in application of paragraph 1. The TSO shall publish on its web site those threshold values in time with the application of paragraph 1.

3. Each TSO shall include in its external contingency list at least:

    a. all contingencies of a single grid element outside its control area which have an influence factor higher than the correspondent external contingency threshold values selected pursuant to paragraph 2;

    b. all contingencies of grid elements of transmission connected DSOs to this TSO and transmission connected CDSOs to this TSO, which are located in the TSO's observability area and commonly agreed between the TSO and the DSO/CDSO according to Article 4(2) or all contingencies of grid elements of these DSOs and CDSOs, which are located in the TSO's observability area, and which have an influence factor higher than the correspondent external contingency threshold values selected pursuant to paragraph 1.

4. Each TSO shall have the right to complement its external contingency list with generating modules and transmission connected demand facilities identified in accordance with Article 4(8).

5. All new elements commissioned inside a TSO's observability area shall either be assessed in accordance with Article 3 or shall be included without any assessment in its external contingency list.

6. Each TSO of a synchronous area shall re-assess its external contingency list in accordance to paragraph 3 and 4 at least once every 5 years.

TITLE 3
Principles of coordination

Chapter 1
Management of exceptional contingencies

Article 6
Classification of contingencies

1. When building its contingency list as required by Article 33 of SO GL, each TSO shall classify for its own control area:
    a. The following contingencies as ordinary:
        i. Loss of a single line / cable;
        ii. Loss of a single transformer;
        iii. Loss of a single phase-shifting transformer;
        iv. Loss of a single voltage compensation device;
        v. Loss of a single component of a HVDC system such as a line or a cable or a single HVDC converter unit;
        vi. Loss of a single power generation unit;
        vii. Loss of a single demand facility.
    b. The following contingencies as exceptional:
        i. Loss of grid elements having common fault mode, meaning that a single fault (such as a fault on a busbar, HVDC grounding system, circuit breakers, measurement transformers, …) will lead to the loss of more than one grid element;
        ii. Loss of overhead lines built on same tower;
        iii. Loss of underground cables built in same trench;
        iv. Loss of grid users having common process mode, meaning that the total or partial sudden loss of one grid user will lead to the total or partial loss of the others (ex: Combined cycle units, ...);
        v. Loss of grid elements/users simultaneously disconnected as a result of the operation of a Special Protection Scheme;
        vi. Loss of multiple generation units (including solar and wind farms) disconnected as a consequence of a voltage drop on the grid.
    c. The following contingencies as out-of-range:
        i. Loss of two or more independent lines;
        ii. Loss of two or more independent cables;

iii. Loss of two or more independent transformers or phase shifter transformer;

iv. Loss of two or more independent grid users (power generating unit or demand facility);

v. Loss of two or more independent voltage compensation devices;

vi. Loss of two or more independent busbars;

vii. Loss of two or more components of a HVDC system such as lines, cables or HVDC converter units.

2. For any other type of contingency resulting in the simultaneous loss of one or several grid users or grid elements and not listed above, each TSO shall classify them in one of the three categories (ordinary, exceptional or out-of-range) according to the definitions provided by Article 3 of SO GL.

Article 7
Occurrence increasing factors handling

1. Each TSO shall determine for each exceptional contingency the relevance and criteria of application of the following occurrence increasing factors:

    a. permanent occurrence increasing factors:

        i. specific geographical location,

        ii. design conditions

    b. temporary occurrence increasing factors:

        i. operational conditions

        ii. weather conditions

        iii. life time or generic malfunction affecting the risk of failure

Article 8
Exceptional contingencies with a risk of high cross-control area impact

1. Some TSOs may jointly establish on agreement on a list of additional exceptional contingencies located in one of their control areas which shall have to be included in their contingency list in order to ensure that the consequences in their control areas remain acceptable.

2. When establishing this agreement, these TSOs shall determine the maximum cost of remedial actions above which cost of fulfilment of operational security limits shall not be deemed proportionate to the risk.

3. When establishing this agreement, these TSOs shall ensure that all affected TSOs are participating in the agreement.

Article 9
Establishment of the contingency list

1. When applying Article 33.1 of SO GL, each TSO shall include in its contingency list:
    a. the ordinary contingencies;
    b. the exceptional contingencies fulfilling the application criteria of at least one of the permanent occurrence increasing factor;
    c. the exceptional contingencies fulfilling the application criteria of at least one of the temporary occurrence increasing factors when conditions are met;
    d. the exceptional contingencies which lead to consequences above the consequences within the TSO's control area which are considered as acceptable in respect with its national legislation as referred to in Article 4(2)(e) of SO GL, or, if no national legislation exists, in respect with its internal rules.
2. In addition, each TSO part of an agreement established according to Article 8 shall include in its contingency list where needed the identified exceptional contingencies.
3. In addition, each TSO shall include in its contingency list the external exceptional contingencies that may endanger its grid whether they are permanently or temporarily included in another TSO's internal contingency list pursuant to Article 10(1) and (4).
4. When assessing the contingencies referred to in point a of paragraph 1, each TSO shall have the right to exclude those which will never lead to consequences above the consequences which are considered as acceptable in respect with its national legislation or, if no national legislation exists, in respect with its internal rules, provided that such contingencies are not part of the external contingency list of any other TSO.
5. When assessing the contingencies referred to in point d of paragraph 1, each TSO shall take into consideration whether the cost of remedial actions needed to maintain the consequences acceptable is deemed proportional to the risk in respect with its national legislation or, if no national legislation exists, in respect with its internal rules.

Article 10 .
Sharing of the contingency list

1. Each TSO shall inform without undue delay the TSOs whose observability area contains grid elements of its contingency list and the relevant RSC(s) about any update of the exceptional contingencies fulfilling the application criteria of at least one of the permanent occurrence increasing factor.
2. Each TSO shall inform without undue delay the TSOs whose observability area contains grid elements of its contingency list about any update of the exceptional contingencies that have the potential to fulfil the application criteria of at least one of the temporary occurrence increasing factor.
3. When informed by another TSO that an exceptional contingency fulfils at least one of the permanent occurrence increasing factor or has the potential to fulfil the application criteria of at least one of the

temporary occurrence increasing factor, each TSO shall assess whether this contingency shall endanger its grid.

4. Each TSO shall inform without undue delay the TSOs whose observability area contains grid elements of its contingency list and the relevant RSC(s) about any update of the exceptional contingencies when conditions are met to fulfil the application criteria of at least one of the temporary occurrence increasing factor.

5. Each TSO shall inform without undue delay, when conditions are no longer met, the TSOs whose observability area contains grid elements of its contingency list and the relevant RSC(s) about any update of the exceptional contingencies no longer fulfilling the application criteria of at least one of the temporary occurrence increasing factor.

6. Each TSO shall inform the relevant RSC(s) about the contingencies of their contingency list for which the TSO shall not be required to comply with the (N-1) criterion either

    a. because the TSO decides not to comply with in (N-1) criterion in application of SO GL Article 35(5) or
    b. because they are part of the set of contingencies jointly agreed in application of Article 11.

7. Each TSO shall inform the relevant RSC(s) about the contingencies which are part of a list established in application of Article 8.

Chapter 2
Evaluation of contingency consequences

Article 11
Common agreement on cross-control area consequences

1. TSOs shall have the right to jointly agree in a multi-lateral agreement that a set of contingencies of their contingency lists do not respect the (N-1) criterion. The precondition for such a multi-lateral agreement is that the contingencies not respecting the (N-1) criterion have consequences limited to the contracting TSOs control areas and considered as acceptable within each contracting TSO's control area in respect of their national legislation or, if no national legislation exists, their national rules.

Article 12
Assessment of consequences

1. In addition to Article 35(1) of SO GL, each TSO shall assess the consequences of any contingency of his contingency list:

    a. by evaluating that the power deviation between generation and demand resulting of the occurrence of a contingency or of a verifiable evolving contingency does not exceed the reference incident, and that one of the following conditions is fulfilled:
        i. the operational security limits determined according to Article 25 of SO GL are respected on all grid elements of its control area in compliance with Article 35(1) of SO GL and there is no risk of propagating a disturbance to the interconnected transmission system, or

ii. the occurrence of the contingency leads to a verifiable evolving contingency with consequences limited to the perimeter of the TSO's control area and considered as acceptable in respect with its national legislation or, if no national legislation exists, in respect with its internal rules, in compliance with Article 35(5) of SO GL

b. or by evaluating with the support of the relevant RSC(s) that the power deviation between generation and demand resulting of the occurrence of a verifiable evolving contingency does not exceed the reference incident, and the occurrence of the contingency leads to a verifiable evolving contingency with consequences limited to the control areas of TSOs which are party to an agreement defined according to Article 11 and considered as acceptable within each TSO's control area in respect with its national legislation or, if no national legislation exists, its national rules and there is no risk of propagating a disturbance to the rest of the interconnected transmission system.

Chapter 3
Coordination of remedial actions

Article 13
Cross-border impact of sets of remedial actions

1. When implementing a set of remedial actions, TSOs shall assess the cross-border impact of the whole set and shall not assess the cross-border impact of each elementary remedial action constituting the set.
2. When jointly implementing a set of remedial actions in application of Article 20 and 78 of SO GL, TSOs shall consider this set of remedial actions as cross-border impacting for them.

Article 14
Procedure for quantitative assessment of cross-border impact

1. When TSOs have to quantitatively assess the cross-border impact of a remedial action or of a set of remedial actions in accordance with Article 15(1), TSOs shall use the remedial action influence factor defined by the maximum flow deviation on its interconnectors normalised by their permanent admissible load resulting from the application of a remedial action or of a set of remedial actions.
2. When assessing the influence factor of a remedial action as described in paragraph 1, TSOs shall have the right to agree, when preparing the proposal for the methodology for the preparation of remedial actions in a coordinated way under Article 76(1)(b) of SO GL, on additional external elements included in their observability area to be considered in addition to their interconnectors.
3. TSOs shall have the right to agree when preparing the proposal for the methodology for the preparation of remedial actions in a coordinated way under Article 76(1)(b) of SO GL, to assess quantitatively the cross-border impact based on change of voltage. In that case, the TSOs shall agree on the list of nodes where such assessment will take place.
4. For preventive remedial actions, the change of flows or voltage shall be assessed on the N situation and on each of the N-1 situations resulting of the contingency list simulation. For curative remedial actions,

the change of flows or voltage shall be assessed on the simulation of the post-contingency situation for which this curative remedial action has been designed.

5. TSOs shall deem cross-border impacting remedial actions or sets of remedial actions for which the RA influence factor is higher than a threshold commonly agreed when preparing the proposal for the methodology for the preparation of remedial actions in a coordinated way under Article 76(1)(b) of SO GL

6. If no such threshold is defined, TSOs shall deem cross-border impacting remedial actions or sets of remedial actions for which the RA influence factor defined in paragraph 1 is higher than 5%.

Article 15
Process for cross-border impact assessment

1. When preparing the proposal for the methodology for the preparation of remedial actions in a coordinated way under Article 76(1)(b) of SO GL, using either a qualitative or a quantitative approach or a combination of them, all TSOs of each CCR shall jointly determine:

    a. the list of potential remedial actions or sets of remedial actions that are deemed cross-border impacting and, for each of those remedial actions, the corresponding affected TSOs, including for remedial actions or sets of remedial actions that are quantifiable such as redispatching for congestion management, countertrading, the magnitude of change of set point on HVDC systems or change of taps on phase-shifting transformers, the quantity above which this remedial actions or set of remedial actions become cross-border impacting;

    b. the list of potential remedial actions or sets of remedial actions that are not deemed cross-border impacting;

    c. the cases where a qualitative or a quantitative approach shall be applied to determine the cross-border impact of a remedial action or set of remedial actions, for those which are not identified in these two lists and

    d. the frequency of update of the previous items.

2. In day-ahead or intra-day operational planning, when preparing a remedial action, each TSO shall assess, in accordance with the cases where a qualitative or quantitative approach shall be applied as defined in application of paragraph 1.c, the cross-border impact of remedial actions that have not been assessed in application of paragraph 1.a.

3. During real time operation, if the system is in alert state, when implementing restoring remedial actions, each TSO shall assess, in accordance with the cases where a qualitative or quantitative approach shall be applied as defined in application of paragraph c the cross-border impact of remedial actions that have not been assessed in application of paragraph a.

4. During real time operation, if the system is in emergency state and only when operational conditions allow it, when implementing restoring remedial actions, each TSO shall assess, in accordance with the cases where a qualitative or quantitative approach shall be applied as defined in application of paragraph c, the cross-border impact of remedial actions that have not been assessed in application of paragraph a.

Article 16
Principles for coordination of cross-border impacting remedial actions

1. In day-ahead or intra-day operational planning, each TSO shall manage in a coordinated way remedial actions that have been deemed cross-border impacting with the affected TSOs following the methodology for the preparation of remedial actions in a coordinated way developed in compliance with Article 76 of SO GL.
2. During real time operation, if the system is in alert state, when implementing restoring remedial actions that have been deemed cross-border impacting, each TSO shall manage them in a coordinated way with the affected TSOs.
3. During real time operation, if the system is in emergency state and only when operational conditions allow it, when implementing restoring remedial actions that have been deemed cross-border impacting, each TSO shall manage them in a coordinated way with the affected TSOs.
4. For a remedial action which is deemed cross-border impacting, each affected TSO shall accept the implementation of the proposed remedial action provided that
    a. this remedial action is considered available in a consistent manner from the time frame of its decision to all the subsequent timeframes of security analyses, up to real time
    b. and
        i. when this remedial action is preventive, it is not setting the affected TSO's grid in an alert state based on the CGM(s) used for its decision and it has no cost effect on the affected TSO,
        ii. when this remedial action is curative, it is not leading to a violation of an operational security limits in the affected TSO's grid after the simulation of the corresponding contingency based on the CGM(s) used for its decision and it has no cost effect on the affected TSO.
5. When the conditions established in the previous paragraph are not met, each affected TSO shall accept or refuse the implementation of the proposed remedial action on the basis of the conditions established in the methodology for the preparation of remedial actions in a coordinated way developed under Article 76(1)(b) of SO GL.

Article 17
Remedial actions availability and consistency

1. When designing remedial actions in application of Article 20 of SO GL or when providing to the relevant RSC the updated list of possible remedial actions in application of Article 78(1)(b) of SO GL, each TSO shall consider as available the remedial actions which were available for the previously performed coordinated operational security analyses or coordinated regional operational security assessments or previously performed capacity calculations of the same timestamps, except if an unforeseen event has made a remedial action unavailable or the remedial action has become technically unavailable.
2. When relieving a constraint during a coordinated operational security analysis in application of Article 72 of SO GL for day-ahead and intraday timeframes, each TSO shall take into consideration all the

remedial actions already agreed, in application of the common provisions determined pursuant to Article 76 of SO GL, during previously performed coordinated operational security analyses or coordinated regional security assessments of the same timestamps except if an unscheduled outage has made a remedial action unavailable or the remedial action has become technically unavailable.

3. When a TSO wants to modify the consistency of a remedial action or of a set of remedial actions which have previously coordinated and agreed, this TSO shall again assess the cross-border impact of the new remedial action or set of remedial actions and; where necessary, coordinate it with the affected TSOs in accordance with Article 16.

Article 18
Preventive remedial actions activation

1. Each TSO shall activate preventive remedial actions at the shortest time compatible with the delay required to implement them provided
    a. their need is confirmed by the latest coordinated operational security analysis or coordinated regional operational security assessment performed of the expected situation and
    a. when they have been deemed cross-border impacting, they have been managed in a coordinated way with the affected TSOs in compliance with Article 16.
2. Each TSO shall have the right to decide to activate preventive remedial actions earlier than when it is necessary with consideration of the operational conditions and provided
    a. it does not introduce any security violation and
    b. when they have been deemed cross-border impacting, this has been managed in a coordinated way with the affected TSOs in compliance with Article 16.

Article 19
Requirements for coordinated operational security analyses

1. When preparing the proposal for common provisions for regional operational security coordination as required by Article 76(1) of SO GL, all TSOs of each CCR shall jointly determine the grid elements on which constraints have to be identified and solved.
2. The list of grid elements established in application of paragraph 1 shall at least include all the critical network elements of the CCR.
3. The common provisions for regional security coordination developed as required by Article 76(1) of SO GL shall ensure that coordinated regional operational security analyses
    a. take into account already implemented remedial actions in the individual grid models,
    b. relieve all constraints on the grid elements identified in application of paragraph 1 using at least the lists of remedial actions provided by TSOs in application of Article 78(1)(b) of SO GL.

Article 20
Remedial actions inclusion in individual grid models

1. When preparing individual grid models pursuant to Article 70 of SO GL, each TSO shall include any remedial actions already agreed as a result of previous coordinated operational security analyses in accordance with Article 17(2) or previous coordinated regional security assessments in accordance with Article 78 of SO GL.
2. When preparing individual grid models pursuant to Article 70 of SO GL, 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 SO GL, each TSO may choose whether or not to relieve constraints on
    a. grid elements identified in application of Article 19(1) of this Methodology as they will be relieved during the subsequent coordinated regional operational security assessment
    b. any other grid elements provided those constraints are likely to be solved by remedial actions which are not deemed cross-border impacting,
    c. and on any other grid elements provided those constraints are likely to be solved by subsequent coordinated regional operational security assessment.
4. When preparing individual grid models pursuant to Article 70 of SO GL, 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 any non-cross-border impacting remedial actions and may include cross-border impacting remedial actions provided this is consistent with the common provisions developed as required by Article 76(1) of SO GL

Chapter 4
Realisation of operational security analyses

Article 21
Long term studies (year-ahead up to week-ahead)

1. In order to apply requirements of Article 72(1)(a) or (b) or Articles 98(3), 100(3) and (4) of SO GL, each TSO shall have the right to decide to apply local scenarios for its control area in addition to the scenarios required according to Article 65 of SO GL, in order to improve robustness of the analyses against uncertainties.
2. Where the need for local scenarios is identified, the TSO shall determine for which operational planning activities those local scenarios are to be considered and shall inform the TSOs of its capacity calculation region or of its outage coordination region and the relevant RSCs about the content of those local scenarios and their usage purpose.
3. Where a TSO defines local scenarios for security analysis in accordance with Article 72(1)(a) or (b) or Articles 98(3), 100(3) and (4) of SO GL, and these scenarios differ from the scenarios defined by all

TSOs according to Article 65 of SO GL, other TSOs shall not be obliged to build their individual grid models for the local scenarios.

4. Where a TSO defines local scenarios for security analysis in accordance with Article 72(1)(a) or (b) of SO GL, this TSO shall define, in coordination with other TSOs of the concerned capacity calculation region, which grid models shall be used to study these local scenarios. These grid models shall be derived from the common grid models established pursuant to Article 67 of SO GL, using appropriate substitutes or derived models where appropriate.

5. Where a TSO defines local scenarios for security analysis in accordance with Articles 98(3), 100(3) and (4) of SO GL, this TSO shall define, in coordination with other TSOs of the outage coordination region, which grid models shall be used to study these local scenarios. These grid models shall be derived from the common grid models established pursuant to Article 67 of SO GL, using appropriate substitutes or derived models where appropriate.

Article 22
D-1 Security Analysis

1. Each TSO shall perform a coordinated operational security analysis of the next day forecasted situation, in accordance with Articles 72(1)(c) and 74(1) and (2) of SO GL, between T1 and T5 on the basis of the day-ahead common grid model built in accordance with Article 32(1), where T1 and T5 are defined in accordance with Article 42.

2. Each TSO shall have the right to delegate this task to the RSC(s) to which it has delegated tasks in accordance with Article 77(3) of SO GL.

3. Taking into account that a margin in line with Article 22 of Regulation (EU) 2015/1222 will be established for capacity calculation processes, each TSO shall not take into account any additional reliability margin to its operational security limits when evaluating the results of the coordinated operational security analysis done in accordance with paragraph 1, and shall not include in its day-ahead individual grid models any additional reliability margin to the operational security limits.

Article 23
Intraday Security Analysis

1. Each TSO shall determine the minimum number and hours of assessment runs in intraday timeframe where it performs a coordinated operational security analysis in accordance to Article 72(1)(d) and 74(1) and (2) of SO GL, taking into account at least:

    a. Conditions and frequency for regional coordinated security analysis provided by an RSC and adopted pursuant to Article 76(1)(a) of SO GL in the capacity calculation regions the TSO is taking part;

    b. Intraday relative timeline distribution of the market activity affecting the positions of market participants in its control area;

    c. Time needed to activate usual remedial actions;

d. Impact of solar or wind generation variations on its system, due to locally connected generation assets or connected inside other control areas;

e. Impact of load variations.

2. The minimum number shall be greater or equal to 3.

3. When performing a security analysis in intraday, and where the results of the security analysis have significantly evolved with a regional impact compared to the previous ones, the TSO shall coordinate with the affected TSOs in accordance with Article 72(5) of SO GL and the relevant RSC(s), in order to:

   a. share information about the significant changes in electrical variables, at least flows;

   b. agree on change on previously agreed remedial action or on new remedial action with cross-border impact which may become required due to moving closer to or exceeding the operational security limits.

4. With respect to the conditions and frequency of intra-day coordination of operational security analysis established pursuant to Article 76(1)(a) of SO GL, the TSO shall have the right to delegate part or all of the coordinated operational security analyses defined in accordance with paragraph 1 to the RSC(s) to which it has delegated tasks in accordance with Article 77(3) of SO GL.

5. Taking into account that a margin in line with Article 22 of Regulation (EU) 2015/1222 will be established for capacity calculation processes, each TSO shall not take into account any additional reliability margin to its operational security limits when evaluating the results of the coordinated operational security analysis done in accordance with paragraph 1, and shall not include in its intraday individual grid models any additional reliability margin to the operational security limits.

Article 24
Handling of extreme event

1. In case of an expected extreme event, such as a weather event, able to trigger significant effects on network assets' or generation assets' availability or on load demand, each TSO shall attempt to evaluate the expected consequences within its control area, with a focus on the period of the day where the event will take place until the end of the day.

2. Where the result of this analysis is that such events are capable of leading to an emergency or black-out state, the TSO shall inform without delay neighbouring TSOs and the RSC(s) to which it has delegated tasks in accordance with Article 77(3) of SO GL, and, where necessary, affected DSOs and SGUs.

Chapter 5
Inter-RSC Coordination

Article 25
General requirements

1. RSCs shall use English for all communication and documentation exchanges between them.

2. RSCs shall aim at providing permanent capability for coordination with other RSCs, on 24 hours a day basis. Where an RSC is not organized for that, a back-up solution shall be defined by the RSC and its served TSOs to allow possible exchange of information at the request of other RSCs during the periods this RSC is unavailable.

Article 26
Overlapping zones

1. In order to achieve transparency and consistency between processes set-up in accordance to Article 77 of SO GL, each couple of RSCs serving at least two neighbouring TSOs, and all their served TSOs shall agree on the overlapping of zones these RSCs monitor by identifying:
    a. the list of network elements monitored by these RSCs;
    b. the list of contingencies simulated by these RSCs;
    c. the list of potential remedial actions generally available to solve operational security limits violations on the network elements monitored by these RSCs.
2. For the remedial actions identified pursuant to paragraph 1.c, using either a qualitative or a quantitative approach or a combination of them, these RSCs and TSOs shall determine:
    a. the list of remedial actions that are deemed cross-RSC impacting and, for each of those remedial actions, the corresponding affected TSOs, including for remedial actions or sets of remedial actions that are quantifiable such as redispatching for congestion management, countertrading, the magnitude of change of set point on HVDC systems or change of taps on phase-shifting transformers, the quantity above which these remedial actions or set of remedial actions become cross-RSC impacting;
    b. the list of remedial actions that are not deemed cross-RSC impacting.
3. RSCs and TSOs shall agree on the update conditions of this information at least for the tasks listed in Articles 78, 80, 81 of SO GL.

Article 27
Monitoring of inclusion of agreed remedial actions in the individual grid models

1. Each RSC shall monitor in the relevant timeframes the correct implementation of the agreed remedial actions in the IGMs by the TSOs, as required by Article 70(4) of SO GL.
2. When a RSC identifies that a previously agreed remedial action has not been implemented in the IGM by a TSO, that RSC shall inform the other RSCs about it. The relevant RSC in charge of providing the task of CGM building for this TSO according to Article 77(3)(b) of SO GL shall, pursuant to Article 79(3) of SO GL, ask the relevant TSO to correct its IGM.

Article 28
Back-up for the common grid model building task

1. RSCs shall set up the relevant organization between them to guarantee the availability of common grid models built in application of Article 79 of SO GL; with a target of absence of interruption for the different timeframes.
2. In case of an interruption of service, RSCs shall aim at recovering the service availability as soon as possible and inform the TSOs of the expected time of recovery.

Article 29
Assessment of cross-RSC influence of remedial actions

1. When considering the use of a remedial action for relieving a congestion in the overlapping zone for which the cross-RSC impact is not assessed in accordance with Article 26(2.b), the relevant RSC shall consider it as cross-RSC impacting.
2. When considering the use of a remedial action which is deemed cross-RSC impacting for relieving a congestion, the RSC shall coordinate with the other concerned RSCs to identify its effects. All affected TSOs shall agree on the use of this remedial action before applying it.

Article 30
Investigation of possible additional remedial actions

1. When a RSC is not able to propose to its served TSOs an efficient remedial action to remove a congestion, this RSC shall coordinate with other relevant RSCs in order to try to find another adequate RA. In case such a RA is identified, its use shall be agreed by all the affected TSOs.
2. For costly remedial actions, the identification and agreement on such remedial actions may be restricted to those possible with consideration of the existence of agreed cost sharing rules between the concerned TSOs.

Article 31
Exchange of results

1. Each RSC shall exchange the results of coordinated regional operational security assessments with other RSCs having an overlapping zone with it for checking and consolidating them where required, notably for cross-RSC impact assessment. They shall at least exchange information about needed remedial actions and all relevant information useful to support the results.

Article 32
Cross-regional day-ahead coordinated operational security assessment

1. TSOs and RSCs shall apply at least the following day-ahead coordinated operational security assessment process, where T0, T1, T2, T3, T4, T5 are defined in accordance with Article 42:

a. At latest hour T0, all TSOs shall deliver an IGM covering all the next day and RSCs shall make available to all TSOs and RSCs the corresponding CGM before hour T1 where T1 is equal to T0 +60 minutes, in accordance with Article 22(4)(d) of the approved common grid model methodology established pursuant to Article 70 of SO GL.

b. At latest hour T2, each RSC shall perform a coordinated regional operational security assessment as required by Article 78(2) of SO GL.

c. At latest hour T2, RSCs shall share between them the results of these coordinated regional operational security assessments. Between T2 and T3, TSOs shall deliver updated IGMs taking into account preventive remedial actions prepared during this coordinated regional operational security assessment, and making also available curative remedial actions prepared during this coordinated regional operational security assessment.

d. At latest hour T3, RSCs shall make available to all TSOs and RSCs the corresponding CGM in accordance with Article 22(4)(e) of the approved common grid model methodology established pursuant to Article 70 of SO GL.

e. At latest hour T4, each RSC shall perform a secondary coordinated regional operational security assessment as required by Articles 78(2) and (3) of SO GL on the basis of the CGM established in accordance with paragraph d, including where relevant analysing the use of additional remedial actions pursuant to Article 30.

f. Between T4 and T5, RSCs shall organize a session, such as a teleconference, where the results of security analyses performed according to paragraph e and proposed remedial actions are shared. During this session, TSOs and RSCs shall consolidate the final outcomes of the whole process described from paragraphs a to f, and TSOs shall agree on the remedial actions, in application of Article 78(4) of SO GL. TSOs shall participate to this session or shall have the right to delegate to its RSC this agreement.

g. Each TSO shall include the agreed remedial actions in accordance with paragraph f in their first intraday IGMs to be provided later than T5 in accordance with the requirements of CGM methodology developed according to Article 70 of SO GL.

2. During this process, RSCs and TSOs may have additional exchanges needed to facilitate its effectiveness.

3. Later in intraday, when RSCs perform regional coordinated operational security assessments or TSOs perform coordinated operational security analyses, they shall take the day-ahead coordinated operational security assessment final outcomes and agreed remedial actions as a reference basis, against which needed adaptations shall be assessed.

4. Where security violations remain not solved at the end of the day-ahead coordinated operational security assessment process, the concerned TSOs and RSCs shall agree on the objectives and the needed steps to follow in intraday in order to improve the management of these remaining violations.

Article 33
Intraday coordinated regional operational security assessment

1. RSCs shall aim at synchronizing the coordinated regional operational security assessments they perform in accordance with Article 78 of SO GL, for harmonized timeframes in intraday, taking into account the approved proposals set-up by TSOs in the different capacity calculation regions in accordance with Article 76(1) of SO GL.

Article 34
Outage planning coordination tasks

1. In application of Articles 80(4) and 80(5) of SO GL, when a RSC and its served TSOs have not succeeded to remove an outage planning incompatibility, this RSC shall coordinate with other RSCs to endeavour to propose cross-RSC solutions to remove the incompatibility.

Article 35
Regional adequacy assessment tasks

1. RSCs shall define a process in order to strengthen the regional adequacy assessment performed by each RSC as required by Article 81 of SO GL, by identifying the capabilities of further support between regions, for at least the timeframe of week-ahead and for other agreed timeframes.
2. This process shall at least ensure that RSCs exchange information on available generation capacity and demand and interconnection capacities in each region, when performing regional adequacy assessment as required by Article 81 of SO GL.

TITLE 4
Management of uncertainties

Chapter 1
Forecasts

Article 36
Forecast of intermittent generation

1. The forecasts established in application of paragraphs 2 to 6 below shall be used as the basis of the security analysis to be performed according to Article 22 and Article 23. Taking into account that a margin in line with Article 22 of Regulation (EU) 2015/1222 will be established for capacity calculation processes, and that this margin as well as security analysis results will be affected by the accuracy of forecasts, each TSO shall consider the following criteria in establishing forecasts of intermittent generation:
    a. The forecasts established shall cover at least the control area of the TSO;

b. The forecasts established shall be of a granularity necessary for the TSO to create IGMs compliant with the requirements of CGM methodology developed according to Article 70 of SO GL.

2. Where total wind (resp. total solar) installed capacity is between 1% and 10% of the reference load, each TSO shall establish/receive at least one wind (resp. solar) generation forecast established in day-ahead for each hour of the day of delivery. It must be established after weather forecast has been made available.

3. Where total wind (resp. total solar) installed capacity is between 10 and 40 % of the reference load, each TSO shall establish/receive in intraday an update of the wind (resp. solar) hourly forecast at least 2 times per day, based on at least 2 weather forecast updates.

4. Where total wind (resp. total solar) installed capacity is above 40 % of the reference load, each TSO shall establish/receive in intraday every hour an update of the wind (resp. solar) hourly forecast, based on at least 2 weather forecast updates and using the best available estimation of actual generation after having qualified it allows to improve forecast accuracy, compared to the accuracy resulting of the application of requirement of paragraph 3.

5. Where total wind and total solar installed capacities are each one above 20 % of the reference load, each TSO shall establish/receive in intraday every hour an update of the wind and. solar hourly forecast, based on at least 2 weather forecast updates and using the best available estimation of actual generation after having qualified it allows to improve forecast accuracy, compared to the accuracy resulting of the application of requirement paragraph 3.

6. Where another type of intermittent generation installed capacity, such as run of river hydro generation, is above 1% of the reference load, each TSO shall establish/receive at least one forecast for this generation type, established in day-ahead for each hour of the day of delivery.

Article 37
Forecast of load

1. The forecasts established in application of paragraphs 2 to 3 below shall be used as the basis of the security analysis to be performed according to Article 22 and Article 23. Taking into account that a margin in line with Article 22 of Regulation (EU) 2015/1222 will be established for capacity calculation processes, and that this margin as well as security analysis results will be affected by the accuracy of forecasts, each TSO shall consider the following criteria in establishing forecasts of load:

    a. The forecasts established shall cover at least the control area of the TSO;

    b. The forecasts established shall be of a granularity necessary for the TSO to create IGMs compliant with the requirements of CGM methodology developed according to Article 70 of SO GL.

2. Each TSO shall receive/establish in day-ahead one load forecast per hour for every day, using the best information available in day-ahead.

3. For a control area where the MW/°C gradient is greater than 1% of the reference load, the relevant TSO shall receive/establish a load forecast per hour for all the day of delivery, based on a weather forecast established at least in the afternoon of the day before the day of delivery. For the control area, the relevant

TSO shall establish/receive at least one update in intra-day between 0h and 12h for the remaining hours of the day of delivery.

Chapter 2

Grid models updates in intraday

Article 38
Frequency of grid model updates

1. By 1st January 2023, and then at least every five years, all TSOs shall assess the need to review the IGM intraday update frequency as defined in CGM methodology developed according to Article 70 of SO GL, taking into account the expected evolution of volatile parameters, such as market positions, intermittent generation, load.

TITLE 5
Governance and implementation

Chapter 1
Governance

Article 39
Identification and governance of common functions and tools

1. All TSOs, with the support of the RSCs, shall aim at regularly identifying the common functions and tools needed for a secure and efficient system operational planning and the relevant information which need to be exchanged among them, at least to implement the tasks listed in Articles 78-79-80-81 of SO GL. The functions and tools and relevant information to be identified shall be of pan-European use or of regional use.
2. For the functions and tools and relevant information identified in accordance with paragraph 1, as well as for those needed to implement the common grid model building task defined in Article 79 of SO GL and the operational planning data environment defined in Article 114 of SO GL, all relevant TSOs, with the support of the RSCs, using, where deemed useful, ENTSO-E bodies, resources and budget and, in that case, in accordance with the provisions of ENTSO-E articles of association, shall:
    a. decide on their development;
    b. provide for the needed budgets for their development and maintenance
    c. agree on the rules applicable for the management of the development and maintenance, including evolutions,
    d. agree on the applicable process to select the hosting entities for their operation, notably in terms of competence and resources necessary to achieve the needed levels of reliability, confidentiality and security

e. and agree on the characteristics of the service delivered by these functions and tools.

3. To facilitate the development and operation of function and tools identified in accordance with paragraph 1, all TSOs, using, where deemed useful, ENTSO-E bodies and resources, shall aim at using or defining standards for project management, data exchange, IT common services.

Article 40
Data quality assessment

1. For the functions and tools and relevant information identified in accordance with Article 39, all relevant TSOs, with the support of the RSCs, shall identify whether the data exchanged in this process require a specific data quality management comparable to the one developed in Article 23 of the common grid model methodology.

2. Where such a need is identified, all relevant TSOs shall:

    a. define, with the support of the RSCs, the data quality criteria applicable, the applicable process to check that the criteria are satisfied before using the data and the process for monitoring data quality criteria achievement;

    b. identify, using where deemed useful ENTSO-E bodies and resources, a common body in charge of analysing results of the data quality monitoring, reviewing the level of quality needed and preparing when relevant the revisions of the data quality criteria.

Article 41
Monitoring of regional coordination

1. All TSOs, with the support of ENTSO-E bodies and resources, shall organize every three years an inquiry towards TSOs and RSCs, in order to collect their evaluation of the appropriateness and efficiency of the processes and rules applied for the coordination of the operational security analyses, outage coordination and short-medium term adequacy analyses in the operational planning timeframe. This inquiry shall allow all TSOs to establish conclusions and identify, if any, improvement perspectives in terms of:

    a. data quality;

    b. efficiency and adaptation of processes to day-ahead or intraday activities, and flexibility to handle out-of-procedure situations;

    c. availability of remedial actions to solve system security issues in a coordinated way, where a coordinated approach is relevant;

    d. existing barriers to coordination.

2. When defining the scope of this inquiry, in order to keep the inquiry process efficient, all TSOs shall take account of the information and conclusions made in the reports established in accordance with Article 17 of SO GL.

3. The conclusions of this inquiry shall be published on the ENTSO-E website.

Chapter 2
Implementation

Article 42
Definition of common hours

1. By 3 months after the approval of this methodology, all TSOs, with the support of all RSCs, shall jointly define the hours T0 to T5. ENTSO-E shall publish these hours on its web site.
2. As long as ENTSO-E has not published these hours, the following default values shall apply: T0=18.00 CET; T1= 19.00 CET; T2=20.00 CET; T3=20.45 CET; T4=21.30 CET; T5= 22.00 CET.

Note for reader: the default values indicated above are subject to further analysis by TSOs.

Article 43
Timescale for implementation

Note for reader: this article, in general and notably for its §4, will be reviewed for the timescale based on more detailed analyses done by TSOs and RSCs. It currently provides working assumptions.

1. Upon approval of the present methodology each TSO shall publish it on the internet in accordance with Article 8(1) of SO GL.
2. After approval of this methodology, and unless differently stipulated in the previous articles or in the following paragraphs of this article, each TSO and RSC shall apply the requirements of this methodology within 6 months after its approval.
3. Each TSO shall apply the requirements of Article 37 within 12 months and of Article 36 within 24 months after approval of this methodology.
4. Each TSO and RSC shall apply the requirements of Article 26 to Article 35 within [*18 to 36 – to be defined after the stakeholder consultation*] months after approval of this methodology.

Article 44
Language

1. The reference language for this CSA Methodology shall be English. For the avoidance of doubt, where TSOs need to translate this proposal into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with Article 8(1) of SO GL and any version in another language the relevant TSOs shall, in accordance with national legislation, provide the relevant national regulatory authorities with an updated translation of the proposal.

Annex I

AI.1 Influence threshold

Power flow influence factor is evaluated by computing two elementary factors: power flow identification influence factor and power flow filtering influence factor. These factors are defined in AI.2.

Set of elements	Power flow identification influence threshold	Power flow filtering influence threshold	Voltage influence threshold
Observability area	5 – 10 %	3 – 5%	0.01 – 0.02 pu
External Contingency list	15 – 25%	3 – 5%	0.03 – 0.05 pu

AI.2 Influence Computation Method

In order to compute influence of elements located outside TSOs control area on a given control area following definitions have to be introduced (Figure 1):

- Element t is an element located in TSOs control area and which is influenced by an element located outside TSOs control area;
- Element r is an element located outside TSOs control area whose influence is assessed;
- Elements i are elements located either in TSOs control area or outside TSOs control area which are disconnected to represent planned (or forced) outages.

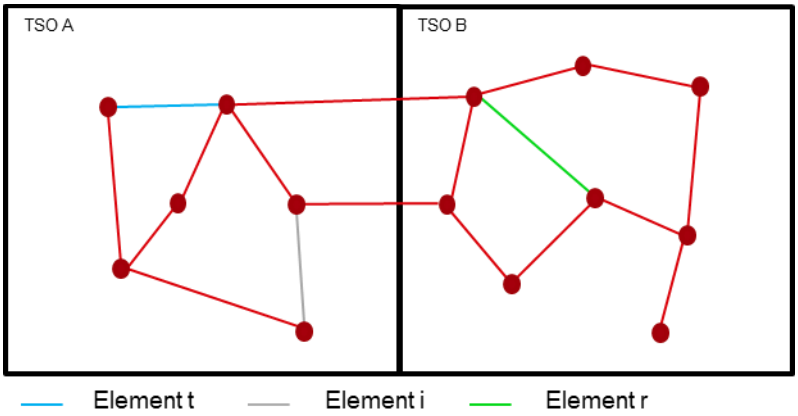

Figure 1

AI.2.1 Power flow influence factor

AI.2.1.1 Grid elements

The influence of an element (r) shall be assessed by each TSO using following formulas:

$$IF_r^{pf,id} = MAX_{\forall i \epsilon I, \forall s, \forall t \epsilon T} \left(\frac{P_{s,n-i-r}^t - P_{s,n-i}^t}{P_{s,n-i}^r} \cdot \frac{PATL^{s,r}}{PATL^{s,t}} \cdot 100 \right)$$

$$IF_r^{pf,f} = MAX_{\forall i \epsilon I, \forall s, \forall t \epsilon T} \left(\frac{P_{s,n-i-r}^t - P_{s,n-i}^t}{P_{s,n-i}^r} \cdot 100 \right)$$

Where

$IF_r^{pf,id}$: power flow identification influence factor of an element r on a element t of the given control area; the factor is normalized in order to take into account potential impacts induced by differences in PATL values;

$IF_r^{pf,f}$: power flow filtering influence factor of an element r on a element t of the given control area; this factor is not normalized

s: scenarios (year-ahead scenarios developed according to SO GL). Setting of HVDC links and PSTs in the different scenarios are assumed to be already defined, in a coherent way, in the context of the scenarios/CGMs development process.

t: Element located inside TSOs control area where the active power difference is observed;

T: Set of elements of the TSO's control area, which are part of CGM and for which the assessment is performed

i: Element located either in TSOs control area or outside TSOs control area (different from elements r and t) considered disconnected from the network when assessing the formula;

I: Set of elements, located either in TSOs control area or outside TSOs control area, modelled in the grid model whose possible outage should be taken into account in the assessment.;

r: Element located outside TSOs control area whose power flow influence factor is assessed;

R: Set of elements located outside TSOs control area to be assessed

P_n^t: Active power through the element t with the element r connected to the network and the element i disconnected from the network;

P_n^r: Active power through the element r, when connected to the network, considering the element i disconnected from the network;

$P_{n-\mathrm{i}}^t$: Active power through the element t with the element r and the element i disconnected from the network;

$PATL^{s,t}$: Permanently Admissible Transmission Loading is the loading in Amps, MVA or MW that can be accepted by element t in the scenario s for an unlimited duration;

$PATL^{s,r}$: Permanently Admissible Transmission Loading is the loading in Amps, MVA or MW that can be accepted by element r in the scenario s for an unlimited duration. If r is a combination of more than one element, the sum of the PATL values is considered.

NB: those computations have to be done inside one synchronous area. By principle, $IF_r^{pf,id}$ and $IF_r^{pf,f}$ are equal to 0 when r and t are not located in the same synchronous area.

The formulas must be applied, for each element r which belongs to the set R, assessing its influence on every element t of the TSO's control area for which the assessment is performed, and considering possible outages (element i) (Figure 1).

The influence factor of an element connected in a given synchronous area on another element connected in a different synchronous area shall be equal to 0. Outages of HVDC links inside of a synchronous area are treated as outages of AC elements.

Each TSO shall classify the "r" element as selected for a given type of influence factor computation (observability area, external contingency, relevant asset) when the following conditions are simultaneously satisfied:

Power flow identification influence factor > Chosen-threshold1
Power flow filtering influence factor > Chosen-threshold2

where Chosen-threshold1 and Chosen-threshold2 are uniquely chosen by the TSO inside the ranges provided above in AI.1

AI.2.1.2 Significant Grid Users

Power flow influence factor for generating modules and demand facilities can be computed using the same formula adopted for grid elements, considering them as the element r and assuming:

P_n^t: Active power through the element t with the generating module or demand facility r (located outside TSOs control area) connected to the network and the element i disconnected from the network;

P_n^r: Active power infeed (generated by the generating module or consumed demand facility r), when connected to the network, considering the element i disconnected from the network;

$P_{n-\mathrm{i}}^t$: Active power through the element t with the generating module or demand facility r and the element i disconnected from the network;

$PATL^{s,t}$: Permanently Admissible Transmission Loading is the loading in, MVA or MW that can be accepted by element t in the scenario s for an unlimited duration;

$PATL^{s,r}$: installed capacity in MW or MVA of the generating module or demand facility r in the scenario s.

AI.2.2 Voltage influence factor

If a TSO decides to use voltage influence factors in the determination of the aforementioned lists (observability area, external contingency, relevant asset) the influence of an element r shall be assessed using following formula:

$$IF_r^v = MAX_{\forall s,\forall m(m\epsilon M)}\left(\left|\frac{V_{s,n-1}^{m,r} - V_{s,n}^{m}}{V_{base}^{m}}\right|\right)$$

Where:

IF_r^v: voltage influence factor of a grid element r on a node m of the given control area;

s: scenarios (year-ahead scenarios developed according to SO GL) which are relevant for influence criteria.

r: Element located outside TSOs control area whose voltage influence factor is assessed;

R: Set of grid elements r to be assessed

$V_{s,n-1}^{m,r}$: Voltage at node m with the element r disconnected from the network;

$V_{s,n}^{m}$: Voltage at node m with the element r connected to the network;

V_{base}^{m}: Nominal voltage in the node m.

The formula must be applied, for each element r which belongs to the set R, assessing its influence on every node n of the given control area. The voltage influence factor of an element r is the maximum value of the previous calculations.

Hence, the influence factor on voltage is the maximum Voltage Deviation on any internal node m resulting from the outage of an element r in any scenario. For a sake of simplicity, voltage is expressed in per unit. Contrary to the influence of flows, the influence on voltage of an element is highly dependent on the load/generation pattern i.e. the active and reactive load of the element in the investigated scenarios.

Where a TSO intends to use voltage influence factors, the TSO shall classify the "r" element as selected for a given type of influence factor computation (observability area, external contingency relevant asset) when the following condition is satisfied:

Voltage influence factor > Chosen-threshold

where Chosen-threshold is uniquely chosen by the TSO inside the ranges provided above in AI.1