

**Terms, Conditions and Methodologies on
Cross-Zonal Capacity Calculation, Provision and Allocation within the Baltic States
and with the 3rd Countries**

Among:

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1. GENERAL TERMS

- 1.1. The Terms, Conditions and the Methodologies on Cross-Zonal Capacity Calculation, Provision and Allocation within the Baltic States and with the 3rd Countries (hereinafter referred to as “the Rules”) are set to define:
 - 1.1.1. Cross-Zonal Capacity calculation, provision and allocation rules between Estonian and Latvian power systems;
 - 1.1.2. Cross-Zonal Capacity calculation, provision and allocation rules between Lithuanian and Latvian power systems;
 - 1.1.3. Cross-Zonal Capacity calculation, provision and allocation rules between Baltic States and 3rd Countries;
 - 1.1.4. Cross-Zonal Capacity calculation, provision and allocation rules between Lithuanian power system and Russia (Kaliningrad area).
- 1.2. Cross-Zonal Capacities within the Baltic States and with the 3rd Countries shall be calculated using the coordinated Net Transmission Capacity approach in a way that facilitates the achievement of the following objectives:
 - 1.2.1. Ensuring Operational Security of the interconnected power systems;
 - 1.2.2. Ensuring that maximum Cross-Zonal Capacity between the power systems of the Baltic States and with 3rd Countries is made available to the market;
 - 1.2.3. Producing results in a transparent and replicable manner;
 - 1.2.4. Ensuring non-discrimination in calculation of internal Cross-Zonal Capacities between the power systems of the Baltic States and in Trading Capacities calculation with the 3rd Countries;
 - 1.2.5. Ensuring that Cross-Zonal Capacities between the interconnected power systems of the Baltic States and with the 3rd Countries in day-ahead and intraday (with exception for trading with 3rd Countries) electricity markets of the Baltic States are provided and allocated in a most optimal and reasonable manner.
- 1.3. The time used in this document is Eastern European Time (EET) during winter and Eastern European Summer Time (EEST) during summer unless stated otherwise.
- 1.4. Capacity calculation from the 3rd Countries to the Baltic States shall be performed by the Coordinator nominated by Baltic TSOs.
- 1.5. Methodologies described in the Rules cover Cross-Zonal Capacity calculation for year, month and week ahead time horizons as well as Cross-Zonal Capacity calculation, provision and allocation for day-ahead and intraday time horizons.
- 1.6. Transmission capacities of High Voltage Direct Current (HVDC) interconnections between Nordic and Baltics as well as Baltics and Poland are taken into account in capacity calculation process.
- 1.7. Trading capacities of HVDC interconnections are defined according bilateral agreements signed among relevant TSOs. General principles for trading capacities of HVDC links are based on technical characteristics of HVDC links, available reserves for relevant TSOs and transmission capacities of adjacent transmission network taking into account N-1

criterion. All the trading capacity of HVDC is allocated through the implicit auctioning in day ahead and intraday time frames.

2. DEFINITIONS

For the purposes of these Rules, the following definitions shall have the following meaning:

- 2.1. **3rd Countries** – the Republic of Belarus and Russian Federation excluding Kaliningrad area.
- 2.2. **AAC** – the Already Allocated Capacity is the total amount of allocated transmission rights.
- 2.3. **AST** – AS “Augstsprieguma tīkls”, Independent Transmission System Operator of the Republic of Latvia.
- 2.4. **ATC** – the Available Transmission Capacity of the designated Cross-Border Interconnections, which is the part of NTC that remains available to the market after each phase of the transmission capacity allocation procedure.
- 2.5. **Baltic States** – the Republic of Estonia, the Republic of Latvia, and the Republic of Lithuania.
- 2.6. **Baltic TSOs** – the transmission system operators for electricity of the Republic of Estonia, the Republic of Latvia and the Republic of Lithuania.
- 2.7. **Bidding Zone** – the largest geographical area (zone) within which market participants are able to exchange energy without capacity allocation.
- 2.8. **BRELL TSOs** – TSOs operating in BRELL Loop.
- 2.9. **BRELL agreement** – the document, signed among Belarusian, Russian, Estonian, Latvian and Lithuanian system operators and network owners, which defines main rules and principles for synchronous operation of the Belorussian, Russian, Estonian, Latvian and Lithuanian (or BRELL Loop) power systems.
- 2.10. **Rules on planning of electric energy and power exchange in the BRELL Loop** – the document, approved among Belarusian, Russian, Estonian, Latvian and Lithuanian system operators, which defines annual, monthly, two days ahead, day ahead planning data extent and exchange procedure among BRELL TSOs.
- 2.11. **Instruction for parallel operation in the cross border interconnection (BRELL)** – the document approved among Belarusian, Russian, Estonian, Latvian and Lithuanian system operators that defines parallel power systems operation conditions in the Cross-Border Interconnection. It includes interconnection description, interconnection transfer capacities, interconnection normal and emergency state operations and system protection description.
- 2.12. **Methodical guidelines for stable operation in BRELL Power Loop** – the document, approved among Belarusian, Russian, Estonian, Latvian and Lithuanian system operators, which defines main system stability requirements to be taken into account by calculation of TTC in all BRELL Loop interconnections.
- 2.13. **BRELL Loop** – transmission networks of the power systems of the Baltic States, the Republic of Belarus and the Russian Federation (Central and North-Western parts).
- 2.14. **Capacity allocation** – the attribution of Cross-Zonal Capacity.

- 2.15. **Capacity calculation coordinator for 3rd Countries (Coordinator)** – the party, acting on behalf of Baltic TSOs, responsible for calculation of Trading Capacity with 3rd Countries.
- 2.16. **Control Area** – A part of the interconnected electricity transmission system controlled by a single TSO.
- 2.17. **Critical Network Elements** – network elements that are found to be critical in relation to the transfer capacity values, and confirmed by TSOs, are given in these Rules, together with TSOs' remarks about possible mitigation of elements overloading.
- 2.18. **Cross-Border Interconnection** – is a physical transmission link (e.g. tie-lines) which connects two power systems.
- 2.19. **Cross-Zonal Capacity** – the capability of the interconnected system to accommodate energy transfer between Bidding Zones. Whenever the Cross-Zonal Capacity is named as Lithuania-Latvia, Estonia-Latvia, Lithuania-Russia (Kaliningrad area), Lithuania-Belarus, Estonia-Russia, Latvia-Russia it means both directions to and from unless specifically indicated particular direction.
- 2.20. **Day-Ahead Firmness Deadline** – the point in time after which Cross-Zonal Capacity becomes firm.
- 2.21. **CACM** – European Commission Regulation (EU) establishing a Guideline on Capacity Allocation and Congestion Management
- 2.22. **Common Grid Model** – data set agreed between BRELL TSOs describing the main characteristic of the power system (generation, loads and grid topology) and rules for changing these characteristics during the capacity calculation process.
- 2.23. **Contingency List** – the list of contingencies to be simulated in the Contingency Analysis in order to test the compliance with the Operational Security Limits before or after a contingency took place.
- 2.24. **Contingency Analysis** – a computer based simulation of contingencies from the Contingency List.
- 2.25. **D-1** – the day prior to the day on which the energy is delivered.
- 2.26. **D-2** – the day before the day prior to the day on which the energy is delivered.
- 2.27. **Data Exchange Rules** – the Baltic TSOs' agreement on mutual application of common operational planning and terms and conditions for data exchange procedures.
- 2.28. **Day-Ahead Market** – the market timeframe where commercial electricity transactions are executed the day prior to the day of delivery of traded products.
- 2.29. **Elering** – Elering AS, Transmission System Operator of the Republic of Estonia.
- 2.30. **Emergency Situation** – a situation where the TSO must act in an expeditious manner and redispatching or countertrading is not possible as defined by Article 16 of Regulation (EC) No 714/2009.
- 2.31. **Force Majeure** – any unforeseeable or unusual event or situation beyond the reasonable control of a TSO, and not due to a fault of the TSO, which cannot be avoided or overcome with reasonable foresight and diligence, which cannot be solved by measures which are from a technical, financial or economic point of view reasonably possible for the TSO, which has actually happened and is objectively verifiable, and which makes it impossible

- for the TSO to fulfil, temporarily or permanently, its obligations in accordance with CACM and/or these Rules.
- 2.32. **Firmness** – a guarantee that Cross-Zonal Capacity rights will remain unchanged and that compensation is paid if they are nevertheless changed.
 - 2.33. **Intraday Market** – the electricity market which operates for the period of time between Intraday Cross-Zonal Gate Opening Time and Intraday Cross-Zonal Gate Closure, where commercial electricity transactions are executed prior to the delivery of traded products.
 - 2.34. **Litgrid** – LITGRID AB, electricity transmission system operator of the Republic of Lithuania.
 - 2.35. **N-1 Situation** – the situation in the transmission system in which a contingency from the Contingency List has happened.
 - 2.36. **Market Operator (MO)** – the operator of day-ahead and intraday electricity markets in the Baltic States.
 - 2.37. **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.
 - 2.38. **Operational Security Limits** – the acceptable operating boundaries: thermal limits, voltage limits, frequency, dynamic and steady state stability limits.
 - 2.39. **Operational Security** – the transmission system capability to retain a normal state or to return to a normal state as soon and as close as possible, and is characterised by thermal limits, voltage constraints, short-circuit current, frequency limits and stability limits.
 - 2.40. **Physical Congestion** – any network situation where forecasted or realised power flows violate the thermal limits of the elements of the grid and voltage stability or the angle stability limits of the power system.
 - 2.41. **Regulation (EC) No 714/2009** – Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003.
 - 2.42. **Remedial Actions** – any measure applied by a TSO or several TSOs, manually or automatically, in order to maintain Operational Security.
 - 2.43. **Russia (Kaliningrad area)** – a part of the Russian power system located in the Kaliningrad region.
 - 2.44. **Shift Key** – means a method of translating a net position change of a given power system into estimated specific injection increases or decreases in the Common Grid Model. Shift Key is settled as generation, renewable generation and load.
 - 2.45. **TRM** – Transmission Reliability Margin which shall mean the reduction of Cross-Zonal Capacity to cover the uncertainties within capacity calculation.
 - 2.46. **TSO** – a transmission system operator for electricity.
 - 2.47. **TTC** – Total Transfer Capacity of the designated Cross-Border Interconnections is the maximum transmission of active power, which is permitted in transmission Cross-Border Interconnections compatible with Operational Security standards applicable for each TSO.

- 2.48. **Trading Capacity with 3rd Countries** – the total trading capacity with 3rd Countries and Baltic States which is compatible with Operational Security standards and take into account the technical uncertainties on planned network conditions for each TSO of the synchronous area.
- 2.49. **Trading Capacity** – the maximum available Cross-Zonal Capacity for trade in Day-Ahead Market and Intraday Market.

3. **TOTAL TRANSFER CAPACITY (TTC) CALCULATION METHODOLOGY**

- 3.1. The Cross-Border Interconnection TTC assessment shall follow the methodological principles in the Methodical guidelines for stable operation in BRELL Loop, as well as in national regulations and standards implemented and agreed in the Instruction for parallel operation in the Cross-Border Interconnections between TSOs involved, while taking into account the intra- and intersystem Operational Security.
- 3.2. Methodical guidelines for stable operation in BRELL Loop is used as a basis and reviewed by TSOs, for ensuring the collective secure operation with neighboring interconnected TSOs.
- 3.3. The Cross-Border Interconnection TTC shall be determined by proceeding Contingency Analysis with respect of Operational Security Limits of BRELL Loop and Control Area of Baltic TSOs.
- 3.4. Contingency Analysis is performed at least for those contingencies which are agreed among Baltic TSOs in the Contingency List. Contingency List shall be agreed and provided among Baltic TSOs.
- 3.5. Critical Network Elements list of Control Area of Baltic TSOs shall be provided among Baltic TSOs.
- 3.6. The cross-border TTC calculation shall be carried out by using as input the following mutually coordinated data and information:
- 3.6.1. Base case - Common Grid Model, which includes power transmission equipment model of BRELL Loop and scenario describing net positions for each of Control Area of Baltic TSOs and Russian/Belorussian power systems, valid for given calculation purposes;
 - 3.6.2. Generation, renewable generation and load Shift Key;
 - 3.6.3. Critical Network Elements;
 - 3.6.4. Outage cases;
 - 3.6.5. Contingency List;
 - 3.6.6. Remedial Actions.
- 3.7. The shifting strategy per power system area shall be the responsibility of each involved Baltic TSO, which has to be communicated with other TSOs before commencing TTC calculation process. The TSOs shall exchange Shift Keys for generation and renewable generation.
- 3.8. TSO shall apply load Shift Key whenever the generation shift shall not be sufficient for determination of TTC.

- 3.9. All Baltic TSOs shall be responsible for TTC calculations at their Cross-Border Interconnections.
- 3.10. Determining the TTC values, TSOs can take into account ambient temperatures for different seasonal periods within Control Area as well as actual emergency power reserves within Control Area of Baltic TSOs and in Russian/Belorussian power systems to provide Operational Security.
- 3.11. If neighbouring TSOs determine different TTC values for the same Cross-Border Interconnection, the lowest value shall be used as a coordinated value.

4. TRANSMISSION RELIABILITY MARGIN (TRM) CALCULATION METHODOLOGY

- 4.1. The TRM is a capacity margin needed for secure operation of interconnected power systems considering the planning errors, including the errors due to imperfect information from 3rd Countries at the time the transfer capacities have been computed.
- 4.2. TRM calculation methodology is covering Cross-Border Interconnections between Lithuanian and Latvian power systems as well as between Latvian, Russian and Estonian power systems.
- 4.3. Each TSO shall define the size of the TRM on its Cross-Border Interconnections according to the methodology described in this Section 4 of these Rules.

TRM determination

4.4. Statistical data

For determining of the TRM values for each Cross-Border Interconnection, the statistical data of planned and factual power flows for aforementioned interconnections is used with the time step of 1 minute. If there are no archive data with the time step of 1 minute, then smallest time step, which is available in the archive data, can be used. For day-ahead, weekly and monthly planning phases TRM calculation uses statistical archive data from last month, but in cases, where topology changes or other network conditions have substantial impact to power flows compared to last month, the data from last week or last day is used.

The used data set is combined from fact deviations from the plan. For TRM calculation the data from time series, which had deviations that increase the risk of exceeding TTC, which is permitted in particular Cross-Border Interconnection, that is positive deviation values, shall be used. Deviations shall be calculated as difference between Cross-Border Interconnection actual power flows and planned power flows.

In yearly planning phase, the average TRM value of last 12 months is used.

4.5. TRM determination approach

TRM shall be determined as the arithmetic average value plus standard deviation. Arithmetic average value of the deviation is determined for the above statistical data set and added to the same data set standard deviation:

$$TRM = \frac{\sum_{i=1}^n X_i}{n} + \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}} \quad (1)$$

8 (20)

where:

X_i – data sets of the i -th element, defined as deviation of factual power flow from planned power flow over Cross-Border Interconnections;

$$\bar{X} - \text{arithmetic average value of } X_i \frac{\sum_{i=1}^n X_i}{n}$$

n – number of elements in the data set.

TRM shall be rounded to the nearest multiple of 50.

- 4.6. In case if factual power flows or planned power flows over Cross-Border Interconnection are smaller than the TTC value and the TSOs can foresee with high certainty, that such situation for next planning period is unchanged, then TRM value of 0 MW for aforementioned interconnection can be used.
- 4.7. When TRM calculation using time periods that are defined in Article 4.5 of these Rules does not produce results that are in line with Operational Security, then TSOs can increase the TRM until all Operational Security limits are met.

5. **TRADING CAPACITY CALCULATION RULES BETWEEN ESTONIAN AND LATVIAN POWER SYSTEMS**

Mathematical description of NTC calculation

- 5.1. AST calculates NTC values for Estonia-Latvia Cross-Border Interconnection, taking into account guaranteed emergency power reserves for TSOs to ensure readiness for normal operation after N-1 Situation has occurred and taking into account Trading Capacities provided for trade with 3rd Countries according Article 9.6.3 and Article 9.6.4 of these Rules, by using following formula:

$$\text{NTC} = (\text{TTC}_1 + \sum K \cdot P) - \text{TRM} \quad (2)$$

where:

$$(\text{TTC}_1 + \sum K \cdot P) \leq \text{TTC}; \quad (3)$$

TTC_1 – Total Transfer Capacity after N-1 Situation has occurred from actual power system network status according to Instruction for parallel operation in the Cross-Border Interconnection between Estonian, Russian and Latvian power systems;

P – amount of guaranteed emergency power reserves in respective power system. For calculation of capacity of the Estonia-Latvia Cross-Border Interconnection in direction to Latvia according to equation (2), AST will take into account reduced amount of guaranteed emergency power reserves by Litgrid. Amount of reduction of the reserves is defined in Article 7.10 of these Rules and is – P_{res} (amount of assured secondary emergency power reserves maintained in Lithuanian power system, which are used in the process of calculation of Trading Capacity from 3rd Countries to Baltic States.);

K – reserve power distribution coefficients considering location of the guaranteed emergency power reserve and down regulation according to Table 1 of these Rules;

TTC – Total Transfer Capacity in actual power system network status according to Instruction for parallel operation in the Cross-Border Interconnection between Estonian, Russian and Latvian power systems;

TRM – TRM value calculated according to the methodology described in Article 5 of these Rules.

- 5.2. Elering calculates NTC values for Estonia-Latvia Cross-Border Interconnection by using following formula:

$$\text{NTC} = \text{TTC} - \text{TRM} \quad (4)$$

where:

TTC – Total Transfer Capacity value for actual power system network status, according to Instruction for parallel operation in the Cross-Border Interconnection between Estonian, Russian and Latvian power systems. The value of TTC is also dependent from the influence of ambient temperatures of particular capacity calculation time period to transmission lines conductors.

TRM – TRM value calculated according to the methodology described in Section 4 of these Rules.

- 5.3. NTC values for Estonia-Latvia Cross-Border Interconnection are dependent from the Total Transfer Capacity of other Cross-Border Interconnections (for example from Estonia-Russia Cross-Border Interconnection). In case there is high probability that contingency from Contingency List will cause other Cross-Border Interconnections of Estonian power system to exceed TTC values, the NTC values for Estonia-Latvia Cross-Border Interconnection in direction from Estonia to Latvia are determined as a maximum value of export capability of Estonian power system through AC lines.

- 5.4. In case TSOs determine different NTC values for the same Cross-Border Interconnection the lowest value shall be used.

Intraday Available Transmission Capacity calculation

- 5.5. Actual D-1 Common Grid Model shall be updated with Baltic TSO's day-ahead trading results and new BRELL Loop power flow calculations shall be performed.

- 5.6. In case if Russia D-1 planning stage data is not available, TSOs shall take into account Russia D-2 planning stage data. New intraday ATC values shall be coordinated as soon as Russia D-1 planning stage data are available.

- 5.7. Intraday ATC values shall be redefined in case of unplanned changes in BRELL Loop that may have influence on the intraday transmission capacities.

- 5.8. ATC values for Estonia-Latvia Cross-Border Interconnection are calculated as follows:

- 5.8.1. If direction of ATC, for which calculation is performed, corresponds to direction of $\text{AAC}_{\text{Day-ahead}}$:

$$\text{ATC} = \text{MIN}(\text{NTC}_{\text{coord}} - P_{\text{PF}}; \text{NTC}_{\text{coord}} - \text{AAC}_{\text{Day-ahead}} + \text{TRM}_{\text{coord}}) \quad (5)$$

5.8.2. If direction of ATC, for which calculation is performed, does not correspond to direction of $AAC_{\text{Day-ahead}}$

$$ATC = NTC_{\text{coord.}} - P_{\text{PF}} \quad (6)$$

where:

$NTC_{\text{coord.}}$ – coordinated Net Transmission Capacity in the particular Cross-Border Interconnections;

P_{PF} – calculated power flow in the particular Cross-Border Interconnections performed with actual D-1 Common Grid Model;

$AAC_{\text{Day-ahead}}$ – Already Allocated Capacity in the particular Cross-Border Interconnections after day-ahead trading;

$TRM_{\text{coord.}}$ – coordinated TRM value from coordinated TTC and NTC values.

ATC value in formula (6) is calculated considering that the TSOs shall, as far as technically possible, net the capacity values of any power flows in opposite directions over congested interconnection line in order to use that line to its maximum capacity.

5.9. In case TSOs determine different ATC values for the same Cross-Border Interconnection the lowest value shall be used.

5.10. Reserve power distribution coefficients (see Table 1 of these Rules) in controlled cross-borders show the impact of power exchange program between two power systems on the loading of controlled Cross-Border Interconnections. Reserve power distribution coefficients in controlled Cross-Border Interconnections of BRELL Loop are determined using BRELL grid model that includes power systems of Belarus, Russia (North-West power system), Estonia, Latvia, Lithuania, Ukraine and Kaliningrad area. In order to determine reserve power distribution coefficients, power flows have been modelled by increasing generation in exporting power system and symmetrical decreasing of generation in consuming power system. Reserve power distribution coefficients are being coordinated among all BRELL Loop power systems.

5.11. Values of reserve power distribution coefficients used according to availability of appropriate amount of down regulation reserves. Amount of down regulation reserves in percentage is evaluated as proportion of available down regulation reserves on one cross-border side to available amount of guaranteed emergency power reserves from another cross-border side.

Table 1

Reserve power distribution coefficients

Amount of down regulation power (%)	Cross-Border Interconnections	Reserves location			
		Lithuania	Latvia	Belarus	Estonia
100	Estonia-Russia → Latvia	0,62	0,74	0,45	
	Latvia →Russia-Estonia				0,74
50	Estonia-Russia → Latvia	0,48	0,60	0,31	
	Latvia →Russia-Estonia				0,52
0	Estonia-Russia → Latvia	0,34	0,45	0,16	
	Latvia →Russia-Estonia				0,29

6. TRADING CAPACITY CALCULATION RULES BETWEEN LITHUANIAN AND LATVIAN POWER SYSTEMS

Mathematical description of NTC calculation

- 6.1. Litgrid and AST calculate NTC values for Lithuania-Latvia Cross-Border Interconnection, taking into account guaranteed emergency power reserves for TSOs to ensure readiness for normal operation after N-1 Situation has occurred, by using following formula:

$$NTC = (TTC_1 + \sum K * P) - TRM \quad (7)$$

where:

$$(TTC_1 + \sum K * P) \leq TTC \quad (8)$$

TTC_1 – Total Transfer Capacity after N-1 Situation has occurred from actual power system network status according to Instruction for parallel operation in the Lithuania-Latvia Cross-Border Interconnection;

Litgrid calculates P value the following way:

P – amount of guaranteed emergency power reserves in respective power system;

AST calculates P value the following way:

P – amount of guaranteed emergency power reserves in respective power system. For calculation of capacity of the Lithuania-Latvia Cross-Border Interconnection in direction to Lithuania according to equation (7), AST will take into account reduced amount of guaranteed emergency power reserves by Litgrid. Amount of reduction of the reserves is defined in Article 7.10 of these Rules and is – P_{res} (amount of assured secondary emergency power reserves maintained in Lithuanian power system, which are used in the process of calculation of Trading Capacity from 3rd Countries to Baltic States);

K – reserve power distribution coefficients considering location of the guaranteed emergency power reserve and down regulation according to Table 2 of these Rules;

TTC – Total Transfer Capacity in actual power system network status according to Instruction for parallel operation in the Lithuania-Latvia Cross-Border Interconnection;

TRM – Transmission Reliability Margin calculated according to the methodology described in Section 4 of these Rules;

- 6.2. In case TSOs determine different NTC values for the same Cross-Border Interconnection the lowest value shall be used.

Intraday Available Transmission Capacity calculation

- 6.3. Actual D-1 Common Grid Model shall be updated with Baltic TSO's day-ahead trading results and new BRELL Loop power flow calculations shall be performed.
- 6.4. In case if Russia D-1 planning stage data is not available, TSOs shall take into account Russia D-2 planning stage data. New intraday ATC values shall be coordinated as soon as Russia D-1 planning stage data is available.

- 6.5. Intraday ATC values shall be defined during the operational stage in case of unplanned changes in BRELL Loop that may have influence on the intraday transmission capacities.
- 6.6. Litgrid and AST calculate intraday ATC values for Lithuania-Latvia Cross-Border Interconnection as follows:

In direction to Lithuania:

If direction of ATC, for which calculation is performed, corresponds to direction of AAC_{day-ahead}:

$$ATC = \text{MIN}(NTC - P_{PF}; NTC - AAC_{\text{day-ahead}} + TRM) \quad (9)$$

If direction of ATC, for which calculation is performed, does not correspond to direction of AAC_{day-ahead}:

$$ATC = NTC - P_{PF} \quad (10)$$

In direction to Latvia:

If $ATC_{\text{Elbas EE} \rightarrow \text{LV}} = 0$ MW, then ATC in direction to Latvia is set 0 MW according to Operational Security and taking into account possible worst case of Intraday Market trade, that increase Physical Congestion of Cross-Border Interconnections.

If $ATC_{\text{Elbas EE} \rightarrow \text{LV}} > 0$ MW, then

$$ATC_{\text{Elbas LT} \rightarrow \text{LV}} = \text{MIN}(NTC - P_{PF}; NTC - AAC_{\text{day-ahead}} + TRM; ATC_{\text{Elbas EE} \rightarrow \text{LV}} * 2). \quad (11)$$

where:

NTC – coordinated Net Transmission Capacity in the particular Cross-Border Interconnection;

P_{PF} – calculated power flow in the particular Cross-Border Interconnections performed with actual D-1 Common Grid Model;

AAC_{day-ahead} – Already Allocated Capacity or total amount of all allocated Trading Capacity after day-ahead trading;

TRM – coordinated TRM value from coordinated TTC and NTC values;

$ATC_{\text{Elbas EE} \rightarrow \text{LV}}$ – calculated intraday ATC value for Estonia-Latvia Cross-Border Interconnection in direction from Estonia to Latvia.

ATC value in formulas (10 and 11) of these Rules is calculated considering that the TSOs shall, as far as technically possible, net the capacity values of any power flows in opposite directions over congested interconnection line in order to use that line to its maximum capacity.

- 6.7. In case TSOs determine different ATC values for the same Cross-Border Interconnection the lowest value shall be used.
- 6.8. Reserve power distribution coefficients (see Table 2 of these Rules) in controlled cross-borders show the impact of power exchange program between two power systems on the loading of controlled Cross-Border Interconnections. Reserve power distribution coefficients in controlled Cross-Border Interconnections of BRELL Loop are determined using BRELL grid model that includes power systems of Belarus, Russia (North-West

power system), Estonia, Latvia, Lithuania, Ukraine and Kaliningrad area. In order to determine reserve power distribution coefficients, power flows have been modelled by increasing of generation in exporting power system and symmetrical decreasing of generation in consuming power system. Reserve power distribution coefficients are being coordinated among all BRELL Loop power systems.

- 6.9. Values of reserve power distribution coefficients used according to availability of appropriate amount of down regulation reserves. Amount of down regulation reserves in percentage is evaluated as proportion of available down regulation reserves on one cross-border side to available amount of guaranteed emergency power reserves from another cross-border side.

Table 2

Reserve power distribution coefficients

Amount of down regulation power, %	Cross-Border Interconnections	Reserves location			
		Lithuania	Latvia	Belarus	Estonia
100	Latvia→Lithuania	0,88		0,72	
	Lithuania→Latvia		0,88		0,62
50	Latvia→Lithuania	0,61		0,44	
	Lithuania→Latvia		0,72		0,46
0	Latvia→Lithuania	0,34		0,16	
	Lithuania→Latvia		0,55		0,29

7. TRADING CAPACITY CALCULATION RULES WITH THE 3RD COUNTRIES

- 7.1 Trading Capacity from 3rd Countries is determined by modelling of physical power flows within the BRELL Loop by taking into account NTCs of following Cross-Border Interconnections: Lithuania-Belarus; Russia-Estonia; Estonia-Latvia plus Russia-Latvia; Lithuania-Latvia.
- 7.2 Modelling of physical power flows performed by using Common Grid Model. The Common Grid Model is formed based on Rules on planning of electric energy and power exchange in the BRELL Loop as well as on requirements for creation Baltic TSOs individual grid model defined in the Data Exchange Rules.
- 7.3 Annual Trading Capacity calculation with 3rd Countries shall be performed by Coordinator based on annual planning data according to Rules on planning of electric energy and power exchange in the BRELL Loop and Baltic TSOs Data Exchange Rules. For Trading Capacity calculation from 3rd Countries one BRELL Loop powers systems balance scenario per month for working day peak hour shall be used.
- 7.4 Monthly Trading Capacity calculation with 3rd Countries shall be performed by Coordinator based on monthly planning data according to Rules on planning of electric energy and power exchange in the BRELL Loop and Baltic TSOs Data Exchange Rules. For Trading Capacity calculation from 3rd Countries two BRELL Loop power systems balance scenarios per week one for day peak hour of working day (Wednesday) and one for Sunday daily peak hour shall be used.

- 7.5 Weekly Trading Capacity calculation with 3rd Countries shall be performed by Coordinator based on monthly planning data according to Rules on planning of electric energy and power exchange in the BRELL Loop and weekly planning data according Baltic TSOs Data Exchange Rules. For Trading Capacity calculation from 3rd Countries two BRELL Loop power systems balance scenario for each day one for day peak hour and one for night low load hour shall be used. Weekly Trading Capacity calculation from 3rd Countries shall be performed only in case if weekly capacity prognosis procedure is defined by MO.
- 7.6 Day ahead Trading Capacity calculation from 3rd Countries shall be performed by the Coordinator based on two day ahead planning data according to Rules on planning of electric energy and power exchange in the BRELL Loop and planning data provided by Baltic TSOs as the best estimated scenario for the next day. As a rule for the best estimated scenario data according to Table 3 of these Rules shall be used.

Table 3

Power system	Monday (working day)	Tuesday-Friday (working days)	Saturday	Sunday	Public holidays
Lithuania, Latvia Estonia	Last Friday's balance plan	Yesterday's balance plan	Last Saturday's balance plan	Last Sunday's balance plan	Last Sunday's or the closest last public holiday's balance plan
Russia	D-2 balance plans	D-2 balance plan	D-2 balance plan	D-2 balance plan	D-2 balance plan
Belarus	D-2 balance plans	Yesterday's balance plan	D-2 balance plan	D-2 balance plan	D-2 balance plan

7.7. Restriction shall be applied to Estonian balance for following cases:

7.7.1. if Estonian balance according to the Table 3 of these Rules exceeds NTC of the Estonia-Latvia interconnection, the Estonian balance will be reduced in the power flows calculations down to the NTC of Estonia-Latvia Cross-Border Interconnection;

if Estonian balance according to the Table 3 of these Rules is less than $k \cdot NTC_{EE-LV}$, (where: k – coefficient showing average of hourly Net Transmission Capacity utilization for the last 12 months; NTC_{EE-LV} - NTC of the Estonia-Latvia Cross-Border Interconnection) the Estonian balance will be set to $k \cdot NTC_{EE-LV}$. Coefficient k is calculated according to the following formula 12:

$$k = \frac{\sum F_{comm}}{\sum NTC} \quad (12)$$

Where:

$\sum F_{comm}$ – sum of commercial flows on Estonia-Latvia cross-border in direction from Estonia to Latvia for the last 12 months;

$\sum NTC$ – sum of NTC values on Estonia-Latvia cross-border in direction from Estonia to Latvia for the last 12 months;

Coefficient showing average of hourly Net Transmission Capacity utilization calculated according formula 12 of these Rules shall be calculated once per month till 28th calendar day of each coming month.

- 7.8. If upon completion of the initial calculation, physical power flows do not exceed the interconnection NTC values established in Article 7.1 of these Rules, the Trading Capacity from 3rd Countries will be determined by reducing generation in deficit Baltic power systems (Lithuania and Latvia) according to the coefficient, which is calculated by the generation Shift Key formula 13 of these Rules:

$$K_{(i)} = \frac{P_{load(i)} - P_{gen(i)}}{\sum_{i=n}^1 (P_{load(i)} - P_{gen(i)})} \quad (13)$$

where:

$K_{(i)}$ – i deficit power system generation reduction coefficient;

$P_{load(i)}$ – i deficit power system demand;

$P_{gen(i)}$ – i deficit power system generation;

i – deficit Baltic power system;

If deficit coefficients $K_{(i)}$ according formula 13 of these Rules for Latvian power system is less than $K_{infrast}$ (proportion coefficient based on existing infrastructure with 3rd Countries $K_{infrast} = 1/3TTC_{EE-LV-RU} / (1/3TTC_{EE-LV-RU} + TTC_{LT-BY}) = 0,15$) or Latvian power system is in surplus, then deficit coefficients for Latvian power system shall be $K_{LV} = 0,15$ and for Lithuanian power system $K_{LT} = 0,85$.

- 7.9. If upon completion of the initial calculation, physical power flows exceed the interconnection NTC values established in Article 7.1 of these Rules, the Trading Capacity from 3rd Countries will be determined by increasing generation in deficit Baltic power systems (Lithuania and Latvia) according to the coefficient, calculated according to the formula 13 of these Rules.
- 7.10. Calculations according to the requirements laid down in Article 7.8. or Article 7.9 of these Rules are completed, when one of the interconnection capacities NTC limits specified in article 7.1 of these Rules is reached and none exceed the aforementioned limits. Trading Capacity from 3rd Countries is calculated by the following formula:

$$P_{3rd\ Countries} = \text{MAX}(P; P_{res}) \quad (14)$$

where:

$P_{3rd\ Countries}$ – Trading Capacity from 3rd Countries;

P – maximum physical flow from 3rd Countries to Baltic States shall be calculated:

$$P = \text{NET}_{intEE} + \text{NET}_{intLV} + \text{NET}_{intLT} + \text{NET}_{intKAL} \quad (14a)$$

where:

NET_{intEE} – Estonian energy system balance according to calculation results together with ESTLINK 1 and ESTLINK 2;

Net_{intLV} – Latvian energy system balance according to the calculation results;

Net_{intLT} – Lithuanian energy system balance with NORDBALT and LITPOL Link according to the calculation results;

Net_{intKAL} – Kaliningrad balance according to Russian TSO's presented planning data. If Kaliningrad is in deficit, NET_{intKAL} shall be set to 0 MW.

Balance values in formula 14a of these Rules are negative, when power system is in surplus, and values are positive, when the power system is in deficit.

P_{res} – amount of assured secondary emergency power reserves maintained in Lithuanian power system, which are used in the process of calculation of Trading Capacity from 3rd Countries to Baltic States. This amount of assured secondary emergency power reserves is coordinated and agreed by Baltic TSO's for each upcoming year.

7.11. Validation process of the calculated Trading Capacity from the 3rd Countries is the following:

7.11.1. Coordinator shall calculate the Trading Capacity from 3rd Countries according to article 7.6 of these Rules and deliver the following results to all TSOs:

- a. Power flow model with initial balance data in agreed data format;
- b. Summary report of restrictive Cross-Border Interconnections;
- c. Hourly Trading Capacities from 3rd Countries;

7.11.2. Coordinator shall calculate the Trading Capacity from 3rd Countries according to Articles 7.3-7.5 of these Rules and deliver following results to all TSOs:

- a. Trading Capacity from 3rd Countries;
- b. Summary report of restrictive Cross-Border Interconnections and their Net Transmission Capacities.

7.11.3. Each TSO shall validate results provided by Coordinator and send validation message to the Coordinator and to other TSOs.

7.12. If results are not validated by all TSOs, the TSO which does not give its validation must deliver its own calculation results and the reasoning for non validation. The lowest value for Trading Capacity from 3rd Countries shall be used. If the calculation results and reasoning for non validation are not delivered, the Trading capacity with 3rd Countries is set equal to calculation results performed by the Coordinator.

7.13. The timeframes for validation of results is set in Table 4 of these Rules.

Table 4

Planning stage	Coordinator provide calculations results not later than	TSO's validate calculation results not later than
Day ahead	9:50	10:10
Weekly	Friday 14:00	Friday 15:00
Monthly	28 th calendar day 12:00	28 th calendar day 16:00
Annually	15 th December calendar day 14:00	17 th December calendar day 16:00

- 7.14. Capacity for the day ahead trade from Baltic power systems to 3rd Countries is determined by following formula:

$$NTC_{LT-BY} = TTC_{LT-BY} - TRM \quad (15)$$

where:

NTC_{LT-BY} – Net Transmission Capacity for trade of Lithuania-Belarus Cross-Border Interconnection;

TTC_{LT-BY} – Total Transfer Capacity of the Lithuania-Belarus Cross-Border Interconnection in the Belarusian direction;

TRM – Transmission Reliability Margin in Cross-Border Interconnection (agreed by Lithuanian and Belarus TSO's).

8. **TRADING CAPACITY CALCULATION RULES BETWEEN LITHUANIAN AND RUSSIAN (KALININGRAD AREA) POWER SYSTEMS**

- 8.1. Day-ahead interconnection capacities for the trade in Lithuanian direction is determined by the following formula:

$$NTC_{RU-LT} = \text{MIN}((TTC_{RU-LT} - TRM); (G_{RU} - P_{RU})) \quad (16)$$

where: NTC_{RU-LT} – Net Transmission Capacity for trade of Lithuania-Russia (Kaliningrad area) Cross-Border Interconnection;

TTC_{RU-LT} – Total Transfer Capacity to the Lithuanian direction according to Instruction for parallel operation in the Lithuania-Russia (Kaliningrad area) interconnection;

TRM – Transmission Reliability Margin in the interconnection, agreed by Lithuanian and Russian TSOs;

G_{RU} – Russia (Kaliningrad area) generation according to the D-2 balance plans;

P_{RU} – Russia (Kaliningrad area) load according to the D-2 balance plans.

- 8.2. Day-ahead interconnection capacities for the trade in Russia (Kaliningrad area) direction is determined by the following formula:

$$NTC_{LT-RU} = TTC_{LT-RU} - TRM \quad (17)$$

where:

NTC_{LT-RU} – Net Transmission Capacity for trade of Lithuania-Russia (Kaliningrad area) Cross-Border Interconnection;

TTC_{LT-RU} – Total Transfer Capacity of the Lithuania -Russia (Kaliningrad area) Cross-Border Interconnection in Russia (Kaliningrad area) direction;

TRM - Transmission Reliability Margin in Lithuania-Russia (Kaliningrad area) Cross-Border Interconnection agreed by Lithuanian and Russian TSOs.

9. PROVISION AND ALLOCATION OF TRADING CAPACITY

- 9.1. Baltic TSOs (including Coordinator) provides calculated and validated Trading Capacities for relevant trading time frames to M O for subsequent capacity allocation through implicit auctioning carried out by MO.
- 9.2. Trading Capacities within the Baltic States are provided and allocated in day-ahead and intraday time frames – Day Ahead Market and Intraday Market.
- 9.3. Trading Capacities with the 3rd Countries are provided and allocated in day-ahead time frame for Day Ahead Market.

Provision and allocation of Trading Capacity between Estonian and Latvian power systems

- 9.4. Estonian-Latvian Trading Capacities provided for trade between the Estonian and Latvian Bidding Zones are equal to the joint Estonian-Latvian NTC calculated according to the Section 5 of these Rules, and which is subsequently allocated through the implicit auctioning following the trading rules established by the MO.

Provision and allocation of Trading Capacity between Lithuanian and Latvian power systems

- 9.5. Lithuanian-Latvian Trading Capacities provided for trade between the Latvian and Lithuanian Bidding Zones are equal to the joint Lithuanian-Latvian NTC calculated according to the Section 6 of these Rules, and which is subsequently allocated through the implicit auctioning following the trading rules established by the MO.

Provision and allocation of Trading Capacity with the 3rd Countries

- 9.6. TSOs have agreed to provide the following Trading Capacities with 3rd Countries:
 - 9.6.1. From Russia to Estonia: from Estonia-Russia import Bidding Zone to Estonia Bidding Zone Trading Capacities is provided equal to “0”;
 - 9.6.2. From Estonia to Russia: from Estonia Bidding Zone to Estonia-Russia export Bidding Zone Trading Capacities is provided equal to “0”;
 - 9.6.3. From Russia to Latvia: from Latvia-Russia import Bidding Zone to Latvia Bidding Zone Trading Capacities is provided equal to “0”;
 - 9.6.4. From Latvia to Russia: from Latvia Bidding Zone to Latvia-Russia export Bidding Zone Trading Capacities is provided equal to “0”;
 - 9.6.5. From Belarus to Lithuania: from Lithuania-Belarus import Bidding Zone to Lithuania Bidding Zone Trading Capacities are provided following capacity calculation procedures in accordance with the Trading Capacity Calculation Rules with the 3rd Countries according to Articles 7.1-7.13 of these Rules, and which is subsequently allocated through the implicit auctioning following the trading rules established by the MO;
 - 9.6.6. From Lithuania to Belarus: from Lithuania Bidding Zone to Lithuania-Belarus export Bidding Zone Trading Capacities are provided in accordance with the Trading Capacity Calculation Rules with the 3rd Countries according to Article 7.14 of these Rules, and

which is subsequently allocated through the implicit auctioning following the trading rules established by the MO;

- 9.6.7. From Kaliningrad area to the Lithuania Bidding Zone Trading Capacities are provided in accordance with the Trading Capacity Calculation Rules between Lithuanian and Russian (Kaliningrad area) Power Systems according to Article 8.1 of these Rules, and which is subsequently allocated through the implicit auctioning following the trading rules established by the MO;
- 9.6.8. From the Lithuanian Bidding Zone to the Kaliningrad area Trading Capacities are provided in accordance with the Trading Capacity Calculation Rules between Lithuanian and Russian (Kaliningrad area) Power Systems according to Article 8.2 of these Rules, and which is subsequently allocated through the implicit auctioning following the trading rules established by the MO.

10. **FIRMNESS**

- 10.1. After the Day-ahead Firmness Deadline, all Cross-Zonal Capacity and allocation constraints are firm for day-ahead capacity allocation unless in case of Force Majeure or Emergency Situation.
- 10.2. The Day-ahead Firmness Deadline is 10:00 CET.
- 10.3. After the Day-ahead Firmness Deadline, Cross-Zonal Capacity which has not been allocated may be adjusted for subsequent allocations.
- 10.4. Intraday Cross-Zonal Capacity is firm as soon as it is allocated unless in case of Force Majeure or Emergency Situation.