

System Operation Guideline implementation

System Operation European Stakeholder Committee
14 December 2018, Brussels

Status of SO GL deliverables - planning 2019

Jean-Philippe Paul

System Operation European Stakeholder Committee
14 December 2018, Brussels

Pan-European deliverables 2019

CSAM
RAOC

mid-December 2018: escalation to
ACER

June 2019: ACER decision

LFCR
Trans-
parency

Preparations ongoing to start
publication

according to SO GL articles 183-190

Regional deliverables 2019

SAOA

March/April 2019: NRA approvals

April/May 2019: signing of agreements

June/July 2019: entry into force of SAOA

Minimum inertia

September 2019: studies per synchronous area

October 2019 – March 2020: methodologies for definition of minimum inertia (where relevant)

CBA

January 2019: approval of CBA methodology

January 2020: CBA results suggesting the minimum activation period for FCR

Remark: abbreviations are defined at the end of the presentation

Regional deliverables 2019

Regional
coordination
proposals
(per CCR)

Due 3 months after approval of CSAM
~July/August 2019: public consultations
~September 2019: submission to NRAs

Key Organisational Requirements, Roles and Responsibilities in relation to Data Exchange

Eduardo Lorenzo Cabrera




System Operation European Stakeholder Committee
14 December 2018, Brussels

TIMELINE

	2018							
	5	6	7	8	9	10	11	12
Data Exchange Art. 40(6)				★		★		★

- ★ Request for amendment from NRAs 15/08/2018
- ★ Deadline for submitting the proposal to NRAs 15/10/2018
- ★ Deadline for approval by all NRAs 15/12/2018

Feedback from NRAs

	Activity	Status	Start	End	Explanation
1	Time period to answer TSO's proposal		15/10/2018 ?	15/12/2018 ?	Due to translation delay
2	NRA's meeting to vote for approval		10/12/2018	14/12/2018	
3	Deadline for national decisions by NRAs		15/01/2019	15/01/2019	Due to translation delay

FCR provision by Limited Energy Reservoirs (LER)

CBA methodology proposal for the definition of a minimum time period of
FCR provision by LER

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14 December 2018, Brussels

Request for Amendments by NRAs – Executive summary

Main information about the RfAs by NRAs

NRAs sent to the respective TSOs a RFAs to the methodology. The last NRA's communication was received the 25th of September.

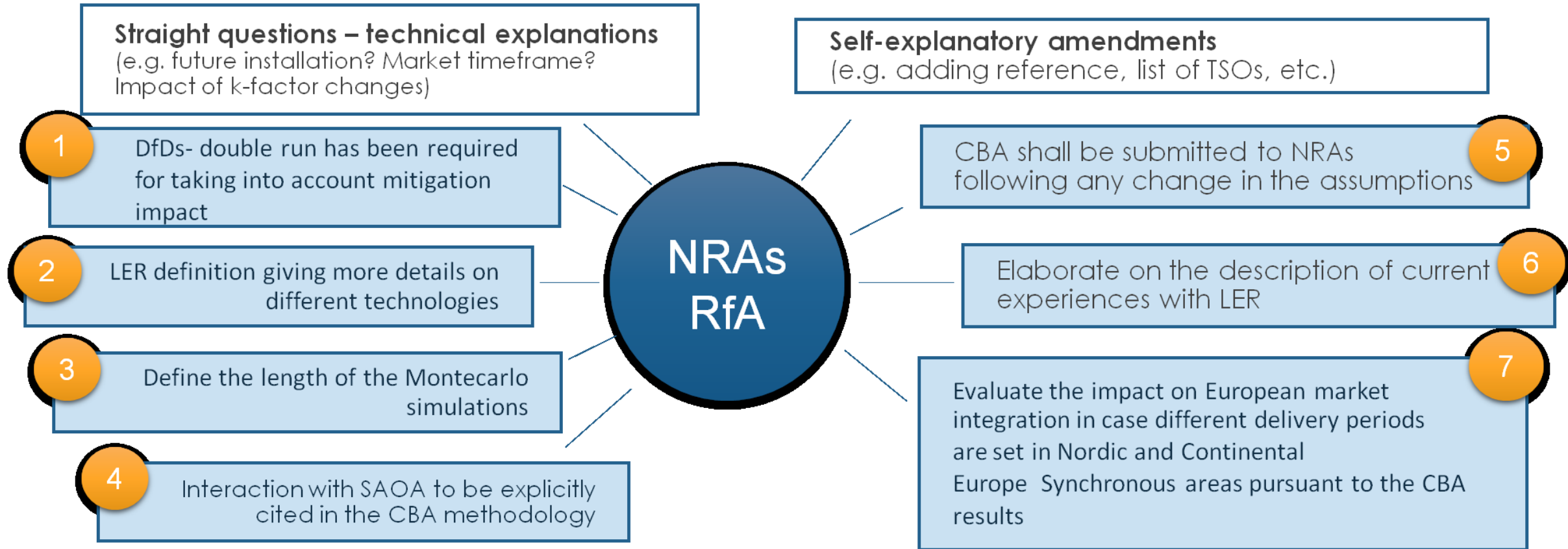
The amended proposal should be submitted by TSOs no later than 2 months after the last national communication of RfA by the NRAs → 25th of November

The methodology has been finalized acknowledging the requests from NRAs and SOC (where in line with the overall methodology principles).

Voting session of the amended proposal started the 14th of November and last until the 21st of November.

The TSOs submit the approved CBA methodology to the respective NRAs.

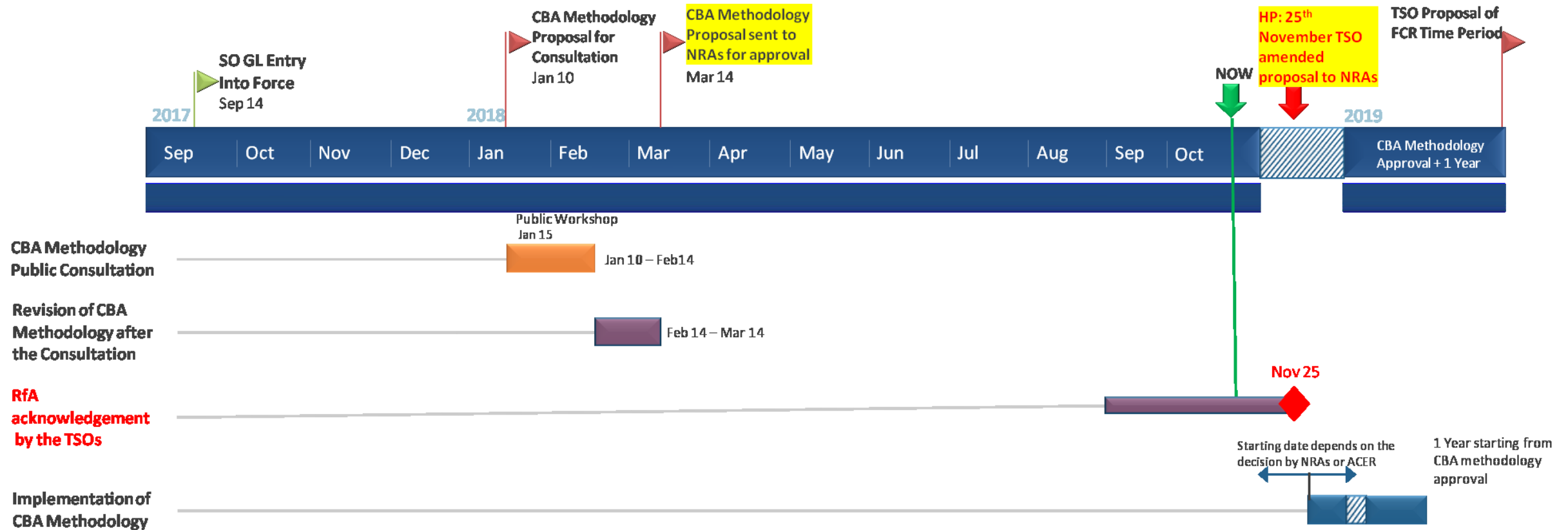
CBA Methodology – NRAs RfA in brief



Many tasks has to be tackled. A tight schedule has been implemented and shared with ENTSO-E bodies

Full Calendar of the activities

The TSOs of the CE and Nordic synchronous area have submitted the proposal for a CBA methodology to the regulatory authorities for their approval. NRAs sent a RfAs that shall be acknowledged by the 25th of November.



Next steps

Each TSO to send the amended proposal to their respective NRAs

Implementation phase will follow after NRAs approval

During implementation phase the coordination with stakeholders will be maintained through the SO ESC meetings

Update on dynamic stability assessment and minimum inertia studies

Knud Johansen

System Operation European Stakeholder Committee
14 December 2018, Brussels

Dynamic stability Assessment | SO GL requirements

Quick reminder - extract from SO GL

Articles concerned: 38, 39 in whole; 41, 45, 48, 57 partially (data exchange)

Article 38: Dynamic Stability monitoring and assessment

- Imposes obligations on individual/synchronous area TSOs on monitoring and exchanging data on dynamic stability (38.1) as well as on performance and coordination of DS assessment (38.2).
- Determines criteria (38.3) and sets the rules for deciding on the methods (38.6) in dynamic stability assessment.
- Dynamic stability includes - frequency stability, angle stability and small signal stability aspects

Article 39: Dynamic Stability management

- Imposes obligations to develop remedial actions if violations appeared (39.1), ensuring fault clearing times shorter than critical time calculated according to (39.2) and sets requirements on the common studies for identification and (if required as the outcome) (39.3.b), all TSOs from the concerned synchronous area shall jointly develop a methodology for the definition of minimum inertia required to maintain operational security and to prevent violation of stability limits methodology for defining a minimum inertia required to maintain operational security and to prevent violation of stability limits.

Activities within ENTSO-E on SO GL art. 38 & 39

ENTSO-E TSO Workshops

- 08-09/11/17 1st WS dialog on current practices - DSA and MI
- 24/04/18 2nd WS aimed at first assessment and solutions in each SA
- 20/09/18 3rd WS aimed at discussion and 1st drafting of the solutions

ENTSO-E DSA Stakeholder Workshops

- 23/05/18 1st DSA SH WS presenting current practices in each SA
- 10/12/18 2nd DSA SH WS aimed at presenting the principles applied in each SA

Actions taken | in-progress

- **For MI - art. 39(3)(a)**
 - All ENTSO-E Regional Groups addressed to timely deliver outcome of their studies (or updates), projects (RG CE and RG Nordic) or taking formal steps to confirm fulfillment of the requirements for the NRAs.
 - Internal report on progress is planned to be available in summer 2019.
- **For DSA – art. 38**
 - Outcomes of a TSO survey on DSA and MI is currently in evaluation

Outcome from the 1st DSA WS with stakeholders – 23.05.2018

1. Participants acknowledged the need for monitoring the system inertia in all synchronous areas for normal and alert operation.
2. Stakeholders suggestion to extend the DSA coordination on agreeing among TSOs on the assumptions on the system split scenarios, including stakeholder's participation.
3. Stakeholders expectation on exchanging information on DSA assessment and management. Workshop concept seems to be an efficient solution.
4. Expectations from stakeholder on establishing a set of clear definitions/requirements on the algorithms/assumptions related to frequency stability aspects (synthetic inertia, fast frequency response functions) in order to enable industry/vendors to provide services.
5. The participants agreed that quality of models used for calculations is a key element for obtaining proper quality of results.
6. Suggestion from stakeholder for the TSOs to take the lead on the RoCoF studies / requirements.
7. Distinction between „network design“ and “system design“ were proposed as essential in the system stability discussions. The terms could be defined as follows:
 - a. “Network design” shall define the dimensioning of the transmission (and distribution) grid infrastructure. One relevant criterion for network design is robustness/resilience against normal and a number of exceptional contingencies (e.g. common mode failures).
 - b. “System design” shall define the robustness/resilience of the transmission (and distribution) system against more severe contingencies, which are beyond network design, e.g. exceptional contingencies without a common cause or out-of-range contingencies like system splits. These incidents shall be mitigated by system defense plans, to which all system users shall contribute through their system-supportive behavior, e.g. by contributing to system inertia.
8. ACER requested a pan-European harmonization on scenario assumption and boundary condition for the DSA studies. Eventually a **set of reference scenarios** as used by EirGrid for generator testing.
9. Special Protection Schemes is considered in the scenarios simulated were presented at the workshop.
10. Investigation of a catalogue of “normative incidents” needs to be reviewed and whether we can prepare **a set of principles for reference scenarios** will be discussed on the ENTSO-E level. A more detailed look on the definitions on what is normal and what is abnormal must be included in the review.

→ Principles behind the DSA calculation scenarios and algorithms applied → 2nd DSA SH WS

Backup slides

SO GL art. 38 Dynamic stability monitoring and assessment

1. *Each TSO shall monitor the dynamic stability of the transmission system by studies conducted offline in accordance with paragraph 6. Each TSO shall exchange the relevant data for monitoring the dynamic stability of the transmission system with the other TSOs of its synchronous area.*
2. *Each TSO shall perform a dynamic stability assessment at least once a year to identify the stability limits and possible stability problems in its transmission system. All TSOs of each synchronous area shall coordinate the dynamic stability assessments, which shall cover all or parts of the synchronous area.*
3. *When performing coordinated dynamic stability assessments, concerned TSOs shall determine:*
 - a) *the scope of the coordinated dynamic stability assessment, at least in terms of a common grid model;*
 - b) *the set of data to be exchanged between concerned TSOs in order to perform the coordinated dynamic stability assessment;*
 - c) *a list of commonly agreed scenarios concerning the coordinated dynamic stability assessment; and*
 - d) *a list of commonly agreed contingencies or disturbances whose impact shall be assessed through the coordinated dynamic stability assessment.*
4. *In case of stability problems due to poorly damped inter-area oscillations affecting several TSOs within a synchronous area, each TSO shall participate in a coordinated dynamic stability assessment at the synchronous area level as soon as practicable and provide the data necessary for that assessment. Such assessment shall be initiated and conducted by the concerned TSOs or by ENTSO for Electricity.*
5. *When a TSO identifies a potential influence on voltage, rotor angle or frequency stability in relation with other interconnected transmission systems, the TSOs concerned shall coordinate the methods used in the dynamic stability assessment, providing the necessary data, planning of joint remedial actions aiming at improving the stability, including the cooperation procedures between the TSOs.*
6. *In deciding the methods used in the dynamic stability assessment, each TSO shall apply the following rules:*
 - a) *if, with respect to the contingency list, steady-state limits are reached before stability limits, the TSO shall base the dynamic stability assessment only on the offline stability studies carried out in the longer term operational planning phase;*
 - b) *if, under planned outage conditions, with respect to the contingency list, steady-state limits and stability limits are close to each other or stability limits are reached before steady-state limits, the TSO shall perform a dynamic stability assessment in the day-ahead operational planning phase while those conditions remain. The TSO shall plan remedial actions to be used in real-time operation if necessary; and*
 - c) *if the transmission system is in the N-situation with respect to the contingency list and stability limits are reached before steady-state limits, the TSO shall perform a dynamic stability assessment in all phases of operational planning and re-assess the stability limits as soon as possible after a significant change in the N-situation is detected.*

SO GL art. 39 Dynamic stability management

1. *Where the dynamic stability assessment indicates that there is a violation of stability limits, the TSOs in whose control area the violation has appeared shall design, prepare and activate remedial actions to keep the transmission system stable. Those remedial actions may involve SGUs.*
2. *Each TSO shall ensure that the fault clearing times for faults that may lead to wide area state transmission system instability are shorter than the critical fault clearing time calculated by the TSO in its dynamic stability assessment carried out in accordance with Article 38.*
3. *In relation to the requirements on minimum inertia which are relevant for frequency stability at the synchronous area level:*
 - a. *all TSOs of that synchronous area shall conduct, not later than 2 years after entry into force of this Regulation, a common study per synchronous area to identify whether the minimum required inertia needs to be established, taking into account the costs and benefits as well as potential alternatives. All TSOs shall notify their studies to their regulatory authorities. All TSOs shall conduct a periodic review and shall update those studies every 2 years;*
 - b. *where the studies referred to in point (a) demonstrate the need to define minimum required inertia, all TSOs from the concerned synchronous area shall jointly develop a methodology for the definition of minimum inertia required to maintain operational security and to prevent violation of stability limits. That methodology shall respect the principles of efficiency and proportionality, be developed within 6 months after the completion of the studies referred to in point (a) and shall be updated within 6 months after the studies are updated and become available; and*
 - c. *each TSO shall deploy in real-time operation the minimum inertia in its own control area, according to the methodology defined and the results obtained in accordance with paragraph (b).*

THANK YOU

FOR YOUR ATTENTION



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Abbreviations used in the presentation

SO GL	Commission Regulation 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation
CSAM	Methodology for coordinating operational security analysis developed in accordance with SO GL article 75(1)
RAOC	Methodology for assessing the relevance of assets for outage coordination developed in accordance with SO GL article 84(1)
CGM M	Common grid model methodology developed in accordance with CACM, FCA and SO GL
LFCR	Load-frequency control and reserves
SAOA	Synchronous Area Operational Agreement developed in accordance with SO GL article 118
CBA	Cost benefit analysis for assessing the time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state conducted in accordance with SO GL article 156(11)
FCR	Frequency containment reserve
CCR	Capacity Calculation Region

Abbreviations used in the presentation

KORRR	Key Organizational Requirements, Roles and Responsibilities in relation to data exchange developed in accordance with SO GL article 40(6)
SGU	Significant Grid User
TSO	Transmission System Operator
DSO	Distribution System Operator
LER	Limited Energy Reservoirs
RFA	Request for amendments
SOC	ENTSO-E System Operations Committee
NRA	National Regulatory Authority
CE	Continental Europe
DSA	Dynamic Stability Assessment
MI	Minimum Inertia