

System Operation Guideline implementation

System Operation European Stakeholder Committee
21 March 2019, Brussels

Status of SO GL deliverables - planning 2019

Jean-Philippe Paul

System Operation European Stakeholder Committee
21 March 2019, Brussels

Pan-European deliverables 2019

KORRR

Approved by all NRAs 19 December 2018

Final version on [ENTSO-E website](#)

CSAM
RAOC

21 December 2018 referred to ACER for decision by
21 June 2019

25 January – 18 February ACER public consultation

LFCR
Trans-
parency

Preparations ongoing to start publication
according to SO GL articles 183-190

Remark: abbreviations are defined at the end of the presentation

Regional deliverables 2019

SAOA

April-August 2019: NRA approvals

1 month after NRA approval: signing of agreements

3 months after NRA approval: entry into force of SAOA

Minimum inertia

15 May 2019: stakeholder workshop

September 2019: studies on minimum inertia per synchronous area

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

CBA

1 March 2019: approval of CBA methodology

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

Regional deliverables 2019

Regional
coordination
proposals
(per CCR)

Due 3 months after approval of CSAM

March-August 2019: public consultations organized by
each CCR

Nordic CCR 15/03/2019-15/04/2019

21 September 2019: submission to NRAs

FCR provision by Limited Energy Reservoirs (LER)

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

Luca Ortolano

System Operation European Stakeholder Committee
14 December 2018, Brussels

FCR provision by Limited Energy Reservoirs - update

Main update on the project

Follow up on the last actions agreed/shared in the previous meetings:

1

On 1st March 2019: NRAs approved the revised CBA methodology



The **NRAs approval** is now obtained, with national decisions to be issued by 20th April 2019

2

At the beginning of the implementation phase, input data analysis is executed to engage ENTSO-E bodies and stakeholders in due time



The CBA project team is committed to starting collecting and analyzing input data. ESC meeting is a good opportunity for sharing

FCR provision by LER – proposal on stakeholders involvement

Here following a list of proposals from the project team with the aim to share how to proceed with the next steps:

- Input data as far as possible will be taken from TSOs available information. By the way literature and stakeholders involvement are a useful and needed crosscheck to be performed at the beginning of the implementation
- During the last ESC meeting and also during the WS the stakeholders proposed an involvement during the implementation phase. The project team approach would be to involve stakeholders through ESC meetings and WSs and asking for data provision.

In particular the CBA project team proposes to involve stakeholders for providing:

1. **input data of outages:** input data should be transparent and provided by TSOs (see above) but it would be better to start possible discussion about quality of input data since the beginning of the implementation;
2. **public data:** since all the data provided by TSOs, related to LER, can not be public, stakeholders can provide public data¹ about **LER installation** that can be used for public sessions when presenting implementation of the methodology;
3. **data for TSO validation:** TSOs will use high quality and trustable input data, anyway stakeholders can be requested or invited to provide additional data to validate and supplement TSOs' data set (e.g. existing LER OPEX and opportunity costs);
4. **confidential data:** in case of input data subject to restrict use (e.g. LER investment costs) provided by stakeholders, confidentially issue can be discussed for a solutions

¹example: number and MW of installations of LER providing FCR per LFC Block, divided by technology and time period availability;

List of inputs – stakeholders involvement proposal

For both the SAs CE and Nordic:

Type of input	Possible providers
New LER investment, OPEX and opportunity costs	Stakeholders
Existing LER OPEX and opportunity costs	Stakeholders
Outages statistics	
<i>Total installed LER capacity per LFCB</i>	<i>Stakeholders</i>

Dynamic stability assessment and minimum inertia studies

Knud Johansen

System Operation European Stakeholder Committee
21 March 2019, 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 DS (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 DS 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 TSO DSA WS dialog on current practices - DSA and MI
- 24/04/18 - 2nd TSO DSA WS aimed at first assessment and solutions in each SA
- 20/09/18 - 3rd TSO DSA WS aimed at discussion and 1st drafting of the solutions
- 09/04/19 – 4th TSO DSA WS aimed at agreement on the principles for coordination and DSA scenarios

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 – objectives not obtained
- 15/05/19 2nd DSA SH WS aimed at presenting the principles for DSA 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.
 - RG GB, RG IE/NI are compliant to art 39(3)(a) and implementation formal needs to be accepted by the respective NRA's
 - Report on progress is planned to be available summer 2019.
- **For DSA – art. 38**
 - Outcomes of a TSO survey on DSA coordination has been concluded.
 - Art 38(2) coordination activities needs to be further agreed and described for RG Central Europe.

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).*

ACER data request for SO GL monitoring

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System Operation European Stakeholder Committee
21 March 2019, Brussels

SO GL monitoring

- ❑ ACER and ENTSO-E started discussing the list of relevant information per SO GL article 14(2) in January 2019
- ❑ ACER's summarized objective:
 - ❑ assessing whether the availability of remedial actions seems to be an issue, or whether they seem to be available in only certain locations
 - ❑ assessing (in)dependency between control areas
 - ❑ cross-RSC remedial action coordination
 - ❑ cross-check between RSC services
 - ❑ check TSOs' internal data quality

SO GL article 14:

...

2. The Agency, in cooperation with ENTSO for Electricity, shall produce within 12 months from the entry into force of this Regulation **a list of the relevant information to be communicated by ENTSO for Electricity to the Agency** in accordance with Articles 8(9) and 9(1) of Regulation (EC) No 714/2009. The list of relevant information may be subject to updates. ENTSO for Electricity shall maintain a comprehensive, standardised format, digital data archive of the information required by the Agency.

Synchronous area operational agreements

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System Operation European Stakeholder Committee
21 March 2019, Brussels

Context

SO GL requirements

SO GL Article 118 requires that all TSOs of each synchronous area (SA) shall

(1) - jointly develop 12 months after entry into force of the SO GL [*by 14 September 2018*] common proposal methodologies, conditions and values that will be included in a **Synchronous Area Operational Agreement (SAOA)**.

(2) - submit the methodologies and conditions listed in Art. 6(3)(d) for approval by regulatory authorities.

- conclude a SAOA within 1 month of approval.

The (4) concerned SAs are Continental Europe, Nordic, Great Britain, and Ireland-Northern Ireland.

*SOGL Article 14 requires ENTSO-E to perform **implementation monitoring**:*

- identification of any divergences in the national implementation of this Regulation for the terms and conditions or methodologies listed in Article 6(3) [*approved by NRAs*]

Methodologies – SAOA – SAFA

- **Methodologies, conditions and values**
 - [Part A] Required by NC/GL and to be approved by NRAs (e.g. Listed in SOGL Art. 6(3))
 - [Part B] Required by NC/GL
 - [Part C] content introduced by TSOs on voluntary basis to further strengthen the objectives of the Agreement
- **SAOA [operational agreement]**
 - Legal Agreement
 - Policies including the methodologies, conditions and values as specified in the SO GL and NC ER
 - [Part D] Derogations (temporary)
 - By being a Party to SAOA, the Parties automatically need to comply with the NC/GL referred to
 - Non-EU countries: exemptions and derogations to the EU law
 - Accepted exemptions/derogations do not affect the compliance by (an)other TSO(s) to the (EU) legal obligations resting on them
- **SAFA [framework agreement]**
 - In Continental Europe, SAFA is more than a SAOA (methodologies mandated by SO GL and NC ER):
it also (will) include methodologies mandated by EB GL

Status of SAOAs

Region / SA	SAOA Status
Nordic	<ul style="list-style-type: none"> • LFCR methodologies that have been sent to NRAs by 14 September 2018 are being discussed with the Nordic NRAs. NRAs may issue a Request for Amendment (RfA) at least for one methodology. • TSOs are working on the methodologies that do not require NRA approval [Part B] • A draft of the main legal framework agreement is available • Annexes are under finalization. • Approval of main agreement and annexes planned for mid of August 2019
Great Britain	<ul style="list-style-type: none"> • Public consultation on methodologies completed 26/08/2018 • Methodologies submitted to Ofgem in September 2018
Ireland and Northern Ireland	<ul style="list-style-type: none"> • Public consultation completed 8/11/2018: no industry response but significant NRA comments. New submission 21/12/2018. • Small number of open issues to be resolved with NRAs by June 2019. • Next workshop with both NRAs scheduled 13th March 2019.
Continental Europe	<ul style="list-style-type: none"> • SAFA for RG CE: 29 Parties (CE TSOs), 30 Signatories (ENTSO-E tasks for administrative and technical support) • All methodologies to be approved by NRAs submitted in September 2018 except one <ul style="list-style-type: none"> • Methodology on additional properties of FCR sent to NRAs by 22 March 2019 (not mandatory – SOGL Art. 154(2)) • NRAs did not provide a shadow opinion • SAFA final version approved 27/02/2019 and Signature expected by 14/03/2019 • Entry into force of SAFA 14/04/2019 (termination of MLA OH)

Common Grid Model methodology

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System Operation European Stakeholder Committee
21 March 2019, Brussels

Approval status of CGM-related methodologies

CGMMs approved:

- CGMM-v1-plus (pursuant to Regulation 2015/1222)
- CGMM-v2-plus (pursuant to Regulation 2016/1719)
- CGMM-v3 (pursuant to Regulation 2017/1485)



- **Content** almost identical
- **Principal differences:** Art. 3 (Scenarios), Art. 4 (IGMs), Art. 22 (CGM Process)
- **Terminology** not 100% consistent

GLDPMs approved:

- GLDPM-v1 (pursuant to Regulation 2015/1222)
- GLDPM-v2 (pursuant to Regulation 2016/1719)



- **Content** almost identical
- **Terminology** not 100% consistent

CGM-related methodologies: remaining tasks

Consolidation:

- NRAs and TSOs agree: a single consolidated version of the CGMMs (and GLDPMs) would be very helpful
- 1 document instead of 3 (2) easier to handle; terminology could be made 100% consistent
- NRAs' legal experts: such a document could be legally binding and could replace the existing versions

CGMM for the week-ahead time frame:

- RSCs and TSOs have expressed interest in a CGMM for the week-ahead time frame
- Principal applications: CGS (Critical Grid Situations analysis), OPC (Outage Planning Coordination), STA (Short-Term Adequacy assessment)
- Principle of a single CGM per time frame to be retained: use of CGM to be described in process descriptions for subsequent processes, not in the CGMM

==> Combine both tasks in order to achieve synergies

==> Work on this revision has recently begun

Should TSOs seek formal approval of the consolidated versions?

Formal requirement in order for the consolidated versions to be legally binding (and replace existing versions):

- TSOs request an amendment under the applicable Network Codes (Guidelines)
- Standard procedure applies: "all TSOs" vote #1, public consultation, revision, "all TSOs" vote #2 ...

Costs:

- A lot of work for TSOs, NRAs, stakeholders participating in the public consultation

Benefits:

- A single document, legally binding
- Consistent terminology

TSOs willing to do the work, but want to make use of ESC in order to gauge stakeholders' opinion

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
KORRR	Key organizational requirements, roles and responsibilities in relation to data exchange in accordance with SO GL article 40(6)
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)
CGMM	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)
CCR	Capacity Calculation Region