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Baltic CCR TSOs Methodology for calculating cross-zonal capacity within the balancing timeframe in accordance with Article 37 of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

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26th September 2022

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Article 1   Purpose

1.1. This Proposal shall be considered as the common proposal of the Transmission System Operators AS Augstsprieguma tīkls, Elering AS, Litgrid AB, Fingrid Oyj, Polskie Sieci Elektroenergetyczne S.A. and Svenska kraftnät (hereinafter referred to as "Baltic CCR TSOs") for the establishment of a methodology for calculating cross-zonal capacity within the balancing timeframe in accordance with Article 37(3) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing.

1.2. Methodology for calculating cross-zonal capacity within the balancing timeframe (CZCBT) for the exchange of balancing energy or for operating the imbalance netting process shall define the capability of the interconnected power systems for balancing purposes between Estonian, Latvian, Lithuanian power systems and from or to Finnish, Swedish, Polish. Russian and Belarusian power system impact should be considered in calculation.

1.3. Proposed methodology shall describe cross-zonal capacity calculation principles for balancing timeframe for situation when Baltic countries are synchronously connected to BRELL Synchronous Area, principles when Baltic countries are synchronously connected to Continental Europe Synchronous Area and principles when Baltic countries are operating in isolated operation mode.

1.4. Proposed methodology shall describe calculation of cross-zonal capacity for balancing before the balancing timeframe, within the balancing timeframe for the operational phase of the balancing market and for the capacity that is published ex post.

1.5. The CZCBT shall be used by Baltic CCR TSOs to determine values to be provided to the European balancing platforms MARI and PICASSO in cooperation with Capacity Management Module (CMM).

Article 2   General terms of the cross-zonal capacity calculation for balancing timeframe methodology

2.1. Cross-zonal capacities within the balancing timeframe for the exchange of balancing energy or for operating the imbalance netting process shall be calculated in a way that facilitates the achievement of the following objectives:

2.1.1. Maximizing capacities available to the balancing market while ensuring operational security of the interconnected power systems;

2.1.2. Producing results in a transparent and replicable manner;

2.1.3. Avoiding market distortions.

2.2. Definitions used in methodology:

2.2.1. AAC – already allocated capacity represents the total amount of allocated transmission rights;

2.2.2. aFRR – frequency restoration reserves with automatic activation;

2.2.3. Balancing platforms – term used to refer to MARI and PICASSO platforms;

2.2.4. Balancing timeframe – time frame after intraday gate closure time;

2.2.5. CC – Capacity calculation;

2.2.6. CZCA – cross zonal capacity allocated is capacity allocated for sharing or exchange of balancing capacity between two or more areas for individual process (mFRR, aFRR) and direction;

2.2.7. CZCL – cross zonal capacity limit is limit for exchange of balancing energy at the balancing border or set of balancing borders (between Areas);

2.2.8. MARI -Manually Activated Reserves Initiative (MARI) is the European implementation project for the creation of the European mFRR platform;

2.2.9. mFRR – frequency restoration reserves with manual activation;

2.2.10. NTC – net transmission capacity of the designated cross-border interconnections is the maximum trading capacity, which is permitted in transmission cross-border interconnections compatible with operational security standards and taking into account the technical uncertainties on planned network conditions for each TSO;

2.2.11. PICASSO- The Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation (PICASSO) is the implementation project to establish the European platform for the exchange of balancing energy from frequency restoration reserves with automatic activation (aFRR);

2.2.12. XB flows – represents additional planned flows on cross-borders resulting from activations of balancing bids and/or imbalance netting process in the balancing platforms.

Article 3   Calculating cross-zonal capacity within the balancing timeframe

3.1. The following formulas shall always take into account the calculation perspective of a control area to reflect the capacity direction from which area to which area the capacity is provided. TSOs owning a common border will have opposite direction for import and export to reflect the possible flow direction on the cross-border (e.g. import direction for TSO 1 will reflect the export direction of TSO 2).

Article 4   CZCL's calculation for Estonia – Finland, Lithuania – Sweden and Lithuania – Poland individual DC interconnections:

4.1. For all DC cross-border interconnectors of Baltic area a common CZCL calculation should be used as described in this chapter. CZCL should be calculated for each interconnector separately using corresponding values for each. CZCL should be calculated using:

4.1.1. sum of already allocated capacity after long term, day ahead and intraday;

4.1.2. CZCA for each process accordingly (mFRR and aFRR);

4.1.3. resulting cross border flow of mFRR and aFRR activations in BPs.

4.2. Ramping restrictions shall be considered to ensure grid security for the CZCL values for each MTU and ensure compliance with Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation. Ramping restrictions shall be treated as an allocation constraint in the balancing timeframe and be consistent with approach provided in Baltic CCR Intraday capacity calculation methodology

4.3. A TSO uses allocation constraints in case of a central dispatch model for ensuring a required level of operational reserve for balancing (hereinafter referred to as balancing constraints). The balancing constraints depend on the foreseen balancing situation and are bidirectional, with independent values for each market time unit and separately in the directions of import and export. This is

applicable for PSE, for all market time units. The details for the use and the methodology of calculation of allocation constraints as described in this article are set forth in Appendix 1.

4.4. A TSO may discontinue the usage of an allocation constraint as described above. The concerned TSO shall communicate this change to the Baltic regulatory authorities and to the market participants at least one month before its implementation.

CZCL calculation for MARI mFRR activations in import and export directions for DC cross-border interconnectors

4.5. CZCL for mFRR activations in MARI for import and export directions should be calculated as follows:

$$CZCL_{MARI\_imp,from-to} = NTC_{imp,from-to} - \sum AAC_{(LT+DA+ID)imp,from-to} + \sum AAC_{(LT+DA+ID)exp,from-to} - XBflow_{MARI_{imp,from-to}} + XBflow_{MARI_{exp,from-to}} - CZCA_{PICASSO\_imp,from-to}$$

$$CZCL_{MARI\_exp,from-to} = NTC_{exp,from-to} - \sum AAC_{(LT+DA+ID)exp,from-to} + \sum AAC_{(LT+DA+ID)imp,from-to} - XBflow_{MARI_{exp,from-to}} + XBflow_{MARI_{imp,from-to}} - CZCA_{PICASSO\_exp,from-to}$$

CZCL calculation for PICASSO aFRR activations in import and export directions for DC cross-border interconnectors

4.6. CZCL for aFRR activations in PICASSO for import and export directions should be calculated as follows:

$$CZCL_{PICASSO\_imp,from-to}$$
$$= NTC_{imp,from-to} - \sum AAC_{(LT+DA+ID)imp,from-to} + \sum AAC_{(LT+DA+ID)exp,from-to} - XBflow_{MARI_{imp,from-to}} + XBflow_{MARI_{exp,from-to}} - XBflow_{PICASSO_{imp,from-to}} + XBflow_{PICASSO_{exp,from-to}}$$

$$CZCL_{PICASSO\_exp,from-to}$$
$$= NTC_{exp,from-to} - \sum AAC_{(LT+DA+ID)exp,from-to} + \sum AAC_{(LT+DA+ID)imp,from-to} - XBflow_{MARI_{exp,from-to}} + XBflow_{MARI_{imp,from-to}} - XBflow_{PICASSO_{exp,from-to}} + XBflow_{PICASSO_{imp,from-to}}$$

Where:

$NTC_{imp,from-to}$ – net transmission capacity for import direction;

$NTC_{exp,from-to}$ – net transmission capacity for export direction;

$\sum AAC_{(LT+DA+ID)imp,from-to}$ – already allocated capacity after latest data of LT, DA and ID markets for import direction;

$\sum AAC_{(LT+DA+ID)exp,from-to}$ – already allocated capacity after latest data of LT, DA and ID markets for export direction;

$CZCA_{PICASSO\_imp,from-to}$ – allocated capacity for aFRR services by import direction;

$CZCA_{PICASSO\_exp,from-to}$ – allocated capacity for aFRR services by export direction;

$XBflows_{MARI_{imp,from-to}}$ – resulting import cross border flow of mFRR activations in MARI for import direction;

$XBflows_{MARI_{exp,from-to}}$ – resulting export cross border flow of mFRR activations in MARI for export direction;

$XBflow_{PICASSO_{imp,from-to}}$ – resulting import cross border flow of aFRR activations in PICASSO on a specific interconnector in import direction;

$XBflow_{PICASO_{exp,from-to}}$ – resulting export cross border flow of aFRR activations in PICASSO on a specific interconnector in export direction;

Article 5 CZCL's calculation for Estonia-Latvia, Latvia-Lithuania, Estonia – Russia and Lithuania – Belarus cross-border interconnectors

5.1. For all AC cross-border interconnectors of Baltic area a common CZCL calculation should be used as described in this chapter. CZCL should be calculated for each interconnector separately using corresponding values for each. CZCL should be calculated using:

5.1.1. highest value of already allocated capacity after long term, day ahead and intraday and calculated power flow value from actual D-1 Common Grid Model;

5.1.2. CZCA for each process accordingly.

5.1.3. resulting cross border flow of mFRR and aFRR activations in BPs.

5.2. From the start of MTU the CZCL$_{MAX}$ is calculated to mitigate the risk of overloading the cross-border interconnectors as a result of market data mismatch with actual power flows in grid. If the initially calculated CZCL is higher than the CZCL$_{MAX}$, the CZCL should be updated and in next iterations the value of CZCL$_{MAX}$ should be used.

5.3. The main objective to use the actual power flows is the high risk of 3rd county flow impact on power flows on cross-border interconnectors of Estonian, Latvian and Lithuanian power systems. In case of disconnection of the Baltic power systems from BRELL loop, actual energy flow value shall not be further used in calculation of CZCL$_{MAX}$ for AC cross-border interconnectors. In such case, the methodology should be reviewed and amended accordingly.

CZCL calculation for MARI mFRR activations in import direction for AC cross-border interconnectors

5.4. CZCL for mFRR activations in MARI in import direction should be calculated as follows:

$$CZCL_{1\ MARI_{imp,from-to}} = NTC_{imp,from-to} - AAC_{MAX(LT+DA+ID;calc.)imp,from-to} + AAC_{MAX(LT+DA+ID;calc.)exp,from-to} - XBflow_{MARI_{imp,from-to}} + XBflow_{MARI_{exp,from-to}} - CZCA_{PICASSO_{imp,from-to}}$$

5.5. Already allocated capacity should be calculated as follows:

$$AAC_{MAX(LT+DA+ID;calc.)imp,from-to} = MAX\left(\Sigma AAC_{LT+DA+ID_{imp,from-to}}; AAC_{calculated\ flow_{imp,from-to}}\right)$$

$$AAC_{MAX(LT+DA+ID;calc.)exp,from-to} =$$
$$MAX\left(\Sigma AAC_{LT+DA+ID_{exp,from-to}}; AAC_{calculated\ flow_{exp,from-to}}\right)$$

Where:

$NTC_{imp,from-to}$ – net transmission capacity of a specific interconnector in import direction;

$\Sigma AAC_{LT+DA+ID_{imp,from-to}}$ – already allocated capacity after latest data of LT, DA and ID markets in import direction on a specific interconnector;

$AAC_{calculated\ flow_{imp,from-to}}$ – calculated power flow in import direction on a specific interconnector performed with actual D-1 Common Grid Model;

$\Sigma AAC_{LT+DA+ID_{exp,from-to}}$ – already allocated capacity after latest data of LT, DA and ID market in export direction on a specific interconnector;

$AAC_{calculated\ flow_{exp,from-to}}$ – calculated power flow in export direction on a specific interconnector performed with actual D-1 Common Grid Model.

$CZCA_{PICASSO_{imp,from-to}}$ – value of cross zonal capacity allocated for aFRR activations in import direction on a specific interconnector;

Additionally, in real-time CZCL$_{MAX}$ for mFRR activations in MARI in import direction should be calculated based on actual flows on cross-border interconnectors as follows:

$$CZCL_{MAX_{MARI_{imp,from-to}}} = NTC_{imp,from-to} - AAC_{flow_{imp,from-to}} + AAC_{flow_{exp,from-to}} +$$
$$XBflow_{PICASSO_{imp,from-to}} - CZCA_{PICASSO_{imp,from-to}}$$

5.6. When Baltic power systems disconnected from the BRELL loop:

$$CZCL_{MAX_{MARI_{imp,from-to}}} = CZCL_{1\,MARI_{imp,from-to}}$$

Where:

$AAC_{flow_{imp,from-to}}$ – already allocated capacity in import direction on a specific interconnector based on actual flow average values in past 5 minutes;

$AAC_{flow_{exp,from-to}}$ – already allocated capacity in export direction on a specific interconnector based on actual flow average values in past 5 minutes;

$CZCA_{PICASSO_{imp,from-to}}$ – value of cross zonal capacity allocated for aFRR activations in import direction on a specific interconnector;

$XBflows_{MARI_{imp,from-to}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI on a specific interconnector in import direction;

$XBflows_{MARI_{epx,from-to}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI on a specific interconnector in export direction;

$XBflow_{PICASO_{exp,from-to}}$ – resulting export cross border flow of aFRR activations in PICASSO on a specific interconnector in export direction;

$XBflow_{PICASSO_{imp,from-to}}$ – resulting import cross border flow of aFRR activations in PICASSO on a specific interconnector in import direction;

5.7. CZCL for mFRR activation in MARI for energy import shall be calculated as minimum value of $CZCL_{1\,MARI_{imp,from-to}}$ and $CZCL_{MAX_{MARI_{imp,from-to}}}$:

$$CZCL_{MARI_{imp,from-to}} = MIN\left(CZCL_{1\,MARI_{imp,from-to}}; CZCL_{MAX_{MARI_{imp,from-to}}}\right)$$

CZCL calculation for MARI mFRR activations in export direction for AC cross-border interconnectors

5.8. CZCL for mFRR activations in MARI in export direction should be calculated as follows:

$$CZCL_{1\,MARI_{exp,from-to}} = NTC_{exp,from-to} - AAC_{MAX(LT+DA+ID;calc.)exp,from-to} +$$
$$AAC_{MAX(LT+DA+ID;calc.)imp,from-to} - XBflow_{MARI_{exp,from-to}} + XBflow_{MARI_{imp,from-to}} -$$
$$CZCA_{PICASSO_{exp,from-to}}$$

Where:

$NTC_{exp,from-to}$ – net transmission capacity of a specific interconnector in export direction;

$CZCA_{PICASSO_{exp,from-to}}$ – value of cross zonal capacity allocated for aFRR activations in export direction on a specific interconnector.

5.9. Additionally, in real-time CZCL$_{MAX}$ for mFRR activations in MARI in export direction should be calculated based on actual flows on cross-border interconnectors as follows:

$$CZCL_{MAX_{MARI_{exp,from-to}}} = NTC_{exp,from-to} - AAC_{flow_{exp,from-to}} + AAC_{flow_{imp,from-to}} +$$
$$XBflow_{PICASSO_{exp,from-to}} - CZCA_{PICASSO_{exp,from-to}}$$

5.10. When Baltic power systems disconnected from the BRELL loop:

$$CZCL_{MAX_{MARI_{exp,from-to}}} = CZCL_{1MARI_{exp,from-to}}$$

5.11. CZCL for mFRR activation in MARI for energy export shall be calculated as minimum value of $CZCL_{1\,MARI_{exp,from-to}}$ and $CZCL_{MAX_{MARI_{exp,from-to}}}$:

$$CZCL_{MARI_{exp,from-to}} = MIN\left(CZCL_{1\,MARI_{exp,from-to}}; CZCL_{MAX_{MARI_{exp,from-to}}}\right)$$

CZCL calculation for PICASSO aFRR activations in import direction for AC cross-border interconnectors

5.12. CZCL for aFRR activations in PICASSO in import direction should be calculated as follows:

$$CZCL_{1\,PICASSO_{imp,from-to}} = NTC_{imp,from-to} - AAC_{MAX(LT+DA+ID;calc.)imp,from-to} +$$
$$AAC_{MAX(LT+DA+ID;calc.)exp,from-to} - XBflow_{MARI_{imp,from-to}} + XBflow_{MARI_{exp,from-to}} -$$
$$XBflow_{PICASSO_{imp,from-to}} + XBflow_{PICASSO_{exp,from-to}}$$

5.13. Additionally, in real-time CZCL$_{MAX}$ for aFRR activations in PICASSO should be calculated based on actual flows on cross-border interconnectors as follows:

$$CZCL_{MAX_{PICASSO_{imp,from-to}}} = NTC_{imp,from-to} - AAC_{flow_{imp,from-to}} + AAC_{flow_{exp,from-to}}$$

5.14. When Baltic power systems disconnected from the BRELL loop:

$$CZCL_{MAX_{PICASSO_{imp,from-to}}} = CZCL_{1\,PICASSO_{imp,from-to}}$$

5.15. CZCL for mFRR activation in MARI for energy export shall be calculated as minimum value of $CZCL_{1\,PICASSO_{imp,from-to}}$ and $CZCL_{MAX_{PICASSO_{imp,from-to}}}$:

$$CZCL_{PICASSO_{imp,from-to}} = MIN\left(CZCL_{1\,PICASSO_{imp,from-to}}; CZCL_{MAX_{PICASSO_{imp,from-to}}}\right)$$

CZCL calculation for PICASSO aFRR activations in export direction for AC cross-border interconnectors

5.16. CZCL for aFRR activations in PICASSO in export direction should be calculated as follows:

$$CZCL_{1\,PICASSO_{exp,from-to}} = NTC_{exp,from-to} - AAC_{MAX(LT+DA+ID;calc.)exp,from-to} + AAC_{MAX(LT+DA+ID;calc.)imp,from-to} - XBflow_{MARI_{exp,from-to}} + XBflow_{MARI_{imp,from-to}} - XBflow_{PICASSO_{exp,from-to}} + XBflow_{PICASSO_{imp,from-to}}$$

5.17. Additionally, in real-time CZCL$_{MAX}$ for aFRR activations in PICASSO should be calculated based on actual flows on cross-border interconnectors as follows:

$$CZCL_{MAX_{PICASSO_{exp,from-to}}} = NTC_{exp,from-to} - AAC_{flow_{exp,from-to}} + AAC_{flow_{imp,from-to}}$$

5.18. When Baltic power systems disconnected from the BRELL loop:

$$CZCL_{MAX_{PICASSO_{exp,from-to}}} = CZCL_{1_{PICASSO_{exp,from-to}}}$$

5.19. CZCL for aFRR activation in PICASSO for energy export shall be calculated as minimum value of $CZCL_{1\,PICASSO_{exp,from-to}}$ and $CZCL_{MAX_{PICASSO_{exp,from-to}}}$:

$$CZCL_{PICASSO_{exp,from-to}} = MIN\left(CZCL_{1\,PICASSO_{exp,from-to}}; CZCL_{MAX_{PICASSO_{exp,from-to}}}\right)$$

Article 6 Technical profile import/export NTC limits and CZCL calculation for Lithuania, Latvia and Estonia areas

6.1. Technical profile represents aggregation of Lithuania, Latvia and Estonia scheduling areas on either side of several borders with specification of a single direction across the corresponding aggregation of borders. It will be submitted as a limit of NTC and CZCL for balancing timeframe. NTC and CZCL should be calculated using:

6.1.1. CZCL calculated for specific AC cross-border interconnectors (Estonia-Latvia, Lithuania-Latvia, Estonia-Russia and Lithuania-Belarus);

6.1.2. agreed cross-borders power distribution coefficients in BRELL ring;

6.1.3. highest value of already allocated capacity after long term, day ahead, intraday, calculated and actual flow historical data;

6.1.4. cross zonal capacity allocated for aFRR activations;

6.1.5. resulting cross border flow of mFRR and aFRR activations in BPs.

6.2. In case LT-BY or EE-RU cross-borders import and export NTCs are equal to 0 (all lines in LT-BY or EE-RU cross-borders are disconnected, BRELL loop network is disrupted), then the coefficient shall be set 1 and:

$CZCL_{PICASSO_{imp,BY-LT}}$ will be replaced by $CZCL_{PICASSO_{imp,LV-LT}}$

$CZCL_{PICASSO_{exp,LT-BY}}$ will be replaced by $CZCL_{PICASSO_{exp,LT-LV}}$

$CZCL_{PICASSO_{imp,RU-EE}}$ will be replaced by $CZCL_{PICASSO_{imp,LV-EE}}$

$CZCL_{PICASSO_{exp,EE-RU}}$ will be replaced by $CZCL_{PICASSO_{exp,EE-LV}}$

For $AAC_{flow_{imp,BY-LT}}$, $AAC_{flow_{exp,LT-BY}}$, $AAC_{flow_{imp,RU-EE}}$, $AAC_{flow_{exp,EE-RU}}$, $AAC_{flow_{imp,LV-EE}}$, $AAC_{flow_{exp,EE-LV}}$, $AAC_{flow_{imp,LV-LT}}$ and $AAC_{flow_{exp,LT-LV}}$ will be applied to 0 MW

Where:

$CZCL_{PICASSO_{imp,BY-LT}}$ – cross zonal capacity limit for aFRR activations in import direction from Belarus to Lithuania.

$CZCL_{PICASSO_{exp,LT-BY}}$ – cross zonal capacity limit for aFRR activations in export direction from Lithuania to Belarus.

$CZCL_{PICASSO_{imp,LV-LT}}$ – cross zonal capacity limit for aFRR activations in import direction from Latvia to Lithuania.

$CZCL_{PICASSO_{exp,LT-LV}}$ – cross zonal capacity limit for aFRR activations in export direction from Lithuania to Latvia.

$CZCL_{PICASSO_{imp,RU-EE}}$ – cross zonal capacity limit for aFRR activations in import direction from Russia to Estonia.

$CZCL_{PICASSO_{exp,EE-RU}}$ – cross zonal capacity limit for aFRR activations in export direction from Estonia to Russia.

$CZCL_{PICASSO_{imp,LV-EE}}$ – cross zonal capacity limit for aFRR activations in import direction from Latvia to Estonia.

$CZCL_{PICASSO_{exp,EE-LV}}$ – cross zonal capacity limit for aFRR activations in export direction from Estonia to Latvia.

$AAC_{flow_{imp,BY-LT}}$ – already allocated capacity in import direction from Belarus to Lithuania based on actual flow average values in past 5 minutes;

$AAC_{flow_{exp,LT-BY}}$ – already allocated capacity in export direction from Lithuania to Belarus based on actual flow average values in past 5 minutes;

$AAC_{flow_{imp,RU-EE}}$ – already allocated capacity in import direction from Russia to Estonia based on actual flow average values in past 5 minutes;

$AAC_{flow_{exp,EE-RU}}$ – already allocated capacity in export direction from Estonia to Russia based on actual flow average values in past 5 minutes;

$AAC_{flow_{imp,LV-EE}}$ – already allocated capacity in import direction from Latvia to Estonia based on actual flow average values in past 5 minutes;

$AAC_{flow_{exp,EE-LV}}$ – already allocated capacity in export direction from Estonia to Latvia based on actual flow average values in past 5 minutes;

$AAC_{flow_{imp,LV-LT}}$ – already allocated capacity in import direction from Latvia to Lithuania based on actual flow average values in past 5 minutes;

$AAC_{flow_{exp,LT-LV}}$ – already allocated capacity in export direction from Lithuania to Latvia based on actual flow average values in past 5 minutes;

NTC calculation for technical profile

In NTC calculation CZCL for PICASSO of each crossborder is used as it corresponds to the available transfer capacity of each crossborder that is necessaary to determine the NTC for TP of each area.

NTCs limits calculation for Lithuania area (technical profile):

$$NTC_{imp,LT\_TP} = MIN \left(\begin{array}{c} MIN \left(\frac{CZCL_{PICASSO_{imp,LV-LT}}}{coef_{imp,LV<>LT}} ; \frac{CZCL_{PICASSO_{imp,BY-LT}}}{coef_{imp,BY><LT}} \right) ; \\ MIN \left(\frac{CZCL_{PICASSO_{imp,LV-LT}}}{coef_{imp,LV><LT}} ; \frac{CZCL_{PICASSO_{imp,BY-LT}}}{coef_{imp,BY<>LT}} \right) \end{array} \right) +$$

$$MAX \left(\left(AAC_{flow_{imp,LV-LT}} + AAC_{flow_{imp,BY-LT}} \right) ; \left(AAC_{MAX(LT+DA+ID;calc.)imp,LV-LT} + \right. \right.$$
$$AAC_{MAX(LT+DA+ID;calc.)imp,BY-LT} + XBflow_{MARIimp,LV-LT} + XBflow_{MARIimp,BY-LT} +$$
$$+XBflow_{PICASSOimp,LV-LT} + XBflow_{PICASSOimp,BY-LT} \Big) \Big)$$

$$NTC_{exp,LT\_TP} = MIN \left(\begin{array}{c} MIN \left(\frac{CZCL_{PICASSO_{exp,LT-LV}}}{coef_{exp,LT><LV}} ; \frac{CZCL_{PICASSO_{exp,LT-BY}}}{coef_{exp,LT<>BY}} \right) ; \\ MIN \left(\frac{CZCL_{PICASSO_{exp,LT-LV}}}{coef_{exp,LT<>LV}} ; \frac{CZCL_{PICASSO_{exp,LT-BY}}}{coef_{exp,LT><BY}} \right) \end{array} \right) +$$

$$MAX \left(\left(AAC_{flow_{exp,LT-LV}} + AAC_{flow_{imp,LT-BY}} \right) ; \left(AAC_{MAX(LT+DA+ID;calc.)exp,LT-LV} + \right. \right.$$
$$AAC_{MAX(LT+DA+ID;calc.)exp,LT-BY} + XBflow_{MARIexp,LT-LV} + XBflow_{MARIexp,LT-BY} +$$
$$+XBflow_{PICASSOexp,LT-LV} + XBflow_{PICASSOexp,LT-BY} \Big) \Big)$$

Where:

$coef_{imp,LV<>LT}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for import from Latvia to Lithuania;

$coef_{exp,LT<>LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for export from Lithuania to Latvia;

$coef_{imp,LV><LT}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for import from Latvia to Lithuania;

$coef_{exp,LT><LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for export from Lithuania to Latvia;

$coef_{imp,BY<>LT}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for import from Belarus to Lithuania;

$coef_{exp,LT<>BY}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for export from Lithuania to Belarus;

$coef_{imp,BY><LT}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for import from Belarus to Lithuania;

$coef_{exp,LT><BY}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for export from Lithuania to Belarus;

$AAC_{MAX(LT+DA+ID;calc.)imp,LV-LT}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for import direction from Latvia to Lithuania;

$AAC_{MAX(LT+DA+ID;calc.)exp,LT-LV}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for export direction from Lithuania to Latvia;

$AAC_{MAX(LT+DA+ID;calc.)imp,BY-LT}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for import direction from Belarus to Lithuania;

$AAC_{MAX(LT+DA+ID;calc.)exp,LT-BY}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for export direction from Lithuania to Belarus.

NTCs limits calculation for Latvia area (technical profile):

$$NTC_{imp,LV\_TP} = MIN\left(\begin{array}{c} MIN\left(\frac{CZCL_{PICASSO imp,EE-LV}}{coef_{imp,EE<>LV}} ; \frac{CZCL_{PICASSO imp,LT-LV}}{coef_{imp,LT><LV}} \right); \\ MIN\left(\frac{CZCL_{PICASSO imp,EE-LV}}{coef_{imp,EE><LV}} ; \frac{CZCL_{PICASSO imp,LT-LV}}{coef_{imp,LT<>LV}} \right) \end{array} \right) +$$

$$MAX\left(\left(AAC_{flow_{imp,LT-LV}} + AAC_{flow_{imp,EE-LV}} \right) ; \left(AAC_{MAX(LT+DA+ID;calc.)imp,LT-LV} + \right.\right.$$
$$AAC_{MAX(LT+DA+ID;calc.)imp,EE-LV} + XBflow_{MARIimp,LT-LV} + XBflow_{MARIimp,EE-LV} +$$
$$\left.\left. +XBflow_{PICASSOimp,LT-LV} + XBflow_{PICASSOimp,EE-LV} \right) \right)$$

$$NTC_{exp,LV\_TP} = MIN\left(\begin{array}{c} MIN\left(\frac{CZCL_{PICASSO exp,LV-EE}}{coef_{imp,LV><EE}} ; \frac{CZCL_{PICASSO exp,LV-LT}}{coef_{exp,LV<>LT}} \right); \\ MIN\left(\frac{CZCL_{PICASSO exp,LV-EE}}{coef_{exp,LV<>EE}} ; \frac{CZCL_{PICASSO exp,LV-LT}}{coef_{exp,LV><LT}} \right) \end{array} \right) +$$

$$MAX\left(\left(AAC_{flow_{exp,LV-LT}} + AAC_{flow_{exp,LV-EE}} \right) ; \left(AAC_{MAX(LT+DA+ID;calc.)exp,LV-LT} + \right.\right.$$
$$AAC_{MAX(LT+DA+ID;calc.)exp,LV-EE} + XBflow_{MARIexp,LV-LT} + XBflow_{MARIexp,LV-EE} +$$
$$\left.\left. +XBflow_{PICASSOexp,LV-LT} + XBflow_{PICASSOexp,LV-EE} \right) \right)$$

Where:

$coef_{imp,LT<>LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for import from Lithuania to Latvia;

$coef_{exp,LV<>LT}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for export from Latvia to Lithuania;

$coef_{imp,LT><LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for import from Lithuania to Latvia;

$coef_{exp,LV><LT}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for export from Latvia to Lithuania;

$coef_{imp,EE<>LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for import from Estonia to Latvia;

$coef_{exp,LV<>EE}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for export from Latvia to Estonia;

$coef_{imp,EE><LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for import from Estonia to Latvia;

$coef_{exp,LV><EE}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for export from Latvia to Estonia;

$AAC_{MAX(LT+DA+ID;calc.)imp,LT-LV}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for import direction from Lithuania to Latvia;

$AAC_{MAX(LT+DA+ID;calc.)exp,LV-LT}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for export direction from Latvia to Lithuania;

$AAC_{MAX(LT+DA+ID;calc.)imp,EE-LV}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for import direction from Estonia to Latvia;

$AAC_{MAX(LT+DA+ID;calc.)exp,LV-EE}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for export direction from Latvia to Estonia.

NTCs limits calculation for Estonia area (technical profile):

$$NTC_{imp,EE\_TP} = MIN \left(\begin{array}{c} MIN\left(\frac{CZCL_{PICASSO\,imp,LV-EE}}{coef_{imp,LV<>EE}} ; \frac{CZCL_{PICASSO\,imp,RU-EE}}{coef_{imp,RU><EE}} \right); \\ MIN\left(\frac{CZCL_{PICASSO\,imp,LV-EE}}{coef_{imp,LV><EE}} ; \frac{CZCL_{PICASSO\,imp,RU-EE}}{coef_{imp,RU<>EE}} \right) \end{array} \right) +$$

$$MAX\left(\left(AAC_{flow\,imp,LV-EE} + AAC_{flow\,imp,RU-EE} \right); \left(AAC_{MAX(LT+DA+ID;calc.)imp,LV-EE} + \right.\right.$$
$$AAC_{MAX(LT+DA+ID;calc.)imp,RU-EE} + XBflow_{MARI\,imp,LV-EE} + XBflow_{MARI\,imp,RU-EE} +$$
$$\left.\left. +XBflow_{PICASSO\,imp,LV-EE} + XBflow_{PICASSO\,imp,RU-EE} \right) \right)$$

$$NTC_{exp,EE\_TP} = MIN \left(\begin{array}{c} MIN\left(\frac{CZCL_{PICASSO\,exp,EE-LV}}{coef_{exp,EE><LV}} ; \frac{CZCL_{PICASSO\,exp,EE-RU}}{coef_{exp,EE<>RU}} \right); \\ MIN\left(\frac{CZCL_{PICASSO\,exp,EE-LV}}{coef_{exp,EE<>LV}} ; \frac{CZCL_{PICASSO\,exp,EE-RU}}{coef_{exp,EE><RU}} \right) \end{array} \right) +$$

$$MAX\left(\left(AAC_{flow\,exp,EE-LV} + AAC_{flow\,exp,EE-RU} \right); \left(AAC_{MAX(LT+DA+ID;calc.)exp,EE-LV} + \right.\right.$$
$$AAC_{MAX(LT+DA+ID;calc.)exp,EE-RU} + XBflow_{MARI\,exp,EE-LV} + XBflow_{MARI\,exp,EE-RU} +$$
$$\left.\left. +XBflow_{PICASSO\,exp,EE-LV} + XBflow_{PICASSO\,exp,EE-RU} \right) \right)$$

Where:

$coef_{imp,LV<>EE}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for import from Latvia to Estonia;

$coef_{exp,EE<>LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for export from Estonia to Latvia;

$coef_{imp,LV><EE}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for import from Latvia to Estonia;

$coef_{exp,EE><LV}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for export from Estonia to Latvia;

$coef_{imp,RU<>EE}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for import from Russia to Estonia;

$coef_{exp,EE<>RU}$ – agreed power distribution coefficient in BRELL network which reflect of impact 100 % utilization of balancing energy for export from Estonia to Russia;

$coef_{imp,RU><EE}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for import from Russia to Estonia;

$coef_{exp,EE><RU}$ – agreed power distribution coefficient in BRELL network which reflect of impact in oppositive cross-border than 100 % utilization of balancing energy for export from Estonia to Russia;

$AAC_{MAX(LT+DA+ID;calc.)imp,LV-EE}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for import direction from Latvia to Estonia;

$AAC_{MAX(LT+DA+ID;calc.)exp,EE-LV}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for export direction from Estonia to Latvia;

$AAC_{MAX(LT+DA+ID;calc.)imp,RU-EE}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for import direction from Russia to Estonia;

$AAC_{MAX(LT+DA+ID;calc.)exp,EE-RU}$ – maximum value of already allocated capacity after latest data of LT, DA and ID market or calculated power flow performed with latest available Common Grid Model for export direction from Estonia to Russia.

CZCL calculation for technical profile

CZCL calculations for MARI mFRR activations for Lithuania area (technical profile):

$$CZCL_{MARI_{imp\_LT}} = NTC_{imp,LT\_TP} - MAX\left(\left(AAC_{flow_{imp,LV-LT}} + AAC_{flow_{imp,BY-LT}} - XBflow_{PICASSOimp,LV-LT} - XBflow_{PICASSOimp,BY-LT}\right); \left(AAC_{MAX(LT+DA+ID;calc.)imp,LV-LT} + AAC_{MAX(LT+DA+ID;calc.)imp,BY-LT} + XBflow_{MARIimp,LV-LT} + XBflow_{MARIimp,BY-LT}\right)\right) - CZCA_{PICASSO_{imp,LV-LT}} - CZCA_{PICASSO_{imp,BY-LT}}$$

$$CZCL_{MARI_{exp\_LT}} = NTC_{exp,LT\_TP} - MAX\Big(\big(AAC_{flow_{exp,LT-LV}} +$$

$$AAC_{flow_{exp,LT-BY}} - XBflow_{PICASSOexp,LT-LV} -$$

$$XBflow_{PICASSOexp,LT-BY}\big); \big(AAC_{MAX(LT+DA+ID;calc.)exp,LT-LV} +$$

$$AAC_{MAX(LT+DA+ID;calc.)exp,LT-BY} + XBflow_{MARIexp,LT-LV} + XBflow_{MARIexp,LT-BY}\big)\Big) -$$

$$CZCA_{PICASSO_{exp,LT-LV}} - CZCA_{PICASSO_{exp,LT-BY}}$$

Where:

$CZCA_{PICASSO_{imp,LV-LT}}$ – value of cross zonal capacity allocated for aFRR activations for import from Latvia to Lithuania;

$CZCA_{PICASSO_{exp,LT-LV}}$ – value of cross zonal capacity allocated for aFRR activations for export from Lithuania to Latvia;

$CZCA_{PICASSO_{imp,BY-LT}}$ – value of cross zonal capacity allocated for aFRR activations for import from Belarus to Lithuania;

$CZCA_{PICASSO_{exp,LT-BY}}$ – value of cross zonal capacity allocated for aFRR activations for export from Lithuania to Belarus.

$CZCL_{MARI_{imp\_LT}}$ – cross zonal capacity limit for mFRR activations in import direction to Lithuania.

$CZCL_{MARI_{exp\_LT}}$ – cross zonal capacity limit for mFRR activations in export direction from Lithuania.

CZCL calculations for MARI mFRR activations for Latvia area (technical profile):

$$CZCL_{MARI_{imp\_LV}} = NTC_{imp,LV\_TP}$$
$$- MAX\Big(\big(AAC_{flow_{imp,LT-LV}} + AAC_{flow_{imp,EE-LV}} - XBflow_{PICASSOimp,LT-LV}$$
$$- XBflow_{PICASSOimp,EE-LV}\big); \big(AAC_{MAX(LT+DA+ID;calc.)imp,LT-LV}$$
$$+ AAC_{MAX(LT+DA+ID;calc.)imp,EE-LV} + XBflow_{MARIimp,LT-LV}$$
$$+ XBflow_{MARIimp,EE-LV}\big)\Big) - CZCA_{PICASSO_{imp,LT-LV}} - CZCA_{PICASSO_{imp,EE-LV}}$$

$$CZCL_{MARI_{exp\_LV}} = NTC_{exp,LV\_TP}$$
$$- MAX\Big(\big(AAC_{flow_{exp,LV-LT}} + AAC_{flow_{exp,LV-EE}} - XBflow_{PICASSOexp,LV-LT}$$
$$- XBflow_{PICASSOexp,LV-EE}\big); \big(AAC_{MAX(LT+DA+ID;calc.)exp,LV-LT}$$
$$+ AAC_{MAX(LT+DA+ID;calc.)exp,LV-EE} + XBflow_{MARIexp,LV-LT}$$
$$+ XBflow_{MARIexp,LV-EE}\big)\Big) - CZCA_{PICASSO_{exp,LV-LT}} - CZCA_{PICASSO_{exp,LV-EE}}$$

Where:

$CZCA_{PICASSO_{imp,LT-LV}}$ – value of cross zonal capacity allocated for aFRR activations for import from Lithuania to Latvia;

$CZCA_{PICASSO_{exp,LV-LT}}$ – value of cross zonal capacity allocated for aFRR activations for export from Latvia to Lithuania;

$CZCA_{PICASSO_{imp,EE-LV}}$ – value of cross zonal capacity allocated for aFRR activations for import from Estonia to Latvia;

$CZCA_{PICASSO_{exp,LV-EE}}$ – value of cross zonal capacity allocated for aFRR activations for export from Latvia to Estonia.

$CZCL_{MARI_{imp\_LV}}$ – cross zonal capacity limit for mFRR activations in import direction to Latvia.

$CZCL_{MARI_{exp\_LV}}$ – cross zonal capacity limit for mFRR activations in export direction from Latvia.

CZCL calculations for MARI mFRR activations for Estonia area (technical profile):

$$CZCL_{MARI_{imp\_EE}} = NTC_{imp,EE\_TP} - MAX\left(\left(AAC_{flow_{imp,LV-EE}} + AAC_{flow_{imp,RU-EE}} - XBflow_{PICASSOimp,LV-EE} - XBflow_{PICASSOimp,RU-EE}\right); \left(AAC_{MAX(LT+DA+ID;calc.)imp,LV-EE} + AAC_{MAX(LT+DA+ID;calc.)imp,RU-EE} + XBflow_{MARIimp,LV-EE} + XBflow_{MARIimp,RU-EE}\right)\right) - CZCA_{PICASSO_{imp,LV-EE}} - CZCA_{PICASSO_{imp,RU-EE}}$$

$$CZCL_{MARI_{exp\_EE}} = NTC_{exp,EE\_TP} - MAX\left(\left(AAC_{flow_{exp,EE-LV}} + AAC_{flow_{exp,EE-RU}} - XBflow_{PICASSOexp,EE-LV} - XBflow_{PICASSOexp,EE-RU}\right); \left(AAC_{MAX(LT+DA+ID;calc.)exp,EE-LV} + AAC_{MAX(LT+DA+ID;calc.)exp,EE-RU} + XBflow_{MARIexp,EE-LV} + XBflow_{MARIexp,EE-RU}\right)\right) - CZCA_{PICASSO_{exp,EE-LV}} - CZCA_{PICASSO_{exp,EE-RU}}$$

Where:

$CZCA_{PICASSO_{imp,RU-EE}}$ – value of cross zonal capacity allocated for aFRR activations for import from Russia to Estonia;

$CZCA_{PICASSO_{exp,EE-RU}}$ – value of cross zonal capacity allocated for aFRR activations for export from Estonia to Russia;

$CZCA_{PICASSO_{imp,LV-EE}}$ – value of cross zonal capacity allocated for aFRR activations for import from Latvia to Estonia;

$CZCA_{PICASSO_{imp,EE-LV}}$ – value of cross zonal capacity allocated for aFRR activations for export from Estonia to Latvia.

$CZCL_{MARI_{imp\_EE}}$ – cross zonal capacity limit for mFRR activations in import direction to Estonia.

$CZCL_{MARI_{exp\_EE}}$ – cross zonal capacity limit for mFRR activations in export direction from Estonia.

CZCL calculations for PICASSO aFRR activations for Lithuania area (technical profile):

$$CZCL_{PICASSOimp\_LT}$$
$$= NTC_{imp,LT\_TP}$$
$$- MAX\left(\left(AAC_{flow_{imp,LV-LT}}\right.\right.$$
$$+ AAC_{flow_{imp,BY-LT}}\right); \left(AAC_{MAX(LT+DA+ID;calc.)imp,LV-LT}\right.$$
$$+ AAC_{MAX(LT+DA+ID;calc.)imp,BY-LT} + XBflow_{MARIimp,LV-LT}$$
$$+ XBflow_{MARIimp,BY-LT} + XBflow_{PICASSOimp,LV-LT}$$
$$+ \left.XBflow_{PICASSOimp,BY-LT}\right)\right) - XBflows_{MARI_{imp,LV-LT}} - XBflows_{MARI_{imp,BY-LT}}$$

$$CZCL_{PICASSOexp\_LT}$$
$$= NTC_{exp,LT\_TP}$$
$$- MAX\left(\left(AAC_{flow_{exp,LT-LV}}\right.\right.$$
$$+ AAC_{flow_{exp,LT-BY}}\right); \left(AAC_{MAX(LT+DA+ID;calc.)exp,LT-LV}\right.$$
$$+ AAC_{MAX(LT+DA+ID;calc.)exp,LT-BY} + XBflow_{MARIexp,LT-LV}$$
$$+ \left.\left.XBflow_{MARIexp,LT-BY} + XBflow_{PICASSOexp,LT-LV} + XBflow_{PICASSOexp,LT-BY}\right)\right)$$
$$- XBflows_{MARI_{exp,LT-LV}} - XBflows_{MARI_{exp,LT-BY}}$$

Where:

$XBflows_{MARI_{imp,LV-LT}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI for import from Latvia to Lithuania;

$XBflows_{MARI_{epx,LT-LV}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI for export from Lithuania to Latvia;

$XBflows_{MARI_{imp,BY-LT}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI for import from Belarus to Lithuania;

$XBflows_{MARI_{epx,LT-BY}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI for export from Lithuania to Belarus.

$CZCL_{PICASSO_{imp\_LT}}$ – cross zonal capacity limit for aFRR activations in import direction to Lithuania.

$CZCL_{PICASSO_{exp\_LT}}$ – cross zonal capacity limit for aFRR activations in export direction from Lithuania.

CZCL calculations for PICASSO aFRR activations for Latvia area (technical profile):

$$CZCL_{PICASSO_{imp\_LV}} = NTC_{imp,LV\_TP} - MAX\left(\left(AAC_{flow_{imp,LT-LV}} + \right.\right.$$
$$AAC_{flow_{imp,EE-LV}}\right); \left(AAC_{MAX(LT+DA+ID;calc.)imp,LT-LV} + AAC_{MAX(LT+DA+ID;calc.)imp,EE-LV} + \right.$$
$$XBflow_{MARIimp,LT-LV} + XBflow_{MARIimp,EE-LV} + XBflow_{PICASSOimp,LT-LV} + $$
$$\left.\left.XBflow_{PICASSOimp,EE-LV}\right)\right) - XBflows_{MARI_{imp,LT-LV}} - XBflows_{MARI_{imp,EE-LV}}$$

$$CZCL_{PICASSO_{exp\_LV}} = NTC_{exp,LV\_TP} - MAX\left(\left(AAC_{flow_{exp,LV-LT}} + \right.\right.$$
$$AAC_{flow_{exp,LV-EE}}\right); \left(AAC_{MAX(LT+DA+ID;calc.)exp,LV-LT} + AAC_{MAX(LT+DA+ID;calc.)exp,LV-EE} + \right.$$

$$XBflow_{MARIexp,LV-LT} + XBflow_{MARIexp,LV-EE} + XBflow_{PICASSOexp,LV-LT} +$$

$$XBflow_{PICASSOexp,LV-EE})) - XBflows_{MARI_{exp,LV-LT}} - XBflows_{MARI_{exp,LV-EE}}$$

Where:

$XBflows_{MARI_{imp,LT-LV}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI for import from Lithuania to Latvia;

$XBflows_{MARI_{epx,LV-LT}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI for export from Latvia to Lithuania;

$XBflows_{MARI_{imp,EE-LT}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI for import from Estonia to Lithuania;

$XBflows_{MARI_{epx,LT-EE}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI for export from Lithuania to Estonia.

$CZCL_{PICASSO_{imp\_LV}}$ – cross zonal capacity limit for aFRR activations in import direction to Latvia.

$CZCL_{PICASSO_{exp\_LV}}$ – cross zonal capacity limit for aFRR activations in export direction from Latvia.

CZCL calculations for PICASSO aFRR activations for Estonia area (technical profile):

$$CZCL_{PICASSO_{imp\_EE}} = NTC_{imp,EE\_TP} - MAX\left(\left(AAC_{flow_{imp,LV-EE}} +\right.\right.$$

$$AAC_{flow_{imp,RU-EE}}\right); \left(AAC_{MAX(LT+DA+ID;calc.)imp,LV-EE} + AAC_{MAX(LT+DA+ID;calc.)imp,RU-EE} +\right.$$

$$XBflow_{MARIimp,LV-EE} + XBflow_{MARIimp,RU-EE} + XBflow_{PICASSOimp,LV-EE} +$$

$$\left.\left.XBflow_{PICASSOimp,RU-EE}\right)\right) - XBflows_{MARI_{imp,LV-EE}} - XBflows_{MARI_{imp,RU-EE}}$$

$$CZCL_{PICASSO_{exp\_EE}} = NTC_{exp,EE\_TP} - MAX\left(\left(AAC_{flow_{exp,EE-LV}} +\right.\right.$$

$$AAC_{flow_{exp,EE-RU}}\right); \left(AAC_{MAX(LT+DA+ID;calc.)exp,EE-LV} + AAC_{MAX(LT+DA+ID;calc.)exp,EE-RU} +\right.$$

$$XBflow_{MARIexp,EE-LV} + XBflow_{MARIexp,EE-RU} + XBflow_{PICASSOexp,EE-LV} +$$

$$\left.\left.XBflow_{PICASSOexp,EE-RU}\right)\right) - XBflows_{MARI_{exp,EE-LV}} - XBflows_{MARI_{exp,EE-RU}}$$

Where:

$XBflows_{MARI_{imp,LV-EE}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI for import from Latvia to Estonia;

$XBflows_{MARI_{epx,EE-LV}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI for export from Estonia to Latvia;

$XBflows_{MARI_{imp,RU-EE}}$ – resulting import cross border flow maximum value for specific MTU of mFRR activations in MARI for import from Russia to Estonia;

$XBflows_{MARI_{epx,EE-RU}}$ – resulting export cross border flow maximum value for specific MTU of mFRR activations in MARI for export from Estonia to Russia.

$CZCL_{PICASSO_{imp\_EE}}$ – cross zonal capacity limit for aFRR activations in import direction to Estonia.

$CZCL_{PICASSO_{exp\_EE}}$ – cross zonal capacity limit for aFRR activations in export direction from Estonia.

Technical profile for Baltic mFRR local activations

6.3. Baltic CCR TSOs shall develop Baltic mFRR local activations process and calculate Baltic up and down balancing capacity activation CZCL. Baltic local mFRR activation is developed as a fallback procedure in case Baltic TSOs do not have access to Balancing platforms and need to activate mFRR or aFRR.

6.4. The CZCL values in both directions are calculated by taking into account all the technical profiles of the Baltic region and choosing the minimal value to ensure no overloads in the Baltic region. The calculation formulas are following:

$$CZCL_{UP,Baltic} = MIN(Tech\ profile_{exp})$$

$$CZCL_{DOWN,Baltic} = MIN(Tech\ profile_{imp})$$

Article 7   CZCL calculation fallback procedure

7.1. Each TSO shall calculate the CZCL values for each cross-border and submit CZCL per cross-border to CMM. In addition, each TSO shall forward the CZCL values to MARI and PICASSO platforms.

7.2. The coordination process between TSOs and CMM shall ensure the fallback of CZCL calculation process as the CZCL values are calculated by at least 2 neighboring TSOs.

Article 8   CZCL calculation cycle

8.1. Based on the requirement of MARI implementation guides the values of CZCL shall be updated after every activation optimization function cycle of MARI and the updated CZCL shall be provided to the balancing platforms and CMM.

8.2. The Baltic CCR TSOs foresee that cycle of CZCL calculations shall be run after:

- each Intraday Gate Closure Time
- input values (NTC/AAC) changes
- every activation optimization function cycle of MARI

Article 9   CZCL publication

9.1. For data publication the CZCL for every cross-border interconnections for every direction and every reserve process is determined as soon as possible after the end of relevant balancing timeframe.

9.2. Published CZCL for balancing timeframe for relevant direction for specific AC cross-border shall be determined:

    9.2.1. In case Baltic power system is connected to BRELL loop, the published CZCL is calculated as sum of minimum calculated value of CZCL during the MTU and corresponding XB flows on specific cross-border received from BPs resulting from activations in BPs.

    9.2.2. Otherwise, when Baltic power system is disconnected from BRELL loop, the published CZCL shall be the CZCL without any balancing activations calculated for the MTU after LT, DA and ID markets are cleared.

9.3. Published CZCL for balancing timeframe for relevant direction for specific DC cross-border shall be determined as the CZCL without any balancing activations calculated for the MTU after LT, DA and ID markets are cleared.

Article 10   Implementation

10.1.   Baltic CCR TSOs will evaluate the input received during public consultation and will prepare final proposal for Methodology for calculating cross-zonal capacity within the balancing timeframe (CZCBT). According to the Article 37(3) of EB Regulation Methodology shall be developed by five years after entry into force of EB Regulation.

10.2.   Baltic TSOs have applied for derogation request from article 20(6) of EB Regulation in order to implement and join MARI platform in coordinated way in region following the agreed go-live scenario. Implementation of the Methodology will be in accordance to the agreed go-live scenario and Methodology will be applied when Baltic CCR TSOs will join MARI platform.

10.3.   Methodology will be applicable only for Baltic CCRs TSOs which share common cross borders and already implemented MARI.

Appendix 1
Justification of usage and methodology for calculation of allocation constraints in PSE as described in Article 4(4.3)

Justification for using allocation constraints in the form of import and export limits

The link between net position and operational security limits

Under CACM, allocation constraints are understood as *constraints needed to keep the transmission system within operational security limits,* which are in turn defined as *acceptable operating boundaries for secure grid operation.* The definition of the latter (Art. 2.7 CACM) lists *inter alia* frequency limits as one of the boundaries to be taken into account.

With regard to constraints used to ensure sufficient operational reserves, if one of interconnected systems suffers from insufficient reserves in case of unexpected outages or unplanned load change (applies to central dispatch systems), there may be a sustained deviation from scheduled exchanges of the TSOs in question. These deviations may lead to an imbalance in the whole synchronous area, causing the system frequency to depart from its nominal level. Even if frequency limits are not violated, as a result, deviation activates frequency containment reserves, which will thus not be available for another contingencies, if required as designed. If another contingency materializes, the frequency may in consequence easily go beyond its secure limits with all related negative consequences. This is why such a situation can lead to a breach of operational security limits and must be prevented by keeping necessary reserves within all bidding zones, so that no TSO deviates from its schedule in a sustained way (i.e. more than 15 minutes, within which frequency restoration reserve shall be fully deployed by given TSO). Finally, the inability to maintain scheduled area balances resulting from insufficient operational reserves will lead to uncontrolled changes in power flows, which may trigger lines overload (i.e. exceeding the thermal limits) and as a consequence can lead to system splitting with different frequencies in each of the subsystems.

Legal interpretation: eligible grounds for applying allocation constraints

Regarding the process of defining what allocation constraints should be applied, it should first be noted that allocation constraints ('ACs') are tools defined as to their purpose. CACM does not enumerate ACs in a form of a list which would allow for checking whether specific constraint is allowed by the Regulation. Thus, the application of provision on allocation constraints requires further interpretation.

CACM was issued based on Regulation 714/2009 and complements that Regulation. The general principle in Regulation 714/2009 (Art. 16.3) is that TSOs make available the maximum capacity allowed under secure network operation standards. Operational security is explained in a footnote to annex I *as keeping the transmission system within agreed security limits*. CACM rules on AC and operational security limits ('OSLs') seem to regulate the same matter as Article 16.3 in greater detail. The definition of ACs relates to OSLs, so to define what is an allocation constraint, we first need a clear idea of OSLs.

Similarly to the 'open' notion of allocation constraints in the CACM, the definition of OSLs (*the acceptable operating boundaries for secure grid operation such as thermal limits, voltage limits, short-circuit current limits, frequency and dynamic stability limits*) does not include an enumerative catalogue (a closed set), but an open set of system operation characteristics defined as to their purpose – ensuring secure grid operation. The list is indicative (using the words 'such as'). The open-set character of the definition is also indicated by systemic interpretation, i.e. by the usage of the term in other network codes and guidelines.

In SO GL, the definitions of specific system states involve a role of significant grid users (generating modules and demand facilities). To be in the 'normal' state, a transmission system requires sufficient active and reactive power reserves to make up for occurring contingencies (Art. 18) – the possible influence of such issues on cross-zonal trade has been mentioned above. Operational security limits as understood by SO GL are also not defined as a closed set, as Article 25 requires each TSO to *specify the operational security limits for each element of its transmission system, taking into account at least the following physical characteristics (…).* The CACM definition of contingency (*identified and possible or already occurred fault of an element, including not only the transmission system*

elements, but also significant grid users and distribution network elements if relevant for the transmission system operational security) is therefore consistent with the abovementioned SO GL framework, and shows that CACM application should involve circumstances related to generation and load.

Moreover, as regards the way the TSOs procure balancing reserves, it should be noted that the Guideline on Electricity Balancing (EB GL) allows TSOs to apply integrated scheduling process in which energy and reserves are procured simultaneously (inherent feature of central dispatch systems). In such a case, ensuring sufficient reserves requires setting a limit to how much can be imported or exported by the system as a whole (explained in more detail below). If CACM is interpreted as excluding such a solution and mandating that a TSO offers capacity even if it may lead to insufficient reserves, this would make the provisions of EB GL void, and make it impossible or at least much more difficult to comply with SO GL.

In PSE's point of view, systemic interpretation allows for consistent implementation of all network codes. In this specific case, understanding operational security limits under CACM can be complemented by applying SO GL provisions. These, in turn, require the TSOs to apply specific market mechanisms to ensure that generation and load schedules resulting from cross-zonal trade do not endanger secure system operation. In sum, operational security limits cover a broad set of system characteristics to be respected when defining the domain for cross-zonal trade. With regard to generation and load, this is done by applying allocation constraints, in this case balancing constraints, in the form of import/export limits.

The CACM provisions on ACs should also be interpreted systemically. They ensure offering maximum possible trading opportunities while preserving system security. CACM and Regulation 714/2009 should also be interpreted in the light of Union policy on energy as prescribed in Article 194 of the TFEU. The four objectives (to *ensure the functioning of the energy market; ensure security of energy supply in the Union; promote energy efficiency and energy saving and the development of new and renewable forms of energy; and promote the interconnection of energy networks*) are of equal importance and are balanced against each other, as well as applied in the spirit of solidarity between the Member States.

In the context of allocation constraints, these principles can be seen as requiring TSOs in each Member State to use market processes to ensure security of supply as far as possible, only limited by legitimate (non-arbitrary) constraints where not applying them could threaten security of supply in one or more control areas.

CACM provisions on allocation constraints reflect these trade-offs. See e.g. recital (18), which mandates that the Union-wide price coupling process respects transmission capacity and allocation constraints. Therefore, it can be concluded that CACM does not mandate trading opportunities to the point of endangering security of supply. If there is no arbitrary discrimination, CACM, along with other codes, allow a TSO to *ex ante* prevent loss of network stability or occurrence of insufficient reserves.

How import and export limits contribute to meeting the CACM objectives?

Contribution to meeting the CACM objectives
Recital 2 of CACM Regulation preamble draws a reciprocal relationship between security of supply and functioning markets. Thanks to grid interconnections and cross-zonal exchange, member states do not have to fully rely on their own assets in order to ensure security of supply. At the same time, however, the internal market cannot function properly if grid security is compromised, as market trade would constantly be interrupted by system failures, and as a result potential social welfare gains would be lost. Recital 18 can be seen as a follow-up, drawing boundaries to ensure a Union-wide price coupling process, namely to respect transmission capacity and allocation constraints.

For the above reasons, one of the aims of the CACM Regulation, as expressed in Article 3, is to ensure operational security. This aim should be fulfilled insofar it does not prejudice other aims. As explained in this methodology, allocation constraints applied by Baltic CCR TSOs are proportional and do not undermine other aims of CACM Regulation.

<u>Compliance of the three reasons for allocation constraints with Article 23</u>
Article 23 requires that allocation constraints are:
1) a) required to maintain the system within operational security limits and b) cannot be transformed efficiently into maximum flows on critical network elements; or
2) intended to increase the economic surplus for single day-ahead or intraday coupling.
As demonstrated under point 1 above, maintaining the transmission system within operational security limits also requires maintaining the necessary reserves to respond to possible contingencies. The inability to efficiently transform these constraints into maximum flows on individual borders is explained below. Therefore, allocation constraints as proposed should be seen as compliant with the CACM regulation.

<center>Detailed reasons and method for calculating allocation constraints by PSE</center>

Allocation constraints in Poland are applied as stipulated in point 4.3 of this CZCBT methodology and described in this Appendix. These constraints reflect the ability of Polish generators to increase generation (potential constraints in export direction) or decrease generation (potential constraints in import direction) subject to technical characteristics of individual generating units as well as the necessity to maintain minimum generation reserves required in the whole Polish power system to ensure secure operation. This is explained further in subsequent parts of this document.

<u>Rationale behind the implementation of allocation constraints on PSE side</u>
Implementation of allocation constraints as applied by PSE side is related to the fact that under the conditions of integrated scheduling based market model applied in Poland (also called central dispatch system) responsibility of Polish TSO on system balance is significantly extended comparing to such standard responsibility of TSO in so-called self-dispatch market models. The latter is usually defined up to hour-ahead time frame (including real time operations), while for PSE as Polish TSO this is extended to intraday and day-ahead time frames. Thus, PSE bears the responsibility, which in self dispatch markets is allocated to balance responsible parties (BRPs). That is why PSE needs to take care of back up generating reserves for the whole Polish power system, which sometimes leads to implementation of allocation constraints if this is necessary to ensure operational security of Polish power system in terms of available generating capacities for upward or downward regulation capacity and residual demand[1] (this is why such allocation constraints are called balancing constraints). In self dispatch markets BRPs are themselves supposed to take care about their generating reserves and load following, while TSO ensures them just for dealing with contingencies in the time frame of up to one hour ahead. In a central-dispatch market, in order to provide generation and demand balance, the TSO dispatches generating units taking into account their operational constraints, transmission constraints and reserve requirements. This is realized in an integrated scheduling process as an optimisation problem called security constrained unit commitment and economic dispatch (SCUC/ED). Thus these two approaches ensure similar level of feasibility of transfer capacities offered to the market from the generating capacities point of view.

<u>PSE role in system balancing</u>
PSE directly dispatches all major generating units in Poland taking into account their operational characteristics and transmission constraints in order to cover the expected load, which is also forecasted by PSE, having in mind adequate reserve requirements. To fulfil this task PSE runs the process of operational planning, which begins three years ahead with relevant overhaul (maintenance) coordination and is continued via yearly, monthly and weekly updates to day-ahead SCUC and ED. The results of this day-ahead market are then updated continuously in intraday time frame up to real time operation.

In a yearly timeframe PSE tries to distribute the maintenance overhauls requested by generators along the year in such a way that the minimum year ahead reserve margin[2] over forecasted demand

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[1] Residual demand is the part of end users' demand not covered by commercial contracts (generation self-schedules).
[2] The margin is regulated by the Polish grid code and currently set at 18% (point II.4.3.4.18). It is subject to change depending on the results of the development of operational planning processes.

including already allocated capacities on interconnections is kept on average in each month. The monthly and weekly updates aim to keep a certain reserve margin on each day[3], if possible. This process includes also network maintenance planning, so any constraints coming from the network operation are duly taken into account.

The day-ahead SCUC process aims to achieve a set value of spinning reserve[4] (or quickly activated, in current Polish reality only units in pumped storage plants) margin for each hour of the next day, enabling up and down regulation. This includes primary and secondary control power pre-contracted as an ancillary service. The rest of this reserve comes from usage of balancing bids, which are mandatory to be submitted by all centrally dispatched generating units (in practice all units connected to the transmission network and major ones connected to 110 kV, except CHP plants as they operate mainly according to heat demand). The remaining generation is taken into account as scheduled by owners, which having in mind its stable character (CHPs, small thermal and hydro) is a workable solution. The only exception from this rule is wind generation, which due to its volatile character is forecasted by PSE. Thus, PSE has the right to use any available centrally dispatched generation in normal operation to balance the system. The negative reserve requirements during low load periods (night hours) are also respected and the potential pumping operation of pumped storage plants is taken into account, if feasible.

The further updates of SCUC/ED during the operational day take into account any changes happening in the system (forced outages and any limitations of generating units and network elements, load and wind forecast updates, etc.). It allows to keep one hour ahead spinning reserve at the minimum level of 1000 MW, which corresponds to the size of the largest unit in the system.

<u>Determination of balancing constraints in Poland</u>
When determining the balancing constraints, the Polish TSO takes into account the most recent information on the aforementioned technical characteristics of generation units, forecasted power system load as well as minimum reserve margins required in the whole Polish power system to ensure secure operation and forward import/export contracts that need to be respected from previous capacity allocation time horizons.

Balancing constraints are bidirectional, with independent values for each market time unit, and separately for directions of import to Poland and export from Poland.

For each hour, the constraints are calculated according to the below equations:

$$\text{EXPORT}_{constraint} = P_{CD} - (P_{NA} + P_{ER}) + P_{NCD} - (P_L + P_{UPres}) \tag{1}$$

$$\text{IMPORT}_{constraint} = P_L - P_{DOWNres} - P_{CD_{min}} - P_{NCD} \tag{2}$$

where:

P_{CD} sum of available generating capacities of centrally dispatched units as declared by generators[5]

$P_{CD_{min}}$ sum of technical minima of centrally dispatched generating units in operation

P_{NCD} sum of schedules of not centrally dispatched generating units, as provided by generators (for wind farms: forecasted by PSE)

P_{NA} generation not available due to grid constraints

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[3] The margin for monthly and weekly coordination is also regulated by the Polish grid code (point II.4.3.4.18) and currently set at 17% and 14% respectively.

[4] The set values are respectively: 9% over forecasted demand for up regulation and 500 MW for down regulation. These values are regulated by the Polish grid code (point 4.3.4.19) and subject to change – see footnote 2.

[5] Note that generating units which are kept out of the market on the basis of strategic reserve contracts with the TSO are not taken into account in this calculation.

P_{ER} generation unavailabilities adjustment resulting from issues not declared by generators, forecasted by PSE due to exceptional circumstances (e.g. cooling conditions or prolonged overhauls)

P_L demand forecasted by PSE

P_{UPres} minimum reserve for up regulation

$P_{DOWNres}$ minimum reserve for down regulation

For illustrative purposes, the process of practical determination of balancing constraints in the framework of day ahead transfer capacity calculation is illustrated below: figures 1 and 2. The figures illustrate how a forecast of the Polish power balance for each hour of the next day is developed by TSO day ahead in the morning in order to determine reserves in generating capacities available for potential exports and imports, respectively, for day ahead market. For the intraday market, the same method applies *mutatis mutandis*.

Balancing constraint in export direction is applicable if ΔExport is lower than the sum of transfer capacities on all Polish interconnections in export direction. Balancing constraint in import direction is applicable if ΔImport is lower than the sum of transfer capacities on all Polish interconnections in import direction.
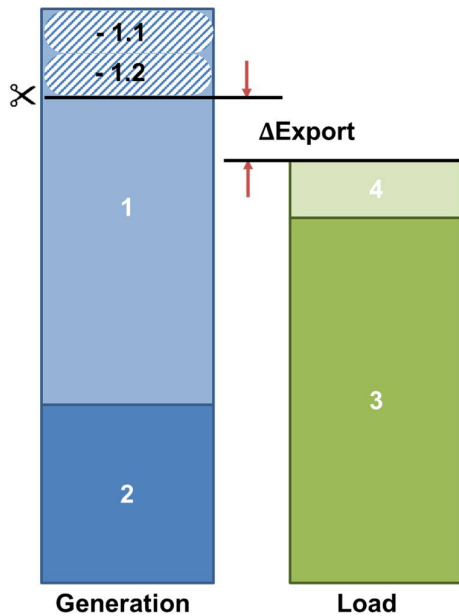
sum of available generating capacities of centrally dispatched units as declared by generators, reduced by:

generation not available due to grid constraints

generation unavailabilities adjustment resulting from issues not declared by generators, forecasted by PSE due to exceptional circumstances (e.g. cooling conditions or prolonged overhauls)

sum of schedules of generating units that are not centrally dispatched, as provided by generators (for wind farms: forecasted by PSE)

demand forecasted by PSE

minimum necessary reserve for up regulation

Figure 1: Determination of balancing constraints in export direction (generating capacities available for potential exports) in the framework of day ahead transfer capacity calculation.

sum of technical minima of centrally dispatched generating units in operation

sum of schedules of generating units that are not centrally dispatched, as provided by generators (for wind farms: forecasted by PSE)

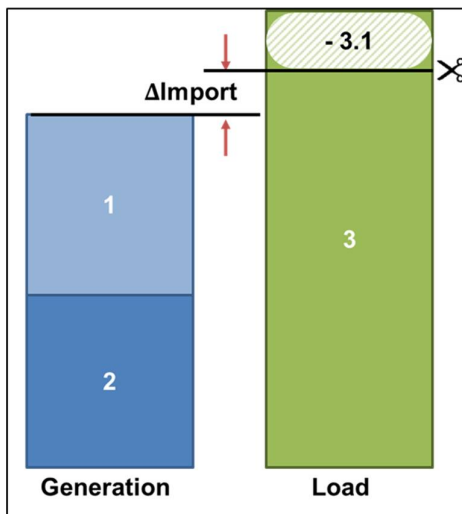demand forecasted by PSE, reduced by: minimum necessary reserve for down regulation

Figure 2: Determination of balancing constraints in import direction (reserves in generating capacities available for potential imports) in the framework of day ahead transfer capacity calculation.

Frequency of re-assessment

Balancing constraints are determined in a continuous process based on the most recent information, for each capacity allocation time horizon, from forward till day-ahead and intraday. In case of day-ahead process, these are calculated in the morning od D-1, resulting in independent values for each market time unit, and separately for directions of import to Poland and export from Poland.

Impact of balancing constraints on single day-ahead coupling and single intraday coupling

Allocation constraints in form of balancing constraints as applied by PSE do not diminish the efficiency of day-ahead and intraday market coupling process. Given the need to ensure adequate availability of generation and generation reserves within Polish power system by PSE as TSO acting under central-dispatch market model, and the fact that PSE does not purchase operational reserves ahead of market coupling process, imposing constraints on maximum import and export in market coupling process – if necessary - is the most efficient manner of reconciling system security with trading opportunities. This approach results in at least the same level of generating capacities participating in cross border trade as it is the case in self-dispatch systems, where reserves are bought in advance by BRPs or TSO so they do not participate in cross border trade, either. Moreover, this allows to avoid competition between TSO and market participants for generation resources.

It is to be underlined that balancing constraints applied in Poland will not affect the ability of any Baltic CCR country to exchange energy, since these constraints only affect Polish export and/or import. Hence, transit via Poland will be possible in case of balancing constraints applied.

Impact of balancing constraints on neighboring CCRs

Balancing constraints are determined for the whole Polish power system, meaning that they are applicable simultaneously for all CCRs, in which PSE has at least it's one border (i.e. Core, Baltic and Hansa). It is to be underlined that this solution is the most efficient application of allocation constraints. Considering allocation constraints separately in each CCR would require PSE to split global allocation constraints into CCR-related sub-values, which would be less efficient than maintaining the global value. Moreover, in the hours when Poland is unable to absorb any more power from outside due to violated minimal downward generation requirements, or when Poland is unable to export any more power due to insufficient generation reserves in upward direction, Polish transmission infrastructure still can be – and indeed is - offered for transit, increasing thereby trading opportunities and social welfare in all concerned CCRs.

Time periods for which balancing constraints are applied

As mentioned above, balancing constraints are determined in a continuous process for each allocation timeframe, so they are applicable for all market time units (hours) of the respective allocation day.

Why these allocation constraints cannot be efficiently translated into capacities of - individual borders offered to the market

Use of capacity allocation constraints aims to ensure economic efficiency of the market coupling mechanism on these interconnectors while meeting the security requirements of electricity supply to customers. If the generation conditions described above were to be reflected in cross-border capacities offered by PSE in form of an appropriate adjustments of border transmission capacities, this would imply that PSE would need to guess most likely market direction (imports and/or exports on particular interconnectors) and accordingly reduce the cross-zonal capacities in these directions. In the NTC approach, this would need to be done in the form of ATC reduction per border. However, from the point of view of market participants, due to the inherent uncertainties of market results such approach is burdened with the risk of suboptimal splitting of allocation constraints into individual interconnections – overstated on one interconnection and underestimated on the other or vice versa. Consequently, application of allocation constraints to tackle the overall Polish balancing constraints at the allocation phase allows for the most efficient use of transmission infrastructure, i.e. fully in line with price differences in individual markets.