Stakeholder Workshop on:

Cross Zonal Capacity Allocation for the exchange of balancing capacity or sharing of reserves

PT CZCA

ENTSO-E, 06.06.2019
## Abbreviations

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>BC</td>
<td>Balancing Capacity</td>
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<tr>
<td>BZ</td>
<td>Bidding Zone</td>
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<td>BSP</td>
<td>Balancing Service Provider</td>
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<td>CACM</td>
<td>Capacity Allocation Congestion Management</td>
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<td>CCR</td>
<td>Capacity Calculation Region</td>
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<td>CEP</td>
<td>Clean Energy Package</td>
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<td>CMOL</td>
<td>Common Merit Order List</td>
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<td>CZC</td>
<td>Cross Zonal Capacity</td>
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<td>CZCA</td>
<td>Cross Zonal Capacity Allocation</td>
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<td>CZCA OF</td>
<td>Cross Zonal Capacity Allocation Optimisation Function</td>
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<td>D</td>
<td>Day</td>
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<td>DA</td>
<td>Day Ahead</td>
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<td>EBGL</td>
<td>Guideline on Electricity Balancing</td>
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<tr>
<td>EE</td>
<td>Economic Efficiency</td>
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<td>EIF</td>
<td>Entry Into Force</td>
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<td>FB</td>
<td>Flow-Based</td>
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<td>FCR</td>
<td>Frequency Containment Reserves</td>
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<td>FRR</td>
<td>Frequency Restoration Reserves</td>
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<td>FTR</td>
<td>Financial Transmission Rights</td>
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<td>GCT</td>
<td>Gate Closure Time</td>
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<td>GOT</td>
<td>Gate Opening Time</td>
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<td>IMB</td>
<td>Inverted Market-Based</td>
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<td>LFC</td>
<td>Load Frequency Control</td>
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<td>M</td>
<td>Month</td>
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<td>MB</td>
<td>Market-Based</td>
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<td>MCO</td>
<td>Market Coupling Operator</td>
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<td>MP</td>
<td>Market Parties</td>
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<td>NEMO</td>
<td>Nominated Electricity Market Operator</td>
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<td>PT CZCA</td>
<td>Project Team Cross-Zonal Capacity Allocation</td>
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<td>PTR</td>
<td>Physical Transmission Rights</td>
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<td>RR</td>
<td>Replacement Reserves</td>
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<td>RT</td>
<td>Real-time</td>
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<td>SDAC</td>
<td>Single Day-Ahead Coupling</td>
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<td>SHW</td>
<td>Stakeholder Workshop</td>
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<td>SIDC</td>
<td>Single Intra-Day Coupling</td>
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<td>SOGL</td>
<td>Guideline on System Operation</td>
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<td>TSO</td>
<td>Transmission System Operator</td>
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<td>W</td>
<td>Week</td>
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<td>Y</td>
<td>Year</td>
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Agenda

1. Introduction
2. Co-optimisation proposal
3. Additional information
4. Conclusion and discussion
Objectives of the workshop

Summary of the stakeholder workshop no. 1
• Presentation of the 3 methodologies and the process of elaboration

What happened since the previous workshop
• Co-optimisation proposal has been completed for consultation
• Templates for market-based and economic efficiency proposals have been transmitted to the CCRs
• Feedbacks from the previous SHW related to Articles 41 and 42 have been transmitted to the CCRs

Objectives of the stakeholder workshop no. 2
• Build a common understanding of the
  • legal framework
  • proposed method including the process
  • market principles
• Prepare stakeholders to provide feedbacks on the method of co-optimised CZCA during consultation
  • Deadline 31st of July 2019
Introduction
TSOs procure (far) ahead of real-time balancing capacity [MW] from Frequency Restoration Reserves and Replacement Reserves.

These reserves are the system's insurance to make sure that in real-time TSOs can activate at least a minimum amount of balancing energy bids [MWh].
TSOs may procure balancing capacity

All TSOs of the LFC block shall regularly and at least once a year review and define the *reserve capacity requirements* for the LFC block or scheduling areas of the LFC block pursuant to *dimensioning rules*. EBGL Art. 32(2)

- Reserve capacity is needed to ensure the quality of the common system frequency

Each TSO shall perform an analysis on *optimal provision of reserve capacity aiming at minimization of costs* associated with the provision of reserve capacity.

**Options** for the provision of reserve capacity:

a) procurement of balancing capacity within control area and *exchange of balancing capacity* with neighbouring TSOs, when applicable;

b) sharing of reserves, when applicable;

c) the volume of non-contracted balancing energy bids which are expected to be available both within their control area and within the European platforms taking into account the available cross-zonal capacity.

- There is no legal obligation to procure balancing capacity given by the EBGL
TSO's procurement of balancing capacity

There are **two options** for cross-border cooperation for the procurement of balancing capacity for Frequency Restoration Reserves (FRR) and Replacement Reserves (RR):

1. **Exchange of balancing capacity**

   Exchange of balancing capacity means the provision of balancing capacity to a TSO in a different scheduling area than the one in which the procured balancing service provider is connected [EB GL].

   Exchange of balancing capacity between balancing areas may lead to a different geographical location of the balancing capacity from the dimensioning results for each area, to increase efficiency, competition and cost savings, however, the total amount of balancing capacity within the two areas is not reduced.

2. **Sharing of reserves**

   Sharing of reserves means a mechanism in which more than one TSO takes the same reserve capacity, being FCR, FRR or RR, into account to fulfil their respective reserve requirements resulting from their reserve dimensioning processes [SO GL].

   Since TSOs not always use their maximum procured capacity simultaneously, TSOs can share their reserves, reduce the total amount of balancing capacity within the two areas and save procurement costs.
Guideline on Electricity Balancing (EB GL) Art. 38 allows two or more TSOs to allocate a part of the cross zonal capacity (CZC) for the cross border exchange of balancing capacity or sharing of reserves.

Balancing capacity markets may therefore compete with SDAC on the use of CZC in the DA timeframe.

Motivation for the allocation of CZC for reserve markets:

- enables TSOs to procure and use balancing capacity in an efficient, economic and market-based manner [EB GL (15)]
- can improve competition for balancing capacity markets
- can improve competition between different markets
- can facilitate regional procurement of balancing capacity
### Title IV

**Cross-zonal capacity for balancing services**

**Chapter 2**

**Exchange of balancing capacity or sharing of reserves**

<table>
<thead>
<tr>
<th>Article</th>
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<td>Article 38: General requirements</td>
<td>List of general requirements belonging to the voluntary application of CZC allocation for the exchange of balancing capacity or sharing of reserves.</td>
</tr>
<tr>
<td>Article 39: Calculation of market value cross-zonal capacity</td>
<td>Description of the requirements how to calculate the actual and forecasted market value of CZC for the exchange of energy and for the exchange of balancing capacity or sharing of reserves to be compared in the CBA.</td>
</tr>
<tr>
<td><strong>Article 40: Co-optimised allocation process</strong></td>
<td>Description of the topics that must be included in the methodology co-optimisation that shall be developed by 2 years after EIF by all TSO, i.e. 18.12.2019.</td>
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<tr>
<td>Article: 41 Market-based allocation process</td>
<td>Description of the topics that must be included in the methodology market-based that may be developed by 2 years after EIF per CCR.</td>
</tr>
<tr>
<td>Article: 42 Allocation process based on economic efficiency</td>
<td>Description of the topics that must be included in the methodology economic efficiency that may be developed by 2 years after EIF per CCR.</td>
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</table>
Reserve markets may compete with SDAC for CZC

BC markets may compete with SDAC for use of CZC

available CZC for market competition per timeframe

Y-1 M-1 W-1

D-1

GCT BC

GCT SDAC

ID

GOT SIDC

GCT BE

Article 42 | Article 41 | Article 40 | Article 41
Reserve markets may compete with SDAC for CZC

Available CZC for market competition per timeframe

BC markets may compete with SDAC for use of CZC

Forecasted day-ahead energy bids
Forecasted balancing capacity bids

Forecasted day-ahead energy bids
Actual balancing capacity bids

Actual day-ahead energy bids
Actual balancing capacity bids
Forecasted balancing capacity bids
Art. 40 is a Proposal of a methodology – not an implementation

<table>
<thead>
<tr>
<th>Dimensioning rules</th>
<th>Balancing Capacity Market/Cooperation</th>
<th>Application of CZCA</th>
<th>CZCA method</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reserve capacity requirements</td>
<td>• Two or more TSOs</td>
<td>• Voluntary application of CZC allocation</td>
<td>• Co-optimised allocation process pursuant to Article 40;</td>
</tr>
<tr>
<td>• Defined in the LFC Block operational agreement</td>
<td>• Common and harmonised rules and processes for the exchange and procurement of balancing capacity</td>
<td>• Bidding zone borders</td>
<td>• Market-based allocation process pursuant to Article 41;</td>
</tr>
<tr>
<td>• SOGL art.119(h)&amp;(i)</td>
<td>• EBGL Art. 33(1)</td>
<td>• Market time frame</td>
<td>• Allocation process based on economic efficiency analysis pursuant to Article 42.</td>
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</tbody>
</table>

The presented proposal is only covering the co-optimised allocation process pursuant to EBGL Article 40, not implementation.
Co-optimisation proposal
In addition to the EBGL requirements, each balancing capacity cooperation implementing the co-optimisation methodology shall be subject to the following principles:

- Common and harmonised rules (Article 33 (1) of the EBGL) for
  - TSO-BSP pricing for balancing capacity
  - Separate upward/downward balancing capacity products (exemptions: NRA approval, central dispatch)
  - Contracting and validity period of balancing capacity bids

- All TSOs need to be informed of the application of the CZCA method, including
  - Involved bidding zone borders
  - Market timeframe
  - Duration of allocation of CZC
  - Time for entering into operation
### Evaluation criteria for Co-optimisation process

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>TSO’s ability to develop and specify the allocation method and the procurement of balancing capacity</td>
<td>TSOs are able to request changes to the allocation method and make their own decisions on the procurement for balancing capacity, (e.g. related to ownership of the platform, control on change requests, IPR on algorithm, in-house knowledge of the solution).</td>
</tr>
<tr>
<td>Technical feasibility</td>
<td>An operational method should be known/available/demonstrated to calculate the results for an optimal allocation of CZC between two different markets.</td>
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<tr>
<td>Efficiency of the allocation</td>
<td>The allocation over all coupled energy and balancing capacity markets should provide maximum economic surplus.</td>
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<tr>
<td>Impact on TSO business processes</td>
<td>Required changes to the TSO business process should be minimal.</td>
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<tr>
<td>Impact on NEMOs business processes</td>
<td>Required changes to the NEMO business processes should be avoided and otherwise only be minimal.</td>
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<tr>
<td>TSOs' operational capabilities</td>
<td>TSOs can independently operate the capacity procurement optimisation function and apply fall-back procedures to safeguard sufficient reserves.</td>
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<tr>
<td>Impact on overall processing time</td>
<td>The total processing time from bidding gate closure to publication of the results should be within the current time window available for the SDAC and respecting the current timings of all other processes.</td>
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<tr>
<td>Governance</td>
<td>The impact on the existing contractual framework between TSOs and NEMOs should be avoided and otherwise only be minimal.</td>
</tr>
<tr>
<td>Impacts on EUPHEMIA</td>
<td>Changes required on EUPHEMIA and NEMOs’ trading systems should be avoided and otherwise only be minimal.</td>
</tr>
</tbody>
</table>
Process of co-optimisation allocation

5 step approach

0) CZC to be used for SDAC is calculated.

1) BC bids (upward/downward) and DA energy offers are submitted to TSOs and NEMOs, respectively.

2) The TSOs convert the BC bids in supply and demand orders likewise NEMOs do for the exchange of energy, to prepare for the SDAC with TSO’s inclusion of BC demand. This is the bid-preparation stage.

3) The SDAC is run taking into account the value of CZC for balancing capacity. Trading bids are matched, prices are determined and SDAC becomes firm. CZC for BC is determined.

4) Awarded CZC for BC is used to build upward/downward CMOL for BC, determine the BC prices and make the allocation of CZC firm.

5) SDAC publishes the market outcome for trading and TSOs publish selected BC bids.

new (sub-)process required
performing CZCA optimisation function
Co-optimisation allocation timeline

**Co-optimisation process**

(D-2)

14:30 end of nomination time for (D-1) of SDAC
16:00 start of capacity calculation processes by TSOs for (D)

iterative calculation of FB-domain for DA by TSOs/Common System (regional processes)

10:20 deadline for TSOs sending capacity (FB-domain) to MCO

12:00 GCT for SDAC
13:00 publication of final SDAC results (Prices, NP of hub, accepted bids)

14:30 end of nomination time for (D) of DA-market
15:00 SIDC GOT; start of capacity publication for ID (CACM Art. 59)

calculation of available ID capacity (regional processes, differ in timings)

22:00 SIDC capacity calculation results by TSOs published (CWE, CEE)

23:00 Gate Closure Time for h01 of (D) for SIDC

Continuous SIDC with each GCT 60 minutes before delivery time/real time

**Known 'actual values' from energy market:**

result/prices of Yearly and Monthly capacity auctions

23:00 results of SIDC for h01

**Timings are indicative**
CZCA optimisation decision

Available CZC is a scarce resource and EB GL allows competition for CZC between SDAC and balancing capacity procurement.

The allocation of CZC for balancing shall be based on a **CZCA Optimisation Function (CZCAOF)**.

In the EBGL it is named cost-Benefit Analysis (CBA)

![CZCA Optimisation Diagram]

The CBA calculates the market value of CZC [EB GL Art. 39] for single day ahead market coupling and compares it with the calculated market value of CZC for the exchange of balancing capacity or sharing of reserves.

CZC may be allocated for the exchange of balancing capacity or sharing of reserves if:

*Market value for exchange of balancing capacity > market value for exchange of energy (day ahead market coupling)*
CZCA economic surplus optimisation

Objective function for allocation of CZC
Maximisation of economic surplus of the sum of the BC market and the SDAC

Economic surplus

SDAC surplus +
Producer surplus +
Consumer surplus +
Congestion income

BC surplus +
Producer surplus (BSPs) +
Consumer surplus (TSOs) +
Congestion income
Market value of cross zonal capacity

Actual Market Value of CZC for the Exchange of Energy

- Actual energy bids
- Maximization of Consumer/Producer Surplus + Congestion Income (Congestion Rent)
- Positive Market Value of MW for exchange of energy compared to isolated markets

→ Similar for BC surplus (depends on TSO-BSP pricing) assuming convex price curves
Market value of cross zonal capacity

Logic behind maximization of the total market value of CZC

- Marginal value of additional MW of CZC for the exchange of energy decreases (left to right, blue line)
- Marginal value of additional MW of CZC for the exchange of balancing capacity decreases (right to left, purple line)

NB: assuming convex price curves
Market conditions with Co-optimisation

Regarding Market

• Co-optimisation increases the opportunity to value the balancing capacity across borders;
• Co-optimisation generates uncertainty for BSPs finding the optimal use of their portfolio because:
  • No linking between energy and balancing capacity bids (at least not in near future)
  • Limited options for linking of balancing capacity bids (at least not in near future)

Regarding Process

• No new entity is required, same entry points: TSOs receives, submit and procure balancing capacity bids
• GCT of balancing capacity equals GCT of energy (trading) markets
• CZC allocated for both markets will be shared with publication of selected bids to market participants
• SDAC algorithm includes the CZCA optimisation function and therefore decides the allocated volume of CZC for the balancing capacity market
• SDAC operator decides the allocation of CZC for the exchange of balancing capacity or sharing of reserves
Additional information

1. Dashboard
2. Mapping of presentation to proposal
3. Table of content of the co-optimisation proposal
## Milestones for co-optimisation methodology (all TSOs)

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<td>1st stakeholder workshop: cross-zonal capacity allocation</td>
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<td>2nd stakeholder workshop: co-optimisation</td>
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## Mapping of presentation to Proposal

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<th>Title</th>
<th>Article related</th>
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<td>16</td>
<td>Evaluation criteria for co-optimisation process</td>
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<td>Process of co-optimisation allocation</td>
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<td>23</td>
<td>Market conditions with co-optimisation</td>
<td>N/A</td>
</tr>
<tr>
<td>Article</td>
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<td>Principles of balancing capacity cooperation</td>
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<td>Determination of the actual market value of cross zonal capacity for the exchange of energy</td>
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<td>Determination of the actual market value of cross zonal capacity for the exchange of balancing capacity or sharing of reserves</td>
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Conclusion and discussion
Article 38 General requirements

1. Two or more TSOs may at their initiative or at the request of their relevant regulatory authorities in accordance with Article 37 of Directive 2009/72/EC set up a proposal for the application of one of the following processes:

(a) co-optimised allocation process pursuant to Article 40;
(b) market-based allocation process pursuant to Article 41;
(c) allocation process based on economic efficiency analysis pursuant to Article 42.

Cross-zonal capacity allocated for the exchange of balancing capacity or sharing of reserves before the entry into force of this Regulation may continue to be used for that purpose until the expiry of the contracting period.

Article 38.1 informs that two or more TSOs are allowed to reserve (a part) of cross-zonal capacity for the use of balancing timeframes based on three different allocation methodologies, or based on a valid contract signed before the entry into force of GL EB. Such contract keeps valid until its termination condition is fulfilled. The allocation is only valid for exchange of balancing capacity (procurement of balancing reserves), and sharing of reserves (reduced procurement of two or more balancing areas due to a reserve sharing agreement). The allocation for balancing energy is not regulated explicitly.

2. The proposal for the application of the allocation process shall include:

(a) the bidding zone borders, the market timeframe, the duration of application and the methodology to be applied;
(b) in case of allocation process based on economic efficiency analysis, the volume of allocated cross zonal capacity and the actual economic efficiency analysis justifying the efficiency of such allocation.

Article 38.2 lists the information of which any CZC allocation proposal should consist of.

3. By five years after entry into force of this Regulation, all TSOs shall develop a proposal to harmonise the methodology for the allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves per timeframe pursuant to Article 40 and, where relevant, pursuant to Articles 41 and 42.

Article 38.3 requires the needs to harmonise the different proposal per methodology after 5 years of GL EB entry into force. However, all TSOs concluded within the Working Group Ancillary Service to develop one single proposal per CZC allocation methodology. This prevents the need to harmonise different methodologies until entry into force + 5 years.
EBGL article 38

Article 38 General requirements

4. Cross-zonal capacity allocated for the exchange of balancing capacity or sharing of reserves shall be used exclusively for frequency restoration reserves with manual activation, for frequency restoration reserves with automatic activation and for replacement reserves. The reliability margin calculated pursuant to Commission Regulation (EU) 2015/1222 shall be used for operating and exchanging frequency containment reserves, except on Direct Current ('DC') interconnectors for which cross-zonal capacity for operating and exchanging frequency containment reserves may also be allocated in accordance with paragraph 1.

Article 38.4 mentions that allocation of cross-zonal capacity is only allowed for the standard products of mFRR, aFRR and RR for both AC and DC connection. The reliability margin of AC connections should not be used for the exchange of balancing capacity or sharing of reserves. On DC connections, cross-zonal capacity may also be allocated for FCR, in addition to mFRR, aFRR, and RR.

5. TSOs may allocate cross-zonal capacity for the exchange of balancing capacity or sharing of reserves only if cross-zonal capacity is calculated in accordance with the capacity calculation methodologies developed pursuant to Commission Regulation (EU) 2015/1222 and pursuant to Commission Regulation (EU) 2016/1719.

Article 38.5 restricts cross-zonal capacity allocation when capacity calculation is not performed according to capacity calculation methodologies developed pursuant to Commission Regulation (EU) 2015/1222 and pursuant to Commission Regulation (EU) 2016/1719.

6. TSOs shall include cross-zonal capacity allocated for the exchange of balancing capacity or sharing of reserves as already allocated cross-zonal capacity in the calculations of cross-zonal capacity.

7. If physical transmission right holders use cross-zonal capacity for the exchange of balancing capacity, the capacity shall be considered as nominated solely for the purpose of excluding it from the application of the use-it-or-sell-it ('UIOSI') principle.
8. All TSOs exchanging balancing capacity or sharing of reserves shall regularly assess whether the cross-zonal capacity allocated for the exchange of balancing capacity or sharing of reserves is still needed for that purpose. Where the allocation process based on economic efficiency analysis is applied, this assessment shall be done at least every year. When cross-zonal capacity allocated for the exchange of balancing capacity or sharing of reserves is no longer needed, it shall be released as soon as possible and returned in the subsequent capacity allocation timeframes. Such cross-zonal capacity shall no longer be included as already allocated cross-zonal capacity in the calculations of cross-zonal capacity.

Article 38.8 consists of two requirements. Firstly, on a regular basis it shall be assessed whether the allocated cross-zonal capacity is needed for the purpose of balancing. Secondly, when assessments reveal that the capacity is not needed for the purpose of balancing, it shall be released as soon as possible and returned in the subsequent capacity allocation timeframes. This means that the capacity may be used for trading and if proven to be beneficial for other balancing processes.

9. When cross-zonal capacity allocated for the exchange of balancing capacity or sharing of reserves has not been used for the associated exchange of balancing energy, it shall be released for the exchange of balancing energy with shorter activation times or for operating the imbalance netting process.

Article 38.9 mentions that cross-zonal capacity should be released when RR, mFRR and aFRR (the latter makes it only available for imbalance netting) have not been activated, meaning that the CZC “has not been used for the associated exchange of balancing energy”. It is still open for interpretation whether CZC shall be released when local non-contracted bids (free bids) fulfil the local dimensioning criteria and the LFC Area/Block is not dependent any more on cross-zonal capacity for a certain balancing product.
EBGL article 39

Article 39 Calculation of market value of cross-zonal capacity

1. The market value of cross-zonal capacity for the exchange of energy and for the exchange of balancing capacity or sharing of reserves used in a co-optimised or market-based allocation process shall be based on the actual or forecasted market values of cross-zonal capacity.

   Article 39.1 states that the market value of cross-zonal capacity is determined (depending on the methodology) based on actual and forecast market values of cross-zonal capacity. This value is calculated based on actual and forecasted bids from trading markets, and from balancing capacity auctions.

2. The actual market value of cross-zonal capacity for the exchange of energy shall be calculated based on the bids of market participants in the day-ahead markets, and take into account, where relevant and possible, expected bids of market participants in the intraday markets.

   Article 39.2 says that the value of cross-zonal capacity determined by the exchange of energy is calculated based on trading bids from the DA and based on expected bids from ID market.

3. The actual market value of cross-zonal capacity for the exchange of balancing capacity used in a co-optimised or a market-based allocation process shall be calculated based on balancing capacity bids submitted to the capacity procurement optimisation function pursuant to Article 33(3).

   Article 39.3 says that the value of cross-zonal capacity determined by the exchange of balancing capacity for methodologies co-optimisation and market-based allocation is calculated based on balancing capacity bids submitted to the European Platform.

4. The actual market value of cross-zonal capacity for the sharing of reserves used in a co-optimised or a market-based allocation process shall be calculated based on the avoided costs of procuring balancing capacity.

   Article 39.4 says that the value of cross-zonal capacity determined by sharing of reserves for co-optimisation and market-based allocation is calculated based on the avoided costs of procuring balancing capacity. We expect that the avoided costs are based on the prices of balancing capacity bids submitted to the respective European Platform.
EBGL article 39

Article 39 Calculation of market value of cross-zonal capacity

5. The forecasted market value of cross-zonal capacity shall be based on one of the following alternative principles:

(a) the use of transparent market indicators that disclose the market value of cross-zonal capacity; or

(b) the use of a forecasting methodology enabling the accurate and reliable assessment of the market value of cross-zonal capacity.

The forecasted market value of cross-zonal capacity for the exchange of energy between bidding zones shall be calculated based on the expected differences in market prices of the day-ahead and, where relevant and possible, intraday markets between bidding zones.

When calculating the forecasted market value, additional relevant factors influencing demand and generation patterns in the different bidding zones shall be taken duly into account.

Article 39.5 allows two different principles (transparent market indicators and use of forecasting methodology) how the forecasted market value of cross-zonal capacity can be determined. It is our understanding that the market indicators and forecast methodologies are not only for the exchange of energy, but also for the exchange of balancing capacity and sharing of reserves.

6. The efficiency of the forecasting methodology pursuant to paragraph 5(b), including a comparison of the forecasted and actual market values of the cross-zonal capacity, may be reviewed by the relevant regulatory authorities. Where the contracting is done not more than two days in advance of the provision of the balancing capacity, the relevant regulatory authorities may, following this review, set a limit other than that specified in Article 41(2).

Article 39.6 gives relevant regulatory authorities the right to review the efficiency of the forecasting methodologies and according to the review, set a capacity allocation limit other than that specified in Article 41(2), a limit being larger or smaller, for the contracting of balancing capacity performed not more than two days in advance of the provision of the balancing capacity.
(Inverted) Market-based approach (D-1, 12:00)
- Real energy bids
- Forecasted balancing bids

Co-optimization (D-1, 12:00)
- Real energy bids
- Real balancing bids

Market-based approach (≤W-1 and >D-1)
- Forecasted energy bids
- Real balancing bids

Economic efficiency (> W-1)
- Forecasted energy bids
- Forecasted balancing bids

Co-optimization (D-1, 12:00)

- Real energy bids
- Real balancing bids

Market-based approach (≤W-1 and >D-1)

- Forecasted energy bids
- Real balancing bids

Economic efficiency (> W-1)

- Forecasted energy bids
- Forecasted balancing bids