


# Balancing energy and the European Exchange Platforms

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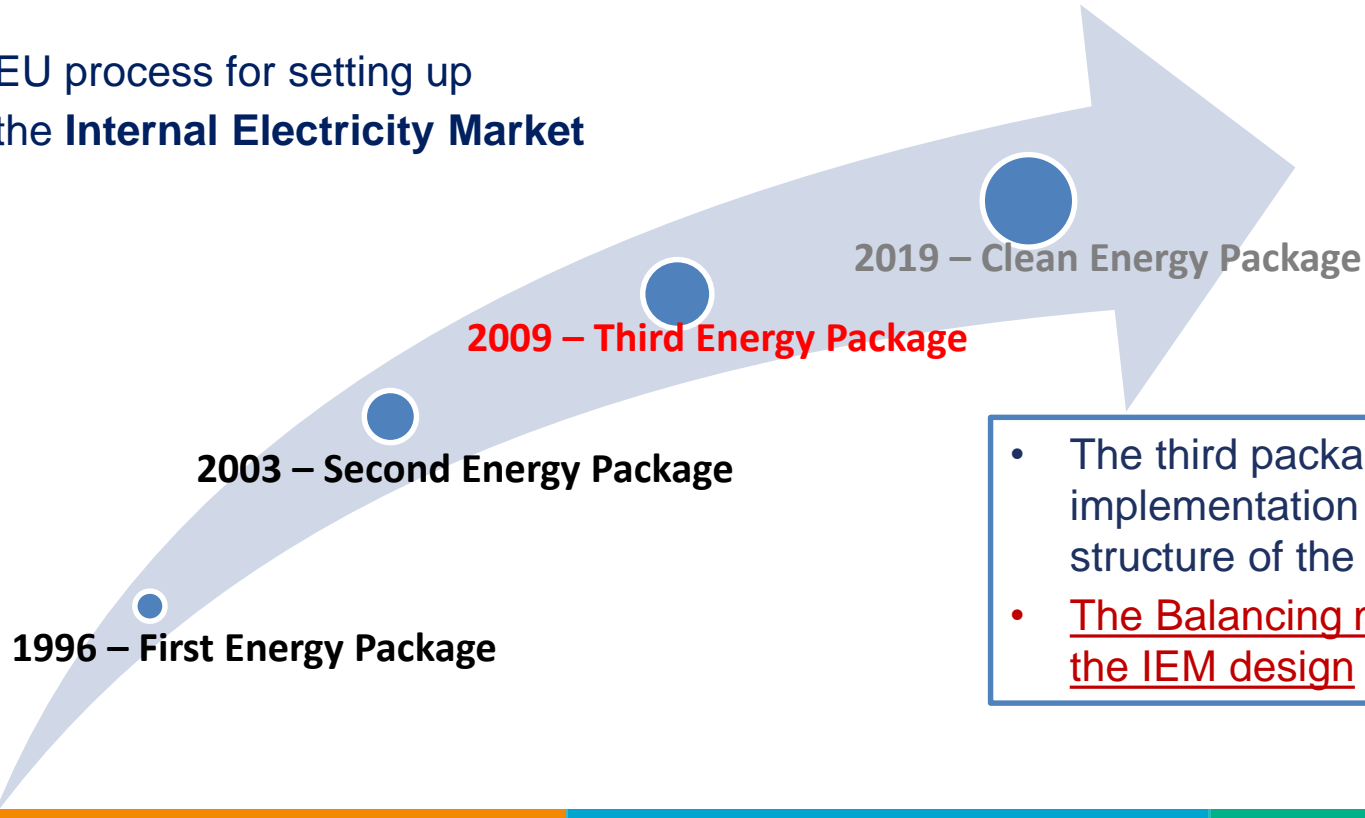


# Agenda

- The European way to the electricity market design
- Balancing process
- EBGL implementation:
  - Balancing market target model
  - Design of platforms
  - Standard products
  - Pricing and settlement
- Conclusions

# European way to the electricity market design

EU process for setting up  
the **Internal Electricity Market**



- The third package is still under implementation and is shaping the structure of the **IEM**
- The Balancing market is one tile of the IEM design

# Balancing processes

**BALANCING** means all actions and processes, on all timelines, through which TSOs ensure, in a continuous way, the maintenance of system frequency within a predefined stability range

Standard processes according to SOGL:

**The frequency containment process:**

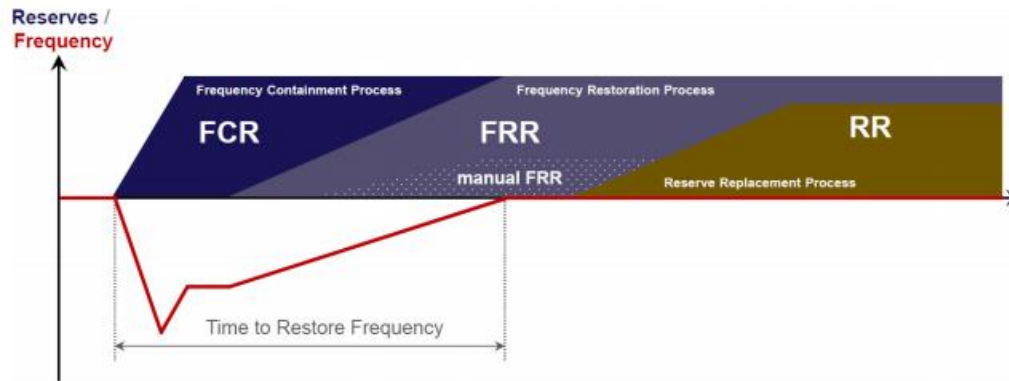
is the process that aims at stabilizing the system frequency by compensating imbalances by means of appropriate reserves

**The frequency restoration process:**

is the process of activating active power to restore system frequency to the nominal frequency. It can be automatic (aFRR) or manual (mFRR)

**The reserve replacement process:**

is the process of restoring and/or supporting the required level of FRR in order to be prepared for additional system imbalances



# Balancing processes

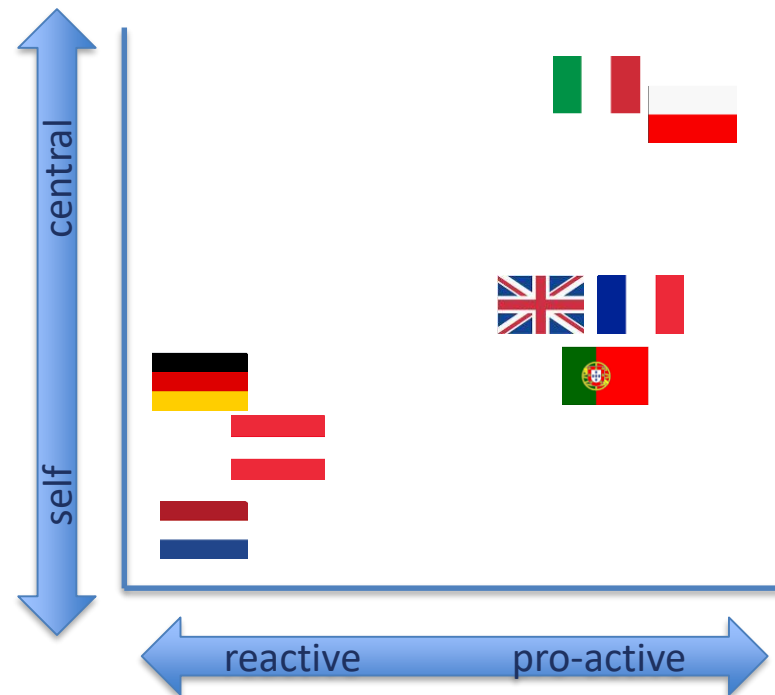
## Before the EU balancing market:

- Balancing process is mainly a national matter (several approaches)
- Process designed to consider peculiarities of each system



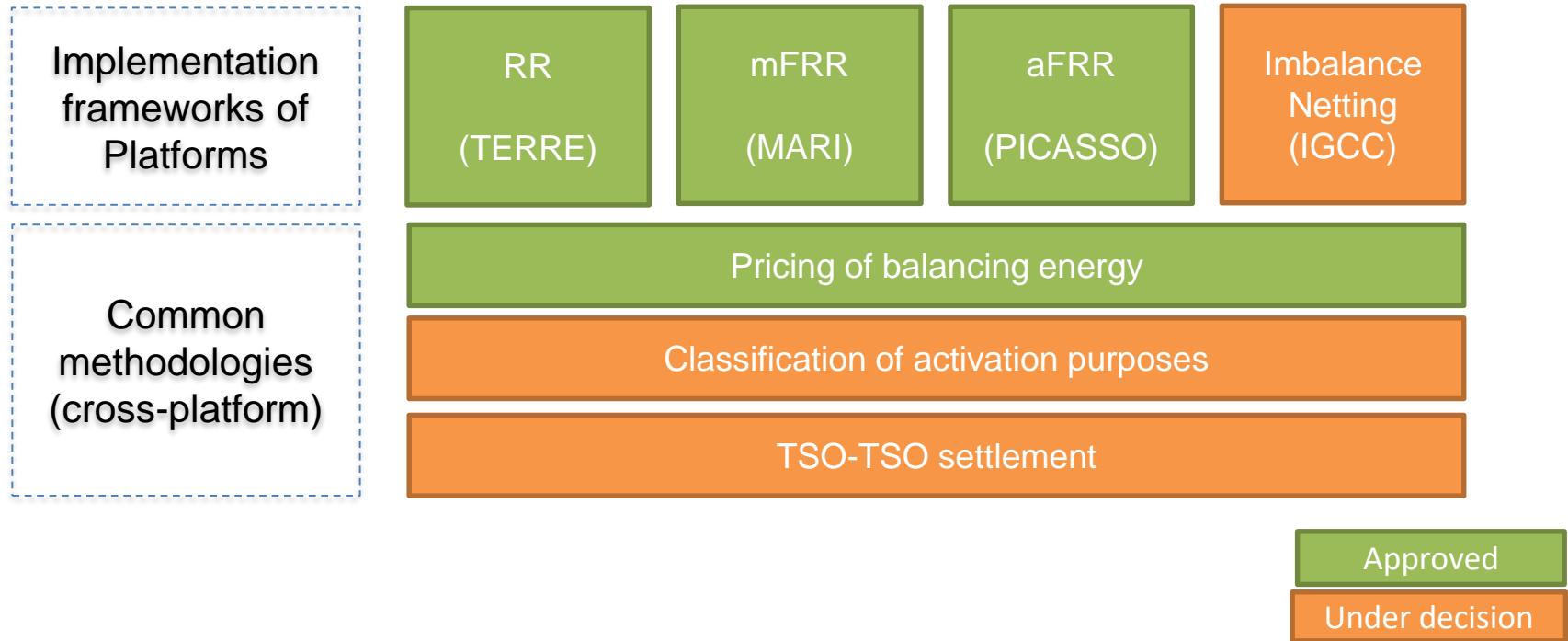
## With the EU balancing market:

- Need to create standard products: standard balancing products are the result of a compromise among TSOs
- All technologies shall be eligible to bid, either per unit or per portfolio



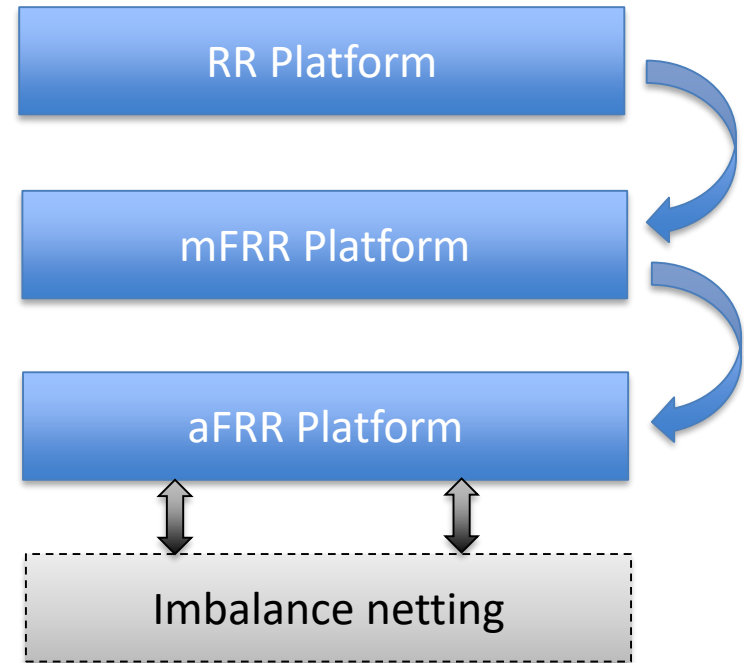
# EBGL and platforms implementation

Main methodologies for setting up the European Balancing market



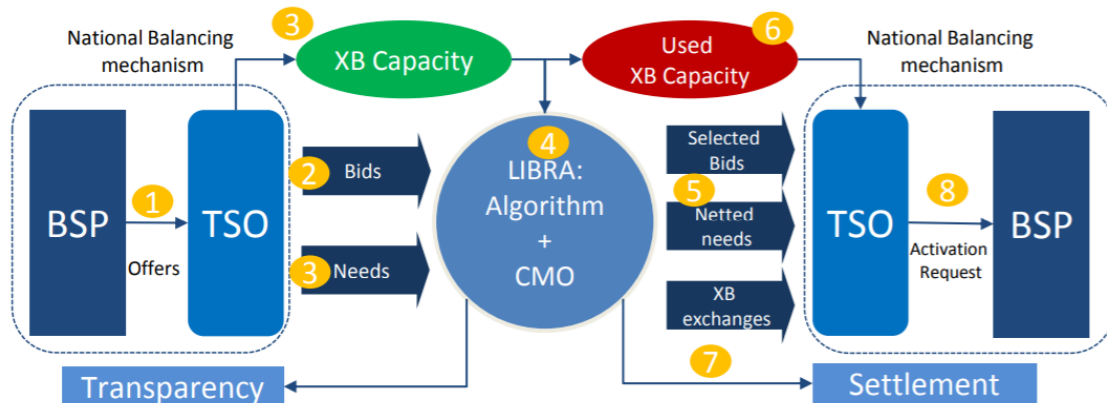
# Balancing market target model

- 4 platforms in sequence, with different characteristics to satisfy TSOs needs
- Platforms are based on the TSO-TSO model
- Selection of bids through the Common Merit Order List
- Clearing by implicit auction and zonal model



# TSO-TSO model

- Balancing Service Providers (BSPs) interact only with the connecting TSO, according to the national T&C
- TSOs forward bids and needs to the platform
- The platform gives back results to TSOs and then TSOs activate BSPs



**Cross border exchange of balancing energy is done through a TSO – TSO exchange**

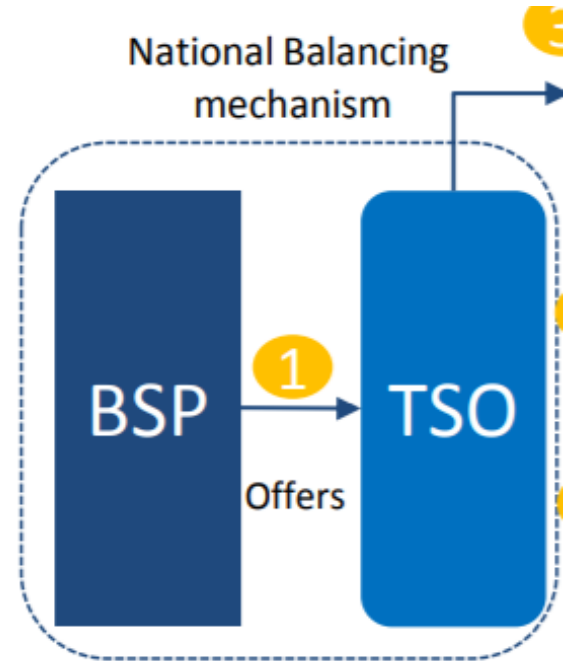


# TSO-BSP interaction

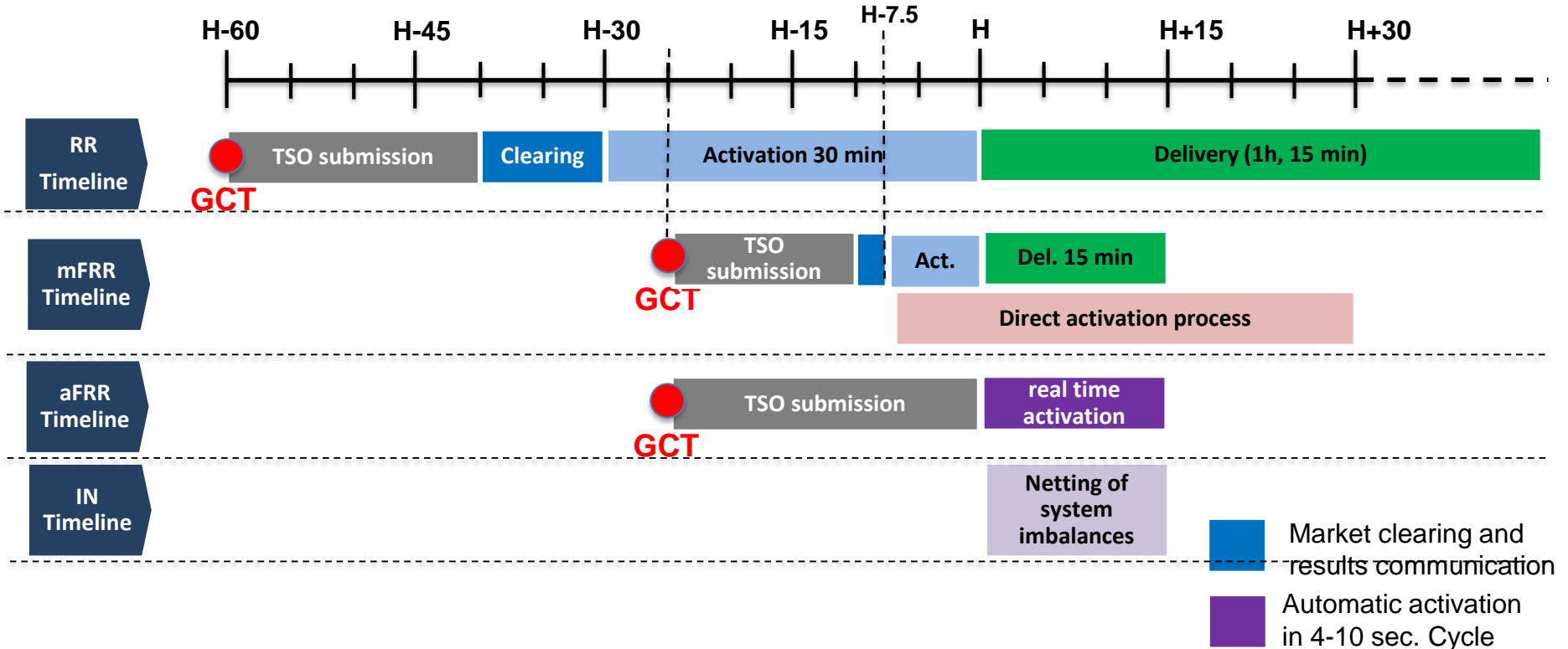
## Regulated by national T&C, according art.18 of EBGL

- To define reasonable and justified requirements for the provision of balancing services
- To allow the aggregation of resources to offer balancing services
- To allow all kind of resources (demand facilities, renewables, storage) to become BSPs

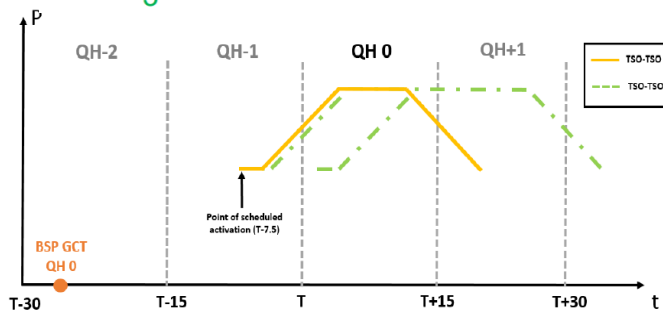
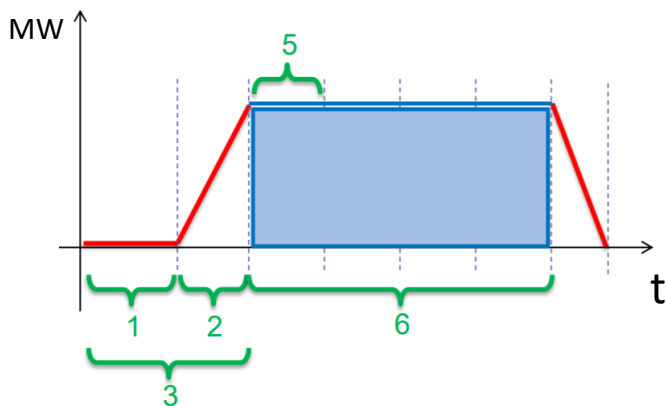
**Intention to extend as much as possible the pool of balancing resources**



# Timing of the balancing market



# RR and mFRR standard products

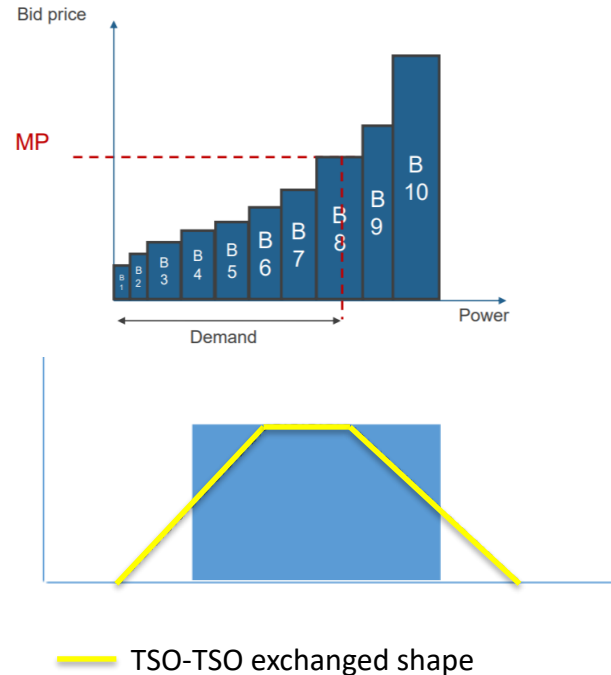


| Characteristic          | RR                             | mFRR                        |
|-------------------------|--------------------------------|-----------------------------|
| 1) Preparation period   | 0 – 30 min                     | 0 – 12.5 min                |
| 2) Ramping period       | 0 – 30 min                     | 0 – 12.5 min                |
| 3) Full activation time | 30 min                         | 12 min                      |
| 5) Min delivery         | 15 min                         | 5 min                       |
| Activation type         | Scheduled                      | Scheduled and direct        |
| Complex bids            | Yes, including linking in time | Yes, but no linking in time |

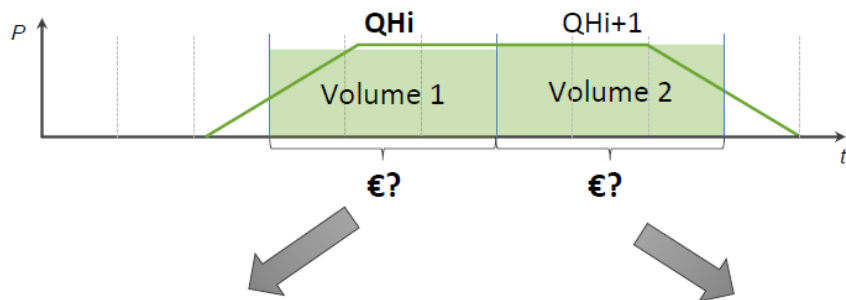
Not all the characteristics are harmonized: flexibility for TSOs in national T&C

# Pricing and settlement of RR and mFRR SAs

- Every run of the scheduled process (RR or mFRR) provides a **cross-border marginal price** for each bidding zone/LFC area
- Volume settled between TSOs is the energy block, considering a ramp of 10 minutes
- BSPs are settled for the activated volume at the marginal price. Deviations from the standard shape may occur (depending on national T&C)



# Pricing and settlement of mFRR DAs



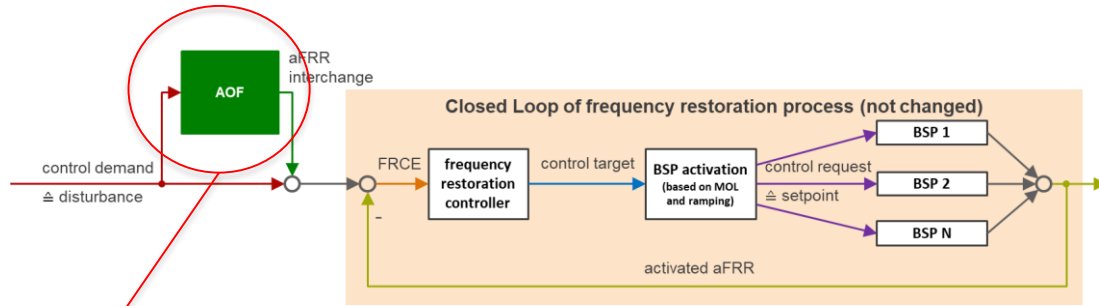
Settlement price for Direct Activated energy delivered in:

| QHi   | QHi+1   |
|---|---|
| $\text{MAXorMIN}(P_{SA} Q_{Hi}; P_{DA} Q_{Hi})$ | $\text{MAXorMIN}(P_{SA} Q_{Hi+1}; P_{DA} Q_{Hi})$ |

$P_{SA}$ ... Price of scheduled activations,  $P_{DA}$ ... Price of direct activation

- Marginal price equal to the maximum bid price of DAs
- Floor is based on the marginal price of the scheduled process
- Incentive for BSPs to submit both scheduled and direct bids
- Incentive for TSOs to use Das when needed

# Process of the aFRR



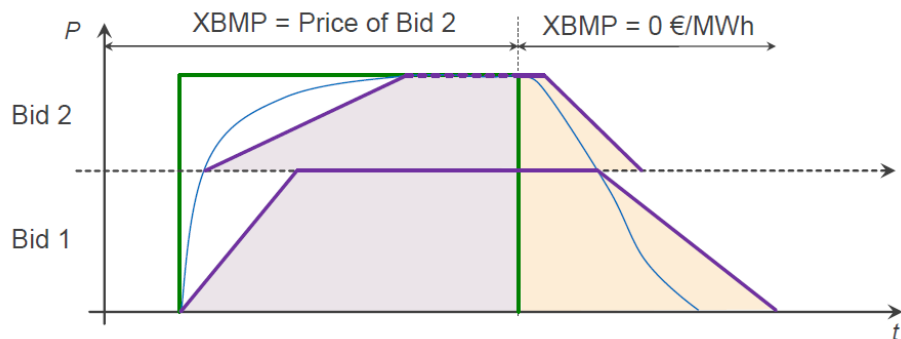
Algorithm of the platform

- 1) Every 4-10 sec, the AOF receives the demands and clears the market on the CMOL
- 2) The platform provides a signal to the local controllers
- 3) The local controllers activate the bids according to the merit order

## Standard product:

- Automatic activation of the product
- Fully divisible
- can be activated and deactivated at any moment within the validity period
- No minimum delivery period
- FAT: 5 min. from Dec 2024
- Validity period: 15 minutes

# Pricing and settlement of aFRR



- Every optimization cycle the AOF provides a **cross-border marginal price**
- Differences between AOF selection and the controller activation
- Volume settled between TSO is the AOF result
- BSPs are settled for the activated volumes at the marginal price (or pay-as-bid)

— AOF result – power and selected bids

— aFRR-controller output

— aFRR-delivery

□ aFRR (BSP) balancing energy settlement volume **to be settled with the XBMP**

□ aFRR (BSP) balancing energy settlement volume **to be settled pay-as-bid**

# Go-live of platforms

- RR platform started in Jan 2020. By the end of the year most of the RR TSOs will be connected
- mFRR and aFRR platforms are expected to be live in 2022
- IGCC (implementation project of the IN platform) is already running. By the end of the year all participating TSOs will be connected



# Conclusions

- EU electricity market is a unique undertaking: 28 countries working to harmonize the Internal Electricity Market, with potential benefits for all consumers
- Balancing market allows TSOs to extend the resources available and BSPs to trade in a wider market, improving economic efficiency of the process
- Many compromises to harmonize the balancing energy exchange, without harmonizing the system operation: potential local inefficiencies
- The go-live of platforms will show if changes are needed

# Backup

# Implicit auction and common merit order list

- All the bids from BSPs and the demand from TSOs are put together in the same **Common Merit Order List**
- Bid selection is done through an implicit auction that maximizes the social welfare, taking into account **cross-zonal capacity** (zonal model)
- Balancing energy settled according to the **marginal price**

