The Future of mFRR in Germany

50 Hz

Roadmap, as of 28.10.21

Roadmap

02.12.2021
Stakeholder Workshop Implementation PICASSO & MARI

01.02.2022
Planned Go-Live of MARI
- Postponed

2021 | 2022

24.11.2021
National Stakeholder Workshop for Germany
- Details about Postponed Go-Live of PICASSO & MARI

08.12.2021
Postponed Introduction of Standard Products for Balancing Energy
- Minimum bid size 1 MW
- Pricing as EUR/MWh

07.2022
New Go-Live of MARI

Product Main Changes

Standard Products

Feature	Today	Future
Minimum bid size	5 MW	1 MW
Full Activation Time (FAT)	15 mins	12.5 mins
Validity Period	T-22.5 mins to T-7.5mins	T-7.5 mins to T+7.5mins
Minimum duration of delivery	-	5 mins
Division of bids	Block orders until 25 MW	(Fully) Divisible and Indivisible
Linking of bids	-	Possible/Required
Direct activation	All bids scheduled and directly activatable	Right to choose if either scheduled only or both

BSPs have an increased flexibility in the bidding process, especially with regards to bid size, Division and Linking of bids and activation mode. At the same time the change in validity period has a significant impact on processes, where BSPs need to adapt!

Bid Types

Bid Types

Three Types of Simple Bids

- **Fully divisible:** can be partially selected; the minimum selected volume is 1 MW
- **Divisible:** can be partially selected; the minimum value is capped by the minimum offered volume
- **Indivisible:** energy product bid, which cannot be activated partially

Complex Bids

Used to model technical and economical behaviors of energy assets.

Multipart Bids

Two or more simple bids within same QH (quarter hour):
- Must have different prices, but may have same volumes
- Fully divisible, divisible, indivisible
- All bids must be in same direction and have the same activation type
- All components must have the same activation type
- A component of a multipart bid cannot be part of another multipart bid

Exclusive Bids
- May have different volumes, directions and prices
- Fully divisible, divisible, indivisible
- All bids must be in same direction
- All components must have the same activation type

Linking of Bids

Facts

Main Principle:	Automatically change availability status of linked bids in case of certain events such as activations or non-activations
Necessity of Linking:	Linking is used for two reasons: ▪ Modeling technical constraints of power plants, such as ramping periods ▪ Economical Optimization, for example regarding start-up-costs or opportunity costs

BSPs are responsible for providing feasible activations only. Making use of linked bids is often a necessity for quarter-hourly products.

Linking Types

Technical Linking
- Linking of bids in two or more subsequent quarter hours.
- Technical linking ensures that a bid in QH-0 is not available for clearing if the bid in the previous quarter hour was activated in direct activation (DA).
- Both bid types, simple and complex, are supported.
- Combination of Technical Linking and Conditional Linking is possible.

Conditional Linking
- Linking of bids in two or three subsequent quarter hours.
- Conditional linking is used to adjust the availability of a bid in QH-0 (available/non-available) based on the activation outcome of linked bids in previous quarter hours QH-1 and/or QH-2.
- Only simple bids are supported, as opposed to Technical Linking.

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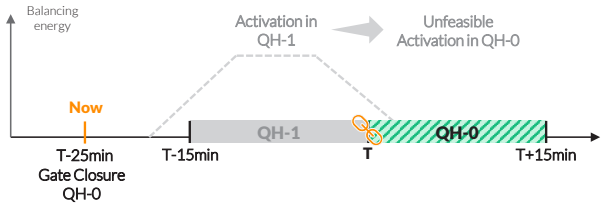
Linking of Bids

Necessity of Linking

Main Principle: Change availability status of linked bids to avoid unfeasible activations.

Example:

- BSP provider is marketing his battery storage via mFRR.
- Battery has capacity to provide 10MW for 5 mins.
- BSP is bidding for two subsequent QHs, from QH-1 to QH-0, but only has the capacity to be activated once.
- At Gate Closure (T-25 for QH-0), he does not know whether he was activated in QH-1 prior to QH-0.
- Linking of Bids for QH-1 and QH-0 necessary, to avoid an unfeasible activation in QH-0 in case BSP gets activated in QH-1.



Linking bids for QH-1 and QH-0 automatically sets availability status of QH-0 to "unavailable" in case of activation in QH-1.

Linking can avoid unfeasible activations. BSPs need to build bidding processes which link bids according to constraints, ideally in an automated way due to 96 possible quarter hours per day.

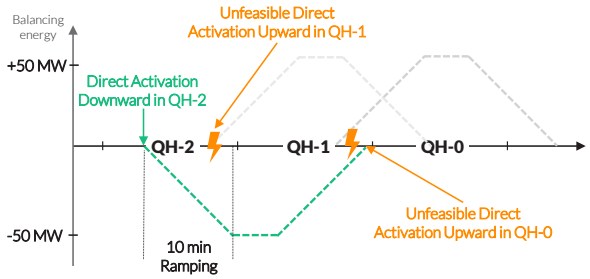
Use Cases

Use Case 1: Modeling Ramping Constraints

Simplified Modelling of Ramping Constraints

- BSP Provider offers two bids per each of three subsequent QHs, in each one upward (+50 MW) and one downward bid (-50 MW).
- Ramping Constraints are +/-5 MW/min.
- Upward Bids in QH-1 and QH-0 must be linked to Downward Bid in QH-2 and vice verse, in order to avoid unfeasible activation.
- Downward Bid in QH-2 gets activated, link sets availability status of Upward Bid in QH-1 and QH-0 to "unavailable".

Quarter Hour	Upward Bid	Downward Bid
QH-2	+50 MW	-50 MW
QH-1	+50 MW	- 50 MW
QH-0	+50 MW	- 50 MW



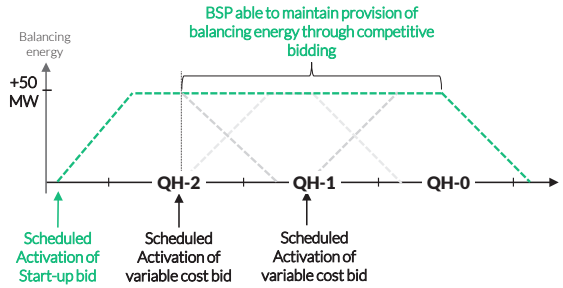
BSP is able to model his ramping constraints and fulfils responsibility of avoiding unfeasible activations.

Use Case 2: Optimization of balancing capacity and modeling of start-up costs

Simplified Modelling of Optimization

- BSP provider offers two bids per each of three subsequent QHs, one bid including start-up and variable cost (10€/MWh) marked available and one bid with variable costs only (1€/MWh) marked unavailable.
- Subsequent bids are linked such that as soon as one 10€/ bid is activated, the availability of subsequent bids including start-up-costs is changed to „unavailable". In return, all bids with variable costs are set from „unavailable" to „available".

QH	Upward Bid incl. var. and Start-up cost	Upward Bid incl. variable Costs only
QH-2	+50 MW @ 10€	+50 MW @ 1€
QH-1	+50 MW @ 10€	+50 MW @ 1€
QH-0	+50 MW @ 10€	+50 MW @ 1€



The BSP is compensated for its start-up costs but is able to offer competitive bids in subsequent QH.

Linking can be used in many different ways. Reach out to FORRS for more details and an assessment of your optimization opportunities!

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