

**Proposal of all TSOs of the LFC Block
TNG+TTG+AMP+50HZT+EN+CREOS concerning FRR dimensioning
rules in accordance with Article 157(1) of Commission Regulation (EU)
2017/1485 establishing a guideline on electricity transmission system op-
eration**

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50Hertz Transmission GmbH (50HZT), Amprion GmbH (AMP), Creos Luxembourg S. A. (CREOS), Energinet (EN), TenneT TSO GmbH (TTG), TransnetBW GmbH (TNG), taking into account the following

Whereas

- (1) This document is a common proposal developed by all Transmission System Operators of Danish-German-Luxembourgish LFC Block (hereafter referred to as “TSOs”) regarding the FRR dimensioning rules in accordance with Article 157(1) of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as “SOGL”)
- (2) Article 6(3)(e)(iv) of SOGL requires the approval by all regulatory authorities of the concerned region of the proposal by all TSOs of an LFC block concerning “[...] *the FRR dimensioning rules in accordance with Article 157(1)*”.
- (3) Article 157(1) of SOGL requires all TSOs of an LFC Block to “[...] *set out FRR dimensioning rules in the LFC Block operational agreement*”.
- (4) Article 157(2) of SOGL defines the requirements to the FRR dimensioning rules. Article 157(2)(e), Article 157(2)(f), Article 157(2)(h) and Article 157(2)(i) of SOGL define the minimum requirements for the dimensioning amounts of FRR which shall cover at least the dimensioning incident of the LFC block as well as 99% of the imbalances of the LFC block.
- (5) This proposal fulfils the requirements of the SOGL as follows:
 - (a) Article 3(1) and Article 3(4) define the responsibility structure between the TSOs of the DE-LU-DK LFC block. The TSOs shall perform the dimensioning for the DE area and DKW area.
 - (b) The compliance with the requirements of SOGL is achieved by fulfilling all requirements of the SOGL individually in the DE area as well as in the DKW area.
 - (c) Article 3(2) sets forth the FRR dimensioning rules which shall be applied by all TSOs of the DE area. These rules ensure that the dimensioning incident of the DE area as well as at least 99% of the imbalances of the DE area are covered by FRR.
 - (d) Article 3(5) sets forth the FRR dimensioning rules which shall be applied by Energinet for the DKW area. These rules ensure that the dimensioning incident of the DKW area as well as at least 99% of the imbalances of the DKW area are covered by FRR.

- (e) In result, since the SOGL requirements for the DE area and the DKW area are fulfilled, the SOGL requirements are also fulfilled for the whole DE-LU-DK LFC block.
 - (f) As required by SOGL, the proposal includes an implementation timeline. As the methodology proposed for the DE area implies procedural changes and requires additional IT processes to collect and process the necessary data, the TSOs require time for implementation after the approval. Therefore, the TSOs propose and implementation period of two months after the approval.
- (6) This proposal fulfils the objectives of SOGL as follows:
- (a) The proposal determines common operational security requirements and principles for FRR dimensioning in the DE-LU-DK LFC block.
 - (b) The proposal respects the responsibility assigned to the TSOs for system security by the national legislation.
 - (c) The transparency is ensured by Article 188(2) of SOGL which requires all TSOs of the LFC block to provide the dimensioning rules to ENTSO for electricity for publication.

SUBMIT THE FOLLOWING PROPOSAL TO THE REGULATORY AUTHORITIES OF DENMARK, GERMANY AND LUXEMBOURG:

Article 1

Subject matter, scope and responsibility structure

- (1) This proposal is based on the LFC block and LFC area structure defined by “All TSOs’ proposal for the determination of LFC blocks for the Synchronous Area Continental Europe in accordance with Article 141(2) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation” and approved by the regulatory authorities.
- (2) In accordance with (1), the proposal applies only for the part of Denmark which is synchronously connected to the synchronous area CE.
- (3) This proposal defines the dimensioning rules in accordance with Article 157(1) of SOGL in the DE-LU-DK LFC block.

Article 2

Definitions and interpretation

- (1) For the purpose of the proposal, the terms used shall have the meaning given to them in Article 3 of SOGL.
- (2) ‘DE area’ means the monitoring areas 50HZT, AMP, CREOS, TNG and TTG.
- (3) ‘DKW area’ means the monitoring area EN which is synchronously interconnected with the synchronous area CE.
- (4) ‘DE-LU-DK LFC block’ means the LFC block comprising the DE area and the DKW area.

Article 3

FRR Dimensioning Rules

- (1) 50Hertz Transmission GmbH, Amprion GmbH, TenneT TSO GmbH and TransnetBW GmbH are responsible for the FRR dimensioning for the DE area and shall apply the requirements of Article 157(2) of SOGL for the DE area including the imbalances of the LFC area TTG+EN.
- (2) The dimensioning methodology for the DE area shall be based on a probabilistic analysis of the expected imbalances for the dimensioning period while fulfilling the minimum requirements of Article 157(2) of SOGL:
 - (a) In accordance with Article 157(2)(e) of SOGL the positive FRR shall not be less than the positive dimensioning incident. In accordance with Article 157(2)(f) the negative FRR shall not be less than the negative dimensioning incident of the DE area determined in accordance with (2)(b).
 - (b) All TSOs of the DE area shall determine the size of the dimensioning incident on a quarterly basis. In accordance with Article 157(2)(d) the dimensioning incident shall be equal to the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, or single HVDC interconnector or from a tripping of an AC line within the DE area in each direction.
 - (c) The dimensioning methodology shall be based on historical imbalance data considering a period of up to five years. In accordance with Article 157(2)(a) of SOGL, the historical data will comprise at least one full year period ending not earlier than six months before the dimensioning period. The time resolution of the data shall be not less than 1 minute.
 - (d) The dimensioning methodology shall consist of the following steps:
 - i. Step 1: The historical imbalance data of (c) is processed and cleared from forced outages.
 - ii. Step 2: The data from step 1 serves as input to a simulation of mFRR activation. The simulation of mFRR activation shall be based on activation procedures for mFRR and take into account minimum activation duration and lead times. The result of the simulation is the synthetic demand data for aFRR and the synthetic demand data for FRR.
 - iii. Step 3: Calculation of positive and negative values of the synthetic aFRR and FRR demand.
 - iv. Step 4: Clustering of the synthetic aFRR and FRR demand using the k-means algorithm in accordance with 2(e), 2(f) and 2(g).
 - v. Step 5: Determination of the characteristics of the dimensioning period in accordance with 2(e), 2(f) and 2(g).
 - vi. Step 6: The weighting factor for each cluster corresponds to the number of data points with the same characteristics as the dimensioning period in this cluster divided by the total number of data points with the same characteristics as the dimensioning period (step 4 and 5).

- vii. Step 7: Calculation of the imbalance probability distributions for aFRR and FRR from the synthetic demand data weighted in accordance with the factors determined in step 6.
 - viii. Step 8: Convolution of the imbalance probability distributions resulting from step 6 with the probabilities of forced outages for aFRR and FRR.
 - ix. Step 9: In accordance with Article 157(2)(e) of SOGL and Article 157(2)(f) of SOGL, the aFRR capacity shall be sufficient to cover at least 99 % of positive and 99 % of negative imbalances given by the aFRR imbalance probability distribution calculated in step 8. The FRR capacity shall be sufficient to cover at least 99 % of positive and 99 % of negative imbalances given by the FRR imbalance probability distribution calculated in step 8. 50Hertz Transmission GmbH, Amprion GmbH, TenneT TSO GmbH and TransnetBW GmbH shall define, publish and monitor the used deficit probabilities in order to fulfil the relevant requirements.
 - x. Step 10: The mFRR capacity in each direction is equal to the difference between the FRR capacity and aFRR capacity determined in step 9.
 - xi. Step 11: In case the positive FRR capacity is less than the positive dimensioning incident, the positive aFRR capacity is increased by the difference between the positive dimensioning incident and the positive FRR capacity. In case the negative FRR capacity is less than the negative dimensioning incident, the negative aFRR capacity is increased by the difference between the negative dimensioning incident and the negative FRR capacity.
- (e) The relevance shall be determined using at least the following seasonal characteristics of the dimensioning period:
- i. time of day;
 - ii. date and month;
 - iii. day of the week and
 - iv. type of day including holidays, bridge days or days with specific events;
- (f) Additionally, the relevance may be determined using the following external characteristics of the dimensioning period:
- i. wind infeed;
 - ii. solar infeed;
 - iii. scheduled exchanges;
 - iv. energy prices;
 - v. load; and
 - vi. temperature.
- (g) 50Hertz Transmission GmbH, Amprion GmbH, TenneT TSO GmbH and TransnetBW GmbH shall consult the usage of any additional characteristics with the stakeholders and publish them in accordance with (3).

- (3) 50Hertz Transmission GmbH, Amprion GmbH, TenneT TSO GmbH and TransnetBW GmbH shall publish the seasonal and external characteristics used for dimensioning on a common internet web site at least one month before a change of the used external characteristics and provide a justification for such a change.
- (4) Energinet is responsible for the FRR dimensioning for the DKW area.
- (5) The dimensioning methodology for the DKW area shall fulfil the following requirements:
 - (a) The dimensioning methodology shall comply with the minimum values for FRR in accordance with Article 157(2) calculated for the DKW area.
 - (b) The aFRR capacity dimensioned for the DKW area shall at least cover the stochastic imbalances remaining after activation of mFRR. The aFRR capacity shall be at least 90 MW.
 - (c) The mFRR capacity is equal to the difference between the dimensioning incident and the aFRR capacity. If outcome of dimensioning requires more than 90 MW aFRR capacity to cover future stochastic imbalances and FRCE quality after activation of mFRR, the aFRR capacity will be increased accordingly in addition to the amount of mFRR capacity to handle the reference incident.

Article 4 Implementation Timescale

- (1) 50Hertz Transmission GmbH, Amprion GmbH, TenneT TSO GmbH and TransnetBW GmbH shall implement the provisions in accordance with Article 3(2) two months after approval of this proposal by the regulatory authorities.
- (2) Energinet shall implement the provisions in accordance with Article 3(5).

Article 5 Language

The reference language for this proposal shall be English. For the avoidance of doubt, where TSOs need to translate the proposal into their national language(s), in the event of inconsistencies between the English proposal proposed by TSOs in accordance with Article 6 of the SOGL and any version in another language, the relevant TSOs shall be obliged to dispel any inconsistencies by providing a revised translation of the proposal to their relevant national regulatory authorities.