

# Manually Activated Reserves Initiative (MARI)

## Part II

Workshop: High level design for the participation in MARI  
& PICASSO platforms

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# mFRR Activation Types

MARI AOF

- SA activations clearing
- DA activations clearing

## Scheduled Activations:

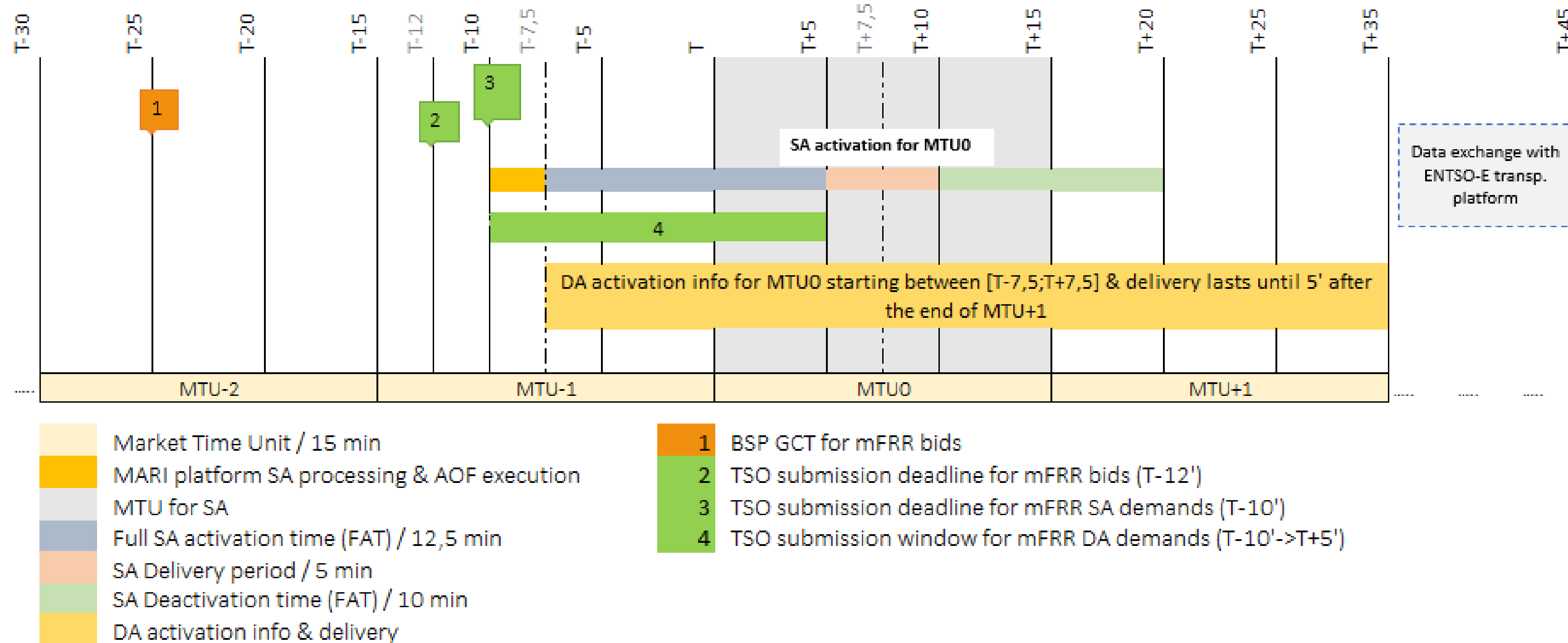
- Run every 15 minutes, once for each quarter-hour throughout the day  $Q_h(t)$ , with delivery for the next full quarter-hour  $Q_h(t+1)$ .
- Clear bids and demands in both directions
- Counter activations are feasible
- **TSO – TSO delivery shape:**
  - 12.5 minutes Full Activation Time, entailing:
    - 2.5 minutes preparation time (from T-7.5 to T-5)
    - 10 minutes start ramping (T-5 to T+5)
  - **5 minutes full delivery (from T+5 to T+10)**
  - 10 minutes end ramping (from T+10 to T+20)

## Direct Activations:

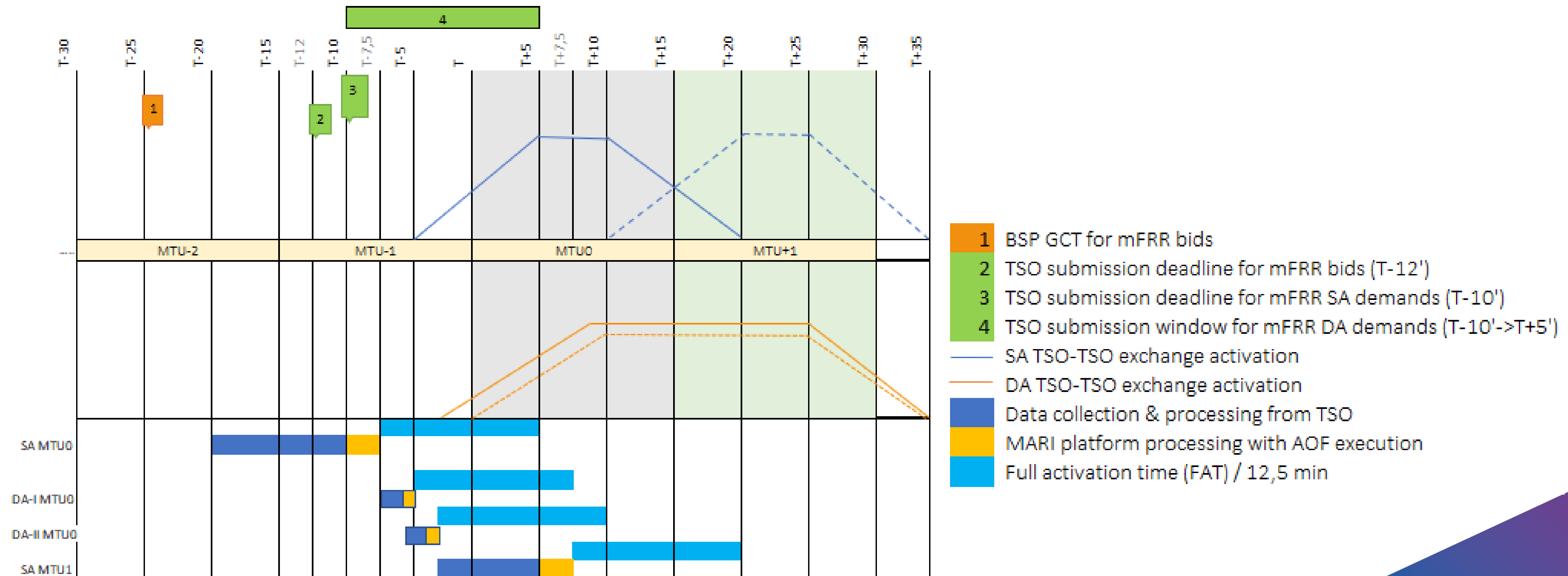
- Run on-demand, require delivery in the concerned quarter-hour  $Q_h(t)$  as well as the next quarter-hour  $Q_h(t+1)$
- Clear bids and demands in a single direction
- No counter activations
- **TSO – TSO delivery shape (*Direct Activation in  $Q_h(t)$* ):**
  - 12.5 minutes Full Activation Time, entailing:
    - 2.5 minutes preparation time
    - 10 minutes start ramping
  - **5 – 25 minutes full delivery (from T+X to T+25)**
  - 10 minutes end ramping (around the end of  $Q_h(t+1)$ , i.e. from T+25 to T+35)

*The Full Activation Time is the same for both Scheduled Activation and Direction Activation (12,5 minutes)*

# MARI Process Timeline



# MARI Process Timeline

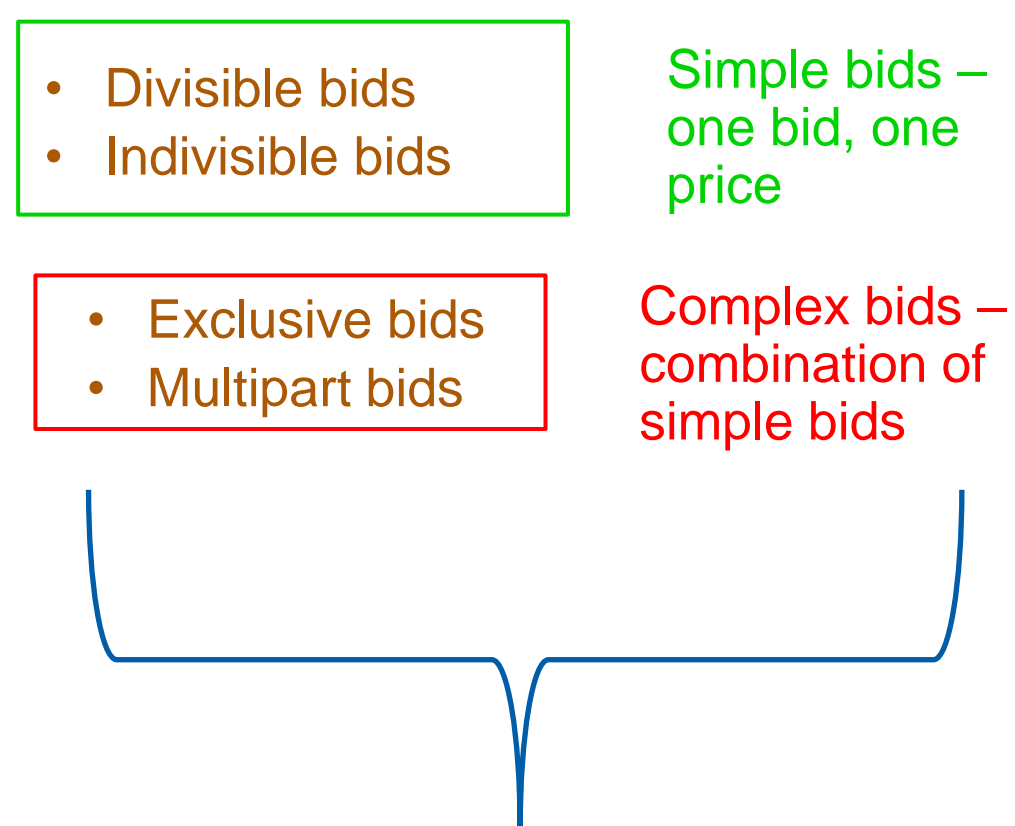


# MARI Bidding Design-Balancing Bids

## Bidding process to mFRR-Platform:

- The BSPs submit their bids to the connecting TSO according to the **locally defined product** (format, tool ...) characteristics.
- Every TSO has to submit the energy bids received from BSPs to the mFRR-Platform.
- Every energy bid submitted to the connecting TSO is available for scheduled activation (SA).
- IPTO foresees to assign an activation type before submission to the MARI platform.
- When submitting a **bid available for DA** in a quarter-hour its activation results in **a delivery extending into the next quarter hour**. The BSP must be able to perform this delivery.
- Bids may be **divisible** or **indivisible**.
- The **bid size** may not be smaller than **1 MW** and not greater than **9.999 MW**.
- Divisible bids may be activated in incremental **steps of 1 MW** from the minimum offered quantity up to the maximum offered quantity.
- Bids price may **be negative, positive or zero**.
- Both the offered and the accepted **price resolution** is **0,01 €/MWh**.

### Type of bids (within one MTU):



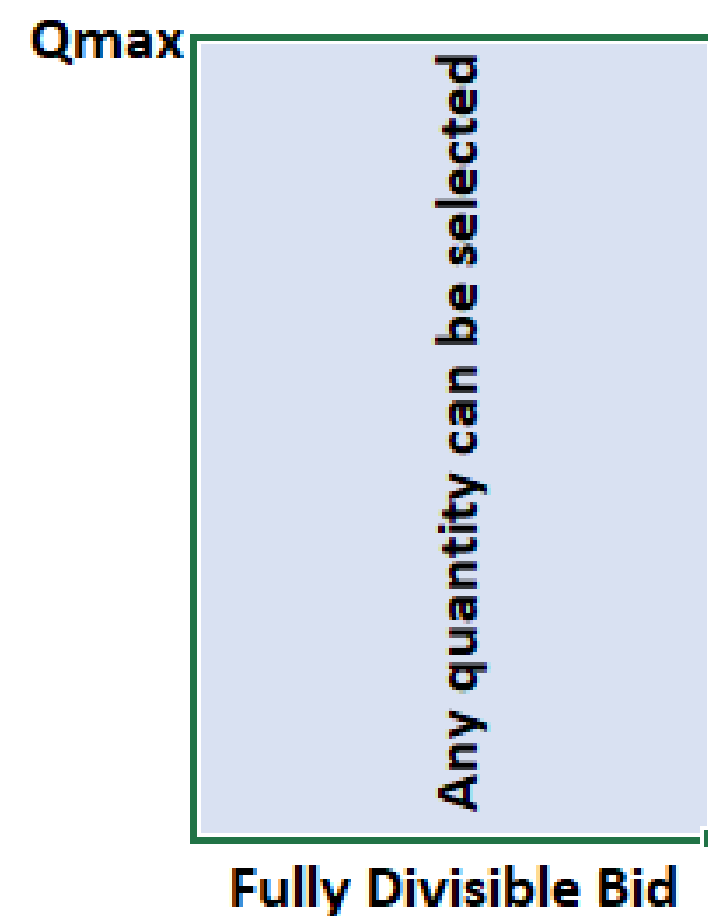
### Linkage of bids (between MTUs):

- Technical linkage
- Conditional linkage

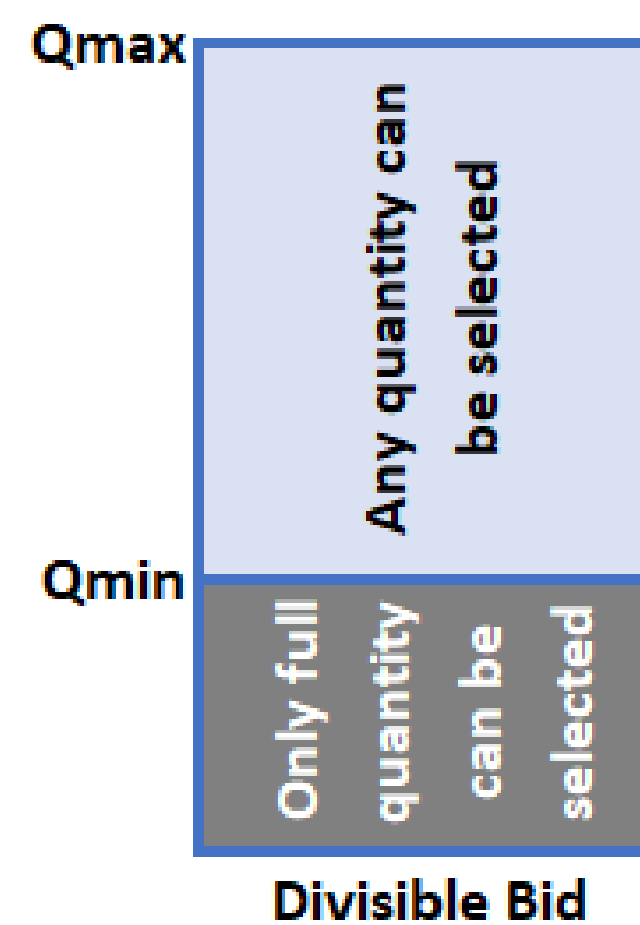
# MARI Bidding Design-Simple Bids

Simple bids: Fully Divisible/Divisible/Indivisible bids.

The **offered volume** determines the size of the bid. Divisible (fully/partially) bids have an activation granularity of 1 MW and the bid size may not be smaller than 1 MW.



- ✓ Minimum quantity,  $Q_{min}$  is equal to 0
- ✓ Accepted quantity lower or equal to  $Q_{max}$
- ✓ Bid is rejected if its accepted quantity is equal to 0



- ✓ Any quantity from  $Q_{min}$  up to  $Q_{max}$  can be cleared in incremental steps 1 MW

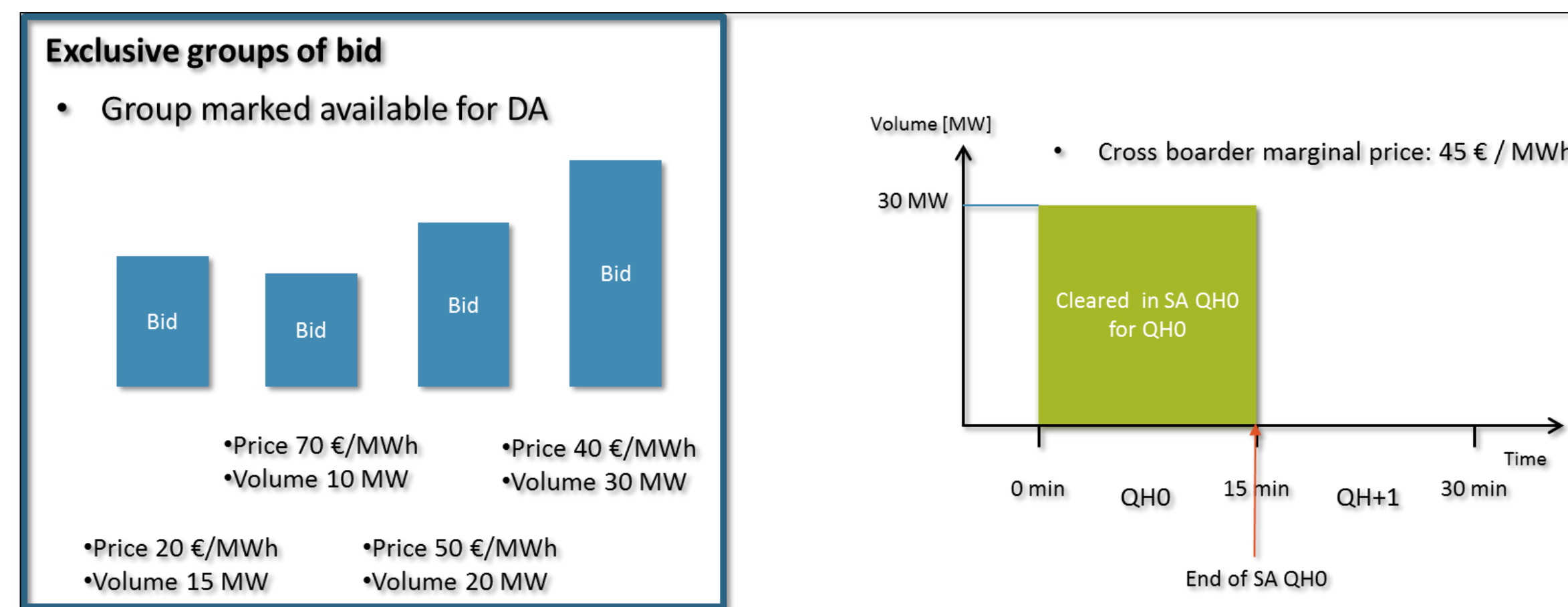
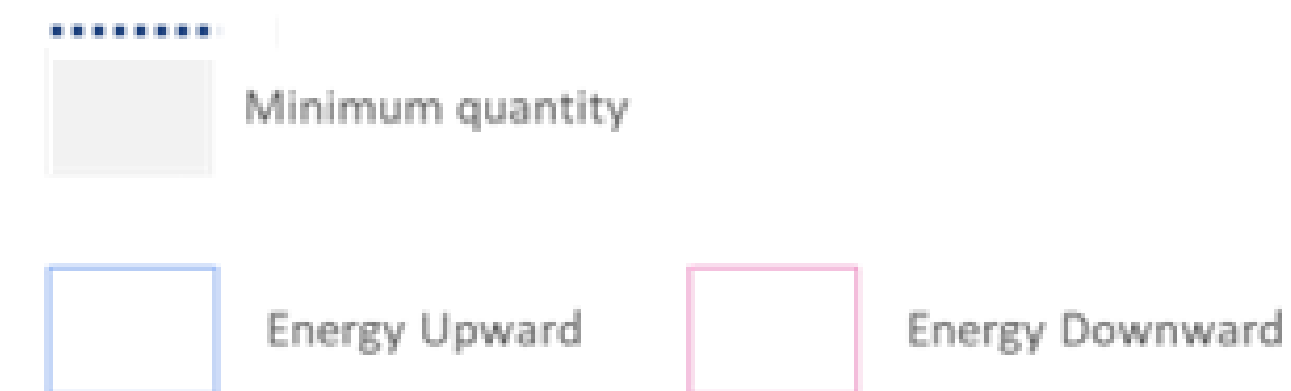
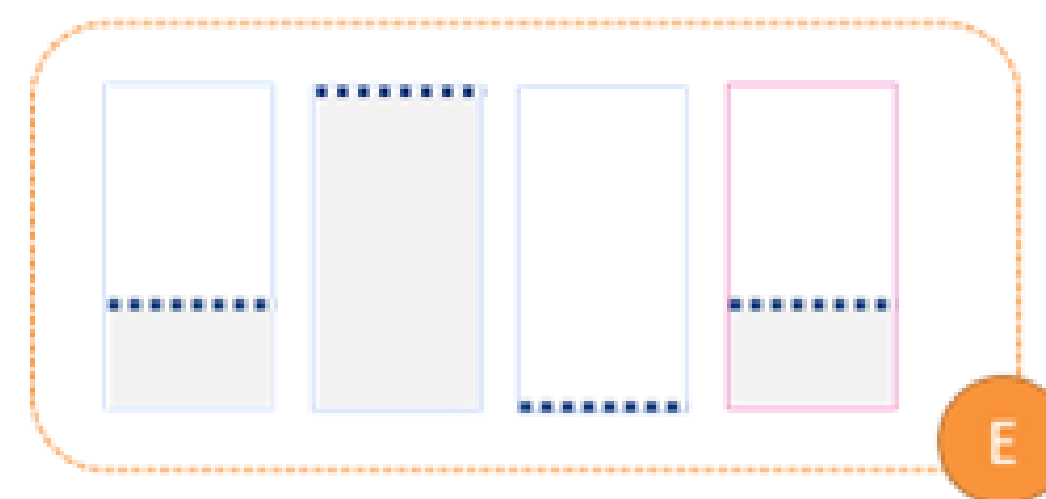


- ✓ Minimum quantity,  $Q_{min}$  is equal to maximum quantity,  $Q_{max}$
- ✓ Either fully accepted, otherwise rejected

# MARI Bidding Design-Complex Bids

## Exclusive groups of bids

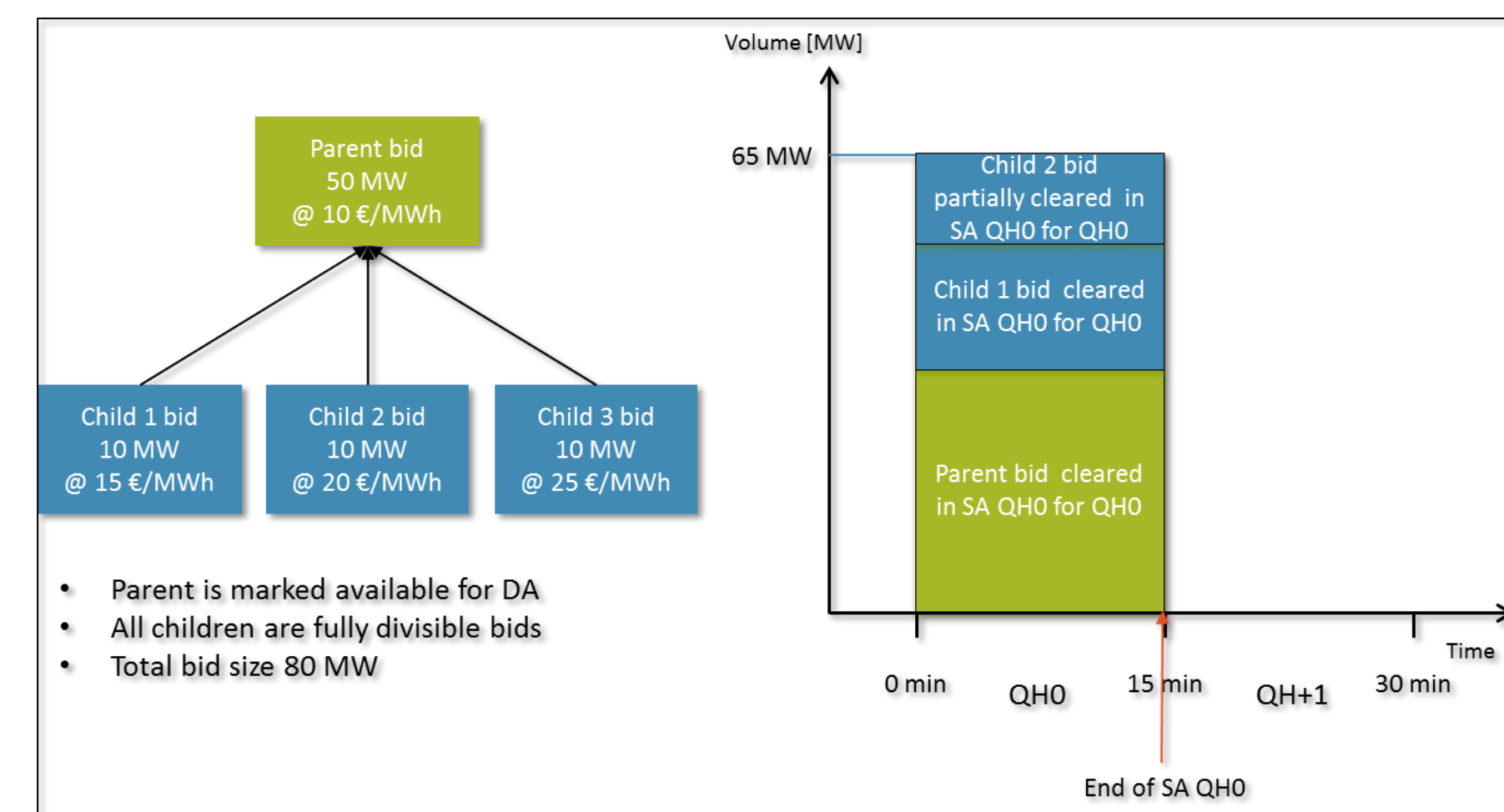
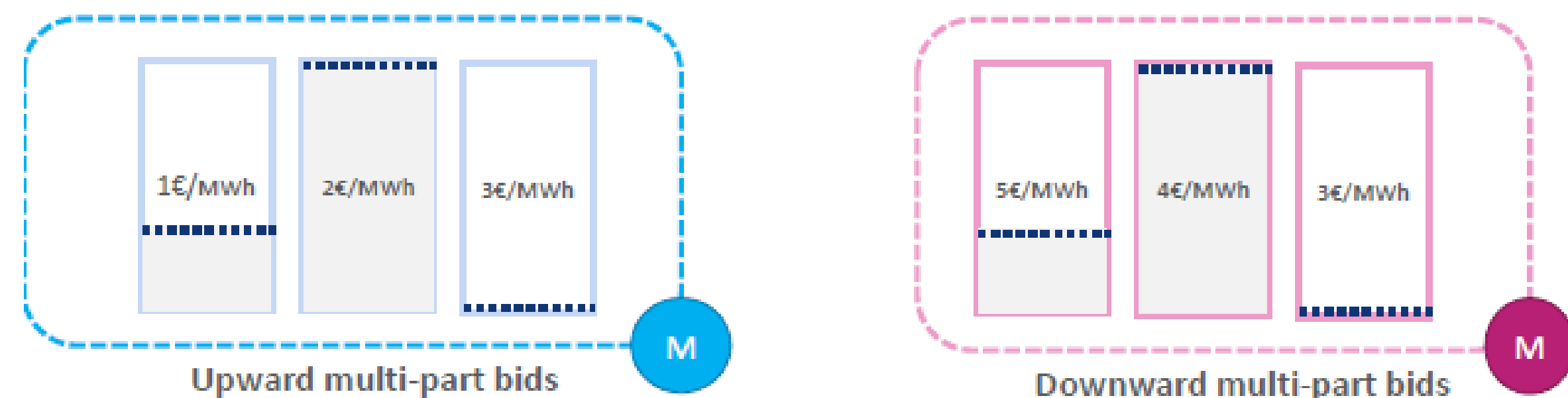
- Set of Simple Bids belonging to the same **Scheduling Area**.
- Mutually exclusive according to the principle „**At most one bid of the group can be accepted (even partially)**”.
- All bids can be divisible, indivisible, and fully divisible.
- May have **different prices, volumes and directions**.
- Always refer to **the same MTU** (15 min).
- An exclusive group of bids can be available for both SA and DA.  
If **none** of the components in the exclusive group of bids is **activated in SA**, the whole exclusive group of bids **remains available for DA**.
- All the bids in an exclusive group **should have the same activation type**.



# MARI Bidding Design-Complex Bids

## Multipart bids (Parent – child bid)

- Set of Simple Bids of the **same direction & Scheduling Area**.
  - Bids can be (fully) divisible or indivisible.
  - Must cover the **same MTU period**.
  - The **activation type should be the same** for all bids of the multi-part bids.
  - **All bids** in the multi-part bid **must have different prices but same or different volumes**.
  - The parent bid will be the cheapest one for the upward direction and the most expensive for the downward direction.
- ✓ If a downward multipart bid is accepted – **all associated bids with higher price must also be accepted**.
  - ✓ If an upward multipart bid is accepted – **all associated bids with lower price must also be accepted**.
  - ✓ If **any component / any bid** in the multi-part bid **is accepted in SA**, **none** of the other components **would be available in DA**.

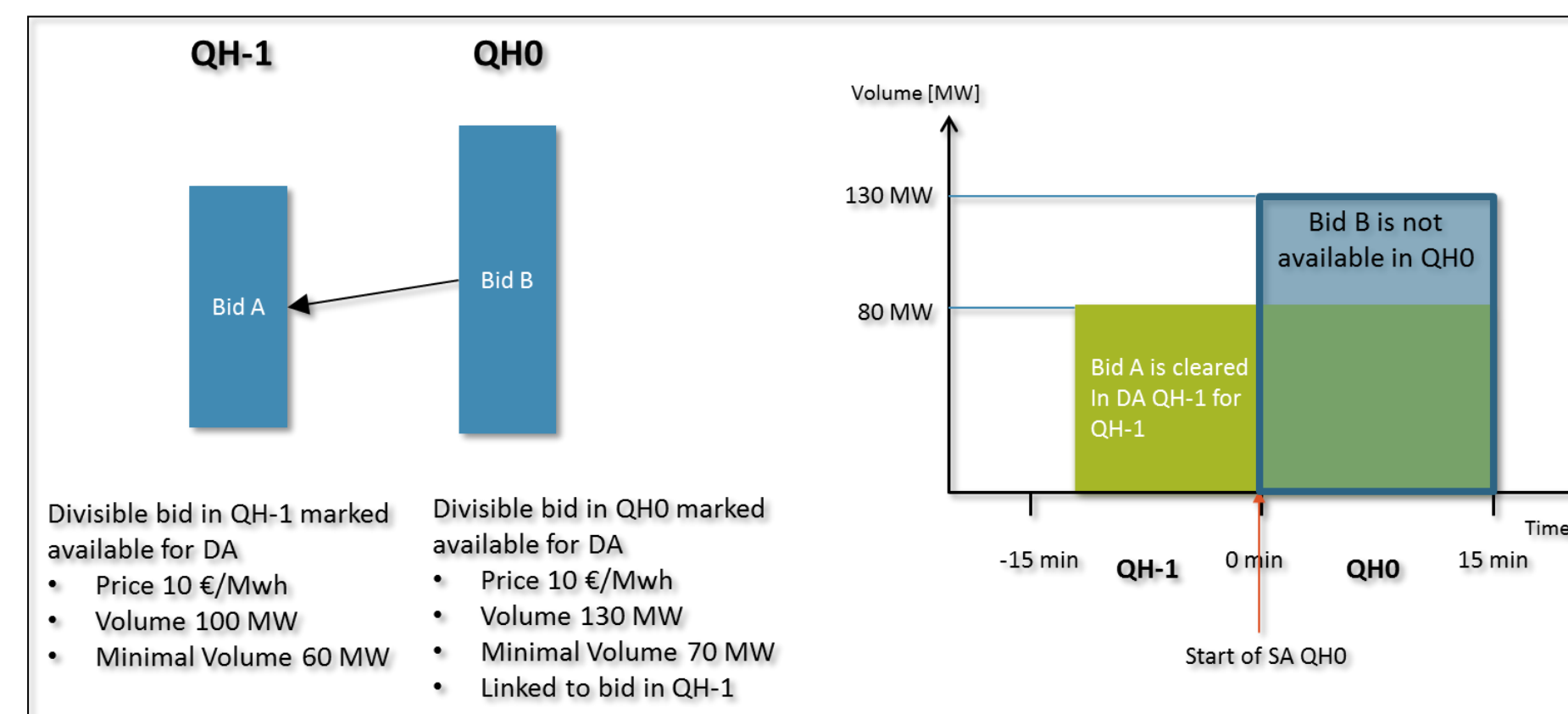
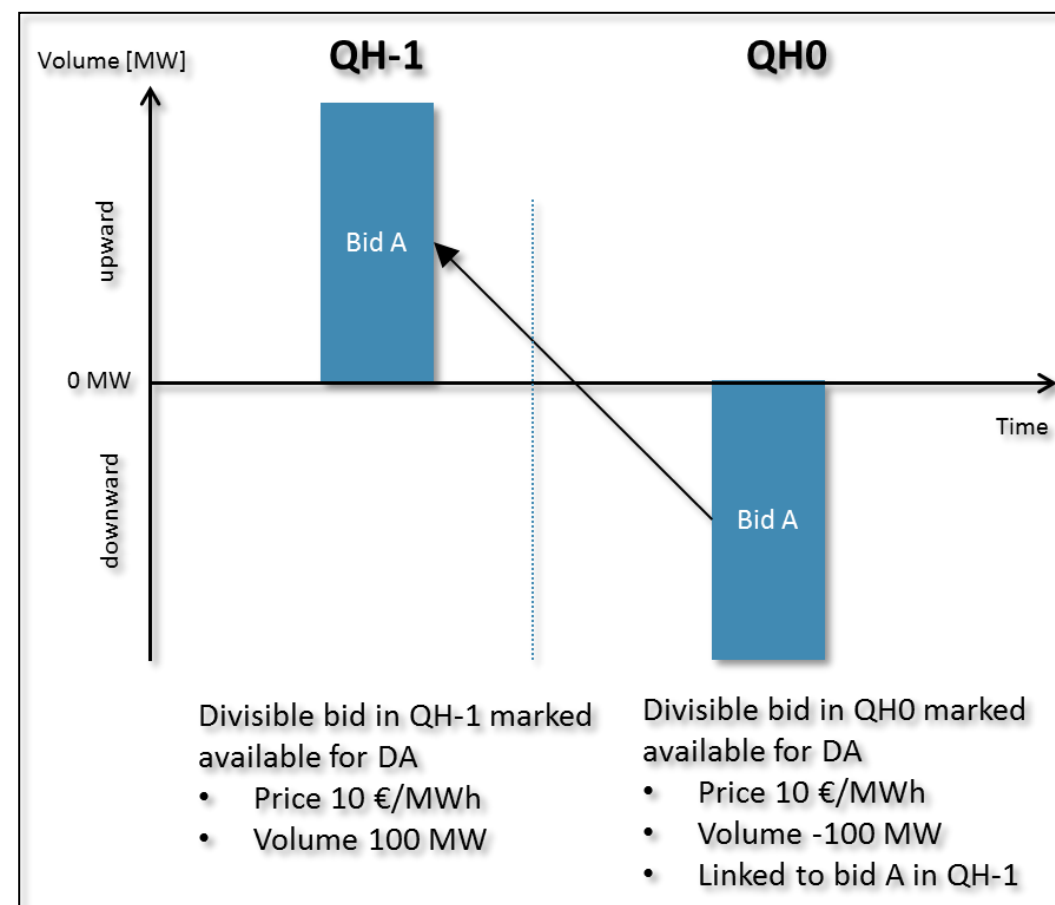


# MARI Bidding Design-Bids Linkage

**‘Technical linking’** is a linking between two bids (simple or complex) of the same asset of a BSP in two subsequent QHs used to avoid unfeasible activation of assets due to being activated in DA spanning over these two QHs.

TSOs may facilitate BSPs with this input

- Bids must be identifiable with a unique ID and it remains the responsibility of BSPs to correctly identify their linked bids, in order to avoid unfeasible activations (e.g. double activation of the same resources).
- Within a given MTU period, there may not be more than one bid having the link to the same bid in previous quarter hour.
- It defines if a bid in QH0 is available for DA clearing if the bid in the QH-1 **was not activated in DA**.
- If the bid in QH-1 is subject to DA, the technically linked bid in QH0 **will be unavailable (for SA as well as DA)**.



# MARI Bidding Design-Bids Linkage

**‘Conditional linking’** means links between bids of a BSP in up to three consecutive QHs needed to represent technical restrictions and cost structure of their portfolio. It is needed because the BSPs do not know at GCT of QH0, if their bid in QH-2 was activated for DA or if their bid in QH-1 was activated for SA or DA.

- As of the current MARI design, conditional linking is only applicable to **simple bids**.
- A given bid in QH0 may have **between zero and three conditional links to bids in QH-1** and/or **between zero and three conditional links to bids in QH-2**. Maximum number of conditional links is 6 (3 between QH0 & QH-1; 3 between QH0 & QH-2).
- A bid in QH0 that is declared as available by default becomes either completely unavailable for both SA and DA or unavailable for DA when at least one of its links indicate unavailability. A bid in QH0 that is declared as unavailable by default, becomes either available or available for DA when at least one of its links indicate availability.

*The conditional linking will turn the initial availability status of bids to the opposite availability status if the condition materializes.*

## The following rules are currently foreseen in the MARI Platform:

- Bid in QH0 initially available:
  - a) Bid unavailable if linked bid in earlier MTU is activated for either SA or DA.
  - b) Bid unavailable if linked bid in earlier MTU is not activated.
  - c) Bid unavailable for DA if linked bid in earlier MTU is activated for SA.
  - d) Bid unavailable for DA if linked bid in earlier MTU is activated for DA.
- Bid in QH0 initially unavailable:
  - a) Bid available if linked bid in earlier MTU is activated for either SA or DA.
  - b) Bid available if linked bid in earlier MTU is not activated.
  - c) Bid available for DA if linked bid in earlier MTU is activated for SA.
  - d) Bid available for DA if linked bid in earlier MTU is activated for DA.

# MARI Bidding Design-Bids Linkage

## Possible Combinations:

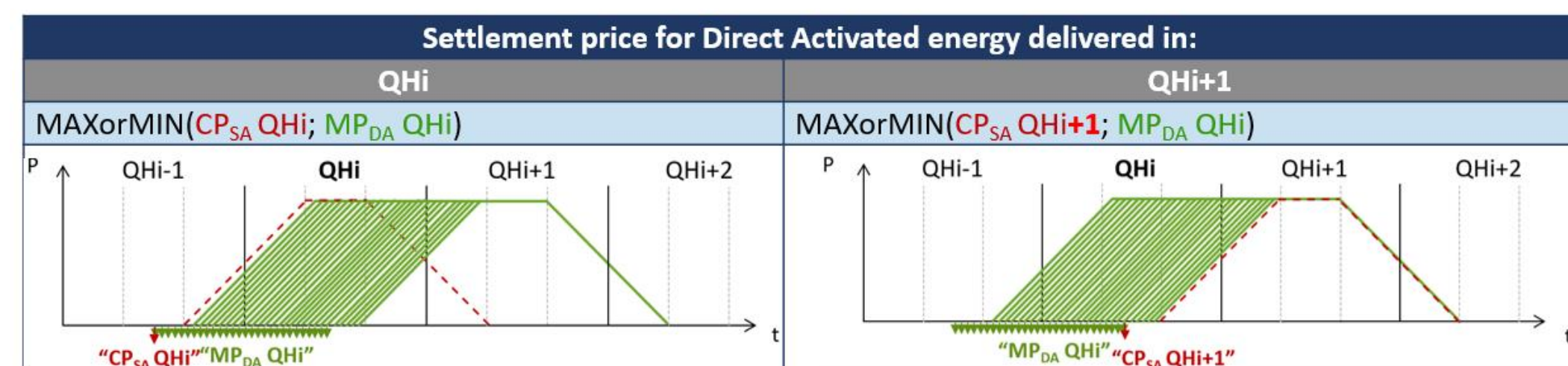
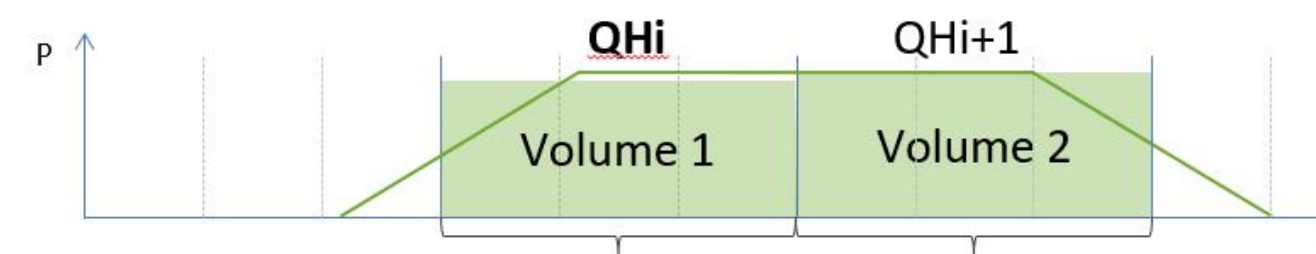
- It is permitted to have **technical links between exclusive and multipart bids** in different MTU periods.
- It is permitted to have **both technical and conditional links between simple bids** (i.e. technical and conditional links between two bids are permitted however in such case both must be simple bids).
- Within a QH0, there **may not be more than one bid** having the **same technical link** to bids in QH-1.
- No technical links are allowed within one MTU.
- No conditional links are allowed within one MTU.

## Difference between technical and conditional linking:

- Technical linking is linking between two different MTU periods (i.e. bid in QH0 may be technically linked with bid in QH-1).
- Conditional linking is linking between two or three different MTU periods (i.e. bid in QH0 may be conditionally linked with bid in QH-1 and with bid in QH-2).
- Conditional linking only concerns simple bids, while technical linking also concerns complex bids.

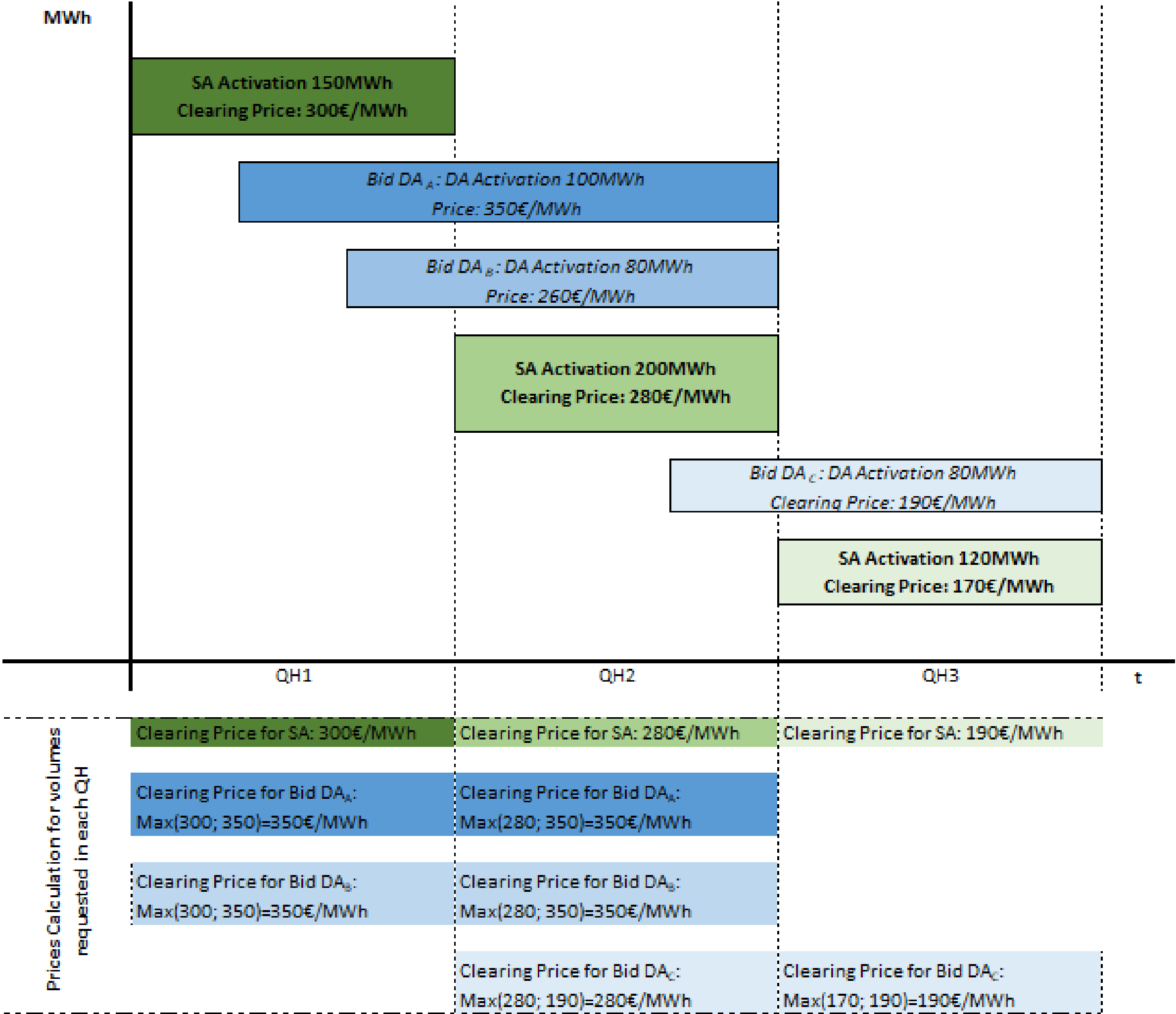
# mFRR Energy Settlement Prices

- **Marginal pricing** is the general principle for determining the settlement prices for activated volumes.
- It is possible to have multiple mFRR clearing prices for a MTU **since various optimizations may happen during the same MTU**;
  - ❖ one for mFRR SA for both positive and negative directions,
  - ❖ none or more for mFRR DA for positive direction, and
  - ❖ none or more for mFRR DA for negative direction
- For scheduled activations, **the CBMP is equal than the most expensive** activated bids.
- For direct activations the energy delivered in the first quarter-hour may be remunerated differently from the energy delivered in the second quarter-hour, thus there are **two CBMPs for both quarter hours** affected by the direct activation:
  - ❖ For volume in QHi: maximum from all positive direct activations in QHi and the SA QHi, alternatively is the minimum from all negative direct activations;
  - ❖ For volume in QHi+1: maximum from all positive direct activations in QHi and the SA Qhi+1, alternatively is the minimum from all negative direct activations.



# mFRR Energy Settlement Prices

Example of mFRR energy clearing prices for Direct & Scheduled Activations in positive direction



Determination of mFRR energy clearing prices

Clearing_price_SA _Qh(t)	Clearing price for Scheduled Activation (both positive and negative direction) requested for and delivered in Qh(t)
Clearing_price_DA, positive_Qh(t)_Qh(t)	Clearing price for Direct Activation in positive direction requested for and delivered in Qh(t) = max [Clearing_price SA _Qh(t); Marginal_bid_priceDA, positive _Qh(t)]
Clearing_price_DA, positive_Qh(t-1)_Qh(t)	Clearing price for Direct Activation in positive direction requested for Qh(t-1) and delivered in Qh(t) = max [Clearing_price SA _Qh(t); Marginal_bid_priceDA, positive _Qh(t-1)]

# Remunerated mFRR Energy

## Energy Remuneration for SA delivery:

- The mFRR Energy Requested (MWh) for the relevant MTU corresponds to the expected balancing energy provision for the net selected bids by MARI of a specific entity for the concerned QH(t) in MW for SA,  $MARI\_SA_{MW}^{Up-Dn}$ .
- The fulfillment of the Dispatch Instruction for a SA as well as the mFRR Energy Requested is remunerated for the pink area and the yellow areas correspond to imbalances.
- For QH(t0) mFRR Energy remunerated is equal to:

$$MARI\_SA_{MWh}^{Up-Dn} = MARI\_SA_{MW}^{Up-Dn} * 1/4 * 15/15 \text{ [MWh]}$$

## Energy Remuneration for DA delivery:

- The mFRR Energy Requested for DA (MWh) is reduced in proportion to the delay of the activation request re. the point of scheduled activation. The mFRR Energy Requested (MWh) for the relevant MTU corresponds to the expected balancing energy provision for the net selected bids by MARI of a specific entity for the concerned QH(t) in MW for DA,  $MARI\_DA_{MW}^{Up-Dn}$ .
- The fulfillment of the Dispatch Instruction for a DA as well as the mFRR Energy Requested is remunerated for the green and pink area. The yellow areas correspond to imbalances.

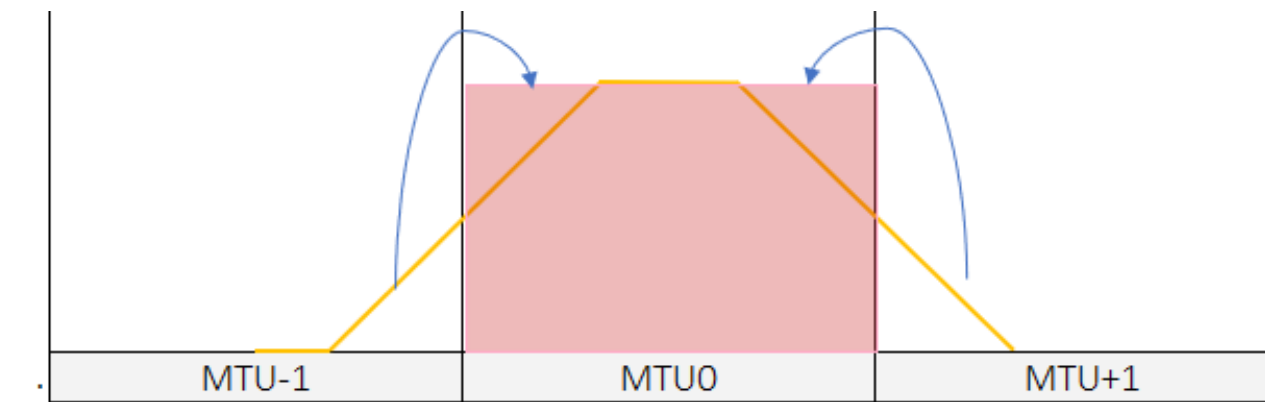
For QH(t0) mFRR Energy remunerated is equal to:

$$MARI\_DA_{MWh}^{Up-Dn} = MARI\_DA_{MW}^{Up-Dn} * 1/4 * (15-t)/15 \text{ [MWh]}$$

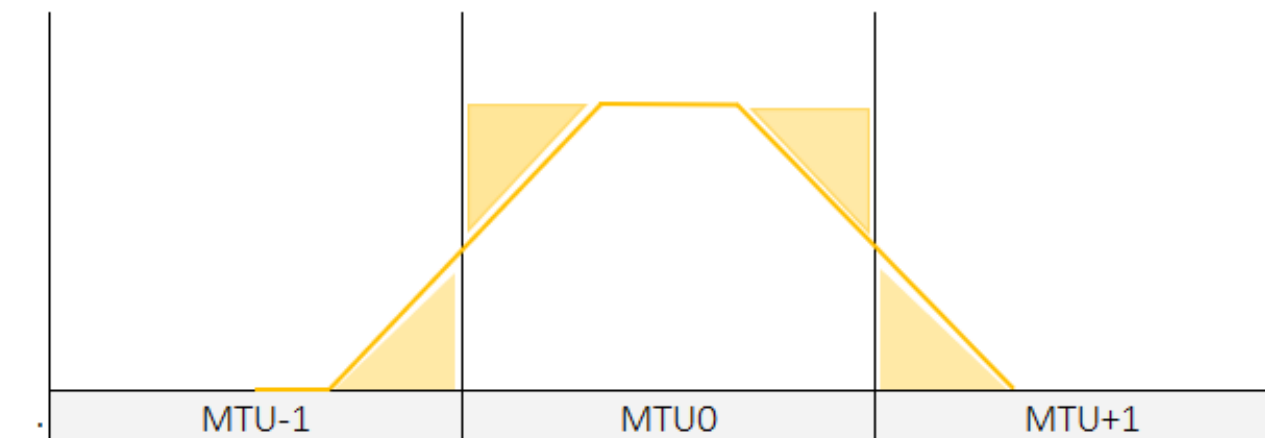
where t is the time delay between point of scheduled activation and the time of the direct activation request.

For QH(t+1) mFRR Energy remunerated is equal to:

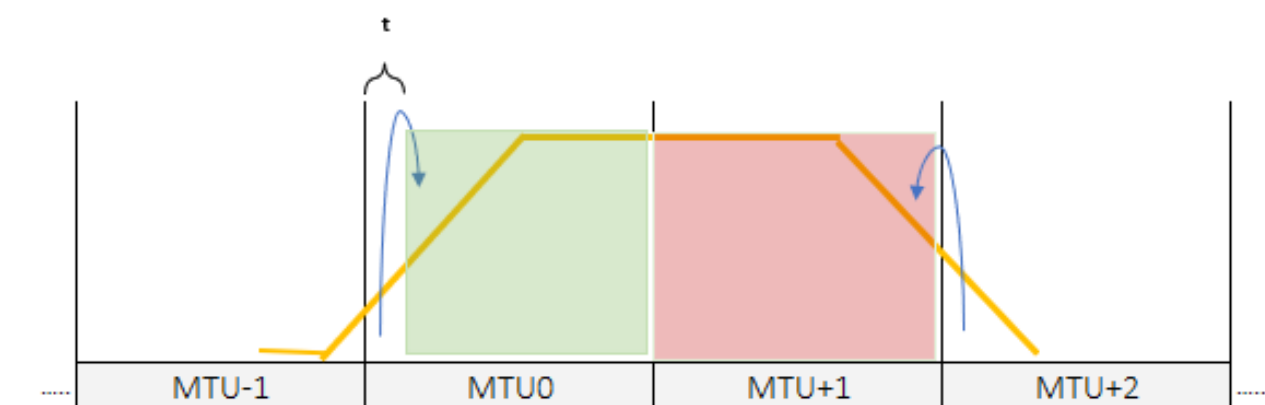
$$MARI\_DA_{MWh}^{Up-Dn} = MARI\_DA_{MW}^{Up-Dn} * 1/4 * 15/15 \text{ [MWh]}$$



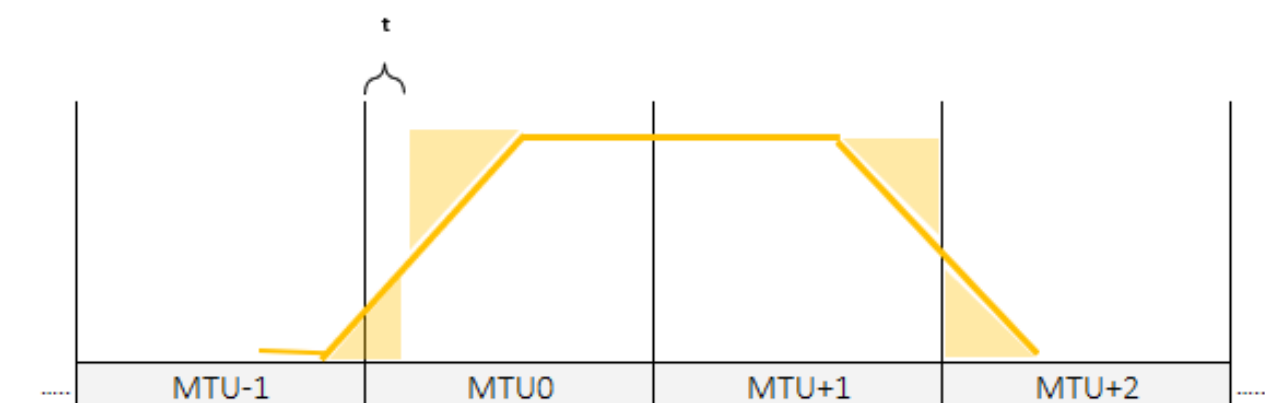
Market Time Unit / 15 min  
TSO-BSP exchanged shape for SA  
mFRR energy remunerated for MTU0



Market Time Unit / 15 min  
TSO-BSP exchanged shape for SA  
Imbalances



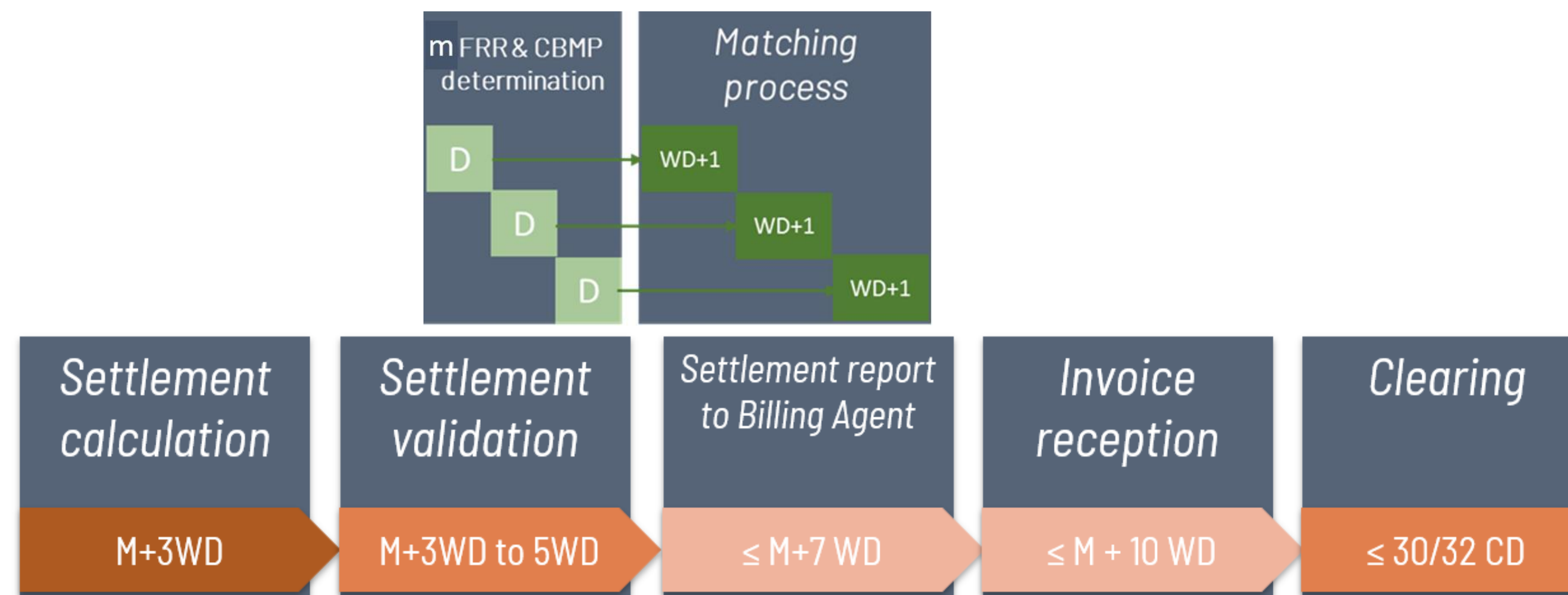
Market Time Unit / 15 min  
TSO-BSP exchanged shape for DA  
mFRR energy remunerated for MTU0  
mFRR energy remunerated for MTU1



Market Time Unit / 15 min  
TSO-BSP exchanged shape for DA  
Imbalances

# MARI-TSO Settlement

- MARI settlement process is performed on a monthly cycle.
- A matching process is performed the following working day after the mFRR energy exchange to determine the exchanged mFRR volumes, which will be settled between MARI and TSO.
- Before the 3<sup>rd</sup> WD of M+1, MARI Settlement Function shall calculate the settlement amounts per quarter-hour and per control area.
- TSOs shall have a validation period in which they have the chance to open a dispute if any error or inconsistency in the MARI settlement report has been detected. Settlement amount validation period is defined between the 3<sup>rd</sup> and the 5<sup>th</sup> day of M+1.
- Settlement data are sent to the Billing Agent on the 7<sup>th</sup> WD of M+1 for invoicing issuance,
- The Invoicing Agent (JAO) invoices monthly all participating TSOs, regarding the settlement amounts before the 10<sup>th</sup> WD of M+1.
- The payments by the TSOs to the Billing Agent are performed no later than 30 calendar days after the date of issuance of the invoice.
- The payments by the Billing Agent to the TSOs are performed no later than 32 calendar days after the date of issuance of the invoice.
- Finally, the correction of invoices is possible up to thirty-six months after the month of delivery.



# MARI-TSO Settlement

The MARI TSO-TSO settlement timeline affects the timeline of the local balancing market settlement as performed today.

## Considerations for the local implementation:

1. **Option 1:** is to switch to monthly local settlement cycles in order to take into account MARI settlement results in the initial settlement.
  - ❖ This option increases the risk for the Clearing House and will increase the required guarantees by Participants **but reduces the need for corrective settlements**.
2. **Option 2:** is to continue with weekly local settlement cycles. In this case, financial exchanges with other TSOs will initially (on the weekly local settlement, w+1) be credited/debited to the Uplift Account 3 (Financial Neutrality Account) and will be corrected with a local corrective settlement performed after the finalization of the TSO-TSO settlement.
  - ❖ This option could create large variations in the Uplift Account 3 depending on the direction of the energy flows by the MARI platform. In addition, the monthly settlement cycle of MARI also affects corrective settlement timing which is now performed in week w+6 and will have to be performed after the receipt of the monthly MARI settlement statement.

Another consideration is the local Final Settlement (w+52) will also have to be performed after the finalization of the MARI settlement which may be performed up to thirty-six months after the month of delivery **[correction of invoices is possible up to thirty-six months after the month of delivery]**.



Thank you for your  
attention!

The high-level market design for MARI and PICASSO is under public  
consultation until 10/02/2023

<https://www.rae.gr/diavoulefses/58907/>