Explanatory Document to all TSOs' proposal for a methodology for a co-optimised allocation process of cross zonal capacity for the exchange of balancing capacity or sharing of reserves in accordance with Article 40 of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

15 May 2019

DISCLAIMER

This explanatory document is released on behalf of the all transmission system operators ("TSOs") only for the purposes of the public consultation on the All TSOs' proposal for a methodology for a co-optimised allocation process of cross zonal capacity for the exchange of balancing capacity or sharing of reserves ("CO CZCA") in accordance with Article 40 of Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing. This version of the proposal does not in any case represent a firm, binding or definitive TSOs' position on the content.

Table of Contents

List of Figures

List of Tables

List of Equations

Definitions and Abbreviations

Definitions

'Allocation of cross zonal capacity'	means CZC that is allocated for exchange of balancing capacity or sharing of reserves and thus withdrawn from energy markets.
'Balancing capacity cooperation'	means two or more TSOs that apply the exchange of balancing capacity or sharing of reserves in a geographical area divided into two or more bidding zones.
'Capacity procurement optimisation function'	means the role to operate the algorithm applied for the optimisation of the procurement of balancing capacity within balancing capacity cooperation in which balancing capacity is exchanged.
'Co-optimisation method'	means the methodology to allocate CZC for the exchange of balancing capacity or sharing of reserves that is based on a comparison of the actual market value of CZC for the exchange of balancing capacity or sharing of reserves and the actual market value of CZC for the exchange of energy.
'Cross zonal capacity'	means as defined in Article 2(10) of Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council
'Cross zonal capacity allocation optimisation function'	means the role to operate the algorithm applied for the optimisation of the procurement of balancing capacity within balancing capacity cooperation in which balancing capacity is exchanged.
'Day-ahead Market time-frame'	means as defined in Article 2(34) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.
'Day-ahead market time-unit'	means the market period within the single day-ahead coupling in which one price per MWh is established within an uncongested area.
'Duration of application'	means the period for which a CZC optimization is performed over one or more bidding zone borders to allocate CZC for the exchange of balancing capacity or sharing of reserves.
'Exchange of balancing capacity'	means the process of procuring balancing capacity by a TSO in a different responsibility area or scheduling area when appropriate than the one in which the procured balancing service Provider is connected.
'Intraday market time-frame'	means as defined in Article 2(37) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.

'Market coupling operator'	means as defined in Article 2(30) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.
'Market value of cross zonal capacity for the exchange of energy'	means the welfare surplus of the SDAC and is the sum of the producer surplus, consumer surplus and congestion income. The market value of CZC for the exchange of balancing capacity or sharing of reserves is defined as the welfare surplus of the balancing capacity market and is the sum of consumer surplus and if applicable producer surplus and congestion income.
'Release of cross zonal capacity'	means CZC allocated for the exchange of balancing capacity or sharing of reserves that is no longer needed and is released as soon as possible and returned in the subsequent capacity allocation timeframes.
'Single day-ahead coupling'	means as defined in Article 2(26) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.
'Single intraday coupling'	means as defined in Article 2(27) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.
'Sharing of reserves'	means a mechanism in which more than one TSO takes the same balancing capacity, being, FRR or RR, into account to fulfil their respective reserve requirements resulting from their reserve dimensioning processes.
'Use of cross zonal capacity'	means allocated CZC used for the exchange of balancing capacity or sharing of reserves, either for the exchange of balancing capacity in terms of dimensioning and compliance or for physical use of CZC for the actual transfer of balancing energy

Abbreviations

The list of abbreviations used in this document:

AC	alternating current
ACER	Agency for the Cooperation of Energy Regulators
aFRR	frequency restoration reserves with automatic activation
ATC	Available Transfer Capacity
BC	balancing capacity
BEC	Bilateral Exchange Computation
BSP	balancing service provider
CACM	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management
CB	critical branch
CCR	Capacity Coordination Region
CO	co-optimisation
CZC	cross zonal capacity
CZCA	cross zonal capacity allocation
D	day
D2CF	two-days ahead congestion forecast
DAM	day-ahead market
DC	direct current
EBGL	electricity balancing guide line
ECC	European Commodity Clearing
ENTSO-E	European Network of Transmission System Operators for Electricity
EU	European Union
FB	flow-based
FCR	frequency containment reserves
FRR	frequency restoration reserves
GCT	gate closure time
GSK	generation shift key
H	hour
JAO	Joint Allocation Office

LFC	load-frequency control
LFCR	load-frequency control and reserves
LT	long-term
mFRR	frequency restoration reserves with manual activation
MC	market coupling
MW	megawatt
NEMO	nominated electricity market operator
NRA	national regulatory authority
NTC	Net Transfer Capacity
PX	power exchange
RCC	regional coordination centre
RR	replacement reserve
SDAC	single day-ahead coupling
SIDC	single intraday coupling
SOGL	guideline on electricity transmission system operation
TSO	transmission system operator

1 Introduction

The Commission Regulation (EU) 2017/2015 establishing a guideline on electricity balancing (hereafter referred to as the 'EBGL') proposes the application of cross-zonal capacity allocation (hereafter referred to as 'CZCA') for the balancing process to improve competition by means of cross zonal balancing exchanges. This implies that TSOs may allocate cross-zonal capacity (hereafter referred to as 'CZC') available from the single day-ahead coupling (hereafter referred to as 'SDAC') to the same timeframe in which the balancing capacity procurement is organised. To yield the largest benefit through a CZCA in a market-based environment, the EBGL introduces three cross-zonal capacity allocation processes:

- Article 40 to develop a methodology based on Co-optimised allocation process
- Article 41 to develop a methodology based on Market-based allocation process
- Article 42 to develop a methodology based on allocation process based on economic efficiency analysis

This document gives background information and rationale for the all TSOs' proposal for a **methodology for a co-optimised allocation process of cross zonal capacity** (hereafter referred to as 'CO CZCA') for the exchange of balancing capacity or sharing of reserves, being developed in accordance with Article 40 of EBGL.

The aim of this explanatory document is to provide additional information with regard to the CO CZCA for the exchange of balancing capacity and sharing of reserves.

For higher legibility the document is structured as follows:

- **Chapter 1** and **2** give a general presentation of the EBGL requirement and the co-optimisation allocation process methodology;
- **Chapter 3** provides background information regarding day-ahead and intraday market coupling, and balancing capacity markets;
- **Chapter 4** covers the assessment of the market value of CZC. The principles of the required CZCA optimisation (cost benefit analysis) are provided;
- **Chapter 5** introduces a comprehensive description of the co-optimised allocation process. The mathematical description and firmness regimes are emphasized;
- **Chapter 6** is dedicated to the intended stakeholders' workshop about this CO CZCA methodology. The impact of the past workshop is analyzed.

1.1 EBGL and the scope of the CZCA Proposal

The EBGL established an EU-wide set of technical, operational and market rules to govern the functioning of electricity balancing markets.

The main purpose of this guideline is the integration of balancing markets to enhance the efficiency of the European balancing processes. The integration should be done in a way that avoids undue market distortion. In other words, it is important to focus on establishing a level-playing-field. This requires a certain level of harmonisation in both technical requirements and market rules. To provide this level of harmonisation, the

EBGL sets out certain requirements for the developments of harmonised methodologies for the allocation of cross zonal capacity for balancing purposes.

1.2 TSOs may allocate cross zonal capacity

TSOs procure ahead of real-time balancing capacity from frequency restoration reserves (FRR) and/or replacement reserves (RR). 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 to cope with imbalances in the system.

Cross border cooperation for the procurement of balancing capacity for FRR and/or RR could be implemented by two different schemes:

- **Exchange of balancing capacity** which refers to 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. 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.
- **Sharing of reserves** which refers to a mechanism in which more than one TSO takes the same reserve capacity, being FRR or RR, into account to fulfil their respective reserve requirements resulting from their reserve dimensioning processes. 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.

Article 38 of the EBGL allows two or more TSOs to allocate a part of the CZC for the cross-border exchange of balancing capacity or sharing of reserves. Such an allocation may:

- enable TSOs to procure and use balancing capacity in an efficient, economic and market-based manner;
- improve competition for balancing capacity markets;
- improve competition between different markets;
- facilitate regional procurement of balancing capacity.

To yield the largest benefit through a CZCA in a market-based environment, the EBGL introduces three capacity allocation methods:

- Co-optimised allocation process, pursuant to Article 40;
- Market-based allocation process, pursuant to Article 41;
- Allocation process based on economic efficiency analysis, pursuant to Article 42.

All TSOs shall provide a common proposal for an allocation method based on co-optimisation (Art. 40) and each CCR may provide a common proposal for a) market-based allocation (Art. 41) and b) allocation based on economic efficiency analysis (Art. 42).

Aforementioned methods differ in the time period, in which the allocation process is conducted as well as in the available data for the allocation. This explanatory document focuses exclusively on the co-optimised method.

1.3 Competition on cross zonal capacity between day-ahead and balancing capacity market

The CZC between two bidding zones is an example of a scarce resource which has to be allocated in an economically efficient way. The CZC allocated to the SDAC decrease the available CZC for the BC and vice versa. In other words, allocation of CZC to one market increases its welfare but decreases the welfare of the second one and vice versa. The DA and BC markets therefore directly compete for the available CZC in the given timeframe. By establishing a method for allocating CZC, the equal treatment of both markets shall be ensured.

The co-optimisation allocation process implies CZCA for the balancing capacity market at D-1 for the 24 hours of the next day together, with and at the same time as the allocation of cross zonal capacity to the SDAC.

Firm energy supply and demand bids, together with firm balancing capacity bids, therefore compete at the same time for the available CZC for the next day, as calculated and published by the TSOs before the GCT of the SDAC.

The classical economic concept to optimally allocate CZC to different purposes (also called the optimal capacity split problem) is to express the marginal economic surplus for an increment of CZC used for each purpose, and then find the capacity split where the marginal value for each purpose is equal (or the difference in marginal value is minimal if the lines do not cross). This principle is shown in Figure 1 below.

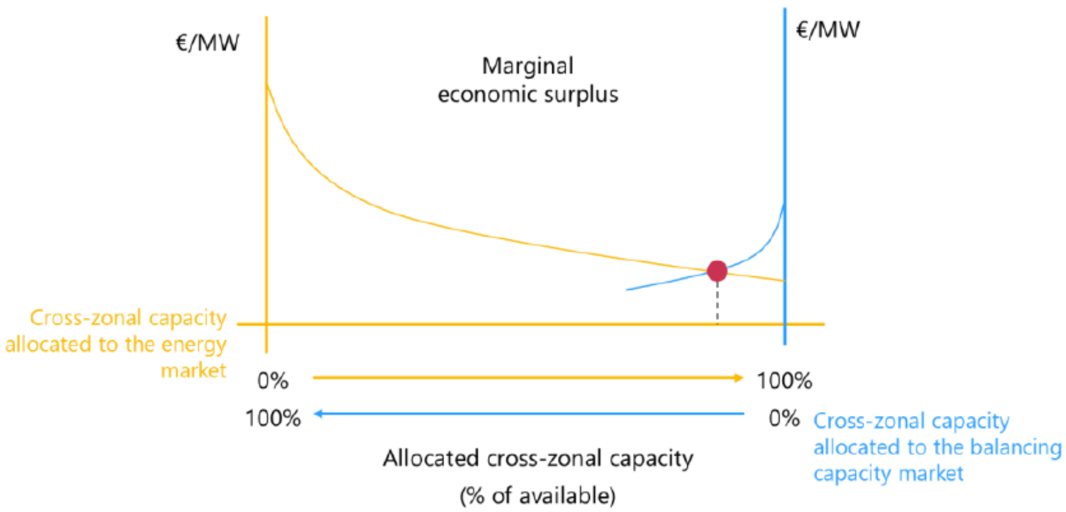


FIGURE 1: PRINCIPLE OF OPTIMAL CAPACITY ALLOCATION TO DIFFERENT PURPOSES

CZCA over all borders, all hours and all allocation purposes gives maximum market welfare if and only if it is not possible (i.e. without violating constraints) to reduce the difference in marginal economic surplus between allocation purposes for any hour on any border any further, while the summed effect of resulting increases of the difference in marginal economic surplus on any other border, hour and allocation purpose is lower. This is called a Pareto optimum.

The objective of the co-optimisation function is to maximise the sum of welfare of the balancing capacity market and the SDAC.

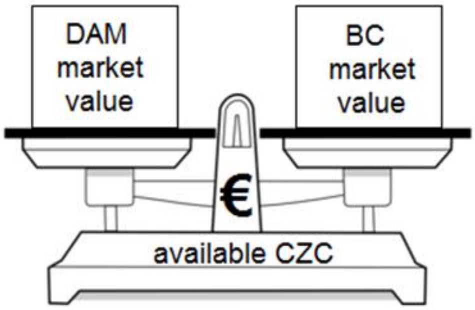


FIGURE 2: HOW TO ALLOCATE AVAILABLE CROSS ZONAL CAPACITY

As a result, CZC may be allocated for the exchange of balancing capacity or sharing of reserves if the market value for the exchange of balancing capacity is superior to the market value for SDAC.

2 EBGL requirements for co-optimisation allocation process methodology

Article 40 of the EBGL requires all TSOs to develop a proposal for a methodology for a co-optimised allocation process of CZC for the exchange of balancing capacity or sharing of reserves. This section provides a summary of the core EBGL requirements for the CO CZCA.

2.1 Co-optimisation proposal: Article 40 of the EBGL

Article 40(1) of the EBGL states the requirement to develop "*a proposal for a methodology for a co-optimised allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves*."

Besides the obligation to develop a proposal, Article 40 of the EBGL defines boundary conditions and specific requirements for this methodology.

In the words of the EBGL, such a methodology shall:

> *a) apply for the exchange of balancing capacity or sharing of reserves with a contracting period of not more than one day and where the contracting is done not more than one day in advance of the provision of the balancing capacity;*

This means that the entire process of CO CZCA takes place within H-24 and H, where H is the time of the provision of the balancing capacity. This means that according to the EBGL, co-optimisation allocation is done during the SDAC auction.

> *(b) include the notification process for the use of the co-optimised allocation process;*

> *(c) include a detailed description of how cross-zonal capacity shall be allocated to bids for the exchange of energy and bids for the exchange of balancing capacity or sharing of reserves in a single optimisation process performed for both implicit and explicit auctions;*

In CO CZCA, for the use of the same amount of CZC, within the same market process, there is a direct competition between (at least) two different products: bids for energy and bids for balancing capacity. The inputs of the single optimisation process are both balancing capacity bids and energy bids, submitted per bidding zone. The result is an optimal allocation of the CZC to both products.

> *(d) include a detailed description of the pricing method, the firmness regime and the sharing of congestion income for the cross-zonal capacity that has been allocated to bids for the exchange of balancing capacity or sharing of reserves via the co-optimised allocation process;*

Pricing methods are, for example, pay-as-bid and pay-as-cleared. The results of the co-optimisation are completely independent from the method for TSO-BSP pricing, which is applied *ex-post* to the selected balancing capacity bids (see Section 4.2).

It is required to describe in detail when the CZC is considered to be firmly allocated to the matched bids for the exchange of balancing capacity or sharing of reserves, in other words, to identify the time interval during which this CZC is not available for any other allocation processes.

In general, the congestion income is part of the total economic welfare and its value can be positive or negative (revenue or cost). It can appear whenever there is a price difference between bidding zones and it can also take into account the cost of using CZC (in case a third party owns transmission rights). The congestion income on a border, if any, must be shared between the TSOs who share that border: it is required that the CO CZCA Proposal contains the principles for sharing the congestion income.

Article 40(3) of the EBGL requires that the definitions of the pricing method of CZC, the firmness regime of CZC, and the sharing of congestion income from CZC for which the CO CZCA Proposal is applied ensure equal treatment between balancing capacity bids and energy bids.

> *(e) include the process to define the maximum volume of allocated cross-zonal capacity for the exchange of balancing capacity or sharing of reserves;*

Article 40 poses no a priori limitation for the co-optimised allocation of CZC for exchange of balancing capacity or sharing of reserves, but limits can arise from technical or economic reasons.

> *(f) be based on a comparison of the actual market value of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves and the actual market value of cross-zonal capacity for the exchange of energy;*

Actual bids, which represent the actual market value, are used for all products. This means that:

- the GCT is the same for balancing capacity and energy markets;
- TSOs (balancing) and NEMOs (trading energy) have the same timeslot to send data to the market coupling operator.

Moreover, it is stated in Article 40(4) of the EBGL that CZC allocated for the exchange of balancing capacity or sharing of reserves via the co-optimised allocation process shall be used only for the exchange of balancing capacity or sharing of reserves and the associated exchange of balancing energy.

2.2 Principles from Articles 38 and 39 of the EBGL

Article 38 of the EBGL – General requirements

The methodology for the CO CZCA is based on general requirements set out in Article 38 of the EBGL:

Article 38(1) of the EBGL states that two or more TSOs are allowed to allocate parts of CZC for the use of balancing, based on three different allocation methodologies, co-optimisation being one of them. Any contract between two or more TSOs for CZCA for the exchange of balancing capacity or sharing of reserves already in place before the EBGL entered into force may remain valid until the contract expires.

Article 38(2) of the EBGL lists information that any CZCA proposal needs to specify regarding its scope of application: bidding zone borders, market timeframe, duration, and methodology.

Article 38(3) of the EBGL stipulates that, where relevant, all TSOs shall develop a proposal to harmonise the different proposals for each of the three allocation methodologies by 5 years after the EBGL entered into force.

Article 38(4) of the EBGL mentions that CZC which is allocated to the exchange of balancing capacity or sharing of reserves can only be used for the standard products of mFRR, aFRR and RR for both AC and DC interconnections. On DC interconnectors, CZC may also be allocated for operating and exchanging FCR. The reliability margin of AC interconnectors shall be used for operating and exchanging FCR and shall not be used for the exchange of balancing capacity or sharing of reserves.

Article 38(5) of the EBGL forbids the CZCA for balancing purposes 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. However, the TSOs believe this requirement shall not prevent TSOs to establish early market based integrated balancing capacity markets and applying allocation of cross-zonal capacity.

Article 38(8) of the EBGL requires that:

- on a regular basis it is assessed whether the allocated CZC is needed for the purpose of balancing;
- when CZC is no longer needed for the purpose of balancing, it shall be released as soon as possible and returned in the subsequent capacity allocation timeframes, where it shall no longer appear as already allocated CZC in the calculations of CZC.

According to Article 38(9) of the EBGL, allocated CZC shall be released when it has not been used for the associated exchange of balancing energy, meaning that the RR, mFRR and aFRR quantities affecting CZC have not been activated in their relevant timeframes. Releasing CZC means that it becomes available for the exchange of balancing energy with shorter activation times (e.g. allocated CZC for aFRR, when released, is available for imbalance netting).

Article 39 of the EBGL – Calculation of the market value of cross zonal capacity

Article 39 of the EBGL defines the principles for the calculation of the market value of CZC. The relevant parts for the CO CZCA methodology are described in the following and in more detail in Section 4, considering that for this methodology it is mandatory to use actual bids for both the exchange of energy and the exchange of balancing capacity (or sharing of reserves).

Article 39(1) of the EBGL states that for the CO CZCA the market value of CZC is determined based on actual market values of CZC.

Article 39(2) of the EBGL says that the actual market value of CZC for the exchange of energy is calculated based on actual bids from the SDAC and its calculation should take into account, where relevant and possible, expected bids from SIDC.

Article 39(3) of the EBGL says that the actual market value of CZC for the exchange of balancing capacity shall be calculated based on balancing capacity bids submitted to the capacity procurement optimisation function.

Article 39(4) of the EBGL says that the actual market value of CZC for sharing of reserves shall be calculated based on the avoided costs of procuring balancing capacity. This is implicitly taken into account in the CO CZCA, because sharing of reserves means that the total demand for balancing capacity of the TSOs in the sharing agreement is lower, therefore the benefit of allocating CZC is the avoided cost of procurement.

2.3 Other relevant information from the EBGL

Article 33 of the EBGL – Exchange of balancing capacity

According to Article 33(2) of the EBGL, *"except in cases where the TSO-BSP model is applied pursuant to Article 35, the exchange of balancing capacity shall always be performed based on a TSO-TSO model whereby two or more TSOs establish a method for the common procurement of balancing capacity taking* *into account the available cross-zonal capacity and the operational limits defined in Chapters 1 and 2 of Part IV Title VIII of Regulation (EU) 2017/1485."*

Article 33(3) of the EBGL states that, apart from the exceptions in Articles 26 and 27 of the EBGL, *"all TSOs exchanging balancing capacity shall submit all balancing capacity bids from standard products to the capacity procurement optimisation function"*, without modifying or withholding any balancing capacity bids which shall be included in the procurement process.

Article 33(4) of the EBGL requires that all TSOs exchanging balancing capacity ensure the (secure) availability of CZC, either by a probabilistic approach (described in Article 33(6) of the EBGL) or by the CZCA methodologies pursuant to Articles 38 to 42 of the EBGL.

Article 36 of the EBGL – Use of cross zonal capacity

According to Article 36(2) of the EBGL, *"[t]wo or more TSOs exchanging balancing capacity may use cross-zonal capacity for the exchange of balancing energy when cross-zonal capacity is:*

> *a) available pursuant to Article 33(6);* i.e. it is calculated with the probabilistic approach,
>
> *b) released pursuant to paragraphs 8 and 9 of Article 38;*meaning that CZC was allocated according to one of the methodologies in Articles 40, 41 and 42 of the EBGL and then either not used for the associated exchange of balancing energy or deemed too high in a re-evaluation,
>
> *c) allocated pursuant to Articles 40, 41 and 42.* meaning that CZC was allocated according to one of the methodologies in Articles 40, 41 and 42 of the EBGL and can therefore be used for the associated exchange of balancing energy.

3 Background information

3.1 Single day-ahead coupling (SDAC)

3.1.1 Market coupling principles

In day-ahead market coupling, the CZC is implicitly (that means capacity and energy) allocated between bidding zones through the choice of energy bids. Indeed, the economic surplus is maximised by selecting the cheapest bids from different bidding zones to the extent of the CZC between them. Below the main steps, the coupling principles and timeline of SDAC are presented.

Day-ahead market (hereafter referred to 'DAM') based on explicit auctions (that means capacity only) are not considered here because this methodology is out of target solution of CACM.

3.1.2 Overview of the functions and steps

Figure 3 illustrates the main functions of the SDAC and is based on the flow-based market coupling process.

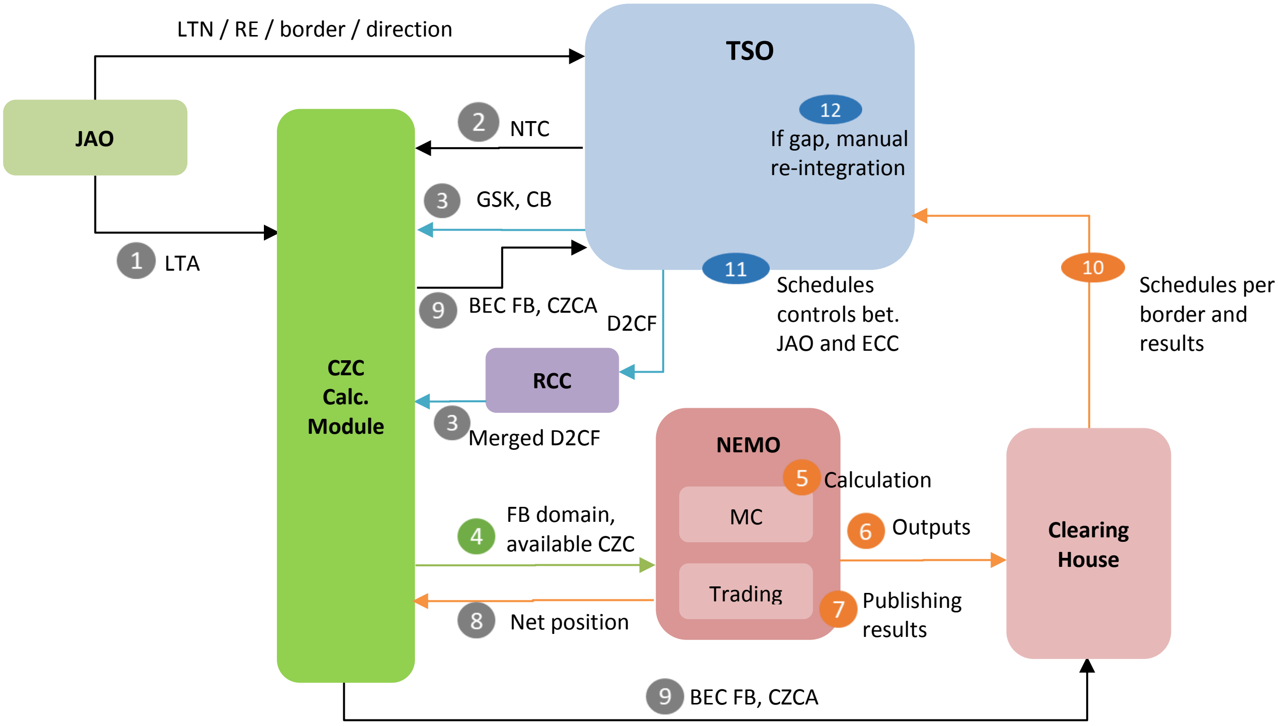


FIGURE 3: MAIN FUNCTIONS OF THE SINGLE DAY-AHEAD COUPLING

The CZC Calculation Module receives the following information in order to assess the FB domain and the available CZC that will be offered to the day ahead market coupling:

- JAO transmits the LT allocation from previous auctions (1).
- The TSOs transmit NTCs (2) and FB files (Critical Branches (CB), Generation Shift Key (GSK)) (3).
- The RCC sends back the merged D2CF (3) for the relevant area.

The CZC Calculation Module informs the NEMO about the FB domain and available CZC (4). The MC algorithm runs the coupled algorithm (5) and sends the following results to the clearing house (6): final net positions, accepted offers, and (marginal) prices. The NEMO also publishes the results at 12:42 (7). The net positions per hub are sent to the CZC Calculation Module (8) for the Bilateral Exchange Computation (BEC). Once the calculation is finished, the CZC Calculation Module sends the results to TSOs and to the clearing house (9). The clearing house forwards the results and the schedules per border to the TSO (10). The TSO then compares the BEC it received by ECC (11) and by the CZC Calculation Module (9). If they are different, nominations will be rejected, and re-integration will be made at day-ahead schedules, with the other TSO as a counterparty (12). In case of decoupling, JAO explicitly allocates CZC through shadow auctions.

3.1.3 Timelines

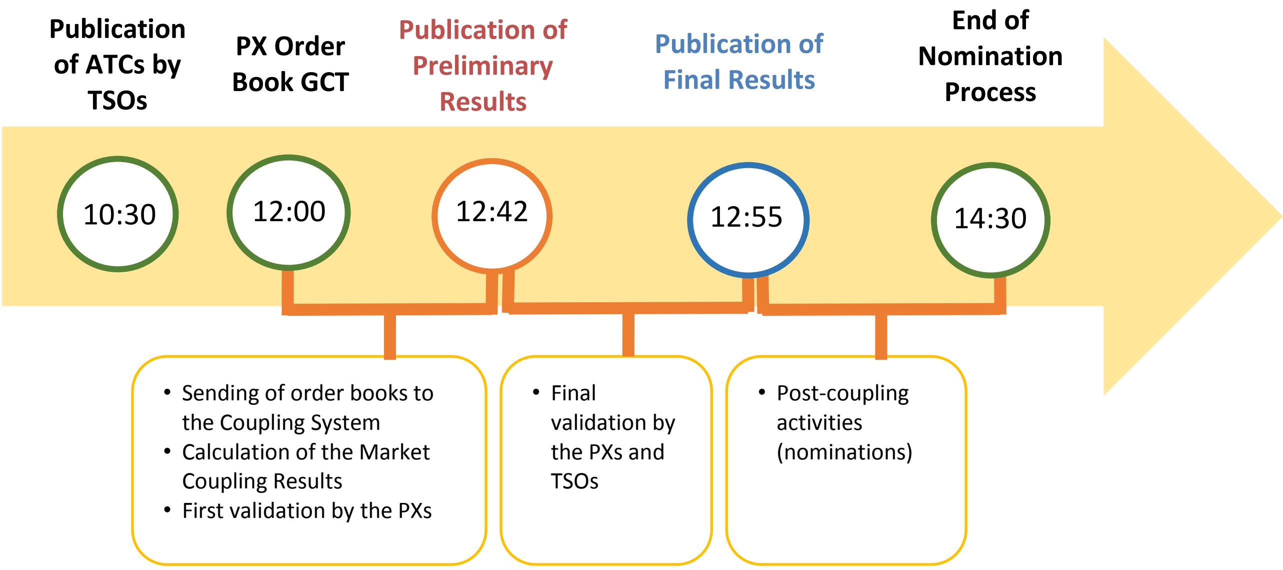


FIGURE 4: REGULAR TIMINGS FOR THE SINGLE DAY-AHEAD COUPLING

1. Until 10.30, TSOs assess the available CZC (Flow Based or ATC) and publish them.
2. The market participants communicate their buy/sell orders from the following day to PX, until market GCT 12:00 for all the coupled market.
3. The MC clearing algorithm calculates the prices, the volumes and the net positions.
4. The results for coupled markets are published, the preliminary publication is for information
5. The final results are published until 12:55 in regular case. In case of problems, the publication of final results could be delayed until 13:50 latest.

in case of technical problems there is the possibility to implement additional actions to get results for the day-ahead process like partial decoupling or full decoupling resulting in a fall-back solution based on explicit capacity shadow auctions.

3.2 Single intraday coupling (SIDC)

SIDC brings the whole European intraday continuous market together, with an implicit CZC allocation across Europe. The structure of the SIDC platform allows the share of order books (SOB) between different PXs while choosing the minimal path for the commercial transaction. The platform is using ATC nonetheless in the future, FB could be used as calculation method.

Considering the timings of SIDC, two options are in place:

For the first one the GCT for the hour for trading is always 60 minutes before the beginning of a full hour. Only until that time, this hour and subsequent ¼ hours could be traded. In fact, this is resulting in different pre-trading duration for the ¼ blocks of each traded hour.

3.3 Balancing capacity market

According to Article 32 of the EBGL, all TSOs of an 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 given by SOGL. Reserve capacity can be provided by:

a) procurement of balancing capacity within control area and exchange of balancing capacity with neighbouring TSOs;

b) sharing of reserves;

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 CZC

3.3.1 Balancing capacity auctioning

Each TSO procuring balancing capacity shall define the rules for the procurement of balancing capacity. The rules for the procurement of balancing capacity shall comply with the following principles, according to the Article 32(2) of the EBGL:

a) the procurement method shall be market-based for at least the frequency restoration reserves and the replacement reserves;

b) the procurement process shall be performed on a short-term basis to the extent possible and where economically efficient;

c) the contracted volume of balancing capacity may be divided into several contracting periods.

d) the procurement of upward and downward balancing capacity for at least the frequency restoration reserves and the replacement reserves shall be carried out separately.

3.3.2 Exchange of balancing capacity

The exchange of reserves allows TSOs to organise and to ensure the availability of reserve capacity resulting from the dimensioning by relying on BSPs that are connected to an area operated by a different contracted TSO within a synchronous area or between two synchronous areas.

Two or more TSOs exchanging or mutually willing to exchange balancing capacity shall develop a proposal for the establishment of common and harmonised rules and processes for the exchange and procurement of balancing capacity while respecting the requirements set by EBGL for procurement for balancing capacity.

Except in cases where the TSO-BSP model is applied, the exchange of balancing capacity shall always be performed based on a TSO-TSO model whereby two or more TSOs establish a method for the common procurement of balancing capacity taking into account the available CZC and the operational limits defined by SOGL.

All TSOs participating in the same exchange of FCR, FRR or RR shall specify an exchange agreement as defined by SOGL.

Exchange of reserves may lead to a different geographical location of the balancing capacity from the dimensioning results for each area, however, the total amount of balancing capacity within the two areas is still equivalent to the total amount without the exchange of reserves.

Figure 5 illustrates the exchange of 200 MW of balancing capacity from Area B to Area A.

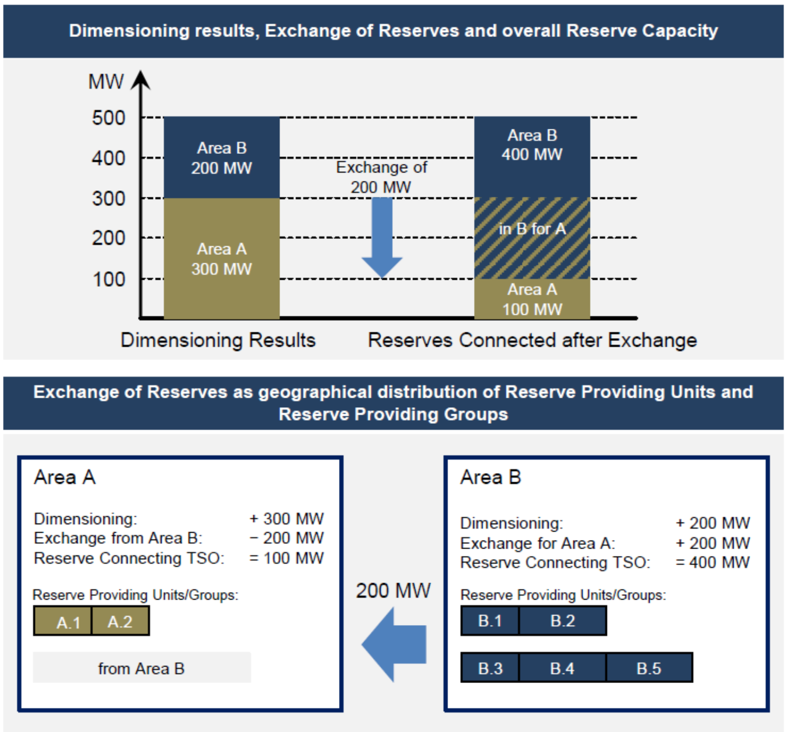


FIGURE 5: EXCHANGE OF RESERVES – ILLUSTRATIVE EXAMPLE. SOURCE: LFCR SUPPORTING DOCUMENT 2013

Suppose that the dimensioning rules result in the need of 300 MW for Area A and 200 MW for Area B. Without the exchange of reserves the respective reserve capacity has to be provided by reserve providing units or reserve providing groups connected to the Area which means that 300 MW have to be connected in Area A and 200 MW in Area B.

As a result of the exchange of reserves of 200 MW from Area B to Area A, 200 MW of reserve capacity needed for Area A are now located within Area B, whereas Area A still ensures in addition the availability of the full amount of its own reserve capacity.

Although the geographical location of the reserve capacity is different from the dimensioning results for each area, the total amount of reserve capacity within Area A and B is still 500 MW which is equivalent to the total amount without the exchange.

3.3.3 Sharing of reserves

The sharing of reserves agreement allows two or more TSOs to organise and to ensure the availability of balancing capacity that is required by dimensioning rules by relying on the same reserves inside a synchronous area and between two synchronous areas.

The roles and responsibilities of the reserve connecting TSO, the reserve receiving TSO and the affected TSO for the exchange of reserves between synchronous areas, shall be described in the synchronous area operational agreement and a sharing agreement as defined by SOGL.

In contrast to the exchange of reserves, that only changes the geographical distribution of reserve capacity, the sharing of reserves changes the total amount of procured balancing capacity by involved TSOs, with an impact on the geographical distribution as an additional implicit effect. The sharing of reserves agreement defines priority rights to the shared reserves in the situation where either two or more TSOs have a simultaneous need.

Figure 6 illustrates the sharing of 100 MW of balancing capacity between two areas with a possible relocation of a 100 MW of reserves from Area A to Area B.

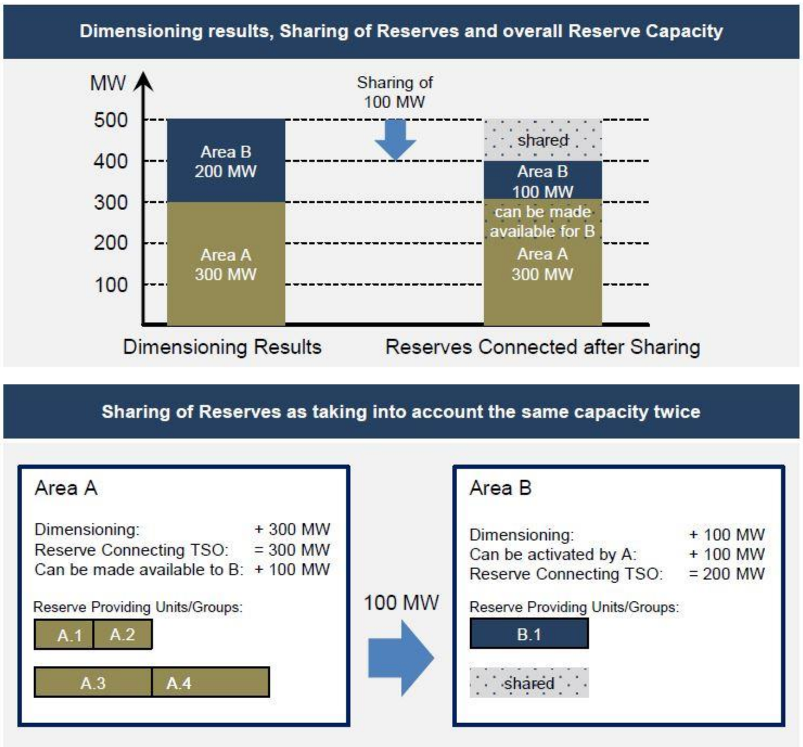


FIGURE 6: SHARING OF RESERVES – SIMPLE EXAMPLE. SOURCE: LFCR SUPPORTING DOCUMENT 2013

Suppose that the dimensioning rules for area A and area B result in the need of 300 MW for area A and 200 MW for area B. Without the sharing of reserves the TSOs of area A and area B have to ensure the availability of respectively 300 MW and 200 MW.

However, assuming that in some cases it might be very unlikely that both TSOs need to activate the full amount reserve capacity at the same time, the TSOs of area A and area B can 'share' part of their reserve capacity. In practice this means that the TSOs of area B can make use of e.g. 100 MW of the reserve capacity of the TSOs in area A.

As a result, the TSOs of area A and area B now need to ensure the availability of 300 MW and 100 MW. The TSOs of area A now make 100 MW of their own reserve capacity also available to the TSOs of area B. The total amount of the reserve capacity within the system is now 400 MW, whereas it was 500 MW without the sharing agreement (leading in this example to reduction of 100 MW of reserve capacity in the total system).

4 Market value of cross zonal capacity

The decision to optimally allocate CZC to either the energy market or the balancing capacity market shall be based on a comparison of the actual market value of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves and the actual market value of cross-zonal capacity for the exchange of energy, according to Article 40(2) of the EBGL.

Article 39 (2-4) of the EBGL further specifies how the actual market value shall be derived: with regard to the exchange of energy the bids of market participants in the DAM shall be used, also taking into account bids in the intraday market where relevant and possible; and balancing capacity bids submitted to the capacity procurement function pursuant to Article 33(3) of the EBGL shall be used with regard to the exchange of balancing capacity. When CZC is used for the sharing of reserves, the market value shall be based on the avoided costs of procuring balancing capacity in order to calculate the consumer surplus for the balancing capacity market. The actual market value of CZC for the exchange of energy between bidding zones and for the exchange of balancing capacity are calculated per day-ahead market time unit.

The economic concept to optimally allocate CZC to different purposes (also called the optimal capacity split problem) is to express the marginal market value for an increment of CZC used for each purpose (market) and then find the capacity split where the marginal values are equal (or the difference in marginal value is minimal if the lines do not cross).

The maximisation of welfare is achieved by allocating CZC on all borders, all hours and for all allocation purposes such that the Pareto optimum is reached. I.e.

(a) it is not possible (i.e. without violating constraints) to reduce the difference in marginal market values between allocation purposes for any hour on any border, while at the same time.

(b) the difference in marginal market values increases on any other border in any other hour and for any allocation purpose.

However, this concept assumes that the welfare optimization problem must be convex. This assumption may not hold for balancing capacity markets, and the consequences of applying this method is further described in chapter 4.2.5.

4.1 Actual Market Value of cross zonal capacity for the Exchange of Energy

4.1.1 The market value of cross zonal capacity

In the CO CZCA Proposal as well as in this Explanatory Document, the market value of CZC for the exchange of energy between all bidding zones of the SDAC is defined as the additional welfare surplus of the SDAC resulting from the additional CZC allocated for the energy market and is calculated based on the sum of producer surplus, consumer surplus and congestion income.

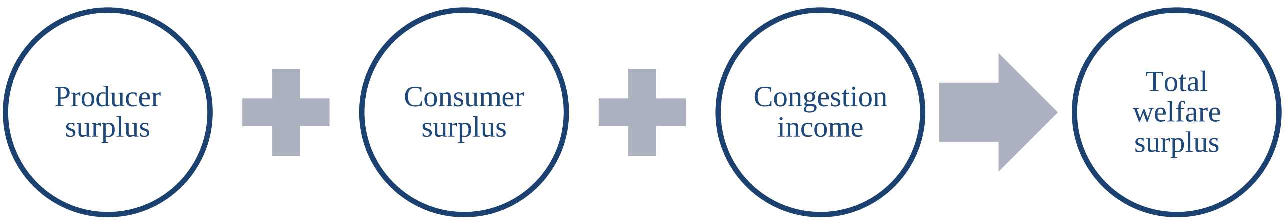


FIGURE 7: MARKET VALUE OF CZC IS DEFINED AS THE TOTAL WELFARE SURPLUS

Note that:

- the important measure for the market value is the surplus in welfare of additional CZC, not the absolute values of welfare.
- only the implicit allocation of CZC (flow-based or ATC-based) is relevant for the calculation since the final allocation of CZC is based on co-optimisation; any explicit allocation of CZC which may take place e.g. monthly or yearly only affects and determines the upper limit of CZC that may be allocated via co-optimisation.

4.1.2 *Isolated energy markets cleared independently*

Figure 8 shows the base case of isolated energy markets which are cleared independently, i.e. no CZC is allocated or used for the exchange of energy and the market clearing prices (will) differ. In this example, the market clearing price in zone C is lower than in zone B. The consumer and producer surpluses are highlighted in blue and red, respectively, and the total sum of the areas represents the total welfare.

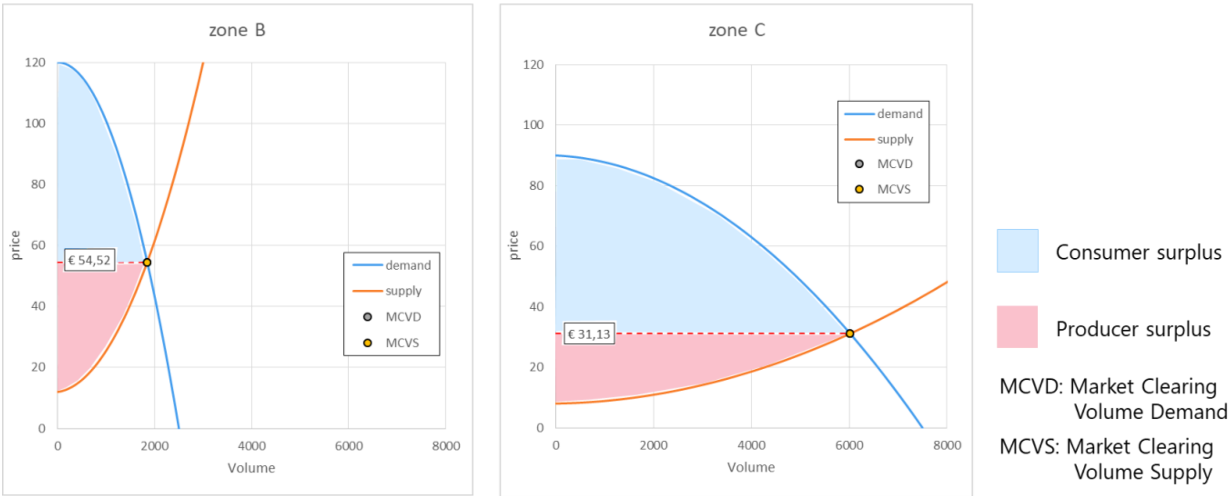


FIGURE 8: WELFARE IN TWO ENERGY MARKETS CLEARED IN ISOLATION

4.1.3 *Coupled energy markets with congestion*

When CZC is allocated and may be used for the exchange of energy, market participants may trade across the border. If the amount of available CZC is large enough, this may even lead to full price convergence between the two bidding zones. Once prices have converged, any additional CZC would then have a value of 0.

Figure 9 depicts a situation where the allocated CZC only allows for a partial price convergence: the market clearing price in zone C remains lower than in zone B. In addition to consumer and producer surpluses, the remaining price difference creates a positive congestion rent which is also part of total welfare (the green area between the red dotted lines in the zone B). With full price convergence, the congestion rent distributions would cancel out and disappear.

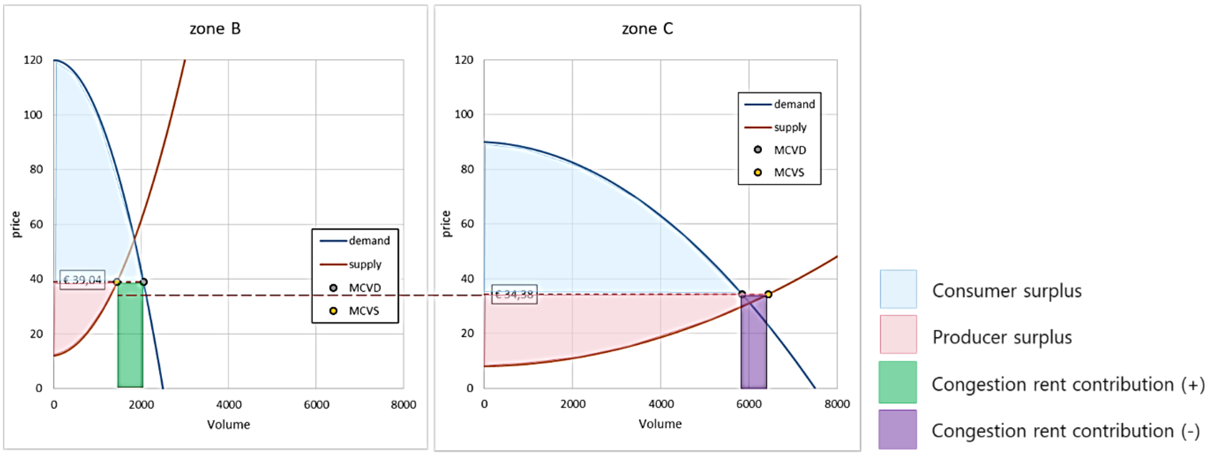


FIGURE 9: WELFARE IN COUPLED ENERGY MARKETS WITH CONGESTION

The same logic may be applied to multiple markets and bidding zones; it is thus possible to calculate the value of CZC for each border for which co-optimisation applies. The general calculation of welfare is shown in the equation below and consists of the sum of consumer surplus, producer surplus and congestion rent over all markets. The congestion rent for a market or bidding zone is calculated based on the market clearing price and the market net position, where the market net position equals the sum of exchanges in both directions (positive for export, negative for import) on all borders with other markets. The market net position also equals the difference in supply and demand volumes cleared.

$$\sum_{all\ markets} \{Consumer\ surplus + Producer\ surplus - Market\ Net\ Position\ * Market\ Clearing\ Price\}$$

EQUATION 1: CALCULATION OF THE ECONOMIC SURPLUS WHEN SUPPLY AND DEMAND ARE MATCHED TO AN EQUILIBRIUM CLEARING POINT

The market value of CZC may now be calculated as the difference between total welfare when CZC is allocated for the exchange of energy and the situation of isolated markets. The optimal allocation of CZC using the co-optimisation method is determined by comparing the marginal market value of an additional MW of CZC for the exchange of energy and then compared to the marginal market value of the same additional MW of CZC for the exchange of balancing capacity for each border.

4.2 Actual Market Value of cross zonal capacity for the Exchange of Balancing Capacity or Sharing of Reserves

In the CO CZCA Proposal as well as in this Explanatory Document, the market value of CZC for the exchange of balancing capacity or sharing of reserves is defined as the additional total welfare surplus in the balancing market resulting from the additional CZC allocated for the balancing capacity market, and is again calculated based on consumer surplus, and when marginal pricing is used as to clear the market also on producer surplus as well as on congestion income. This means that the market value does not represent the absolute value of the balancing capacity market and CZCA.

The underlying data are upward and downward balancing capacity bids which have been submitted and accepted by the capacity procurement optimisation function pursuant to Article 33(3) of the EBGL. This function is part of the co-optimisation method and is described in more detail in Section **Error! Reference source not found.**. In general, upward and downward balancing capacity bids are co-optimised independently, i.e. the demands etc. are not netted *ex-ante*. Note, that sharing of reserves is modelled as a reduction of consumer (TSO) demand by the shared amounts, before the markets are coupled. The additional market value of sharing of reserves is therefore based on the avoided costs of procuring according to Article 39(4) of the EBGL and assigned as the consumer surplus.

4.2.1 The market value is independent of the pricing method for balancing capacity

The calculation of the market value is based on the maximization of welfare. Hence it is independent of the pricing method for balancing capacity, i.e. pay-as-bid or marginal pricing. The only difference is that the total welfare is the same, but the distribution is different: there is producer surplus for marginal pricing; for pay-as-bid pricing this would also be part of consumer surplus. Also, with pay-as-bid pricing, all welfare gains are attributed to TSOs (as consumer surplus), whereas marginal pricing allows producers to also profit from the value of CZC.

4.2.2 Isolated markets for balancing capacity with pay-as-bid pricing

Figure 10 depicts the base case of two isolated markets for balancing capacity with pay-as-bid pricing. In this example, it is assumed that the supply curves for balancing capacity are monotonously non-decreasing in both markets and the demand for balancing capacity in both areas is fixed and perfectly inelastic. It should be noted this is a simplification, as the balancing capacity market includes non-convexities as start-up and shut-down costs along with minimum output requirements (which state that if a plant is running, it must produce at least a certain amount). This is further elaborated in 4.2.5.

In this example, the price for the last accepted bid for TSO A is higher than the respective price for TSO B. The red arrow indicates available CZC for the exchange of balancing capacity or sharing of reserves, if the markets were coupled.

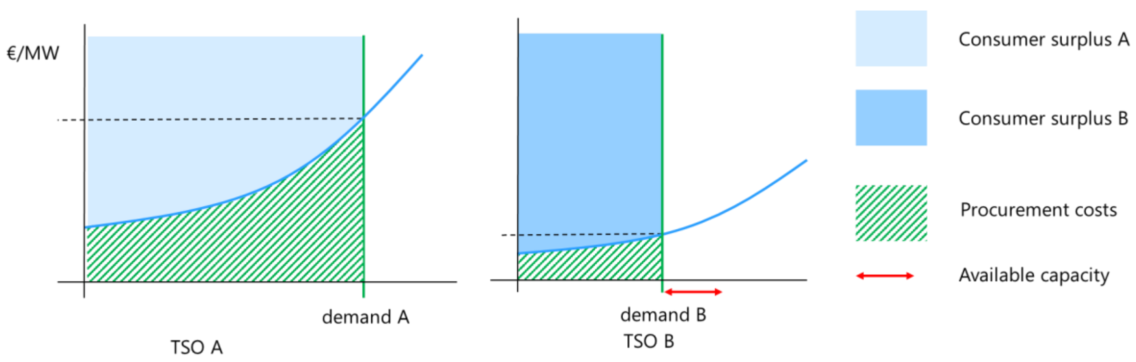


FIGURE 10: WELFARE IN ISOLATED MARKETS WITH PAY-AS-BID PRICING

4.2.3 Coupled balancing markets with pay-as-bid pricing

When the two markets are coupled and CZC is allocated, TSO A will be able to procure part of its balancing capacity in the area of TSO B. As a result, the price of the last accepted bid of TSO A will decrease and that of TSO B will increase. Figure 11 shows the situation where available CZC is not enough to reach full price convergence; consumer surplus for TSO A will decrease, whereas consumer surplus for TSO B will increase. A part of the procurement costs of TSO A in the isolated situation is now used to procure cheaper balancing capacity in market B. As is shown on the left hand side of Figure 11 the difference in welfare is the area (yellow) below the supply curve of area A, above the shifted supply curve of area B (dashed blue line) and between the supply clearing volume in the coupled situation and the original demand A. This is the market value of the allocated CZC in this particular situation. To derive the marginal market value these results must be compared to incremental changes of CZC, i.e. for each additional MW of CZC allocated to the balancing capacity market.

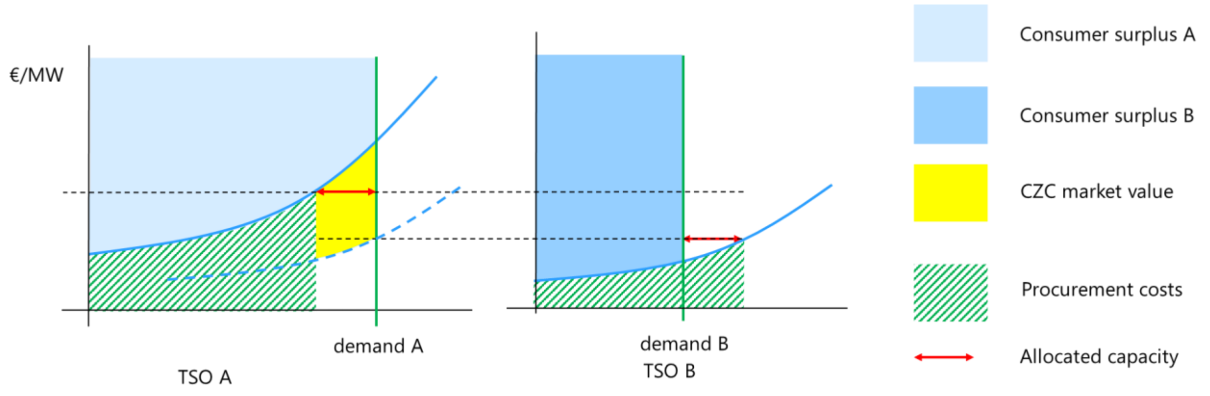
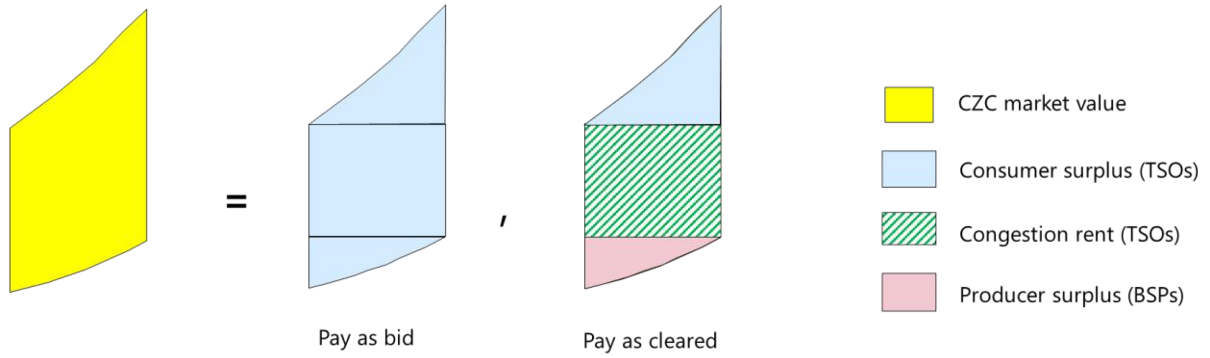


FIGURE 11: WELFARE IN COUPLED BALANCING MARKETS WITH PAY-AS-BID PRICING

4.2.4 Difference in the distribution of welfare surplus depending on the pricing scheme

The market value of CZC does not depend on the pricing scheme. With pay-as-bid pricing all of the market value represents consumer surplus. When the market is cleared with marginal pricing, this value also consists of producer surplus and congestion rent; the sum, however, remains the same. This difference in distribution is summarized in Figure 12 below.

FIGURE 12: DIFFERENCE IN THE DISTRIBUTION OF WELFARE SURPLUS DEPENDING ON THE PRICING SCHEME



4.2.5 Non-convexities in balancing capacity markets

The balancing capacity market is directly linked to the energy market, i.e. the BSPs' expectation of the market clearing in the energy market will be reflected in their bidding behaviour for balancing capacity. The alternative costs for provision of reserves instead of energy are lowest for the market participants that are almost indifferent to deliver energy, i.e. their marginal costs are near the spot price. For reserves to be offered, some market participants can lower their energy output, and others can start energy production at a moderate economic loss. The former has a variable cost and the latter have a fixed cost.

This dependency between the two markets makes it difficult to apply the market coupling principles presented in 3.1.1. For this to be true, there must be no externalities, and no transaction costs, and perfect information is assumed. Additionally, the welfare optimization problem must be convex. This includes the absence of discrete variables. Discrete variables mean combinatorial problems that are hard to solve. Balancing capacity bids that reflect fundamental costs cannot be organized as a monotonously increasing "merit order list".

Non-convexities include start-up and shut-down costs along with minimum output requirements (which state that if a plant is running, it must produce at least a certain amount). Due to this combinatorial problem, there does not exist a "market clearing price" in spinning reserve markets that clears a balancing capacity market efficiently, nor a "marginal price". The market price conveys little or no information on which reserve offers were accepted.

The non-convex effects in the balancing capacity market can be tackled through discrete variables (block bids and combinatorial constraints), and by maximising the welfare integer programming. Efficiency of the allocation will be the highest if the energy and balancing capacity market were integrated into one single auction, where the economic surplus is maximised over all matched energy market bids and balancing capacity market bids subject to system constraints. However, this will increase the complexity and processing time.

The combinatorial difficulties can be overcome by restricting reserve bids to a simple format (price, volume). This would render a "merit order" of bids, but the bids would not reflect underlying costs, and the auction would not deliver welfare optimization. This will on the other hand reduce the efficiency of the CZCA allocation and the increase the procurement cost of balancing capacity, since the BSP must include a higher risk in their pricing or abstain to participate in the market, which will reduce the liquidity.

4.3 Value of Single Intraday Coupling

As mentioned above, Article 39(2) of the EBGL states that for the calculation of the actual market value of CZC for the exchange of energy, expected bids of market participants in the intraday market shall be taken into account where relevant and possible.

However, with regard to co-optimisation (see Section **Error! Reference source not found.**), the incorporation of the intraday market would introduce the necessity to forecast the respective bids, whereas the focus on the day-ahead energy market and the balancing capacity market allows for calculating the optimal allocation of CZC based on actual bids only. Using forecasting methods for bids introduces additional uncertainty to the co-optimisation. As the resulting effects cannot be anticipated by market participants, reducing overall transparency of the method.

In addition, it may be assumed that day-ahead schedules and bids of market participants already contain the expectations of the market environment for the respective day, and that the intraday market is used for minor adjustments to these schedules. This also means, that the volume on the intraday market is smaller than on the day-ahead energy market. Compared to the additional uncertainty introduced by forecasting the bids, the intraday market cannot be incorporated into co-optimisation in a meaningful way.

4.4 Value of Balancing Energy

Allocation of CZC for balancing capacity also allows for the subsequent exchange of balancing energy, including the respective welfare effects. Article 39(3) of the EBGL demands that the actual market value of CZC for balancing capacity is calculated. This is again taken into account in co-optimisation by using only actual bids. In order to derive the contribution of the exchange of balancing energy to the market value, the energy bids would need to be forecast which introduces uncertainty. Hence, balancing energy is not taken into account for co-optimisation.

Note, however, that in contrast to the intraday market, the relative contribution of balancing energy to the market value of CZC for the balancing market may be equal or even larger than the contribution of balancing capacity. This is also exacerbated by the possibility of a dual use of CZC from one market area to the other: for example, positive balancing energy exchanged from area A to area B and negative balancing energy exchanged from area B to area A have the same energy flow direction, in this case from area A to area B.

5 Co-optimisation

5.1 Criteria for a functional co-optimisation process

Subject to the requirements set by the EBGL, different options for the co-optimisation process have been evaluated and based on specified criteria and requirements. Table 1 presents the evaluation criteria chosen for the co-optimisation process. The proposed co-optimisation process is described in paragraph 5.2.

Criterion	Requirement
TSO's ability to develop and specify the allocation method and the procurement of balancing capacity	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).
Technical feasibility	An operational method should be known/available/demonstrated to calculate the results for an optimal allocation of CZC between two different markets.
Efficiency of the allocation	The allocation over all coupled energy and balancing capacity markets should provide maximum economic surplus.
Impact on TSO business processes	Required changes to the TSO business process should be minimal
Impact on NEMOs business processes	Required changes to the NEMO business processes should be avoided and otherwise only be minimal.
TSOs' operational independency from third parties	TSOs can independently operate the capacity procurement optimisation function.
Impact on overall processing time	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.
Governance	The impact on the existing contractual framework between TSOs and NEMOs should be avoided and otherwise only be minimal.
Impacts on EUPHEMIA	Changes required on EUPHEMIA and NEMOs' trading systems should be avoided and otherwise only be minimal.

TABLE 1: EVALUATION CRITERIA FOR THE CO-OPTIMISATION PROCESS

5.2 Process overview

Based on the evaluated criteria of paragraph 5.1, the developed co-optimisation methodology consists of 5 fundamental process steps, which are schematically depicted in Figure 13.

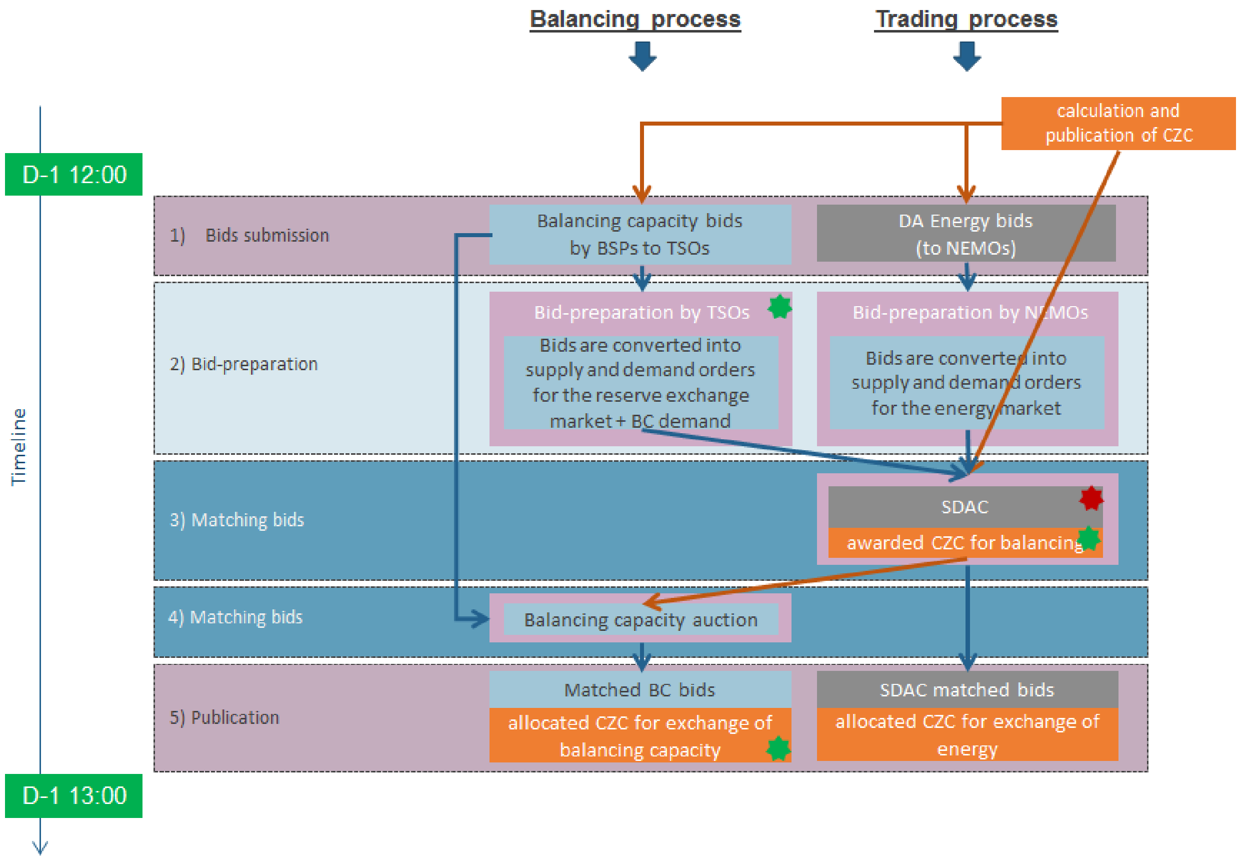


FIGURE 13: CO-OPTIMISATION PROCESS

Before the first step of the co-optimisation process, CZC available for the day-ahead market timeframe is calculated and published for market participants to prepare their bidding strategies for the SDAC, and for the cross zonal market for balancing capacity based on a TSO-TSO model.

5.2.1 Step 1: Bid submission

With the same GCT as the SDAC:

- Upward and/or downward BC bids are submitted by BSPs to the connecting TSOs;
- DAM bids are submitted by market parties to the NEMOs.

5.2.2 Step 2: Bid preparation

For the balancing capacity market, the TSOs of the balancing capacity cooperation convert the BC bids in supply and demand orders to make them compatible for the SDAC. Meanwhile, NEMOs convert the received DAM bids such that they are compatible for the SDAC.

The results of the bid preparation step are the so-called balancing capacity import/export curve and, based on these, a curve for the CZC to be allocated to the balancing capacity market of the bidding zone is generated. The latter is the required input for co-optimisation. Note, that the linear curves shown in Figure 14 represent approximations used for illustration and that the curves in the final process may deviate (see also Sections 4.1 and 4.2).

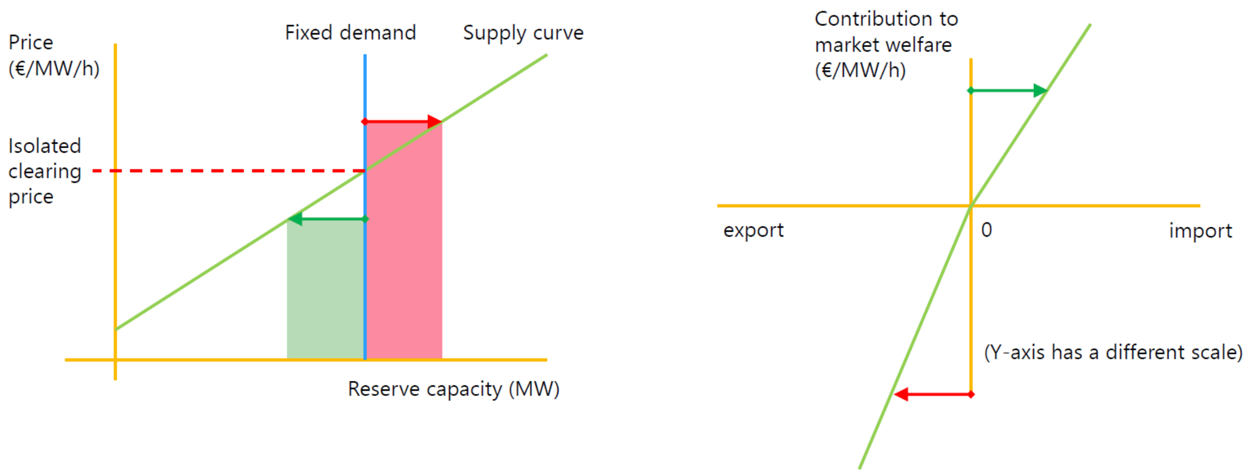


FIGURE 14: TRANSLATION OF BALANCING CAPACITY BIDS FOR THE CZCA

5.2.3 Step 3: Matching bids in the Single Day-Ahead Coupling

The SDAC is performed and takes into account all energy and balancing capacity bids. The co-optimisation function maximises the welfare of both markets combined. The amount of CZC for the exchange of balancing capacity or sharing of reserves is determined and communicated to the TSOs of the balancing capacity cooperation. Bids of the DAM are matched, prices are determined, and the result becomes firm.

5.2.4 Step 4: Matching bids of balancing capacity

Awarded CZC for the balancing capacity cooperation is used by the TSOs when matching upward and/or downward balancing capacity bids to demand and maximize the economic surplus over all matched balancing capacity bids. The step is performed by the capacity procurement optimisation function pursuant to Article 33(3) of the EBGL. Prices are determined and the allocated CZC for the exchange of balancing capacity or sharing of reserves becomes firm.

5.2.5 Step 5: Publication

Finally, the market outcome for energy trading is published (matched bids and prices). And TSOs publish the market outcome of BC (matched bids and prices if applicable).

5.3 Mathematical description

The co-optimisation function maximises the total welfare of the energy market and of the balancing capacity market.

Regarding the energy market it contains:

- producer surplus (supply bids);
- consumer surplus (demand bids); and
- congestion income.

Regarding the balancing capacity market, it contains:

- consumer surplus (TSO demand), and if applicable
- producer surplus (BSP bids), and if applicable

- congestion income.

Since the optimisation function for trading is already developed and implemented in the SDAC, only the optimisation function for the exchange of balancing capacity or sharing of reserves is further elaborated. The co-optimisation function for the exchange of balancing capacity or sharing of reserves is based on the actual market value of CZC for each bidding zone which can be derived directly from bids in the bidding zones.

The conceptual description is:

- balancing capacity auction (per TSO, per bidding zone)
- objective: maximize economic welfare over all matched balancing capacity supply orders
  - $max \sum_{all\ matched\ supply\ orders} -\{supply\ order\ volume * supply\ order\ price\}$
- Inputs:
  - Balancing capacity demand
  - Balancing capacity offers
  - Allocated CZC to the balancing capacity market (or equivalently: net position in the balancing capacity exchange market)
- Outputs:
  - Matched balancing capacity orders and clearing prices
- Constraints:
  - Matched volume of balancing capacity offers must equal balancing capacity demand plus the sum of allocated CZC to the balancing capacity market.

5.4 Evaluation of proposed co-optimisation process

The proposed co-optimisation process has been evaluated based on the criteria presented in chapter 5.1. Table 2 summarises the evaluation.

Criterion	Score	Argument
TSO's ability to develop and specify the allocation method and the procurement of balancing capacity	medium	TSOs can own the balancing capacity market auction themselves; allocation algorithm and allocation platform remain property of NEMOs (no access to algorithm specification for TSOs)
Technical feasibility	high	Method known (EUPHEMIA), mathematical formulation of optimization problem can be provided
Efficiency of the allocation	low/high	Market value of CZC for both markets is fully taken into account, provided discrete variables of balancing capacity market are fully passed through to the allocation; Non-convexities may reduce the efficiency of the allocation of CZC and procurement of balancing capacity
Impact on TSO business processes	medium	TSOs send (anonymized) balancing capacity exchange bids to the NEMOS and receive the results of the allocated capacities to the balancing capacity markets from the NEMOs
Impact on NEMOs business processes	medium	NEMOS will have to process supply and demand bids and block orders for balancing capacity exchanges into their MC system; NEMOs will have to send the allocated capacities to the balancing capacity market to the TSOs

TSOs' operationally independency	medium	TSOs can run the balancing capacity market auction themselves but not the CZC allocation for it
Impact on processing time	medium/ high	Combinatorial complexity of optimization problem increases because of balancing capacity market block bids; some increase of processing time expected; the materiality of this increase will have to be tested – Impact depends on the bid characteristics
Impact on governance	medium	The auction run by NEMOs will have to include bids for CZC, NEMOs will be operationally responsible for CZC allocation to the balancing capacity market; TSOs will have to provide those bids
Impact on EUPHEMIA algorithm and data model	medium	The EUPHEMIA objective function and the network constraints will have to be adapted; additional balancing capacity exchange bids and balancing capacity exchange constraints will have to be accommodated

TABLE 2: EVALUATION OF PROPOSED CO-OPTIMISATION PROCESS

5.5 Sharing of congestion income of cross zonal capacity

The rules propose to be applied for the sharing of congestion income are equal to the ones developed for the balancing energy market and based on the all-TSO proposal for a Congestion Income Distribution (CID) methodology in accordance with Article 73 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management.

For each balancing capacity border on which congestion income results from the exchange of balancing capacity or sharing of reserves, in accordance with the calculation of congestion income from the SDAC, the TSOs on each side of the balancing capacity border shall receive their share of net border congestion income based on a 50%-50% sharing key. In specific cases the concerned TSOs may also use a sharing key different from 50%-50%. Such cases may involve, but are not limited to, different ownership shares or different investment costs. The percentages for these specific cases are included in Annex 1 of the CID of the CACM.

In case specific interconnectors are owned by entities other than TSOs, the reference to TSOs in this article shall be understood as referring to those entities.

5.6 Firmness regime of cross zonal capacity

Allocated CZC for the exchange of balancing capacity or sharing of reserves after the co-optimisation process is firm after the selection of upward balancing capacity bids or downward balancing capacity bids by the capacity procurement optimisation function pursuant to Article 33(3) of the EBGL.

According to Article 38(9) of the EBGL, when CZC 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.

The costs of ensuring firmness or in the case of curtailment of firm CZC in the event of force majeure or emergency situations are borne by the relevant TSOs sharing the CZC. These costs include the additional costs from the procurement of balancing capacity due to the non-availability of the balancing capacity given the curtailment of CZC.

6 Public Consultation

To fulfil the EBGL requirements, this proposal is subject to consultation in accordance with Article 10(3) of the EBGL. More importantly, this proposal wants to get the input from the stakeholders and market participants on this important feature for the future European balancing capacity market. As a result, ENTSO-E holds this open on-line consultation.

ENTSO-E have organised a first workshop with stakeholders address on 4 of February 2019 (Link). ENTSO-E intends to hold a Stakeholder Workshop on this CO CZCA proposal on 6 of June, in which the content of this methodology will be presented. It is worth mentioning that the corresponding Workshops for the proposal for a market-based allocation process of cross zonal capacity for the exchange of balancing capacity or sharing of reserves pursuant Article 41 of the EBGL and the proposal for a methodology for the allocation of CZC based on an economic efficiency analysis pursuant Article 42 of the EBGL may be organised by current existing CCR as defined in ACER decision No 06/2016.

The last phase will entail the assessment of all the stakeholder comments collected, along with the all-TSOs events referred above. After the agreement reached by all TSOs, a new version of this proposal will be drafted and submitted for approval to the relevant NRAs and to the Agency on 18 December 2019.