

Network Code Balancing

Main Concepts and Final Target Model

07th May 2013

Disclaimer:

Presentation based on DRAFT Version 1.19 of the NC Balancing!
NC Balancing is work in progress.



Reliable Sustainable Connected

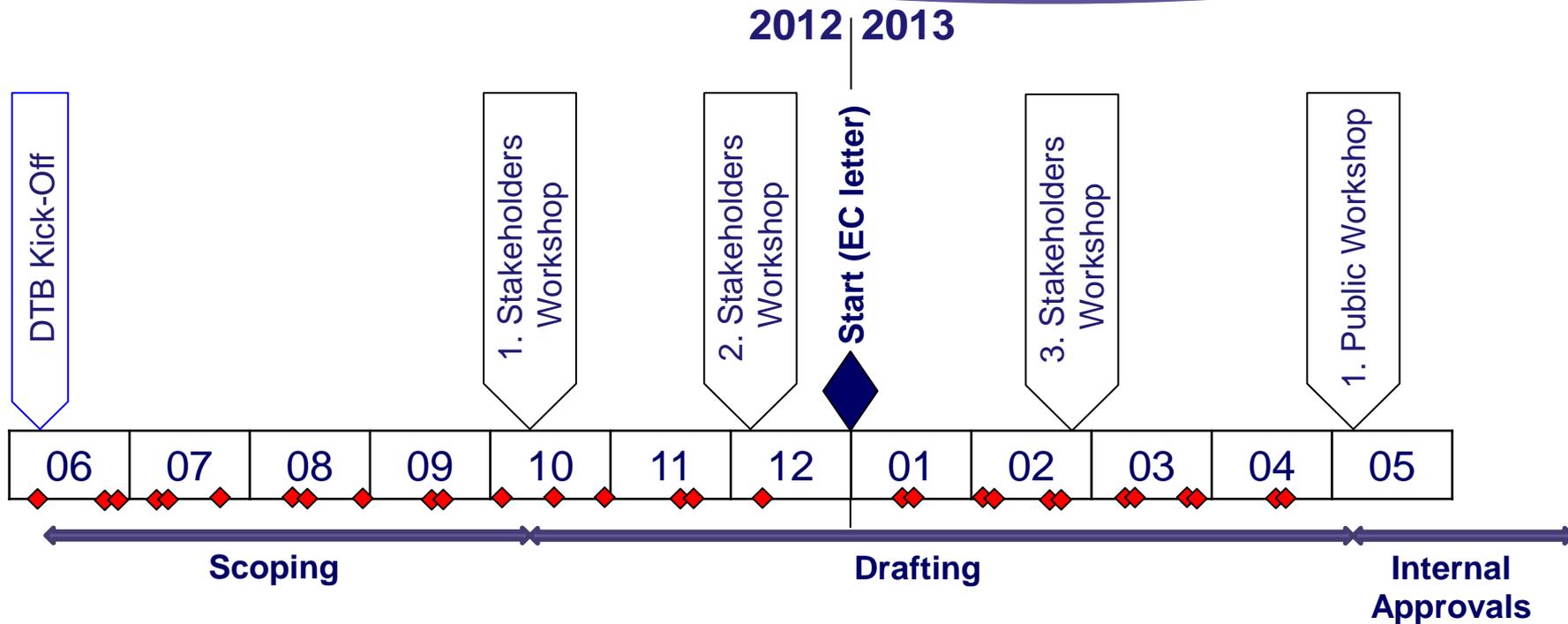
Agenda

- **Process Overview**
- **Target Models & Transitory Period**
- **Key Concepts of NC EB**
- **(Main) Content of Network Code Electricity Balancing (NC EB)**



Process Overview

Overview Meetings



- ◆ DT had 18 meetings so far (including Kick-Off)
 - 3 Stakeholder Advisory Group Meetings held in Brussels
 - Several bilat. meetings with Stakeholder Associations, EC, ACER
 - 1st Public Workshop on 7th of May (together with NC LFC-R)

Drafting Team

- DT consists of 16 people.
 - Also, we have an excellent geographical representation in order to consider different practical experience.
 - Full support end effort of DT members needed (50% of their time is reserved for DT EB development purposes)!
 - As almost no blue prints are available (compared to e.g. Operational Security, CACM, etc.) drafting the NC EB was/is very challenging.
- Hence, Stakeholder involvement was and is very important!
- An open approach for Stakeholder cooperation was chosen and is established!

*Balancing Code
Drafting Teams
Members*



External Cooperation

- A very proactive approach was chosen regarding stakeholder involvement
 - Several discussions, Telco's and workshops with ACER, EC and other Stakeholders have been organised and conducted
 - Discussion of early drafts with Stakeholders (more than 150 comments after 3rd EBSAG meeting)
- It was (and still is) very challenging to keep pace!

Drafting is guided by the FWGL



- NC Drafting based on understanding of the mechanisms established by the FWGL
- Continuous cross-checking ensures consistency & highlights potential deviation at an early stage

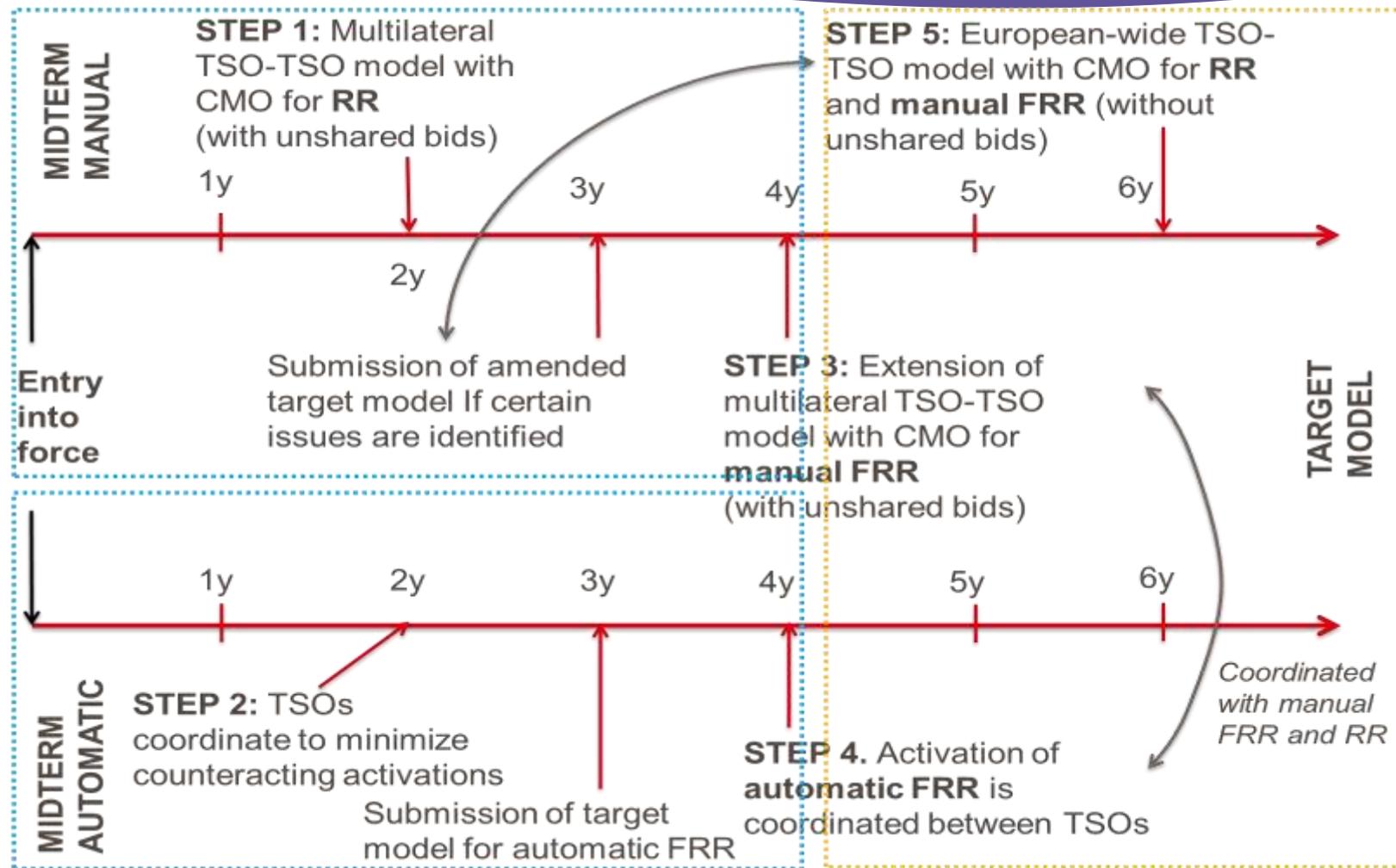
→ Currently only few discrepancies identified (ca. 6/200) which are currently analysed and will be resolved by the DT EB in cooperation with ACER

TC Article	Implemented by NC	NC Article Title	Page no.
The Network Code on Electricity Balancing shall provide that ENTSO-E or NEMOs or TSOs directly or relevant second to the Agency, without delay, all the relevant information and documents related to the opening of any approval or filing procedure to NEMOs, as provided for in Sections 1.5, 2.2, 3.2, 3.3.1, 3.3.2, 3.4.1, 4.2 and 4.3 of these Framework Guidelines. The Network Code on Electricity Balancing shall also require relevant NEMOs to inform the Agency of the outcome of any approval or filing procedure.			
2 General principles			
2.1 General principles pursued in the Network Code on Electricity Balancing			
The specifications for national balancing reserve and balancing energy procurement and cross-border balancing exchanges shall pursue the following objectives: - safeguarding operational security; - fostering competition, non-discrimination and transparency in balancing markets; - facilitating wider participation of demand response and renewable sources of energy; - increasing overall social welfare and efficiency; - promoting cross-border balancing exchanges.	●	Article 9 - General Objectives of the Balancing Market	3
<i>In addition, it shall be ensured that these specifications are consistent with any relevant arrangements with other national systems in a similar, but not identical, way.</i>			
2.2 Role of TSOs in balancing			
The Network Code on Electricity Balancing shall clearly specify the roles and responsibilities of TSOs regarding electricity balancing.	●	Article 11, Role of TSOs	4.3
TSOs are responsible for organising balancing markets and shall strive for their integration, keeping the system in balance in the most efficient manner and following the general objectives defined in Section 2.1 of these Guidelines.	●	Article 11, Role of TSOs	5
The Network Code on Electricity Balancing shall require that each TSO is responsible for procuring the required balancing services from BSOs and is not allowed to offer the balancing services itself except, subject to NEMO's approval, if a proven capacity is threatened due to insufficient bids from BSOs.	●	Article 11, Role of TSOs	2.3
The Network Code on Electricity Balancing shall define common principles for the procurement of reserves and balancing energy in order to ensure that: - it is non-discriminatory, fair, objective, transparent and market based; - it is able to foster liquid balancing markets and avoid undue entry barriers for new entrants; - undue distortions within the internal market and in particular between adjacent markets that use different procurement mechanisms are avoided.	●	Article 9 - General Objectives of the Balancing Market, Article 11 refers to Article 9	2c
2.3 Terms and conditions related to balancing			
The Network Code on Electricity Balancing shall require that TSOs, in their responsibility only, which relevant, define terms and conditions related to balancing in accordance with the Network Code on Electricity Balancing and European and national legislation.	●	Article 13, Terms and conditions for balancing	5
The Network Code on Electricity Balancing shall require that these terms and conditions include reasonable and justified requirements for BSOs and BSOs. The Network Code on Electricity Balancing shall provide that TSOs are responsible for debiting the penalties to be applied to BSOs, in the case of non-compliance with technical and contractual requirements, with the terms and conditions.	●	Article 13, Terms and conditions for balancing	4

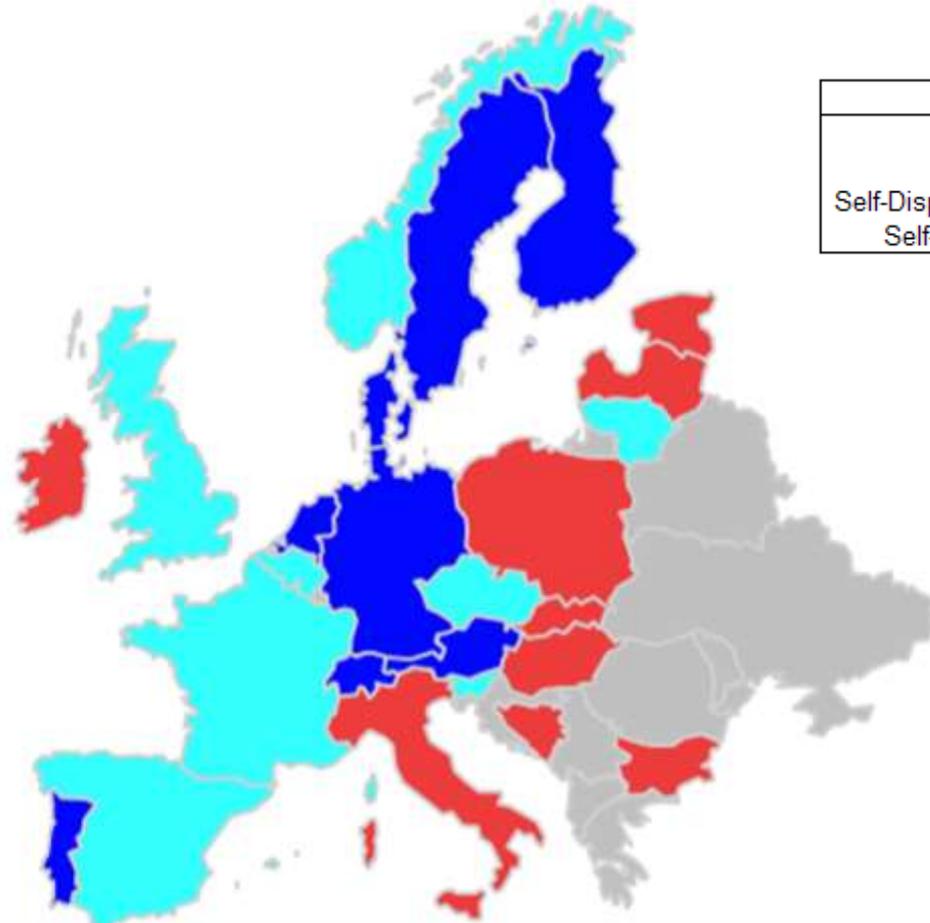


Target Model & Transitory Period

Target Models and Transitory Period (Article 57: Targets)



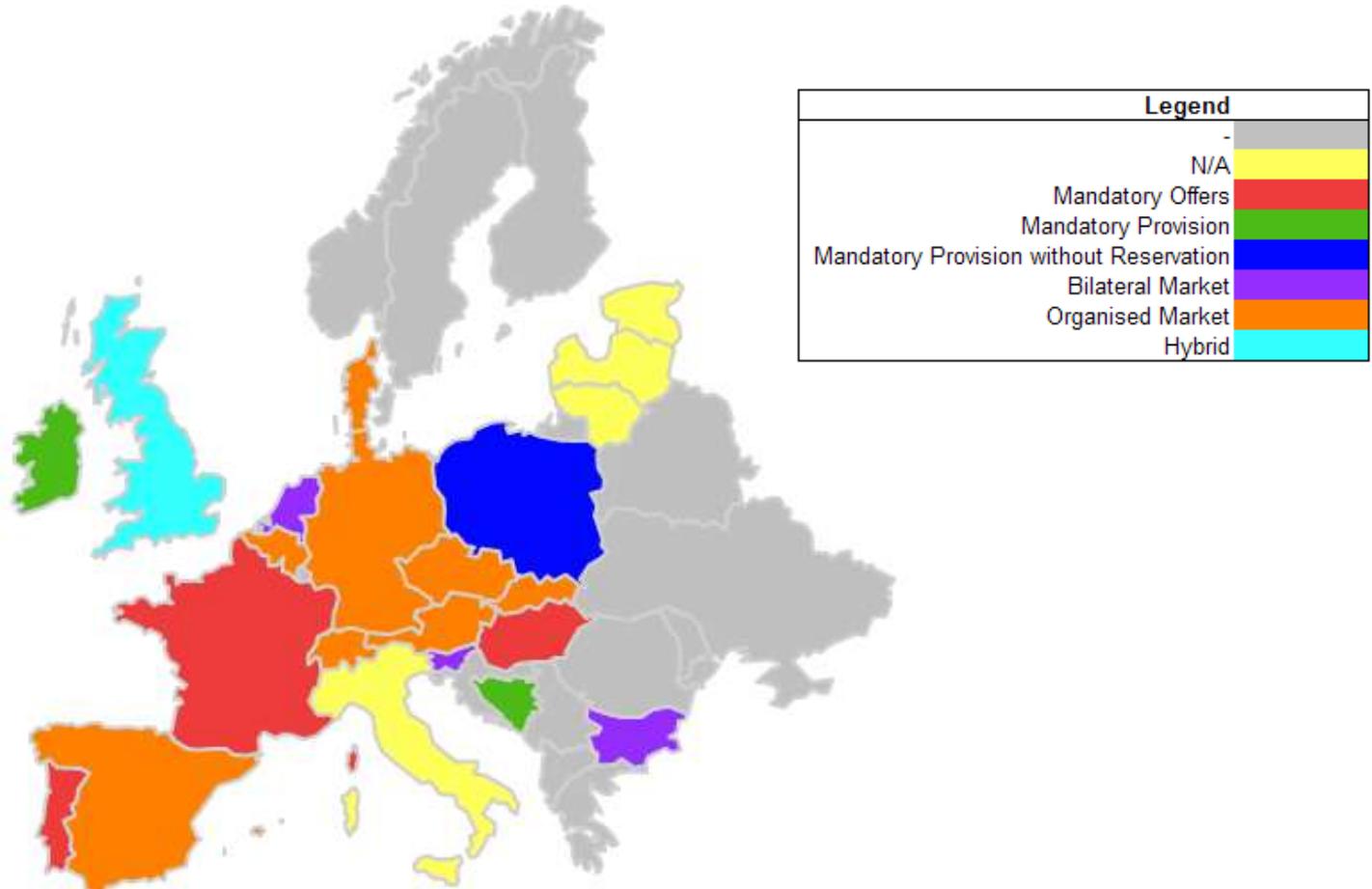
Balancing Processes in Place



Legend	
-	Grey
Central Dispatch	Red
Self-Dispatch - Portfolio Based	Blue
Self-Dispatch - Unit Based	Cyan

- Different market systems in place!

FRR (Automatic) – Capacity – Procurement Schemes



- Different procurement schemes are currently in place across Europe!

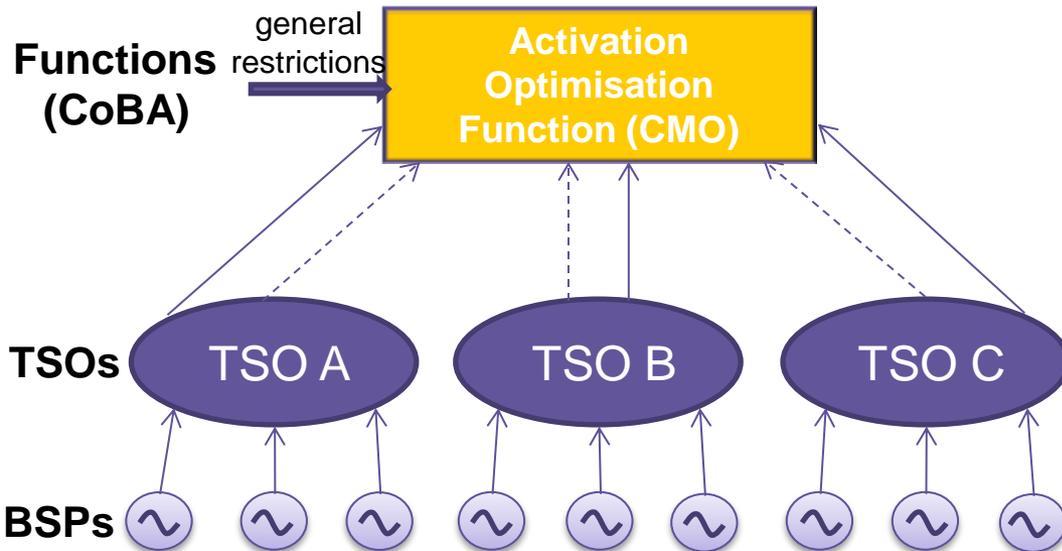


Key Concepts of NC EB



TSO-TSO Model

TSO-TSO Model example: FRRa Balancing Energy



- > Commercial information: bids, offers for Balancing Energy
- - - -> Individual restrictions: unshared bids, specific products,...
- > General restrictions: (LFC&R), grid constraints (PTDFs, AMFs,...), available capacities (after IDGT, reserved capacities,...)

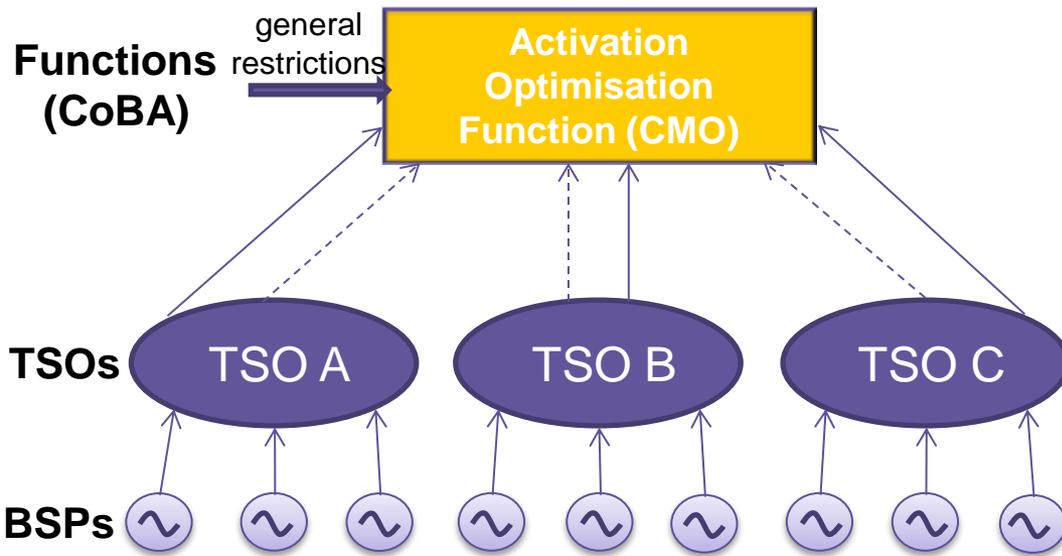
Principle Handling:

- Every few seconds TSOs submit current demand to AOF (e.g. 2-4 seconds)
- Considering commercial information, individual and general restrictions optimisation process is conducted
 - No restrictions → same price
 - With restriction → different prices → “online market coupling process”
- Controllers of CoBA TSOs receive “correction” signals (virtual tie-lines) for physically applying the results.
 - Hence, local merit orders are “corrected”

Error Handling:

- In case of CMO breakdown (IT, VTL, communication) no influence on SoS because activation according to local merit order (just without CMO correction)

TSO-TSO Model example: FRRa Balancing Energy



Clear responsibilities:

- Connection TSO has the necessary information to control the system at all times
 - Even in case of external activation the processes are the same (activation out of TSOs MOL by TSOs system controller)
- Prequalification by Connection TSO
- Monitoring by Connection TSO
- TSO-BSP settlement by Connection TSO
- Common TSO-TSO settlement processes

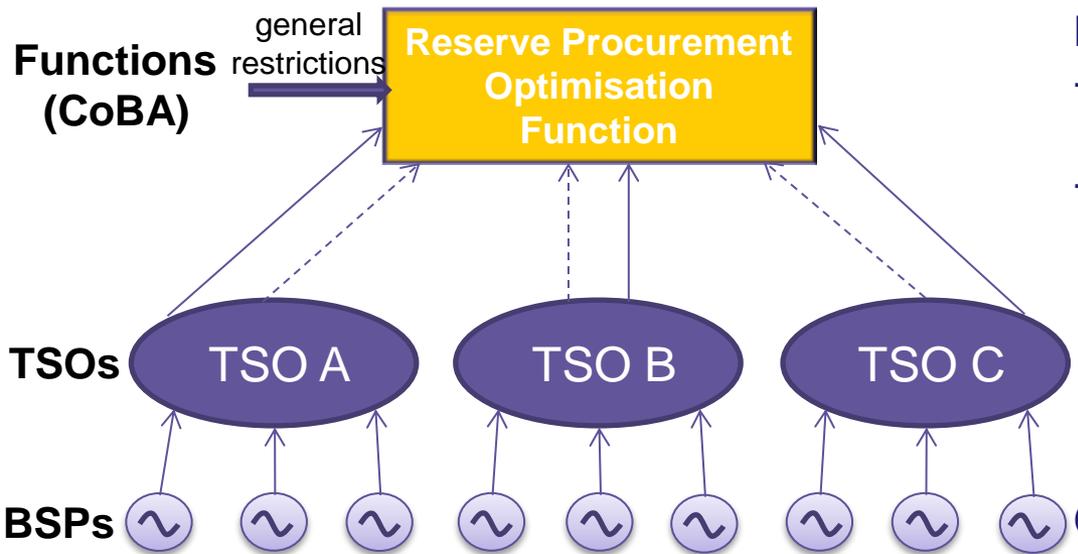
Maximising benefits:

- Because of coordinated usage of available capacities (reservation, after IDGT,...), AOF and related processes:

→ **Welfare optimal solution achievable!**

- Commercial information: bids, offers for Balancing Energy
- > Individual restrictions: unshared bids, specific products,...
- General restrictions: (LFC&R), grid constraints (PTDFs, AMFs,...), available capacities (after IDGT, reserved capacities,...)

TSO-TSO Model example: FRRa Balancing Reserves



Principle Handling:

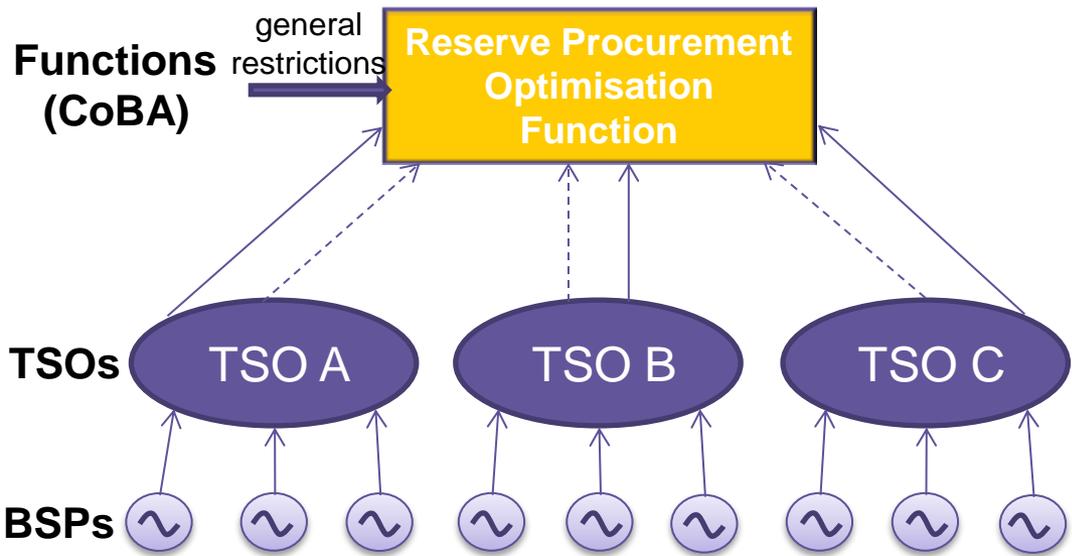
- Every TSO submits reserve requirements to RPOF (e.g. weekly, monthly, yearly)
- Considering commercial information, individual and general restrictions optimisation process is conducted
 - No restrictions → same price
 - With restriction → different prices
 - “market coupling process”

Clear responsibilities:

- Prequalification by Connection TSO
- Monitoring by Connection TSO
- TSO-BSP settlement by Connection TSO
- Common TSO-TSO settlement processes
- Rather easy and coordinated fulfilment of LFC&R obligations

- Commercial information: bids, offers for Balancing Reserves
- > Individual restrictions: unshared bids, specific products,...
- General restrictions: LFC&R, grid constraints (PTDFs, AMFs,...), available capacities (reserved capacities,...)

TSO-TSO Model example: FRRa Balancing Reserves



- > Commercial information: bids, offers for Balancing Reserves
- - - -> Individual restrictions: unshared bids, specific products,...
- > General restrictions: LFC&R, grid constraints (PTDFs, AMFs,...), available capacities (reserved capacities,...)

Maximising benefits:

- Because of coordinated usage of available capacities (reservation,..), AOF and related processes:
- **Welfare optimal solution achievable!**

Consistency:

- Fully consistent with Balancing Energy schemes
 - Same (similar) settlement, monitoring, error handling principles

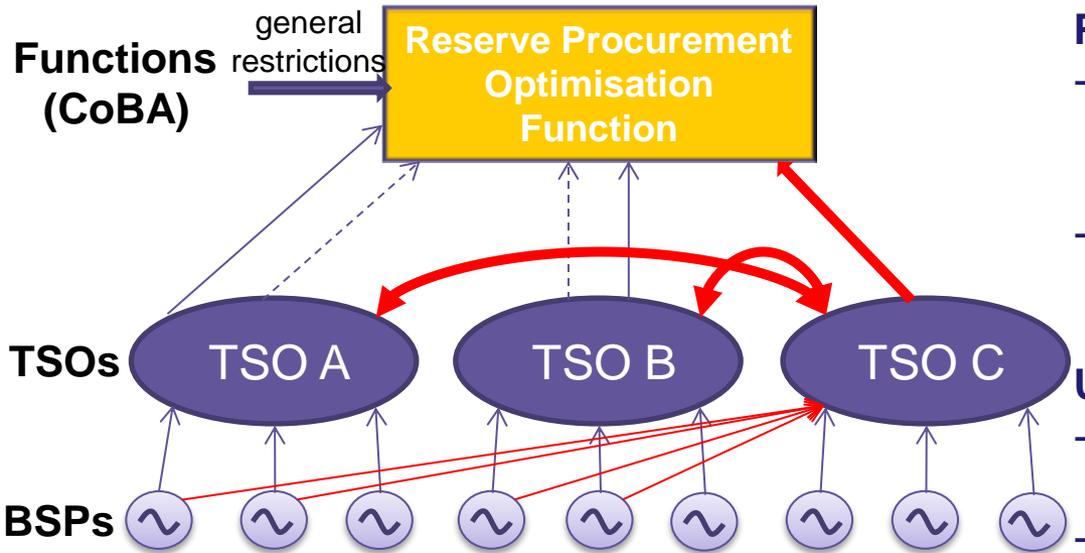
Fairness:

- Common cost/benefit sharing principles necessary

Drawbacks:

- Huge coordination efforts necessary! (e.g. procurement horizon)

TSO-BSP Model example: FRRa Balancing Reserves (TSO C performing TSO-BSP reserve procurement)



Principle Handling:

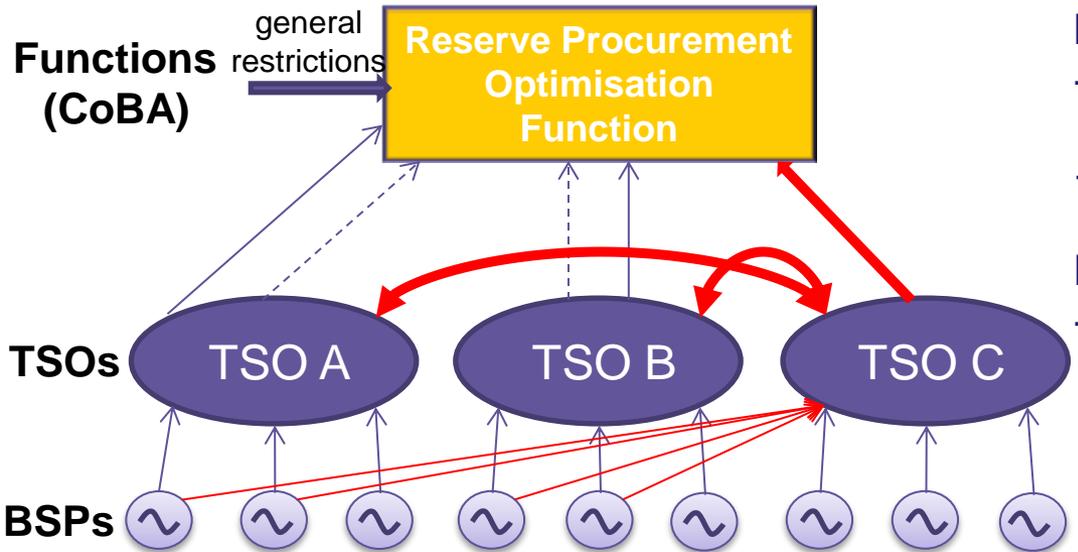
- BSP from different countries may join reserve procurement process of TSO C based on prior consent of TSO A, TSO B
- VTL integration from BSPs to foreign TSO necessary (number, complexity)?

Unclear responsibilities:

- Who is performing monitoring, prequalification, settlement
- Fulfilment of LFC&R obligation more complicated
- How to use reserved capacities?
- In case of outage Connection TSO has problems but with information, tools?
- BSP might have several (bilateral) reserves obligations; to whom to bid balancing energy?
 - At least all Balancing Energy bids to be placed at Connection TSO!

- > Commercial information: bids, offers for Balancing Reserves-
- - - -> Individual restrictions: unshared bids, specific products,...
- > General restrictions: LFC&R, grid constraints (PTDFs, AMFs,...), available capacities (reserved capacities,...)

TSO-BSP Model example: FRRa Balancing Reserves (TSO C performing TSO-BSP reserve procurement)



- > Commercial information: bids, offers for Balancing Reserves
- - - -> Individual restrictions: unshared bids, specific products,...
- > General restrictions: LFC&R, grid constraints (PTDFs, AMFs,...), available capacities (reserved capacities,...)

Maximising benefits:

- Because of uncoordinated usage of available capacities (reservation,..):
- **No overall welfare optimal solution possible**

Fairness:

- Cost/benefit sharing principles more complicated
 - How to “avoid” that TSO C reserves cheapest resources from A, B for their drawback?

Drawbacks:

- Consistency problems, huge coordination effort necessary

→ **Nevertheless, TSO-BSP model for reserves shall be possible according to NC EB for interim periods!**



Coordinated Balancing Area and Area Consistency (Chapter 2)

Goals and Requirements for the Definitions

Clarity of Definitions

- Differences between Areas should be clear
- Definitions should include all aspects of LFC&R and Balancing
- Inconsistencies with other Codes have to be avoided

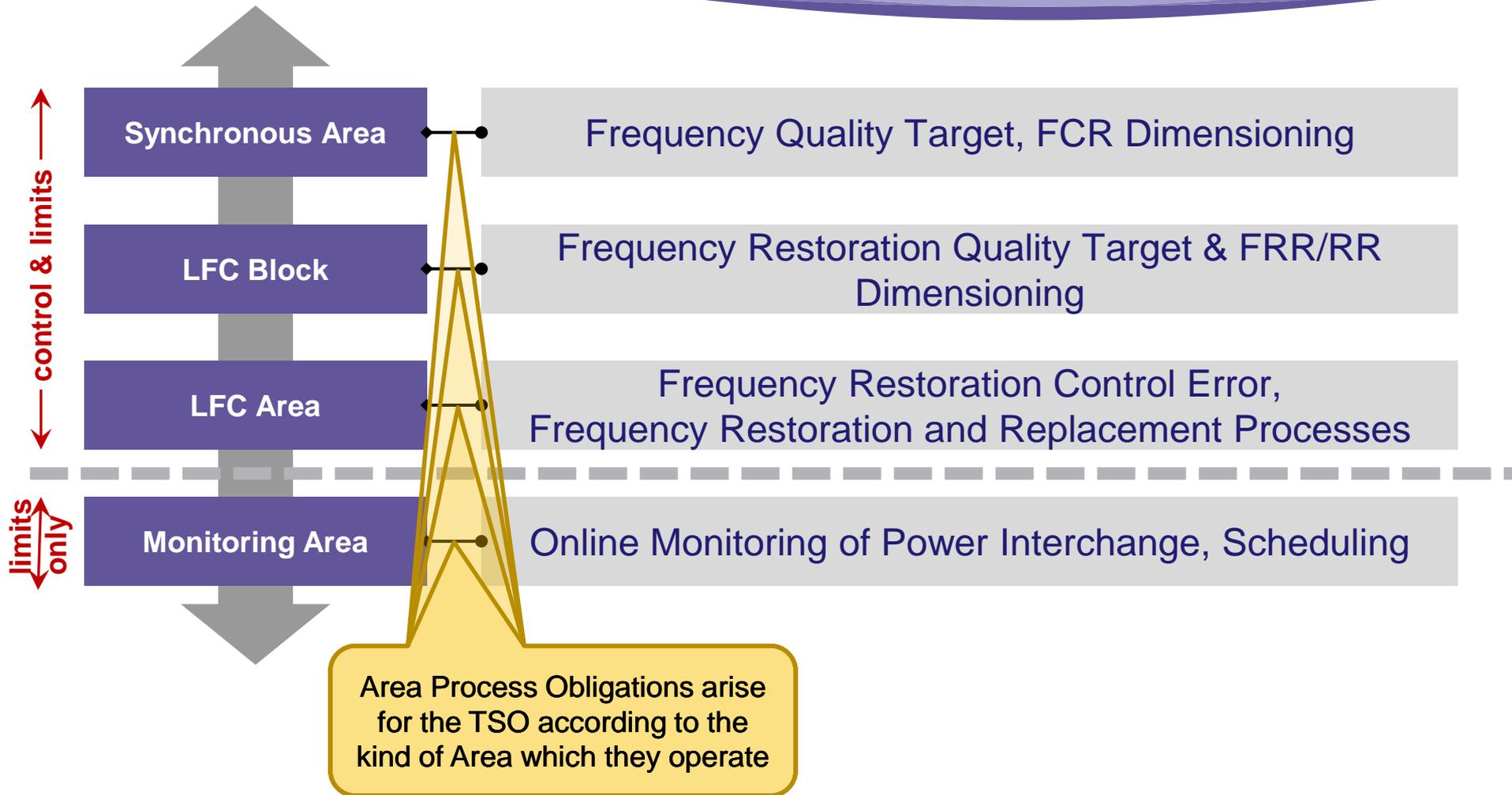
Clarity of Responsibilities

- Attachment of responsibilities to different Area Types (consistent with definitions)
- Assignment of each TSO to an Area and its responsibilities shall be clear and not conflicting (between Codes and Areas)

Clarity of Choices

- Processes for the association of a TSO to an Area have to be clearly defined
- **Areas should be able to accommodate today's control and market structures to foster flexibility and harmonisation**

Area Definitions in LFC&R



Area Definition in Balancing: Coordinated Balancing Area

Concept of a Coordinated Balancing Area

- TSOs are obliged to cooperate in a so called **Coordinated Balancing Area (CoBA)** with one or more TSOs
- Each CoBA includes the exchange of one (or more) Standard Product(s) and Imbalance Netting
- Flexibility on the way to reach the FWGL targets is ensured by not detailing which cooperation is to be done with which TSO
- Sharing and Exchange of Balancing Reserves is not mandatory, but possible
- CoBAs for Balancing Reserves (if established) can be smaller than those for Balancing Energy
- Functions are performing central tasks

Area Definition in Balancing: Coordinated Balancing Area

May exchange Balancing Services between Coordinated Balancing Areas, already exchanged within them

Coordinated Balancing Area 1

Coordinated Balancing Area 2

Cooperation per Balancing Service/product

Cooperation per Balancing Service/product

TSO 1

...

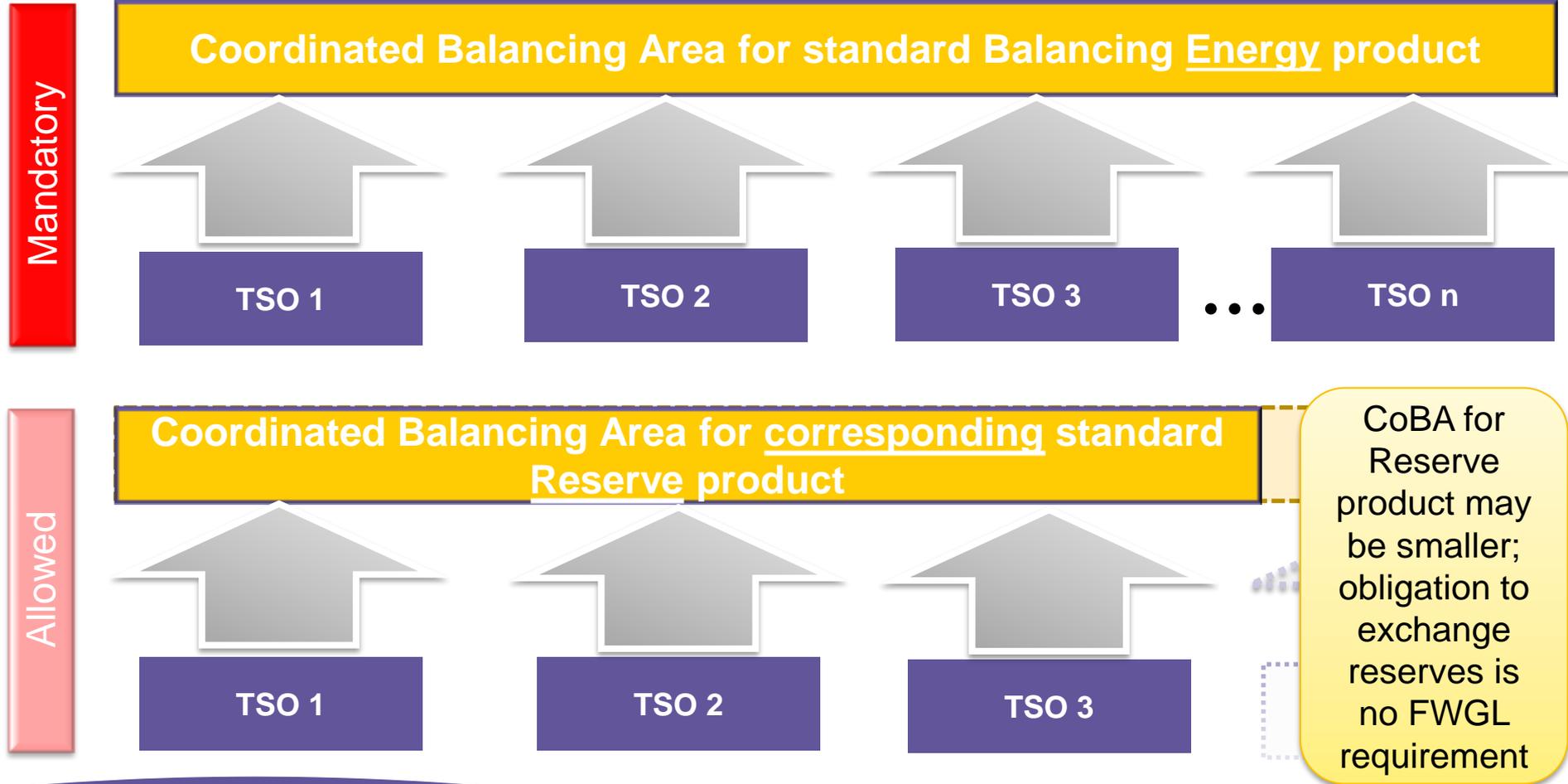
TSO n

TSO m

...

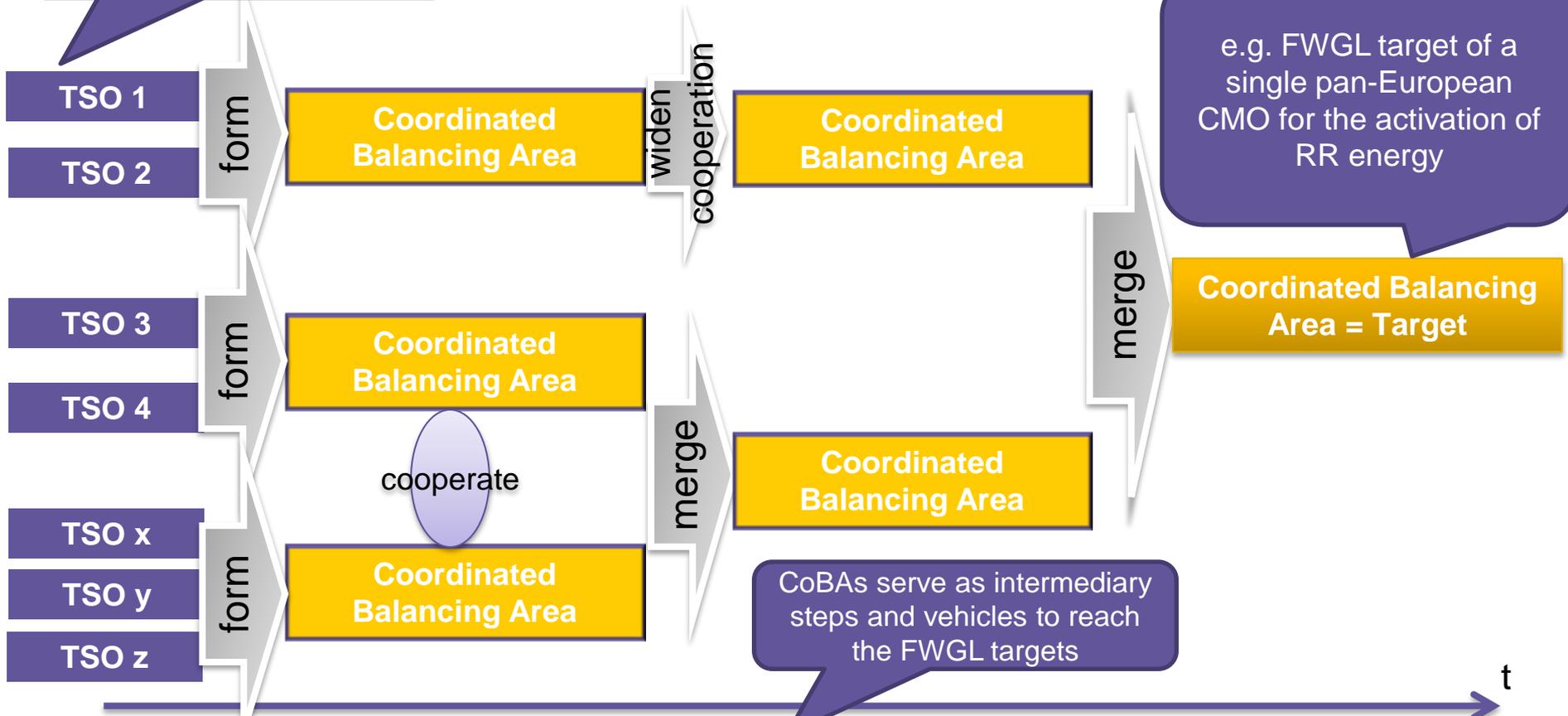
TSO x

Area Definition in Balancing: Coordinated Balancing Area



Coordinated Balancing Areas: Promoting Integration & Flexibility

TSOs may cooperate with different TSOs in CoBAs for different products



e.g. FWGL target of a single pan-European CMO for the activation of RR energy

CoBAs serve as intermediary steps and vehicles to reach the FWGL targets

Concept allows for early cooperation due to its flexibility

Obligation for cooperation in CoBAs fosters integration

Integration of CoBAs allows for reaching the FWGL targets

Link between proposed Area Definitions

Coordinated Balancing Area

Obligation to cooperate at regional level

LFC Area or Monitoring Area

LFC Area or Monitoring Area

...

LFC Area or Monitoring Area

Responsibility: Area Process Obligations

TSO 1

TSO 2

...

TSO n

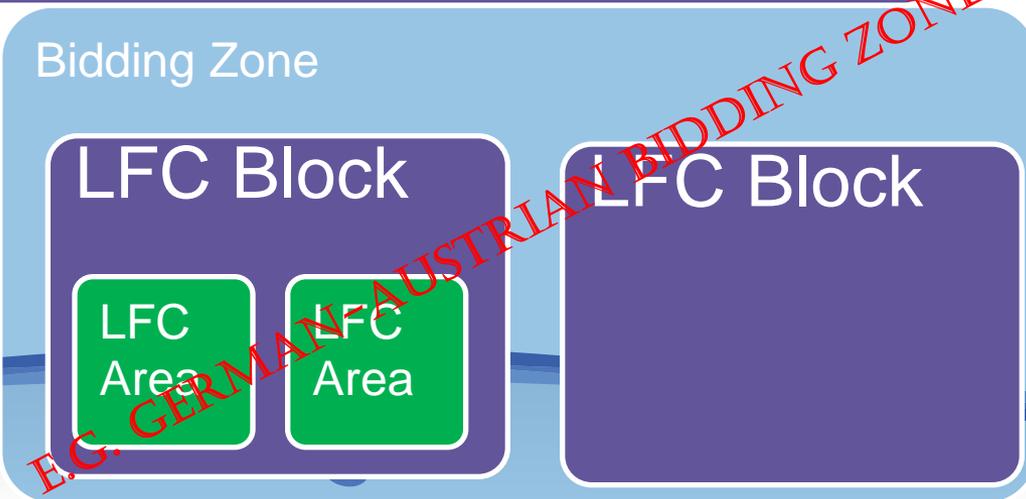
Link established in Balancing Code

Link established in LFC&R Code

NC EB uses the term "Relevant Area" to describe the Area controlled by an individual TSO

Relationship with other Areas – Various settings are possible

The Area Definition Proposals are flexible enough to accommodate today's market and control structures





- **Chapter 1:** General Provisions
- **Chapter 2:** The Electricity Balancing System
- **Chapter 3:** Procurement of Balancing Services
- **Chapter 4:** Use, Allocation and Reservation of Cross Zonal Capacity for Balancing Services
- **Chapter 5:** Settlement
- **Chapter 6:** Algorithm Development
- **Chapter 7:** Reporting
- **Chapter 8:** Targets and Transitional Arrangements
- **Chapter 9:** Final Provisions

(Main) Content of Network Code EB

- **Chapter 1: General Provisions**
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Chapter 1: General Provisions (examples)

- **Article 1:** Subject Matter and Scope
 - Establishment of common principles for procurement and common methodologies for activation of **FCR, FRR, RR**
 - Requirements shall apply to TSOs, NRAs, ACER, DSOs, Designated Entities and Market Participants (where applicable)
- **Article 6:** Consultation
 - Comprehensive list of items needs to be publicly consulted (for a period of at least 4 weeks)
- **Article 7:** Regulatory Approval
 - Approval foreseen by “all NRAs”, “NRAs of CoBA” and “each NRA”
 - Approval foreseen within 3 month (each NRA) or 6 month (all/CoBA)

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Chapter 2: The Electricity Balancing System (examples)

- **Article 10:** Coordinated Balancing Area (CoBA)
- **Article 11:** Role of the TSOs
 - TSOs are responsible for organising Balancing Markets
 - TSOs are responsible for procuring Balancing Services
 - Imbalance Settlement can be delegated to “Designated Entities” on a national level, in order to allow current (successful) market structures (market operators) to continue with their work
- **Article 11a:** Cooperation with DSOs
 - DSOs shall cooperate with TSOs and BSPs to ensure efficient and effective Balancing
 - DSOs are involved during prequalification to real time operation in order to consider problems in DSOs grid

Chapter 2: The Electricity Balancing System (examples)

- **Article 12:** Functions in Coordinated Balancing Areas
 - Within a CoBA different functions needs to be established
 - Counteracting Activation Minimisation Function (Imbalance Netting)
 - Reserve Procurement Optimisation Function
 - Transfer of Reserve Optimisation Function (Secondary Market)
 - Activation Optimisation Function (ensure Common Merit Order activation)
 - TSO-TSO Settlement Function
 - Function to be delegated to third parties (for performing functions centrally and commonly)
- **Article 13:** Terms and Conditions
 - TSOs to develop a framework within a CoBA
 - 6 month after the framework each TSO need to develop ToRs
 - ToRs shall also facilitate aggregation of demand/generation, RES ...

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Chapter 3: Procurement of Balancing Services (examples)

- **Article 14:** Requirements for Standard and Specific Products
 - After 12 month common initial proposal on Standard Products (Balancing reserves and Balancing Energy)
 - Each TSO shall be entitled to use Specific Products (regulatory approval necessary)
- **Article 18:** Fall-Back Procedures
 - Each TSO shall ensure that fall-back solutions are available in case of procedural fails.
- **Article 20:** Exchange and Sharing of Balancing Reserves; General P.
- **Article 21:** TSO- BSP Model for Reserve Procurement (Transitional)
 - Max. 6 years after entry into force of NC EB TSO-BSP model for reserve procurement shall be applicable

Chapter 3: Procurement of Balancing Services (examples)

- **Article 24:** Avoidance of Counteraction Activation
 - After 2 years TSOs of a CoBA shall implement Imbalance Netting in order to avoid counteracting activation
- **Article 25:** Activation Mechanism of Balancing Energy
 - Deals with the activation of Standard Balancing Energy Bids from CMOL
 - Each TSO to submit activation requests to Activation Optimisation Function and connection TSOs shall activate the relevant Bid
- **Article 26:** Optimisation Principles from CMOL
 - Considering LFC-R principles, Balancing Energy Bids, submitted requests of TSOs, available transmission capacity

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Chapter 4: Use, Allocation and Reservation of Cross Zonal Capacity for Balancing Services (examples)

- **Article 27:** Use of Cross Zonal Capacity for Balancing Services
 - Each TSO is entitled to use Cross Zonal Capacity for exchanging and sharing Balancing Services and Sharing of Balancing Reserves:
 - Available after IDGT; or
 - Provided for Balancing Services (see below Art. 29)
- **Article 29:** Approaches for the Provision of Cross Zonal Capacity
 - Probabilistic approach
 - Allocation of Cross Zonal Capacity via Co-optimisation
 - Reservation of Cross Zonal Capacity

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- **Article 32: General Settlement Principles**
 - Non discriminatory, objective, fair, transparent, effective competition, appropriate (= no perverse) incentives to all
- **Section 2: Settlement of Balancing Energy Volumes TSO – BSP**
 - Settlement of Balancing Energy from FCR, FRR, FRR processes
- **Section 3: Settlement of Exchanged Energy Volumes TSO – TSO**
 - To ensure fair and equal distribution of costs and benefits resulting from Exchange of Balancing Energy and Unintentional Deviation
- **Section 4: Imbalance Settlement TSO – BRP**
 - Incentives to BRPs to be balanced
 - Imbalance Settlement Period harmonisation,...

Thanks for listening!