Explanatory document to Capacity calculation methodology within the Baltic Capacity Calculation Region in Accordance with Article 10(1) of the Commission Regulation (EU) 2016/1719 of 26 September 2016 Establishing a Guideline on Forward Capacity Allocation

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1 INTRODUCTION

The Commission Regulation (EU) 2016/1719 of 26 September 2016 Establishing a Guideline on Forward Capacity Allocation (FCA) foresees to develop and implement a common Long Term Capacity Calculation Methodology (LT CCM) per Capacity Calculation Region.

Three Baltic countries plan to synchronize with Continental Europe Synchronous Area (CESA) in the first quarter of 2025. In addition, considering Baltic CCR NRAs decision on 29th of January 2021, Baltic CCR NRAs encourage the Baltic CCR TSOs to develop new Long Term Capacity Calculation Methodology (LT CCM) proposal, where applicable following the guidance in ACER's decision on the LT CCM and submit a new proposal to Baltic CCR NRAs.

Considering these circumstances, Baltic CCR TSOs provide new updated Baltic LT CCM in accordance with FCA article 10(1) for Baltic CCR NRAs approval including requested changes considering Baltic states synchronization with CESA and proposing new principles which will be aligned with Baltic DA ID CCM. In this explanatory document Baltic CCR TSOs will explain the changes included in the proposal for Baltic LT CCM.

2 SYNCHRONIZATION WITH CESA

Baltic states synchronization with CESA has legal and technical aspects. Legal aspects relevant for Baltic LT CCM development covers changes for currently existing operational agreements. Technical synchronisation aspects, related to Baltic area and relevant for Baltic DA ID CCM are explained in Section 6. New LT CCM is developed and planned to be implemented by the time Baltic states are synchronized with CESA when new principles will be applied.

Baltic states currently are operating in different synchronous area called BRELL (Belarus, Russia, Estonia, Latvia and Lithuania). Key operational and organizational principles within common synchronous area of BRELL are set out in an agreement between TSOs of Belarus, Russia, Estonia, Latvia and Lithuania. This agreement also covers capacity calculation and coordination principles between parties as well as other relevant operational aspects for system operations. As Baltic states operate in the same BRELL synchronous area, they must apply common principles set out in aforementioned agreement.

This agreement will be no longer relevant for Baltic TSOs as they will operate in CESA. New LT CCM sets out principles for capacity calculation in accordance with CACM and FCA Regulations. This allows to be fully compliant with EU regulations and full integration with EU capacity coordination processes and electricity markets.

3 COORDINATED NTC CAPACITY CALCULATION APPROACH APPLICATION

Coordinated NTC approach as in FACE article 10(1) and Commission Regulation (EU) 2015/1222 establishing a guideline on Capacity Calculation and Congestion Management (CACM Regulation) article 21(1)(b)iv is foreseen to be applied by Baltic CCR TSOs in new updated Baltic LT CCM. This decision is consistent with the DA ID CCM where the same method is foreseen to be applied.

Key factors determining coordinated NTC approach in Baltic LT CCM are Baltic TSOs electrical grid configuration and desynchronization from BRELL network. After desynchronization from

BRELL network Baltic TSOs networks are distributed radially, which allows to better anticipate and manage flows, as there are no possibilities for loop flows to appear. Therefore, varying net positions of each bidding zone results in direct flows on cross borders and there are no loop flows impact for Baltic TSOs networks. In addition, as Baltic TSOs will be desynchronized from BRELL network, there will no longer be any impact from third countries and no loop flows induced by any of third country party network net position variation.

Therefore, the coordinated NTC approach allows for an optimal use of the transmission infrastructure while maintaining a high level of system security as well as for efficient grid operation for each Baltic TSO. This method allows efficiently determine and coordinate cross border flows in Baltic region by disregarding any impact from third countries or other system operators.

3.1 TTC CALCULATION

Net Transmission Capacity (NTC) determines maximum allowable cross border power exchanged between bidding zones. It is equal to Total Transfer Capacity (TTC) reduced by Transmission Reliability Margin (TRM).

TTC will be calculated using Common Grid Model (CGM) according to CACM Regulation article 28(5) and article 29(8)a by evaluating system security analyses and analysed maximum possible exchanges between bidding zones. CGM usage allows to fulfil general requirements of FCA and CACM Regulations and efficiently integrate into EU TSOs processes after Baltic TSOs synchronization with CESA. TTC calculation principle remains consistent with DA ID CCM proposal.

3.2 TRM CALCULATION

TRM will be calculated by considering netted planned and actual power flow deviations on cross border and adding one standard deviation. This calculation will be done for data set, covering last 12 months period. TRM recalculation and update is foreseen at least once every month. In addition, TRM will be calculated and applied for each cross-border interconnection direction. On top of that, for the initial period of synchronization with CESA, data for calculation will not be available, therefore, for the first one month period it is foreseen to apply fixed 50 MW TRM values for all cross-borders. After that, TRM will be calculated based on available data and recalculated every month by adding additional data set, until 12 months data set is available. TRM calculation principle remains consistent with DA ID CCM proposal.

3.3 NTC CALCULATION

NTC will be considered as outcome of capacity calculation process. It will be calculated as usual by considering TTC and TRM values. NTC value will be obtained by subtracting TRM value from TTC.

4 LONG TERM CAPACITY ALLOCATIONS

Baltic CCR TSOs do not have any long-term physical allocation processes developed for Baltic CCR cross-border capacities. Relevant Baltic CCR TSOs have set up financial transmission rights on EE-FI and EE-LV cross-borders, but the financial transmission rights do not allocate any physical capacities and do not affect any following market timeframes.

5 LITHUANIA – SWEDEN CROSS BORDER CAPACITY CALCULATION

Updated Baltic LT CCM contains updated proposal regarding Lithuania - Sweden HVDC interconnection capacity determination which is aligned with DA ID CCM. LT CCM includes updates for capacity determination including additional coefficients to the formula. Coefficient alpha represents outage situation and regulates possible maximum capacity value. This coefficient could have ranged value from 0 to 1. This coefficient depends on outage situation on Swedish electrical network as shown on formula below:

$$TTC_{I,\ A>B} = A_I \cdot P_{I,\ MAX\ THERMAL}$$

Formulas for ATC are amended by representing Already Allocated Capacity (AAC) with direction indexes to represent cross border capacities allocations more accurately for specific border and direction as shown in example formula below:

$$SE\ ATC_{SE>LT} = TTC_{SE>LT} - AAC_{SE>LT} + AAC_{LT>SE}$$

6 LITHUANIA - POLAND SYNCHRONOUS CONNECTION WITH CESA CAPACITY CALCULATION

Considering circumstances, that three Baltic countries are planning synchronous operation with CESA via 400 kV overhead double circuits line, the permitted power flow on the interface will be very important factor influencing safe and reliable Baltic power system operation. Synchronous Baltics power system operation via relatively weak interface with CESA insist, that LT-PL cross border TTC determination shall be performed in specific way and requires in depth stability analysis assessment.

New LT CCM is aligned with DA ID CCM, and defines that LT-PL cross border TTC determination shall be performed by evaluating:

- static stability,
- transient stability,
- oscillatory stability,
- frequency stability.

To define LT-PL cross border TTC, power flow limits will be calculated for each type of stabilities mentioned above.

TTC limitations resulting from static stability will be based on power flow calculations by applying N-1 contingencies after which bus voltages and network elements loading shall be maintain within permissible limits.

TTC limitation resulting from transient stability criteria will be calculated based on Critical Fault Clearing Time Calculations by applying three phase symmetrical faults.

TTC limitation resulting from oscillatory stability criteria will be calculated based on small signal stability analysis. From small signal stability point of view Baltic power systems behaves as small power system connected by a not very strong connection to a much larger system. Main aspects of small signal stability analysis is to check sufficiency of the damping of inter-area oscillations. TTC values should ensure save power transfers in the interconnector in case of N-1 situation. Any power deficit/surplus in Baltic power systems during synchronous operation with CESA will

result in changed power flow in the interconnection line, due to instantaneous inertial response of the large CESA system and FCR response of the synchronous machines. In the conditions in which:

- BSPS export power to CESA and there is outage of power demand (including HVDC link operating in direction to Nordics), or
- BSPS import power from CESA and there is outage of power infeed (including HVDC link operating in direction to BSPS or synchronous generator),

power transfer in the interconnection line will be increased. The increased power transfer should not exceed safe transfer limits from small signal stability point of view. Therefore, TTC values for relevant direction shall be defined by applying the following approach:

- power flow limit based on small signal stability criteria in direction to Lithuania shall be calculated considering security limits based on small signal stability criteria and possible loss of biggest infeed in Baltic power systems,
- Power flow limit based on small signal stability criteria in direction to Poland shall be calculated considering security limits based on small signal stability criteria and possible loss of biggest demand in BSPS.

Reliable and robust small signal stability analysis is taxing and challenging. Proper power flow and dynamic models of the entire synchronous area are required. Preparation of such a model for certain time horizon is demanding, as it means collecting and adjusting data from different sources, model fine-tuning and validation. Therefore, calculation from small signal stability perspective will be performed not on a daily basis, but only after significant change in Baltic power systems grids.

TTC limitations resulting from frequency stability will be based on calculations covering transition of Baltic power systems to island operation. Due to the fact that Baltic power system is a relatively small, high Rate of Change of Frequency (RoCoF) is expected when BSPS switches to island mode operation with high exchange of power between Baltic power systems and CESA and therefore principals for TTC calculation must consider relevant dynamics of the frequency control process. Frequency stability calculation will be performed considering the following assumptions:

1. following system resources impacting frequency response will be evaluated:
    a. free control capacities of HVDC links,
    b. free control capacities of battery energy storage systems,
    c. free control capacity of FCR resources,
    d. amount of power demand connected to the power system,
    e. system inertia.
2. Two security criteria related to frequency stability will be considered:
    a. RoCoF,
    b. zenith and nadir of frequency (max and min value of frequency).

Transmission capacity of LT-PL cross border interconnection shall not exceed any of above-mentioned stabilities limits. TTC for LT-PL cross border shall be the minimum of static, transient, oscillatory and frequency stability limits. NTC will be determined by taking into account TRM as described in paragraph 3.32.

7 IMPLEMENTATION TIMESCALE

Baltic LT CCM is updated considering changes due to Baltic TSOs synchronisation with CESA. This new methodology will replace operational agreements with third countries regarding capacity calculation and secure grid operation. Therefore, methodology based on CACM and FCA Regulations is foreseen to be fully implemented in order to have legal framework for capacity calculation rules and terminating any existing rules with third countries. Baltic LT CCM is foreseen to be implemented as foreseen in LT CCM proposal – 6 months after NRAs approval.

8 ANNEX 1 – PUBLIC CONSULTATION RESPONSES

Orgnanization	EDF	TSO comment/responsible
Energy Traders Europe	We full support the Baltic countries synchronization with Continental Europe Synchronous Area (CESA) in the first quarter of 2025. We welcomed the fact that Baltic CCR TSOs have set up financial transmission rights on EE-FI and EE-LV cross-borders. However, FTRs at the EE->LV and FI->EE borders are only allocated in the general direction of the flow. We would like them to see allocated in both directions EE<->LV and FI<->EE. The justification is that even if the hedging need is lower in the opposite direction to the most common positive DA spread, it is nonetheless present. There are hours during which that positive DA spread is reversed, and market participants would be benefit from covering that risk – as big or small as it may be. This is also a good source of income for TSOs.	Thank you for the comment, and this is fully noted by relevant TSOs. However, your comment shall be considered in future as the (a) type of long-term transmission rights; (b) forward capacity allocation time frames; (c) form of product (base load, peak load, off-peak load); and (d) the bidding zone borders covered are defined in the Baltic Capacity Calculation Region's Regional Design of Long-Term Transmission Rights in accordance with Article 31 of Commission Regulation (EU) 2016/1719 of 26 September 2016, establishing guidelines on forward capacity allocation (approved by relevant Baltic CCR NRAs in 2022). Previously a public consultation regarding a study on regulation (EU) 2016/1719 Article30(4) on Electricity Forward Market was done. In which it was indicated from market participants that the most crucial FTR that needs to be provided is FI->EE FTR. Regarding the EE-LV border where indications that hedging between Baltic states is less crucial as the bidding zone prices are on the same level. There was no indication that there is a need to introduce any new instruments on the borders between Baltic bidding zones.

Energy Traders Europe	On CNEC definition and transparency, we note that the PTDF threshold percentage is not defined in art.4.2. We advise establishing a minimum PTDF threshold of 5% in the methodology, so that at the very least no (internal) CNEC can be included in the capacity calculation below that. We also advise including in art. 4.1 the rule from the Core LT CCM whereby only cross-zonal interconnectors are included de facto in the CNEC list, and the list of internal CNECs must be reviewed at least every 2 years and conformed with the pre-defined PTDF threshold. Appropriate transparency on CNECs should also be foreseen in art. 21.	PTDFs are calculated when flow-based capacity calculation method is applied. In Baltic CCR we intend to apply coordinated NTC method which approach for calculation is different than flow based. Therefore, we do not determine PTDF value for CNECs, but methodology foresee to determine impacting elements for capacity calculation. Method for CNEs definition for long term capacity calculation is set out in paragraph 4.2 which indicates that CNEs definition and impact assessment principles shall follow guidelines from coordinated security analysis methodology according to System Operation Guideline (COMMISSION REGULATION (EU) 2017/1485 of 2nd August 2017) art. 75. Security analysis methodology includes standard value for CNEC impact. CNECs review frequency is already set out in the long-term capacity calculation methodology proposal in paragraph 4.6.
Energy Traders Europe	We also encourage the Lithuanian TSO and NRA on the bidding zone borders of Lithuania and Poland, Lithuania and Latvia and Lithuania and Sweden to consider this opportunity further. Since the start of the liberalisation of the electricity sector, Energy Traders Europe has supported the issuance by TSOs of forward transmission rights at all bidding zone borders in Europe and in all directions, to the full amount that the underlying infrastructure can offer for each timeframe as calculated in advance of delivery.	Based on the (EU) 2016/1719 regulation establishing a guideline on forward capacity allocation Article 30(8) Lithuanian NRA in 2022 made “Analysis of Electricity Forward Market Hedging Opportunities in Lithuanian Bidding Zone Borders” and public consultation with the market participant in 2023 about hedging possibilities in Lithuania. With the additional coordination with the Swedish NRA the need for other than long-term cross-zonal hedging products where declared (Based on the FCA Article 30.5b). This approach is out of the scope of the new Baltic CCR long term capacity calculation methodology. Furthermore, Lithuanian TSO is analysing best ways to

	This activity is an essential part of the TSOs' "public service" activities, as regulated entities. The issuance of forward transmission rights at all borders in all directions allows to: • guarantee that a certain minimum volume of products will always be available and offered on a transparent and non-discriminatory manner through organised auctions; • provide substantial congestion income to TSOs by allowing them to extract the maximum value out of the network infrastructure they manage in advance of delivery; • provide better and more reliable visibility for market participants as to the total volumes of cross-border transmission hedging products; • ensure that the capacity that is offered to the market is maximised at all points in time and that any variations of these volumes is published in a timely and effective manner; • provide valuable signals as to the structural value of cross-border capacity, from a "congestion" point of view. This is useful for all market participants and for TSOs and regulators, whereas the daily price signals are much more volatile. For example, forward allocation provides clear market-based price signals as to the need for additional infrastructure investments. Therfore, we encourage to use FTR options in the Baltic CCR at all borders in both directions.	strengthening forward market with different approaches anticipating synchronization, new electricity market design with virtual hub approach and others changes.