

Methodology for Calculating the Probability of Available Cross-zonal Capacity after Intraday Cross-zonal Gate Closure Time

in accordance with Article 33(6) of the Commission Regulation (EU)
2017/2195 of 23 November 2017 Establishing a Guideline on Electricity
Balancing as Amended by Commission Implementing Regulation (EU)
2021/280 of 22 February 2021

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Whereas

- (1) This document provides a methodology for calculating the probability of available cross-zonal capacity after intraday cross-zonal gate closure time (hereafter referred to as the “Probabilistic Method”) in accordance with article 33(6) of the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing as amended by Commission Implementing Regulation (EU) 2021/280 of 22 February 2021 (hereafter “EBGL”) for Transmission System Operators (hereafter “TSOs”) of the involved countries Austria, the Czech Republic, and Germany.
- (2) This Probabilistic Method takes into account the general principles and goals set out in the EBGL, in the Commission Regulation (EU) 2015/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter “SOGL”), as well as in Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.
- (3) The TSOs intend to exchange balancing capacity for automatic frequency restoration reserves (hereafter “aFRR”) and plan for that reason to develop common and harmonised rules and processes for this exchange and procurement in accordance with article 33 of the EBGL, including provisions as to whether this Probabilistic Method will be applied for a certain border, as well as a capacity procurement optimization function in accordance with article 58(3) of the EBGL. To ensure both the availability of cross-zonal capacity and that the operational security requirements set out in the SOGL are met, the TSOs develop this Probabilistic Method, the results of which may then serve as input for the capacity procurement optimization function in accordance with article 58(3) of the EBGL.
- (4) The Probabilistic Method is based on two steps and aims at balancing (a) the general goal of enabling the exchange of balancing capacity and (b) the mitigation of inherent risk of insufficient reserve capacity due to a probabilistic ex-ante assessment. While striving for the maximum amount of transparency and since there is no precedence for an application of a methodology for calculating the probability of available cross-zonal capacity after intraday cross-zonal gate closure time as the basis for the exchange of balancing capacity, the Probabilistic Method contains provisions to keep this inherent risk manageable and to minimize the effect on operational security. The first step consists of the assessment in accordance with articles 33(6)(c) and (d) of the EBGL and is performed before the gate closure time of the balancing capacity procurement auctions (the result is hereafter referred to as “Initial Exchange Limit”) such that most recent data can be taken into account to determine the probability of available cross-zonal capacity after intraday cross-zonal gate closure time. The second step consists of the possibility to reduce the Maximum Exchange Limit such that unforeseeable events which could not be captured by the first steps can be taken into account such that the effect on operational security is mitigated (hereafter referred to as “Security Limit”).
- (5) This Probabilistic Method generally contributes to the achievement of the objectives of article 3 of the EBGL. In particular, the Probabilistic Method serves the following objectives:
 - a. The Probabilistic Method enables the TSOs to determine the maximum amount of balancing capacity which may be exchanged by applying common and harmonized rules and processes

according to article 33(1) of the EBGL based on (statistical) forecasting techniques and as such represents the basis of exchanging balancing capacity – as an alternative to the methodologies for allocating cross-zonal capacity to the balancing timeframe pursuant to Chapter 2 of Title IV of the EBGL in particular before these methodologies are developed and implemented. Hence, the Probabilistic Method facilitates effective competition in a non-discriminatory and transparent way in balancing markets (article 3(1)(a) of the EBGL), enhances the efficiency of European and national balancing markets (article 3(1)(b) of the EBGL), and contributes to the objective of integrating balancing markets and promoting the possibilities for exchanges of balancing services (article 3(1)(c) of the EBGL).

- b. The contribution to operational security which is also set forth in article 3(1)(c) of the EBGL is ensured by the Probabilistic Method by providing rules for fallback solutions in case of unavailability of cross-zonal capacity or insufficient reserve capacity and by providing the requirement for ex-post review and monitoring of risk with regard to operational security requirements set out in the SOGL.
- c. The Probabilistic Method as the basis of exchanging balancing capacity directly facilitates the efficient and consistent functioning of balancing markets, and since its focus is on the availability of cross-zonal capacity after intraday cross-zonal gate closure time it does not negatively impact the efficient and consistent functioning of day-ahead and intraday markets. On the contrary, enabling the integration of balancing markets and promoting the possibilities for exchanges of balancing services adds a possibility for market participants to optimize and efficiently use their portfolios. I.e. it fosters liquidity for the procurement of balancing capacity in integrated balancing capacity markets and provides a transparent and objective input for the capacity procurement optimization function in accordance with article 58(3) of the EBGL. Therefore, the Probabilistic Method contributes to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union (article 3(1)(d) of the EBGL) and ensures that the procurement of balancing services is fair, objective, transparent and market-based, avoids undue barriers to entry for new entrants, fosters the liquidity of balancing markets while preventing undue distortions within the internal market in electricity (article 3(1)(e) of the EBGL).
- d. The Probabilistic Method does not negatively impact the objectives in accordance with articles 3(1)(f) and (g) of the EBGL.

Article 1 – Subject Matter and Scope

- (1) This document is the methodology for calculating the probability of available cross-zonal capacity after intraday cross-zonal gate closure time in accordance with article 33(6) of the EBGL for the TSOs. The TSOs may choose to apply this Probabilistic Method for a certain product and on a certain border and direction by stating this in the common and harmonized rules and processes for the exchange and procurement of balancing capacity in accordance with article 33(1) of the EBGL.
- (2) This Probabilistic Method may be applied for the exchange of aFRR balancing capacity.

Article 2 – Definitions and Interpretation

- (1) For the purposes of this Probabilistic Method terms used in this document shall have the meaning of the definitions included in article 2 of the EBGL and article 3 of the SOGL.
- (2) In this document,
 - a. the headings are inserted for convenience only and do not affect the interpretation of this Proposal; and
 - b. any reference to legislation, regulation, directive, order, instrument, code, or any other enactment shall include any modification, extension, or reenactment of it then in force.

Article 3 – Process

- (1) For assessing the risk of unavailability of cross-zonal capacity due to planned and unplanned outages and congestions as well as the risk of insufficient reserve capacity due to unavailability of cross-zonal capacity the Initial Exchange Limit shall be calculated once per calendar day and will be provided at the gate closure time for submitting aFRR balancing capacity bids for the delivery day closes. For the calculation of the Initial Exchange Limit, the method described in Article 4 shall be applied.
- (2) Each TSO who applies this Probabilistic Method may define a Security Limit in accordance with Article 5 which shall be provided to the central procurement optimization function at the gate closure time for submitting bids for the delivery day closes.
- (3) The capacity procurement optimization function in accordance with article 58(3) of the EBGL shall take Maximum Exchange Limit, as the minimum of the set of Initial Exchange Limit and Security Limit, into account for the respective border, direction, product, and contracting period.
- (4) In case the calculation of the Initial Exchange Limit cannot be finished successfully until the time defined in paragraph (1), an Initial Exchange Limit that is set to 0 MW shall be defined as the output of paragraph (1).

Article 4 – Initial Exchange Limit

- (1) The Initial Exchange Limit shall be determined for each border for which the Probabilistic Method is applied, separately per product and direction.
- (2) The Initial Exchange Limit shall be determined for each contracting period as defined in the common and harmonized rules and processes for the exchange and procurement of balancing capacity in accordance with article 33(1) of the EBGL.
- (3) The Initial Exchange Limit determined in accordance with paragraphs (1) and (2) shall be valid for the respective contracting period of the delivery day the gate for submitting bids of which sets the deadline as defined in Article 3(1).

(4) The Initial Exchange Limit shall be determined using the following procedure:

- a. Forecasting of the available cross-zonal capacity for the border, direction, product, and contracting period as defined in paragraphs (1) and (2);
- b. Determination of the possible range of Initial Exchange Limits including increments (hereafter “Scenarios”);
- c. Determination of a maximum value for the risk of unavailable cross-zonal capacity due to un/planned outage or congestion;
- d. Determination of a maximum value for the risk of insufficient reserve capacity due to the unavailability of cross-zonal capacity;
- e. For each Scenario, the determination of the risk of unavailable cross-zonal capacity due to un/planned outage or congestion is defined as the probability that the actual available cross-zonal capacity due to un/planned outage or congestion is lower than or equal to the Scenario. This probability shall be determined based on the forecast result of paragraph (a);
- f. For each Scenario, the determination of the probability that the actual aFRR demand of a country – before the impact of the platforms pursuant to articles 21 and 22 of the EBGL – is higher than or equal to the aFRR balancing capacity, which would have been procured without the exchange of balancing capacity or sharing of reserves, minus the Scenario; this probability is calculated based on three inputs:
 - a. The historical aFRR (balancing energy) demands.
 - b. The dimensioned aFRR demands.
 - c. The cross-zonal capacity value of each Scenario.
- g. For each Scenario, the determination of the risk of insufficient reserve capacity due to the unavailability of cross-zonal capacity is defined as the probability determined in paragraph (e) multiplied by the probability determined in paragraph (f);
- h. Determination of the Initial Exchange Limit by selecting the highest Scenario for which the following conditions are both fulfilled
 - a. the risk of insufficient reserve capacity due to the unavailability of cross-zonal capacity as determined in paragraph (g) remains lower than or equal to the maximum value as determined in paragraph (d), and
 - b. the risk defined in (e) remains lower than or equal to the maximum value defined in (c).

~~(5)~~—The forecasting of the available cross-zonal capacity pursuant to Article 4(4)(a) may be calculated separately by two different forecasting tools. TSOs will develop up to two distinct forecasting tools. Each TSO who applies the Probabilistic Method shall define a tool as priority and the other tool as non-priority. By default, the Initial Exchange Limit based on the forecasting of the available cross-zonal capacity calculated by the priority tool shall be used by the capacity procurement optimization function. If the Initial Exchange Limit from the priority tool is not available, the Initial

Exchange Limit calculated by the non-priority tool may be used by the capacity procurement optimization function.

~~(6) —~~

~~By no more than one year after the first application day of the Probabilistic Method all TSOs who apply the Probabilistic Method shall submit an amendment to this proposal describing the forecasting tool(s) described in Article 4(5). This amendment shall specify at least:~~

~~A description of the algorithm used by each forecasting tool pursuant to Article 4(5).~~

~~(5) A description of input data which the algorithm used by each forecasting tool pursuant to Article 4(5) shall use but is not limited to.~~

(6) The algorithm of the forecasting tool FOX shall follow the following criteria:

a. The forecasted risks referenced in Article 4(4)(e) and Article 4(4)(f) shall be based on the averaging method of historical data according to 4(67)(b). First, the risks shall be assessed in the resolution of the input data per four-hour block in accordance with the criteria set out in Article 4(4)(e) and Article 4(4)(f). Second, the forecasted risk for a four-hour block shall be determined as the mean of the risks derived from the previous assessments.

b. The forecasted risk of insufficient reserve capacity due to the unavailability of cross-zonal capacity shall be calculated with the forecasted risks from Article 4(67)(a) according to Article 4(4)(g).

c. The input data shall cover a fixed lookback period T before the delivery day D, starting from D- (T+2) to D-2. The length of the lookback period shall be published on the ALPACA ENTSO-E Website.

d. The input data shall be used in the following resolution

i. 15-minute average values of the cross-zonal capacity per border

ii. 4-second values of the PICASSO demand of the importing country

4-hour

iii. aFRR capacity demand of the importing country

(7) The algorithm of the forecasting tool TIGER shall follow the following criteria:

a. The risk referenced in Article 4(4)(e) shall be calculated with a machine learning algorithm utilizing the inputs specified under Article 4(78)(b).

b. The risk referenced in Article 4(4)(f) shall be calculated by plotting historic aFRR activations of a country in an inverted cumulative distribution function utilizing the inputs specified under Article 4(78)(c).

c. The following inputs shall be used to calculate the risk referenced in Article 4(4)(e):

i. Day-Ahead Price Forecasts

ii. Temperature Forecasts

iii. Energy Load Forecasts

iv. Wind Generation Forecasts

v. PV Generation Forecasts

vi. Vertical Grid Load Forecasts

vii. Forecasted Exchanges Between Bidding Zones

viii. Overall Energy Generation Forecasts per Bidding Zone

ix. Net Position Forecasts per Bidding Zone

d. The following inputs shall be used to calculate the risk referenced in Article 4(4)(f):

- i. Dimensioned Demand aFRR
- ii. Balancing Energy Demand aFRR

Article 5 – Security Limit

- (1) The Security Limit can be determined for each border for which the Probabilistic Method is applied, separately per product and direction.
- (2) The Security Limit can be determined for each contracting period as defined in the common and harmonized rules and processes for the exchange and procurement of balancing capacity in accordance with article 33(1) of the EBGL.

Article 6 – Fallback and Settlement

- (1) In case the risk of unavailability of cross-zonal capacity or insufficient reserve capacity realizes between the time when the gate for submitting bids for a contracting period closes and the real-time activation via the balancing energy platform according to articles 20 and 21 of the EBGL, the TSOs whose operational security requirements in accordance with article 157 of the SOGL are negatively affected shall determine and initiate local fallback procedures such that the potentially negative impact with regard to said operational security requirements is mitigated.
- (2) The rules regarding the settlement of procured balancing capacity as defined by the TSOs in the common and harmonized rules and processes for the exchange and procurement of balancing capacity in accordance with article 33(1) of the EBGL shall be affected neither by the probability of available cross-zonal capacity after intraday cross-zonal gate closure time nor in case the risk of unavailability of cross-zonal capacity or insufficient reserve capacity realizes between the time when the gate for submitting bids for a contracting period closes and the real-time activation via the balancing energy platform according to articles 20 and 21 of the EBGL.

Article 7 – Implementation Timeline

- (1) The TSOs who intend to apply the Probabilistic Method on one or more borders as determined in the common and harmonized rules and processes for the exchange and procurement of balancing capacity in accordance with article 33(1) of the EBGL shall implement the Probabilistic Method no later than 18 months after the approval of said common and harmonized rules and processes for the exchange and procurement of balancing capacity in accordance with article 33(1) of the EBGL by the relevant regulatory authorities.

Article 8 – Notification

- (1) The TSOs who apply this Probabilistic Method shall notify all TSOs in the relevant Load Frequency Control blocks as defined in accordance with article 141(2) of the SOGL following the procedure set forth in article 150(1) of the SOGL.

Article 9 – Publication and Transparency

- (1) The Probabilistic Method shall be published by the TSOs who submitted it for approval without undue delay pursuant to article 7 of the EBGL after a decision has been made by the relevant

regulatory authorities. If this Probabilistic Method is amended – either by request of one or several regulatory authorities in accordance with article 6(1) of the EBGL, or on the initiative of TSOs who submitted a previous version for approval in accordance with article 6(3) of the EBGL the amended and approved Probabilistic Method shall be published without undue delay by the TSOs who submitted the amendment for approval.

- (2) The TSOs who apply this Probabilistic Method shall publish the Maximum Exchange Limit for each product, border, and direction for which the Probabilistic Method is applied at the latest when the results of the procurement for a contracting period are published.
- (3) The TSOs shall review and monitor the risks of applying the Probabilistic Method and shall, by three, six, nine, and twelve months after the first application day of the Probabilistic Method submit a report to the relevant regulatory authorities. This report shall include at least:
 - a. an assessment of the deviation of the risk of unavailability of cross-zonal capacity due to planned and unplanned outages and due to congestions from the actual risk incurred from an ex-post perspective;
 - b. an assessment of the deviation of the risk of insufficient reserve capacity due to the unavailability of cross-zonal capacity from the actual risk incurred from an ex-post perspective;
 - c. an evaluation and monitoring of forecast results for the Initial Exchange Limit of the previous period and in case applicable, information about measures taken to improve the determination of the Initial Exchange Limit in accordance with Articles 4(1)-(4);
 - d. information about applied fallback procedures in accordance with Article 6(1) and the associated costs.
- (4) By no later than one month before the first application day of the Probabilistic Method all TSOs who apply the Probabilistic Method shall publish an explanation of the forecasting tool(s) pursuant to Article 4(5). It shall at least include an overview of the algorithm used by each forecasting tool pursuant to Article 4(5) as well as a listing of the inputs used in this process.

Article 10 – Language

- (1) The reference language for the Probabilistic Method shall be English. For the avoidance of doubt, where TSOs need to translate the Probabilistic Method into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with article 7 of the EBGL and any version in another language, the relevant TSOs shall be obliged to dispel any inconsistencies by providing a revised translation of the Probabilistic Method to their relevant regulatory authorities.