GUIDELINE ON ELECTRICITY TRANSMISSION SYSTEM OPERATION AND
GUIDELINE ON ELECTRICITY BALANCING

Neum, March 2022
WHAT ARE NETWORK CODES / GUIDELINES

1. Set of rules that apply to cross-border cooperation and electricity market

2. Developed by the European Commission, ACER, ENTSO-E, market participants in accordance with article 8 of Regulation 714/2009

3. EU process of drafting laws called “comitology”

4. Process that ends with the network codes and guidelines that become obligatory legislation to be implemented in all EU Member States.
Market integration
Enables market competition, new participants, facilitates optimization of resources

Connection codes
- Green energy, Smart consumption
- Connection of new customers to transmission network and contribution to power system security

Operational codes
- Enhancing security of supply
- Planning, operating and monitoring network with new challenges and technologies
NETWORK CODES / GUIDELINES DIVISION

3 Market codes
- Long-term capacity allocation
- Capacity Allocation and Congestion Management
- Balancing energy

2 Operation codes
- Operation of electricity transmission system
- Emergency operation and power system restoration

3 Connection codes
- Demand connection
- Requirements for generators
- Connection of HVDC systems

Implementation 6 years

2017

2023
GUIDELINE ON ELECTRICITY TRANSMISSION SYSTEM OPERATION - SO GL
### Structure

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▪ Regulatory aspects  
▪ Monitoring and reporting |
| ▪ Classification and monitoring of system condition  
▪ Corrective actions  
▪ Operational requirements | ▪ Data exchange  
▪ Training |
| ▪ Common network model and OPDE  
▪ Operational security analysis  
▪ Regional security centers | ▪ Outage planning  
▪ Adequacy analysis  
▪ Scheduling |
| ▪ Operational agreements  
▪ Procurement, exchange and sharing the reserves  
▪ Frequency quality parameters |
| ▪ Voltage ranges  
▪ Values of the frequency quality parameters  
▪ Technical requirements for FCR |
SYSTEM OPERATION GUIDELINES - SOGL
OPERATIONAL SECURITY

Real time monitoring of the system state:
- security analyses every 15 minutes
- monitoring the power system parameters and comparison with the operational limits
- monitoring the level of available reserves
- System state on the emergency alert system platform - EAS
SYSTEM OPERATION GUIDELINES - SOGL
OPERATIONAL PLANNING

REGIONAL COORDINATION

- CGM
  - Shared scenarios
  - Developing IGM/CGM
- Security analysis
  - Security analysis
  - Corrective actions preparations
- Outage planning
  - Detection of inconsistencies in planned outages
- Adequacy planning
  - Shared scenarios
  - Developing IGM/CGM

ENTSO-E OPDE platform for operational planning data

Scheduling
Ancillary services
SYSTEM OPERATION GUIDELINES - SOGL
ACTIVE POWER/FREQUENCY REGULATION AND RESERVES

SO GL: LFCR
- Frequency Quality
- Regulation reserve
- Activation of reserves
- Real-time coordination
- Imbalance sharing
- XB Activation of reserves
- Location and volume of reserves
- Reserves sharing
- Reserves exchange

EB GL
- Market design
- Product definition
- Market design
- CMOL
- Cross-border coordination
- Coordination in procurement of reserves

Diagram showing joint action within synchronous area, LFC area, FCR, FRR, manual FRR, RR, reserve replacement process, frequency containment process, frequency restoration process, and time to restore frequency.
Synchronous Area Framework Agreement for continental Europe;
Entered in force on 14 April 2019

- LFCR Rules
- Scheduling rules
- Settlement rules
- Rules on coordinated operational planning
- Rules on emergency operation and power system restoration
- Data exchange rules
GUIDELINE ON ELECTRICITY BALANCING - EB GL
Regulation of the Commission (EU) 2017/2195 of 23 November 2017, providing guidelines for electricity balancing (EB GL) stipulates detailed rules on integration of balancing markets in Europe with the aim of encouraging effective competition, non-discrimination, transparency and integration in balancing markets, thus improving the efficiency of European balancing system as well as security of supply.

**Balancing** means all actions and processes continuously performed by the transmission system operators to maintain power system frequency within the defined limits, as well as ensuring the quantities of the required regulation reserves against the required quality. The balancing process comprises three major steps: 1) dimensioning of the required reserves; 2) procurement of the required reserve capacities; and 3) procurement of balancing energy.
GUIDELINE FOR ELECTRICITY BALANCING - EB GL

STRUCTURE

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<td>Scope, objectives, regulatory aspects, definitions</td>
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<td>Balancing market</td>
<td>Roles and responsibilities, balancing platforms, cost allocation, requirements for standard and specific balancing products</td>
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<td>Procurement of balancing services</td>
<td>Activation of balancing energy, function of optimization, CMOL, balancing capacity</td>
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<td>Cross-zonal capacities for balancing services</td>
<td>Cross-zonal exchange of balancing energy, calculation of cross-zonal capacity, market based allocation of cross-zonal capacity, allocation on the basis of economic efficiency analysis</td>
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<td>Settlement</td>
<td>Balancing energy settlement, TSO-TSO, TSO-BSP, TSO-BRP, harmonization of imbalance settlement period</td>
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<td>Other provisions</td>
<td>Coupling algorithms, reporting, cost-benefit analysis</td>
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- TSO is responsible for ensuring power system balance near to real-time, taking into consideration other electricity markets
- Balancing service providers (generators, DSR, energy storage systems) offer balancing services (capacity, energy) used by TSO to keep the power system balance
- BRP is financially responsible for imbalances and thus tries to keep their positions (generation, consumption, exchange) in balance
FCR: Operational reserve to prevent frequency deviations from nominal value in order to continuously maintain the active power balance in the whole synchronous area.

FRR: Operational reserve that is activated to restore the frequency up to the nominal value and to restore to the planned value the active power balance of synchronous area that consists of several control areas.

RR: Reserve of active power for restoration or support to the required level of FRR, with the aim of balancing additional system imbalances.

IN: Process agreed among TSOs that allows avoidance of simultaneous activation of aFRR in opposite directions, taking into consideration relevant control area errors, as well as the activated aFRR.
- Requirements for standard product for mFRR and RR defined
- Full activation time (FAT) for aFRR shall be specified
### GUIDELINES FOR ELECTRICITY BALANCING - EB GL

#### STANDARD AND SPECIFIC PRODUCTS

<table>
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<tr>
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<th>mFRR</th>
<th>RR</th>
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<tr>
<td><strong>Activation method</strong></td>
<td>Manual</td>
<td>Manual</td>
</tr>
<tr>
<td><strong>Activation type</strong></td>
<td>Direct or contracted</td>
<td>Direct or contracted</td>
</tr>
<tr>
<td><strong>Activation time</strong></td>
<td>12.5min</td>
<td>30min</td>
</tr>
<tr>
<td><strong>Min quantity</strong></td>
<td>1MW</td>
<td>1MW</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>1MW</td>
<td></td>
</tr>
<tr>
<td><strong>Max quantity</strong></td>
<td>9999MW</td>
<td>In accordance with national rules</td>
</tr>
<tr>
<td><strong>Minimal delivery time</strong></td>
<td>5min</td>
<td>15min</td>
</tr>
<tr>
<td><strong>Maximum delivery time</strong></td>
<td>Defined in conditions for BSPs</td>
<td>60min</td>
</tr>
<tr>
<td><strong>Price resolution</strong></td>
<td>0.01EUR/MWh</td>
<td>In accordance with national rules</td>
</tr>
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</table>

**Other requirements**
- BSPs are allowed to submit divisible and non-divisible bids
- Direction of bids upwards/downwards
- Preparation period, ramping period and deactivation time are defined in conditions for BSPs in accordance with conditions given in the table
- Minimum time between two activations are defined in conditions for BSPs

**Specific products:**
- In order to meet the requirements for the reserves dimensioning, TSO may request from NRA approval for defining the specific products
- Specific products may be converted into standard products if they are to be used at balancing platforms, in accordance with the rules defined in the table
IGCC cooperation in work since 2010
TERRE platform started operation on 9 January 2020
Planned go-live for MARI foreseen in 2021
GUIDELINE FOR ELECTRICITY BALANCING - EB GL
BALANCING RESERVE ACTIVATION

- Activation of balancing services
  - Activation of balancing bids
    - Activation for purposes other than balancing
  - Unavailable bids
    - Requirements for divisible bids
    - Bid restrictions due to internal congestion
  - Optimization of activation function
    - Common merit order lists - CMOL
  - Balancing capacity
    - Market-oriented procurement of capacities
    - Capacity exchange - TSO-TSO model
    - Transfer of capacity among BSPs
    - TSO-BSP model
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<th>CZC Use</th>
<th>After the intra-day gate closure time, all TSOs must use available cross-zonal capacities for exchanging balancing energy or implementation of the imbalance netting process</th>
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| CZC Calculation                                                        | Continuous updating of CZC values  
Development of methodology for CZC calculation, 5 years following the EB GL entry in force, within the balancing timeframe |
| Exchange                                                               | CZC allocated for exchange of reserve capacities for power system balancing or sharing reserves is used solely for mFRR, aFRR and RR reserves |
| Calculation                                                            | Market value of CZC for energy exchange and for exchange or sharing the reserve capacity for power systems balancing is based on actual or forecasted market values of cross zonal capacity |
| Allocation procedure                                                   | Co-optimized allocation process  
Market-based allocation process  
Allocation process based on analysis of economic efficiency |
GUIDELINES FOR ELECTRICITY BALANCING - EB GL
IMBALANCE SETTLEMENT

General principles of settlement:
▪ Enable the imbalance settlement at the price that reflects the actual costs of energy
▪ Encourage the balance responsible parties to be in balance and help the power system to restore balance
▪ Encourage competition among market participants
▪ Encourage balancing services providers to offer and provide balancing services
▪ Ensure financial neutrality of all TSOs

When calculating the balancing energy, each TSO must establish a procedure for:
▪ Calculation of activated volume of balancing energy on the basis of requested or metered activation
▪ Claims for recalculation of the activated volume of balancing energy.

Each TSO calculates the activated volume of balancing energy for:
▪ Each imbalance settlement period
▪ Its imbalance areas
▪ Each direction, where the negative sign indicates relative withdrawal by the balancing services provider, and positive sign indicates relative injection by the balancing service provider
GUIDELINES FOR ELECTRICITY BALANCING - EB GL
IMBALANCE SETTLEMENT

- Within three years from entry into force of the EB GL, all TSOs must use the Imbalance Settlement Period (ISP) of 15 minutes in all scheduling areas while ensuring that all boundaries of *market time unit* - MTU coincide with ISP boundaries.
- TSO shall set up rules for: calculation of final positions, determination of the allocated volumes, determination of the imbalance adjustments, calculation of imbalances, and method of claiming the recalculation of imbalances.
- Along with the imbalance, the volume and direction of settlement transaction among parties responsible for imbalance and TSO shall be stated, where the imbalance may have positive or negative sign.
- Each TSO shall set up rules to calculate the imbalance price that may be positive, zero or negative.
- TSO shall specify the imbalance price for each imbalance settlement period and each imbalance direction.
THANK YOU FOR YOUR ATTENTION!