Public Stakeholder Workshop

EBGL pricing proposal (Article 30)
EBGL activation purposes proposal (Article 29)

16 October 2018
ENTSO-E premises

Agenda

From		To	Item
10:00	-	10:15	Welcome: Agenda
10:15	-	11:15	An overview of the pricing and activation purposes proposals
11:15	-	12:30	Balancing Energy Pricing Period for aFRR
12:30	-	13:30	Lunch
13:30	-	14:30	Pricing for Activations due to System Constraints
14:30	-	14:45	Break
14:45	-	15:15	Price divergence
15:15	-	16:15	Q&A: Open Discussion
16:15	-	16:30	*AOB*

Overview EBGL implementation

#	NC	Article	Level 1 Article content/activity	2018												2019											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
126	EBGL	A 18.1	propose T&Cs for BSPs and BRPs																								
127	EBGL	A 19.1	Proposal for implementation framework for RR Platform			W																					
130	EBGL	A 20.1	Proposal for implementation framework for European mFRR Platform						W																		
134	EBGL	A 21.1	Proposal for implementation framework for European aFRR Platform						W																		
138	EBGL	A 22.1	Proposal for implementation framework for European IN Platform			W																					
143	EBGL	A 25.2	Proposal for list of Standard Balancing Capacity Products																					W			
146	EBGL	A 29.3	Proposal for Activation Purposes									W															
147	EBGL	A 30.1	Proposal for pricing method for all products									W															
151	EBGL	A 40.1	Methodology for cooptimised CZC allocation																						W		
152	EBGL	A 41.1	Methodology for market based CZC allocation																						W		
159	EBGL	A 52.2	Proposal for harmonisation of certain features of imbalance calculation & pri																								

Process for drafting proposal
Public Consultation
TSO deadline for submitting proposal
NRA Approval preparation
NRA Approval publication
ACER Decision preparation
ACER Decision publication
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Overview on
Activation purpose proposal

Pavel Zolotarev

Convenor PT PSAP

Workshop on All TSO proposals

Activation purpose proposal

Scope

Activation Purposes Proposal

Pricing Proposal: Pricing of Balancing Energy

Pricing Proposal: Pricing of Cross-Zonal Capacity

RR IF

mFRR IF

aFRR IF

IN IF

Content

No.	Article	Remark
	Whereas	*explanation of how we fulfil EBGL*
1	Subject Matter and Scope	*in accordance with Article 29 EBGL*
2	Definitions and interpretations	*definitions, consistent with IFs*
3	Activation Purposes and Classification Criteria	
4	Publication and implementation of the proposal	*as in the IFs*
5	Language	*as in the IFs*

Activation Purposes

Process	Activation purpose: balancing	Activation purpose: system constraints*
RR	yes	yes
mFRR	yes	yes
aFRR	yes	no

*System constraints is an activation purpose which does not serve the frequency-control process targets in accordance with the SO GL (frequency restoration process and reserve replacement process)

Overview on
Pricing Proposal

Pavel Zolotarev

Convenor PT PSAP

Workshop on All TSO proposals

EB GL Requirements

Art. 30: Pricing for balancing energy used for exchange or imbalance netting

- ”[...] *develop a proposal for a methodology to determine prices for the balancing energy that results from the activation of balancing energy bids for the* ***frequency restoration*** […] *and the* ***reserve replacement*** *process* […].”

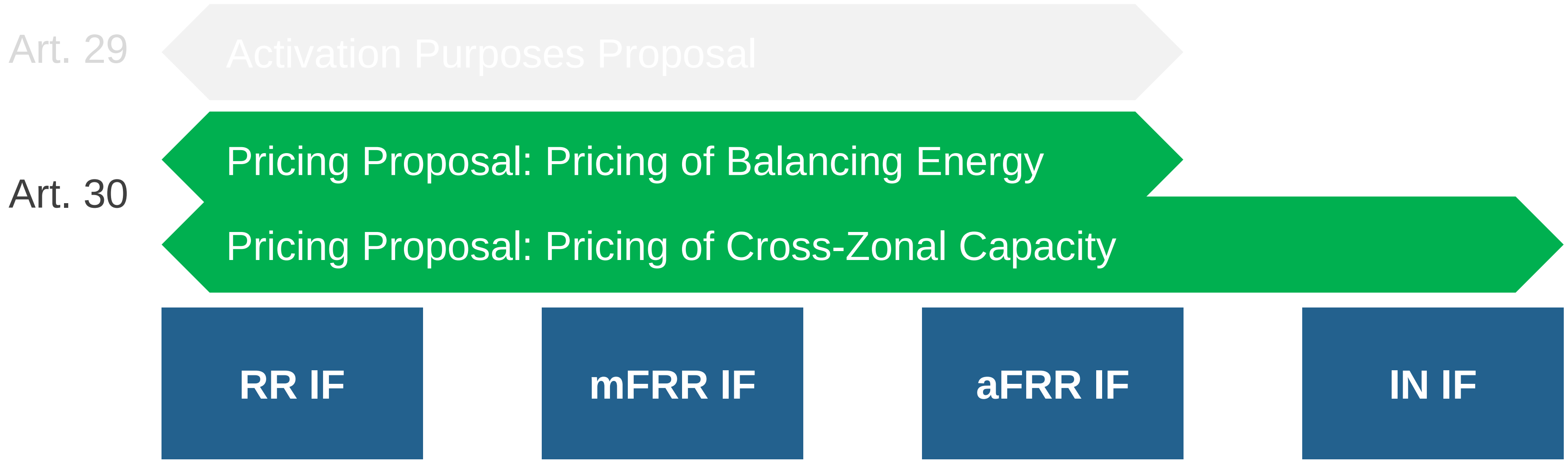
  “Such methodology shall:
  (a) be *<u>based on marginal pricing (pay-as-cleared)</u>*
  (b) define how […] *balancing energy bids activated for purposes other than balancing affects the balancing energy price* […].

Art. 50:

- ”[...] *common settlement rules applicable to all intended exchanges of energy* […] as a result of one or more of the following processes:
  - *(a) the reserve replacement process*
  - *(b) the frequency restoration process with manual activation;*
  - *(c) the frequency restoration process with automatic activation;*
  - *(d) the imbalance netting process.*

Pricing proposal

Scope



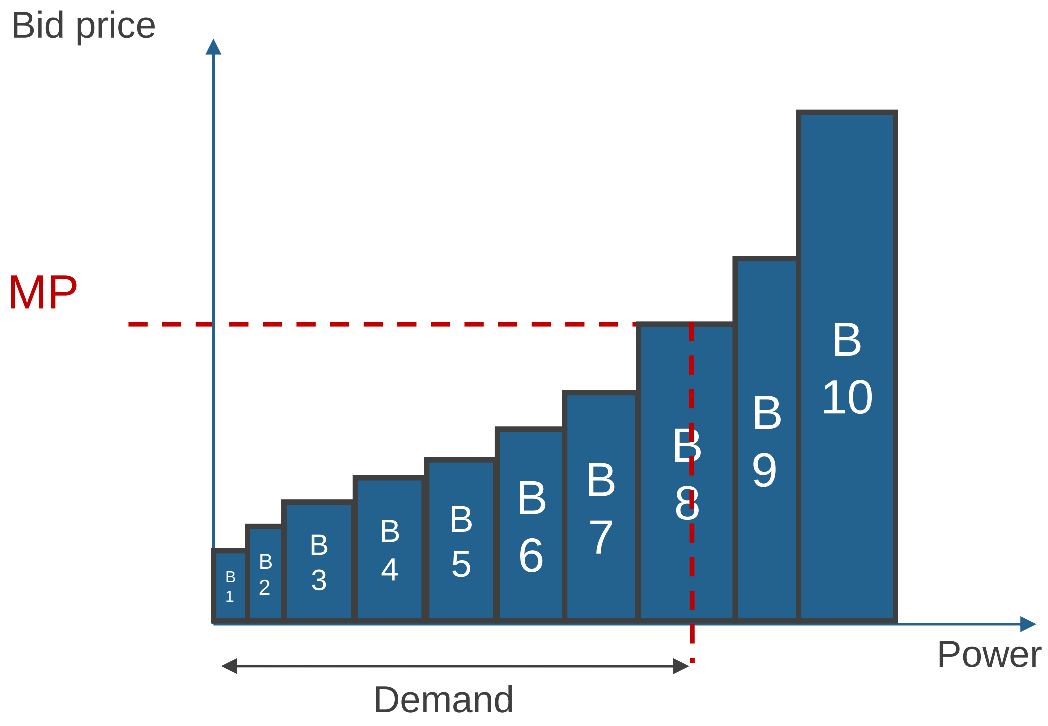
Content of the Proposal

No.	Article	Remark
	Whereas	*explanation of how we fulfil EBGL*
1	Subject Matter and Scope	*in accordance with Article 30 EBGL*
2	Definitions	*definitions, consistent with IFs*
3	General Principles	*pricing methodology applicable to all processes*
4	Additional Provisions for the Pricing of Standard RR Balancing Energy Product Bids and Standard mFRR Balancing Energy Product Bids with Scheduled Activation Type	*specific aspects of the methodology for RR and scheduled mFRR*
5	Additional Provisions for the Pricing of Standard mFRR Balancing Energy Product Bids with Direct Activation Type	*specific aspects of the methodology for direct mFRR*
6	Additional Provisions for the Pricing of Standard aFRR Balancing Energy Product Bids	*specific aspects of the methodology for aFRR*
7	Pricing of Specific Products	*as much defined as possible*
8	Additional Provisions for Pricing for System Constraint Purpose Activations	*standard balancing energy bid selected for system constraint purpose remuneration*
9	Pricing of Cross-Zonal Capacity	*including imbalance netting*
10	Publication and Implementation of PP	*as in the IFs*
11	Language	*as in the IFs*

Marginal Pricing as Basis for the Proposals

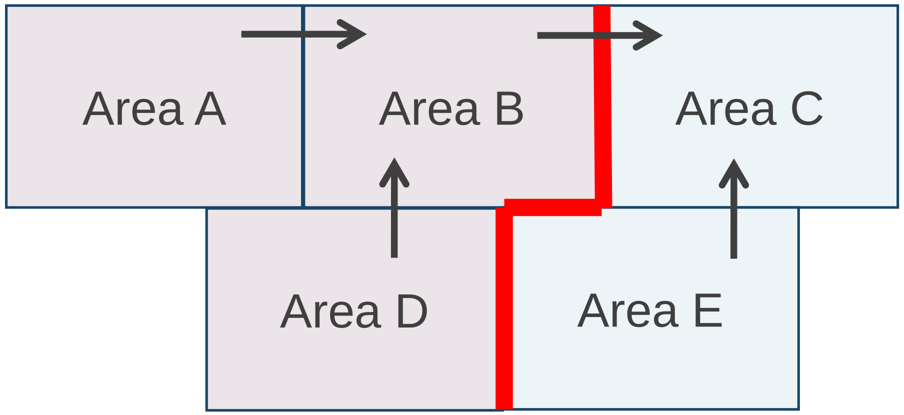
In this context, the Marginal Price (MP) represents the price of the last bid of a standard product which has been activated to cover the energy need for balancing purposes within a specified area.

- ► Same principle as day-a-head market
- ► Easy bid setting
- ► Lower bid prices (marginal cost bidding vs. markup in pay-as-bid)

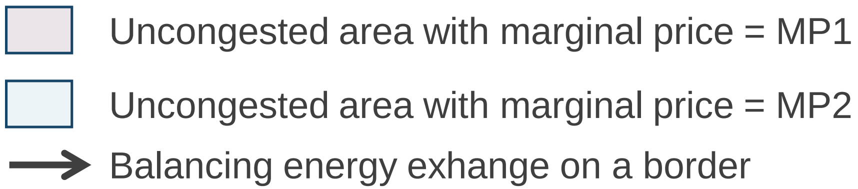


Cross-Border Marginal Pricing (XBMP)

- The AOF will compute the balancing energy price per ”uncongested area”.
- In the case there is no congestions between adjacent areas, the price will be the same in these areas
- In case there is a congestion – there will be a price split (principally like the day-ahead market)
- In the case of evolving congestions, the uncongested areas for RR could be different than from mFRR. Also the uncongested areas for mFRR could be different from the uncongested areas for aFRR

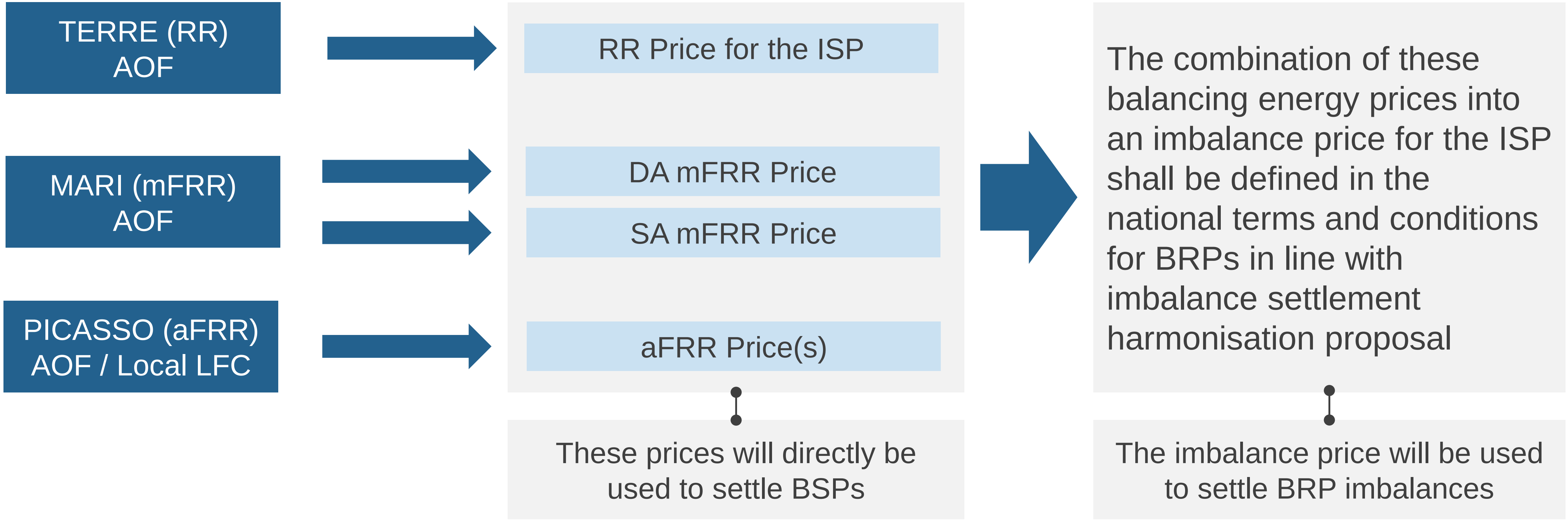


- In this example there is a congestion on the borders B→C, B→E and D→E
- Area A,B and D have the marginal price MP1
- Area C and E have the marginal price MP2



One Product – One Price for each Period

… or in other words – there will be no cross-product pricing



The proposal foresees to apply different price for balancing and system constraint activation purpose (applicable in scheduled mFRR and RR).

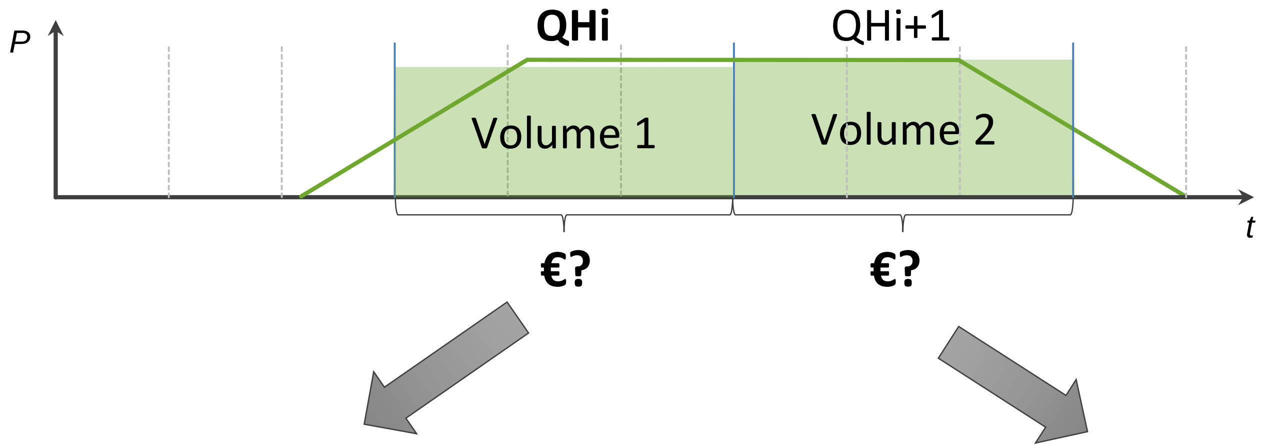
Summary of the Proposal 1/2

General Principles	▪ XBMP will be applied for standard product bids activated for balancing purpose ▪ One XBMP will calculated in each platform ▪ **Each balancing energy volume will be remunerated at least with the bid price**
Application of General Principles to RR and mFRR	▪ The “general principles” can be applied directly to RR and mFRR with scheduled activation. ▪ The price will be calculated by the AOF based on the result of the optimisation. ▪ The article defines the intersection point which is the XBMP ▪ The balancing energy pricing period (BEPP) is 15 min, i.e. there will be one price for 15 min for scheduled mFRR and one price for 15 min for directly activated mFRR.
Application of General Principles to aFRR	▪ The calculation of the XBMP then follows the same principles as for RR or scheduled mFRR (but without the intricacies of the “complex” bids which are not foreseen by the implementation framework) ▪ We propose a BEPP which is equal to the optimisation cycle of the AOF – **options are discussed in the explanatory document and presented today!**

Summary of the Proposal 2/2

Pricing of Specific Products	▪ The pricing of the specific products which are converted to standard products is based on the standard product bid price (not to be confused with the pricing of bids in the central dispatch models) ▪ Bid conversion and financial neutrality of the TSO must be "taken into account". ▪ The details must be addressed at the national level.
Pricing of Cross-Zonal Capacity	▪ The price of the CZC will be equal to the XBMP price difference on the borders. ▪ For the energy exchange which is performed in the framework of the imbalance netting platform the CZC price will be 0 €/MWh (since the imbalance netting platform does not include a common pricing of aFRR).
Pricing of System Constraints Activations	▪ In the proposal – bids selected for system constraints activation purpose with a price **above** the XBMP of an optimisation with balancing-only demands **will be settled with pay-as-bid**. ▪ The bids selected for system constraints activation purpose with a price **below** the XBMP of an optimisation with only balancing demands will receive the XBMP of balancing-only optimisation. ▪ **Options are included in the explanatory document and presented today**

Pricing of direct activated mFRR

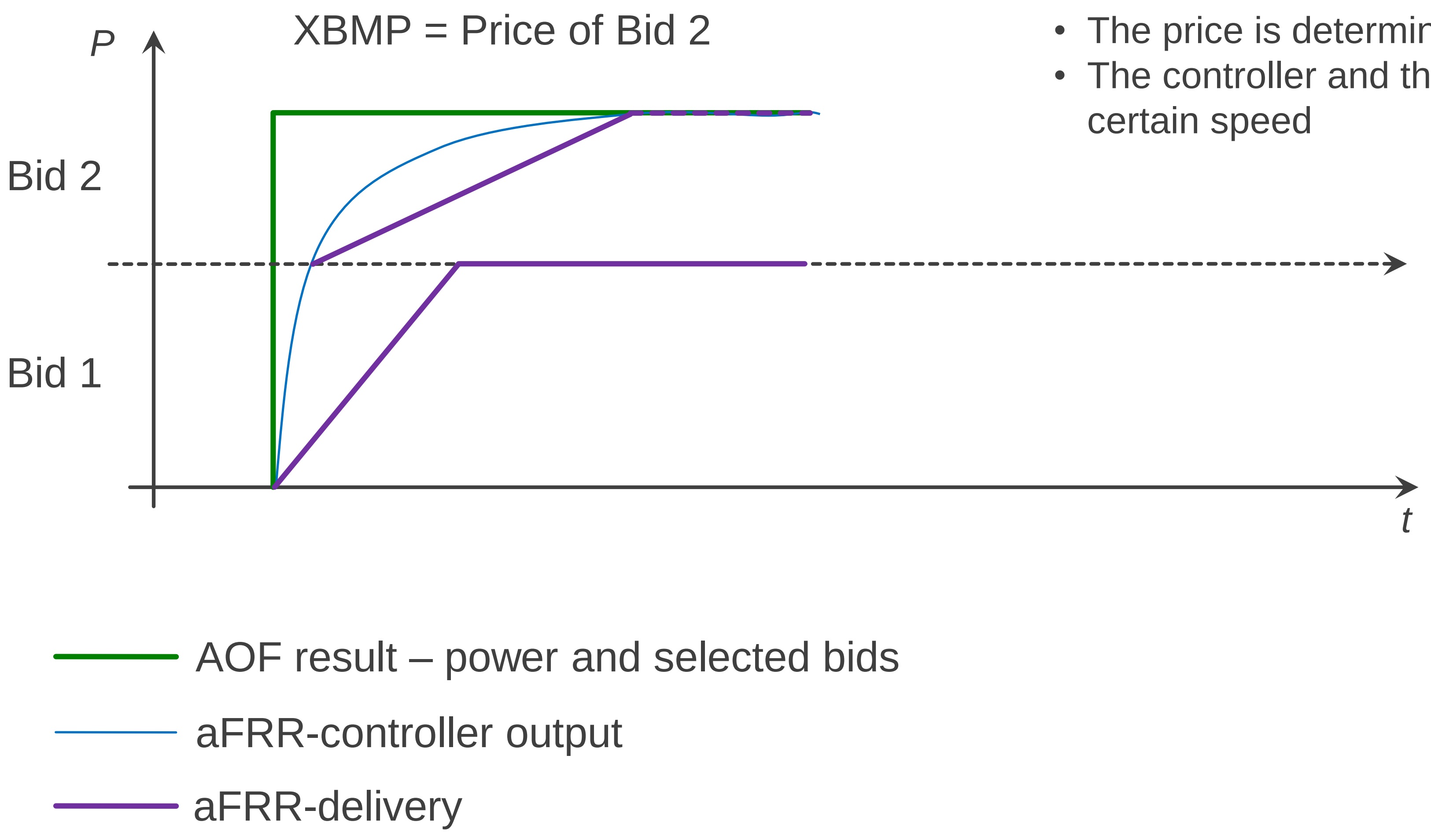


Settlement price for Direct Activated energy delivered in:	
QHi	**QHi+1**
MAXorMIN(P_{SA} QHi; P_{DA} QHi)	MAXorMIN(P_{SA} QHi+1; P_{DA} QHi)

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

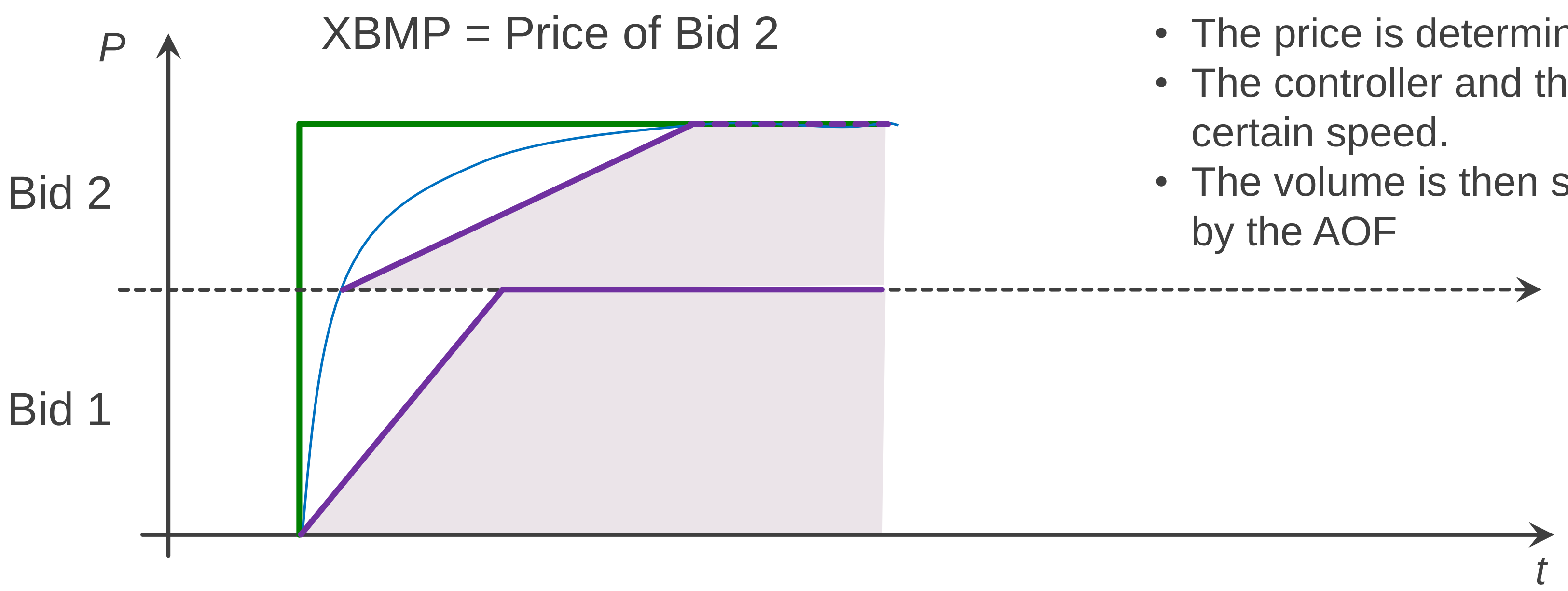
Note the floor is different in the two ISP's as this is based on the XBMP of the scheduled activations

aFRR – Dynamic Effects 1/5



- The AOF selects bids from the merit-order list.
- The price is determinded by the AOF.
- The controller and the aFRR delilvery follow with a certain speed

aFRR – Dynamic Effects 2/5



- The AOF selects bids from the merit-order list.
- The price is determinded by the AOF.
- The controller and the aFRR delilvery follow with a certain speed.
- The volume is then settled with the price determined by the AOF

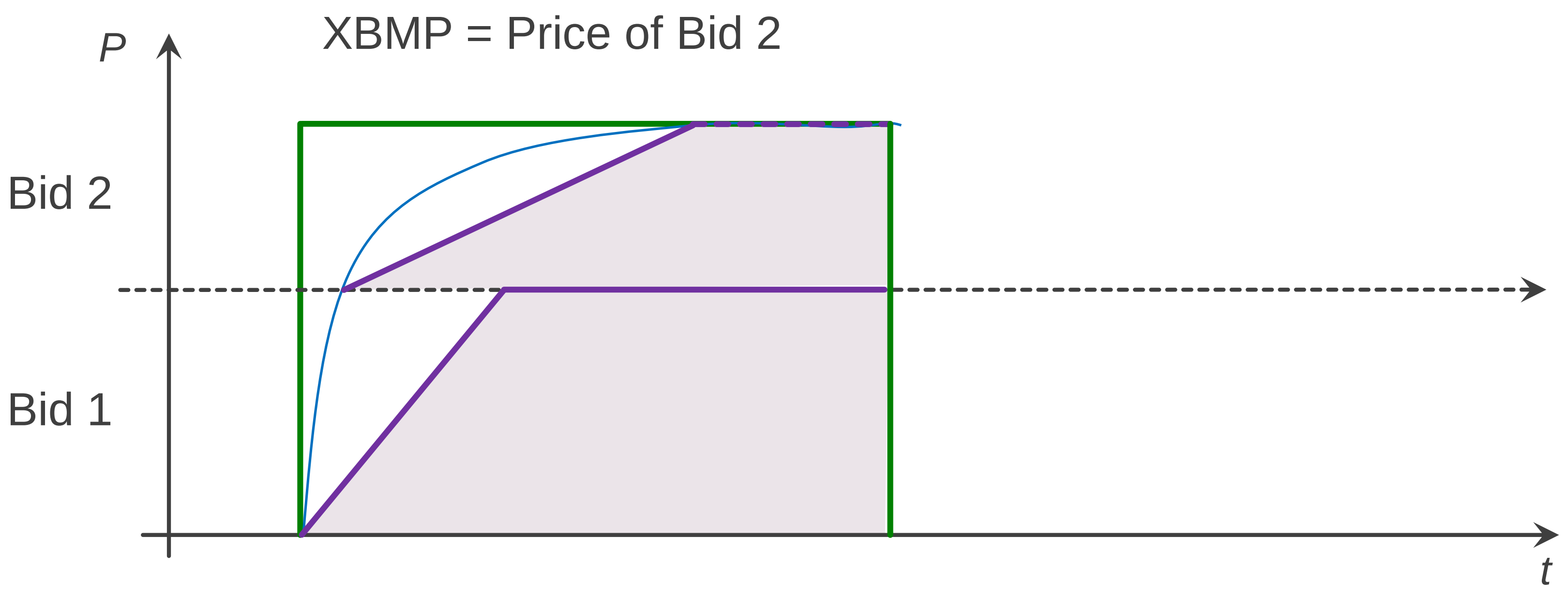
AOF result – power and selected bids

aFRR-controller output

aFRR-delivery

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

aFRR – Dynamic Effects 3/5



- The imbalances are volatile, i.e. they can increase or decrease as in this example.

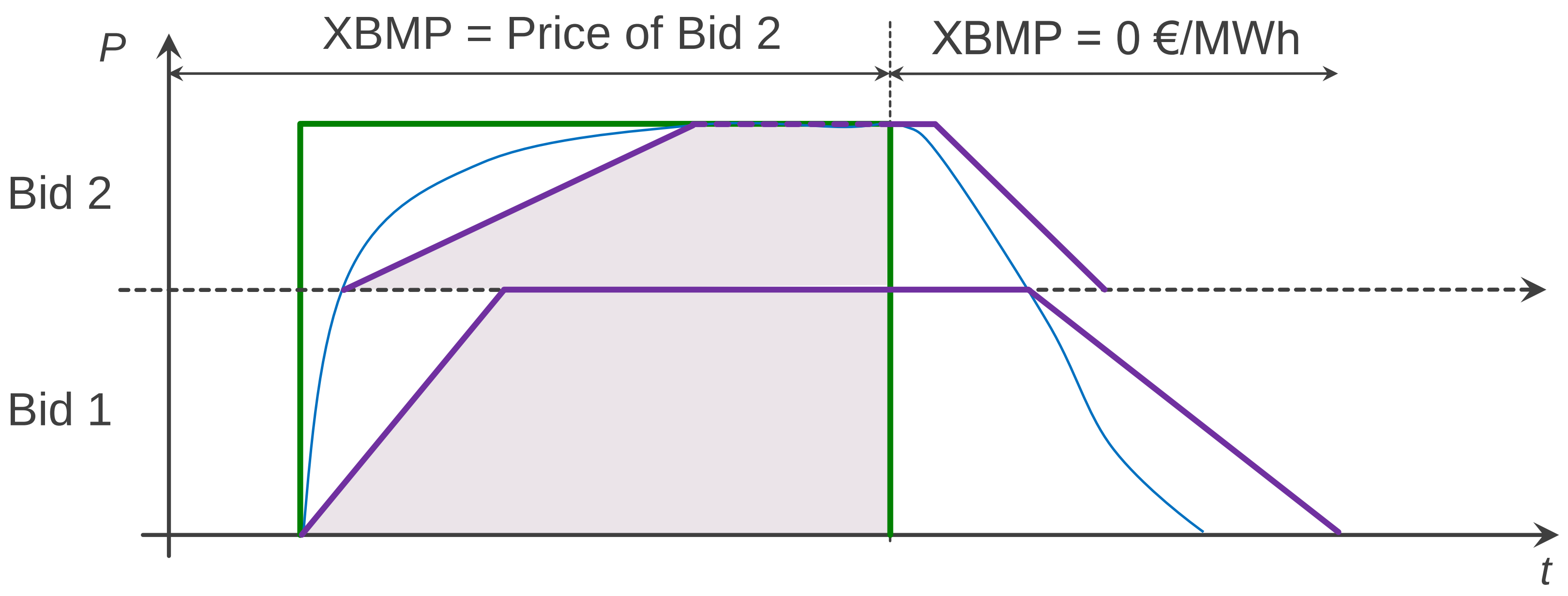
AOF result – power and selected bids

aFRR-controller output

aFRR-delivery

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

aFRR – Dynamic Effects 4/5



- The imbalances are volatile, i.e. they can increase or decrease as in this example.
- The bids are deactivated – but still delivered – at the same time the XBMP determined by the AOF is lower than the bid price.

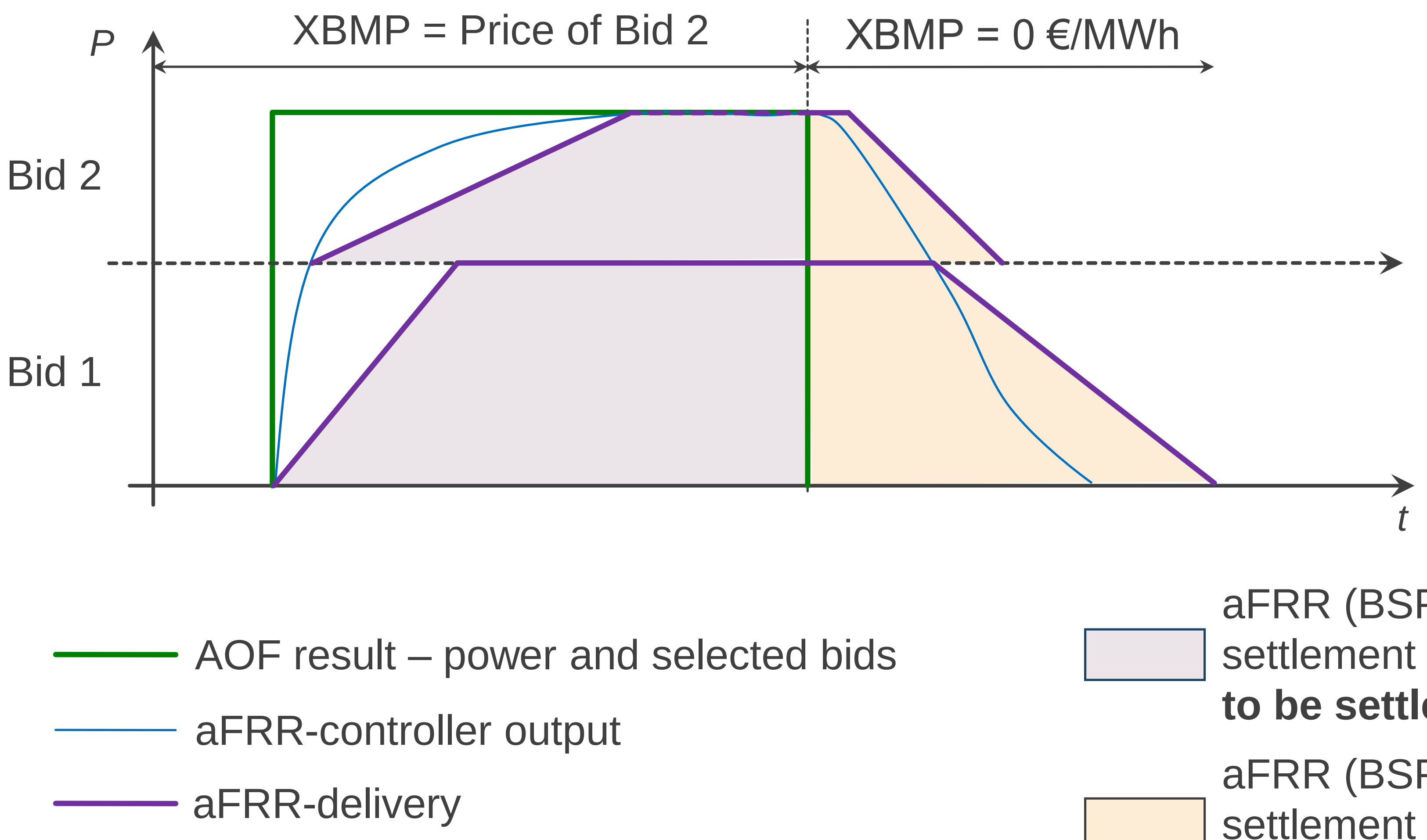
AOF result – power and selected bids

aFRR-controller output

aFRR-delivery

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

aFRR – Dynamic Effects 5/5



- The imbalances are volatile, i.e. they can increase or decrease as in this example.
- The bids are deactivated – but still delivered – at the same time the XBMP determined by the AOF is lower than the bid price.
- **Solution – settle with pay-as-bid!**

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

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

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Balancing Energy Pricing Period for aFRR

Benjamin Genêt

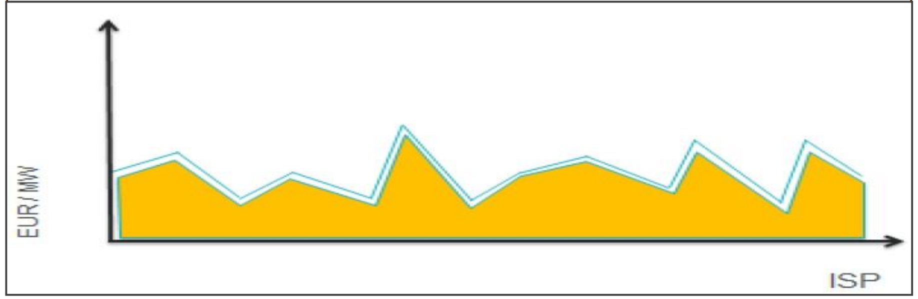
PICASSO convener

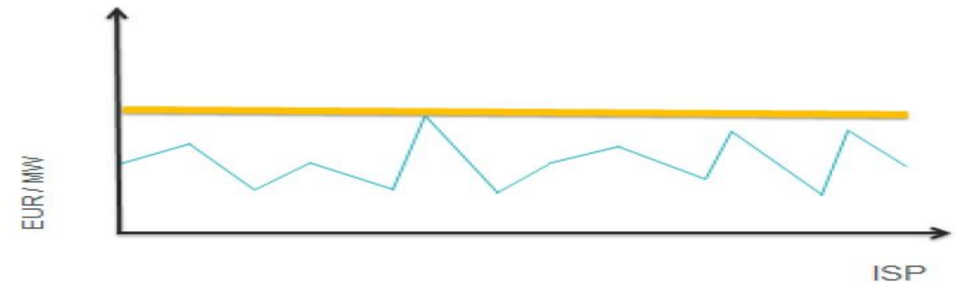
Workshop on All TSO proposals

2 approaches

- Balancing energy pricing period (**BEPP**): time interval for which XBMPs are calculated

Optimisation-cycle BEPP	15-minute BEPP
• The XBMP is determined on an optimisation-cycle basis (e.g. each 4 s) • The imbalance price is based on a volume-weighted average	• The XBMP is determined on an ISP basis (each 15 minutes) • The imbalance price is directly based on XBMP





- Note:
  - The aFRR activations are unchanged.
  - The aFRR balancing energy price(s) resulting from the 2 approaches contribute differently to the imbalance settlement price.

Optimisation cycle BEPP - description

- For each run of the activation optimisation function (AOF), a different price is set. All balancing energy bids activated during one optimisation cycle receive the same price.
- Each BSP will receive a weighted average balancing energy settlement price for every activated bid per ISP. This means multiple balancing energy prices per ISP.
- The price is directly derived from the algorithm and consider the TSO demand and the congestions that occur during this run
    - Uncongested area between TSOs may change at each optimisation cycle
- Imbalance price for a given ISP could be an average of all the optimisation cycle prices over this ISP.

Pros & cons of optimisation-cycle BEPP

Pros optimisation-cycle BEPP

- Provides a **full consistency** with the AOF results (bid selection, congestion, prices)
- **Maximises** the occurrence of **price convergence between LFC areas**, thus, maximises the competition among the BSPs.
  - This is seen as a critical element for markets with limited internal competition in order to efficiently apply a marginal pricing approach.
- It is **simple** and **transparent** from an algorithmic perspective.
- Avoids cases where the congestion rent is artificially increased, and cases where the congestion rent is negative.

Cons optimisation-cycle BEPP

- Does **not** provide a **full consistency** between settlement period for **BRPs (ISP)** and BSPs (BEPP), where ISP is equal to 15 minutes.
- Entails more complexity in terms of **data handling**.

15-minute BEPP - description

- One single price per direction is selected for each ISP for each uncongested area (assuming activation in that direction): the highest/lowest activated bid price in the upward/downward direction per uncongested area.
    - In case of aFRR activations in the uncongested area in both upward and downward directions within the same ISP, two prices will be determined for the ISP.
- The XBMP is determined for each full ISP: when congestions occur at any point within the ISP, price divergence will apply for the full ISP.
- Uncongested areas are defined on ISP-basis.

Pros and cons 15-min BEPP

Pros 15-min BEPP

- The aFRR component of imbalance price can be set directly equal to the aFRR balancing energy price
  - Where the ISP is equal to 15 minutes and when no other balancing product is activated, it provides a full consistency between balancing energy prices and imbalance prices
- Less data handling than optimisation-cycle BEPP

Cons 15-min BEPP

- Discrepancy between the congestion considered in the AOF for the activation and the congestions that are considered to derive the 15-minute prices
- The congestion rent has to be calculated separately in each direction with separate prices for upward and downward activations. Congestion rent for 15-min BEPP is expected to be generally higher than the congestion rent for control-cycle BEPP (due to more congestions), but there are specific cases where it can be negative

Potential effect on the bid prices

Two effects on the bid price have been identified related to the choice of the BEPP:

- If the **BEPP** is **15 minutes**, a discrepancy is introduced between the “activation”-congestions (established every optimisation cycle) and the “price”-congestions (15 minutes)
  - The “price”-congestion will be the (combination of the) most congested situation of all the optimisation cycles
    - If a border is congested during one optimisation cycle, it will be considered “price”-congested for the whole quarter
  - This discrepancy can lead to bidding strategy where increasing the bid price leads to more benefits for a BSP even if there are less activations
    - This would not be in line with the fundamentals of a marginal pricing approach where the bidding at marginal cost would theoretically be the most efficient bidding strategy
    - The bidding strategy could be derived by a statistical analysis of past results, considering the (medium-term) benefits obtained under different bidding strategies
    - This problem of discrepancy between “activation”-congestions and the “price”-congestions is more acute when the occurrence of congestions has more influence on the competition between BSPs. Typically: small areas, with little internal competition

Potential effect on the bid prices

- If the **BEPP** is equal to the **optimisation-cycle**:
  - The BSPs may include a mark-up in its bid price because the self-regulating effect of BRP costs on the BSP price would be less present due to an averaging effect of the BSP settlement price in the imbalance price over the ISP length
    - *In other words: the BSPs would not be incentivised to bid in at reasonable costs in order not to increase too much their costs as a BRP*.
  - The BSPs may increase the bid price at the beginning of the merit-order since the benefits may be less than what can be captured by playing on the imbalance position (where this is allowed)
  - For the BSPs at the end of the merit order, there may be a disincentive to deliver (depending on penalty regime, and on imbalance pricing approach)

As there are theoretical considerations that can justify including mark-ups in the bid price for both the BEPP of 15 minutes and the BEPP equal to the optimisation cycle, it is not possible to draw definitive conclusions on the effect of the BEPP choice on the bid price.

The choice of the BEPP has consequently been based on the other pros and cons.

Agenda

Lunch time!

Back at 13:30

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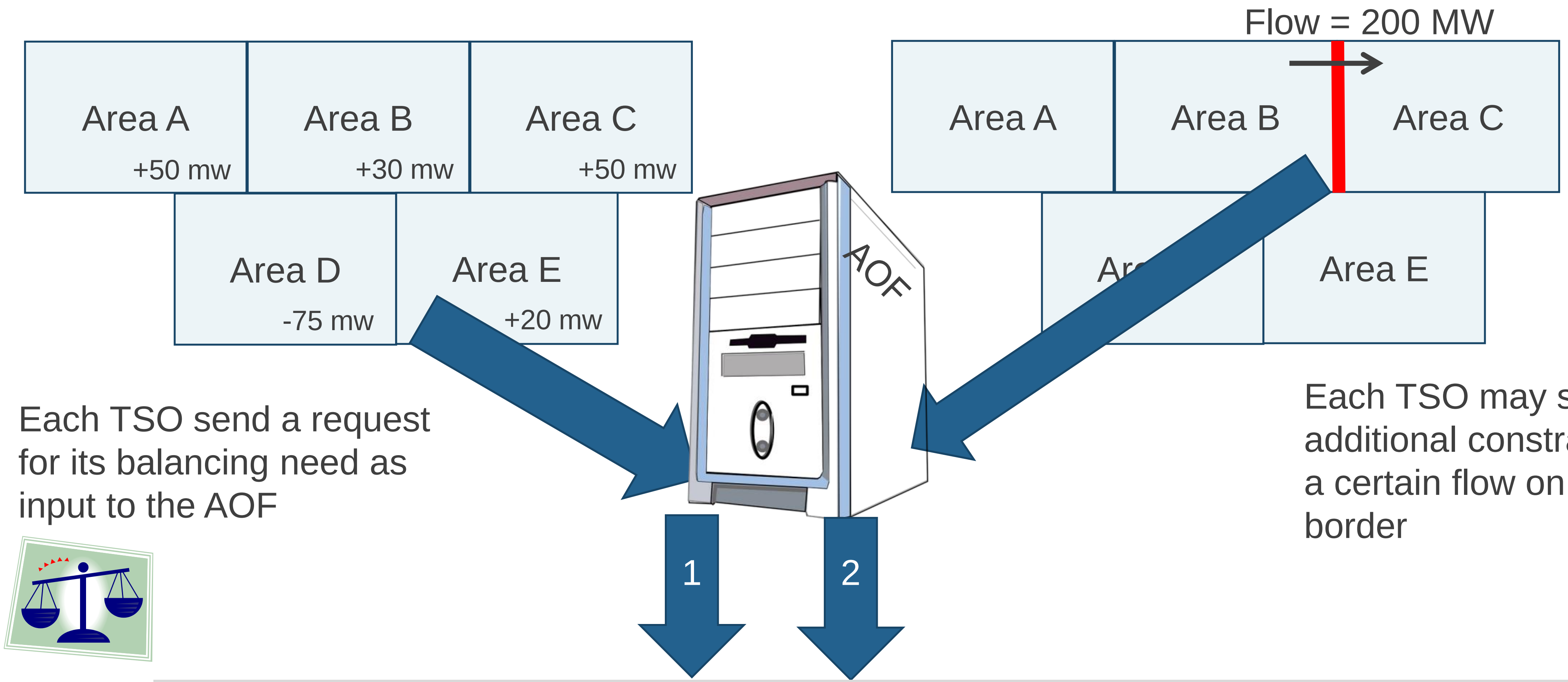
Pricing for Activations due to System Constraints

Martin Høgh Møller
MARI convener

Amine Abada
TERRE convener

Workshop on All TSO proposals

Example of using the platform for cross border countertrade



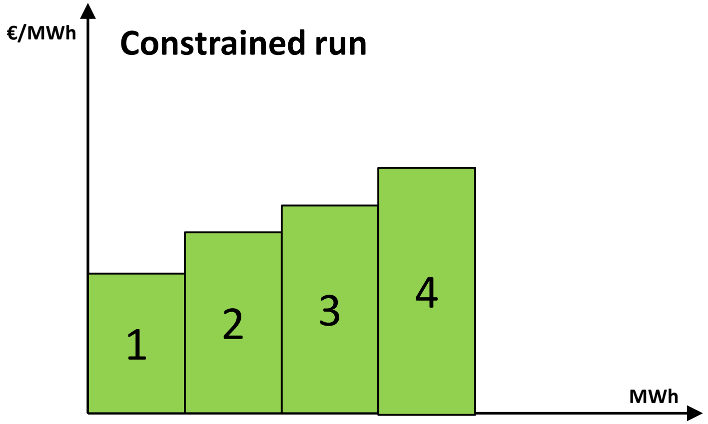
Each TSO send a request for its balancing need as input to the AOF

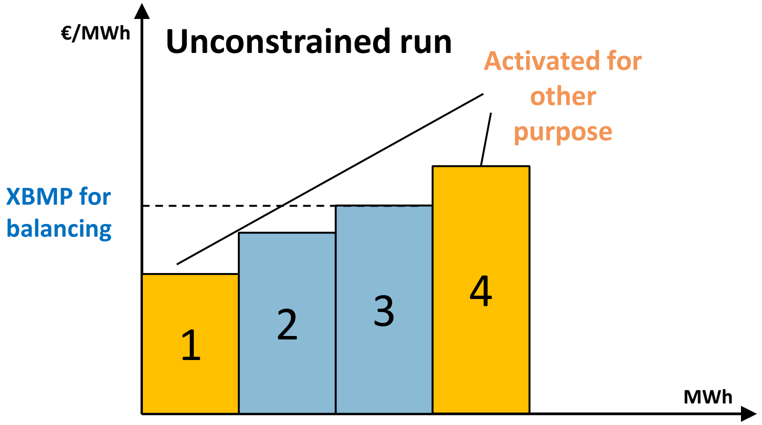
Each TSO may send an additional constraint, namely a certain flow on a specific border

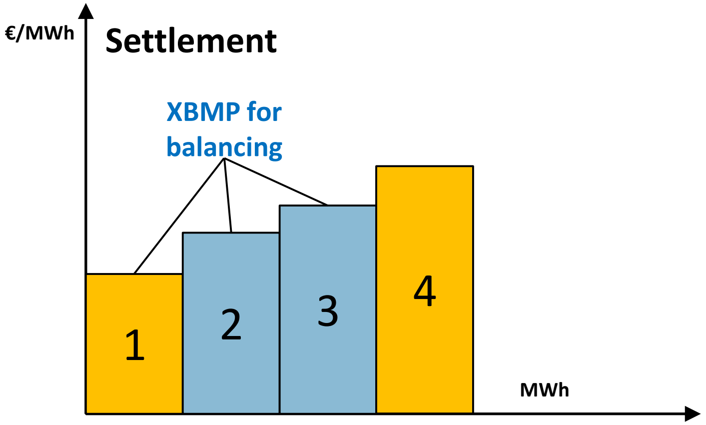
1. The AOF identifies which bids to activate – to solve both constraints in a one step optimisation problem
2. The AOF does a parallel run – to identify which bids to activate, if it only should solve the balancing needs

The difference between the two runs determines the activation purpose for each bid

Pricing of activations for other purpose than balancing







How to settle bid number 4

Pay-as-bid ?

Increase the XBMP ?

There are consequences in both options

Note: As this is activation is done via the platform, there are no other additional requirements to bids activated for other purpose. There will be no other geographical information than Bidding zone/ LFC area level to be used, when the AOF will select a bid for activation for other purpose than balancing.

Different views among the parties


BSPs view

- I deliver the same kind of energy, whatever the purpose is. Why shall the remuneration be different ?
- If there is a risk of pay-as-bid settlement – I may add some mark-up in my bid price depending on the probability for pay-as-bid settlement.


BRPs view

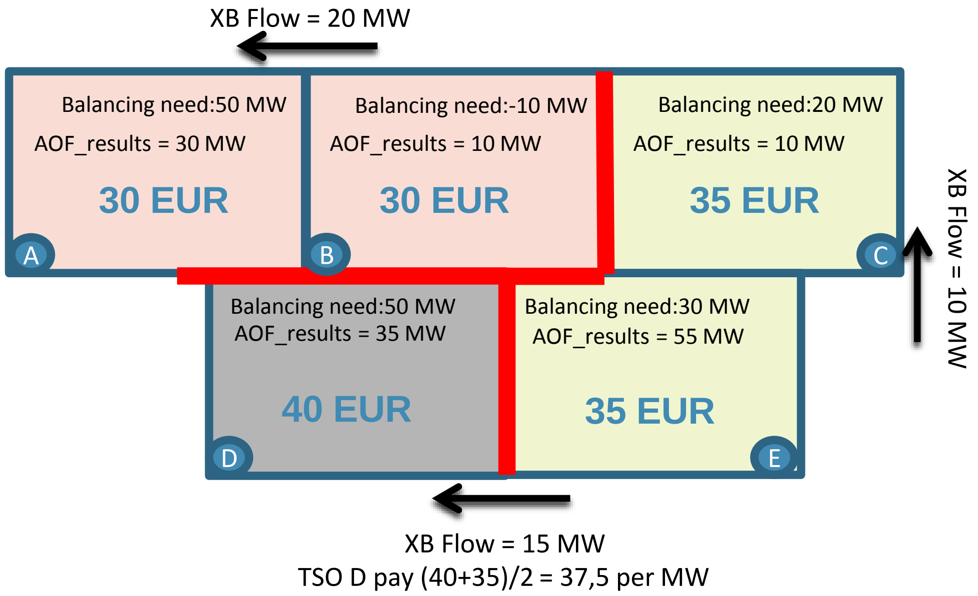
- Why shall the imbalance price be increased, when there was really no imbalances in the system – but just a countertrade needed due to satisfy some intraday trades ?


TSO view

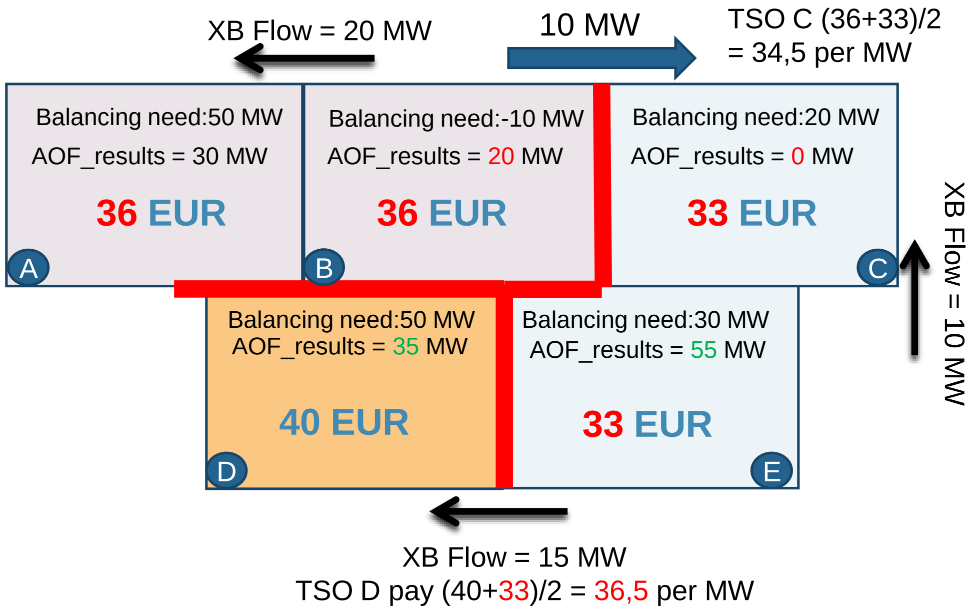
- In the case of choosing one XBMP: Can the BRP concerns be solved through the TSO-TSO settlement ?
- We don't have any gain/losses as we have to be 100% financial neutral on these matters (tariff adjustments)

Random example with some assumed AOF prices

Normal run – without system constraints



Run – with additional system constraints



Red figures illustrates changes

the "winners" for a countertrade can be BRPs in area E, and BSPs in area A, but "losers" can be BSP's in area E together with tariff payers in area B and C

What are the consequences of having one XBMP for all activations whatever the purpose ?

The imbalance price will be affected more than if the pay-as-bid solution is chosen, and it is hardly possible to mitigate this by the TSO-TSO settlement, as this will become too complex.

From case to case it will be different, who are the “winners” and who is the “losers” from such an additional activation request, and hence one could ask, why we should try to compensate for this ?

There are also many other effects that also influences the marginal price, but there is no compensation for this.

- Bids can be withhold from the platform → in general increased balancing energy price
- Bids can be marked as unavailable for the platform → in general increased balancing energy price
- Within the uncongested area – the imbalance price of a well balanced area will be affected by imbalances in other areas

Key take away

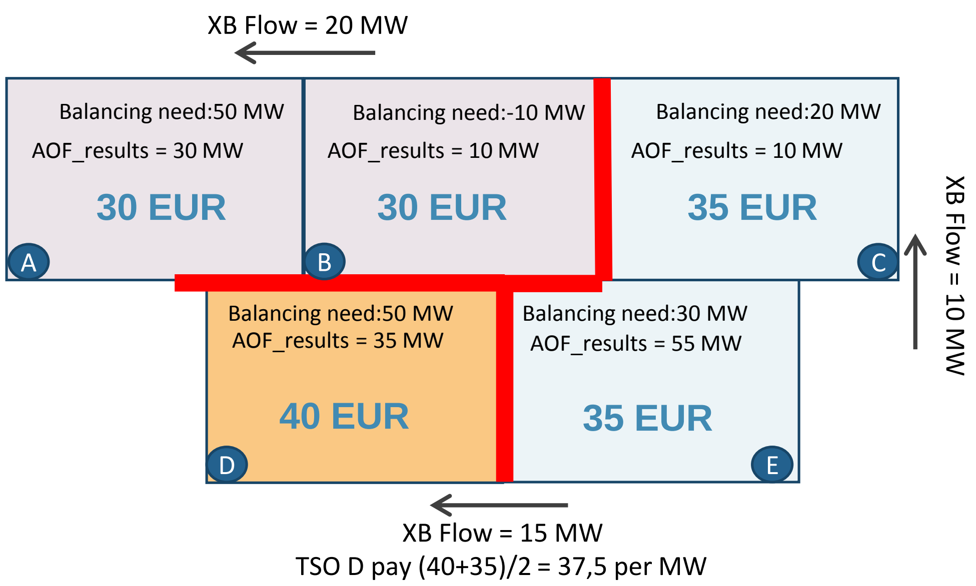
- With pay-as-bid, there will be different remuneration for the same kind of service (Energy supply in an ISP) – is that OK fro BSPs ?

- With one XBMP it will most likely not be possible to mitigate the effect on the imbalance price – the imbalance price will be affected by system constraints - is that OK for the BRPs?

Please provide your opinion

Examples

Pricing: Single XBMP for balancing and COUNTERTRADE (I)

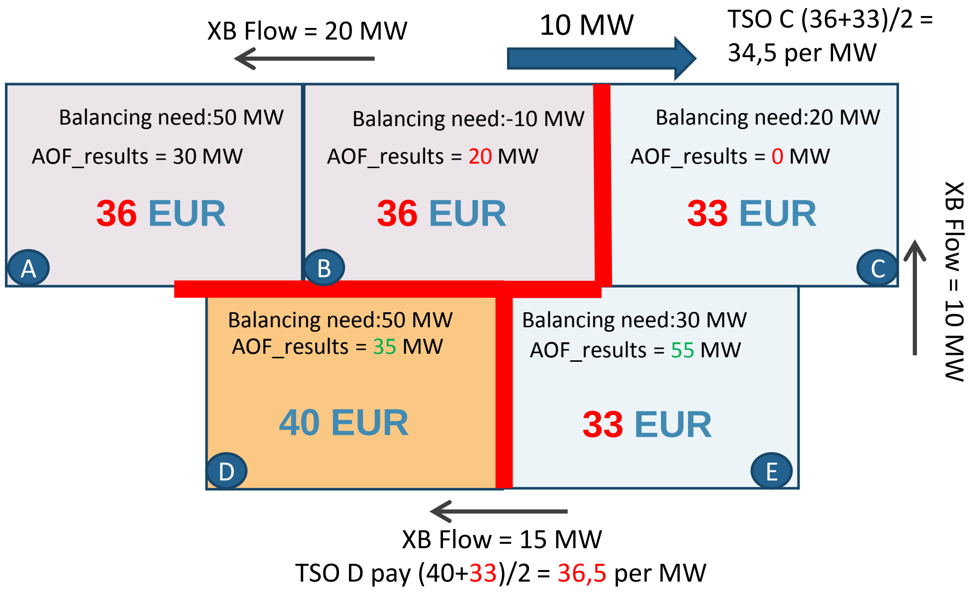


Un-constrained run

Row No	Border	A - B	A - D	B - C	B - D	B - E	C - E	D - E
1	Flow, MW	- 20	0	0	0	0	-10	-15
2	Flow, Euro	-600	0	0	0	0	-350	-562,5
	TSO	**A**	**B**	**C**	**D**	**E**		
3	Payment to BSPs, Euro	(30*30) = -900	(10*30) = -300	(10*35) = -350	(35*40) = -1400	(55*35) = -1925		
4	Income from TSOs (Row 2 results)	-600	+600	-350	-562,5	912,5		
5	Sum expenses (Row 3 + 4)	-1500	300	-700	-1962,5	-1012,5		
6	Income from BRPs	(50*30) =1500	(-10*30) = -300	(20*35) =700	(50*40) = 2000	(30*35) =1050		
7	TSO income (row 5 + 6)	0	0	0	37,5	37,5		

Pricing: Single XBMP for balancing and COUNTERTRADE (I)

Possible Scenario: In order to execute the activations according to the results of the electricity market, a flow from (C) to (B) of xMW would be necessary, however, the TSOs realize after market clearing (el. Market), that only a flow of x-10MW is physically possible due to congestions. In order to make up for the already sold capacity that can't be provided due to congestions (B) and (C) execute a redispatch and agree to increase generation in (B) by 10MW and decrease generation in (C) by 10MW. This leads to:
● a flow of 10MW from (B) to (C) (because amount activated in each area is changed) ● Price Increase in uncongested area A/B ● Price decrease in uncongested area C/E ● A Congestion Rent ((36-33)*10) on this border (as part of redispatch cost)



Difference between un-constrained run and the constrained run

Constrained run

Row No	Border	A - B	A - D	B – C	B - D	B - E	C - E	D - E
1	Flow, MW	- 20	0	10	0	0	-10	-15
2	Flow, Euro	-720	0	345	0	0	-330	-547,5
	TSO	A	B	C	D	E		
3	Payment to BSPs, Euro	(30*36) = -1080	(20*36) = -720	(0*33) = 0	(35*40) = -1400	(55*33) = -1815		
4	Income from TSOs (Row 2 results)	-720	+1065 (720+345)	-675 (-345-330)	-547,5	877,5 (330+547,5)		
5	Sum expenses (Row 3 + 4)	-1800	345	-675	-1947,5	-937,5		
6	Income from BRPs	(50*36) =1800	(-10*36) = -360	(20*33) =660	(50*40) = 2000	(30*33) =990		
7	TSO income (row 5 + 6)	0	-15	-15	52,5	52,5		

	TSO	A	B	C	D	E	sum
	BSP win/loss	+180	+420	-350	0	-110	+145
	BRP win/loss	-300	+60	+40	0	+60	-140
	TSO win/loss*	0	-15	-15	+15	+15	0

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12:30	-	13:30	Lunch
13:30	-	14:30	Pricing for Activations due to System Constraints
14:30	-	14:45	Break
14:45	-	15:15	Price divergence
15:15	-	16:15	Q&A: Open Discussion
16:15	-	16:30	*AOB*

Price divergence

Benjamin Genêt

PICASSO convener

Amine Abada

TERRE convener

Workshop on All TSO proposals

UAB rule and link with pricing - Example

Let's imagine 1 area with an inelastic positive need and 3 offers: 1 IUB, 1 DUB and 1 DDB as illustrated on the picture.

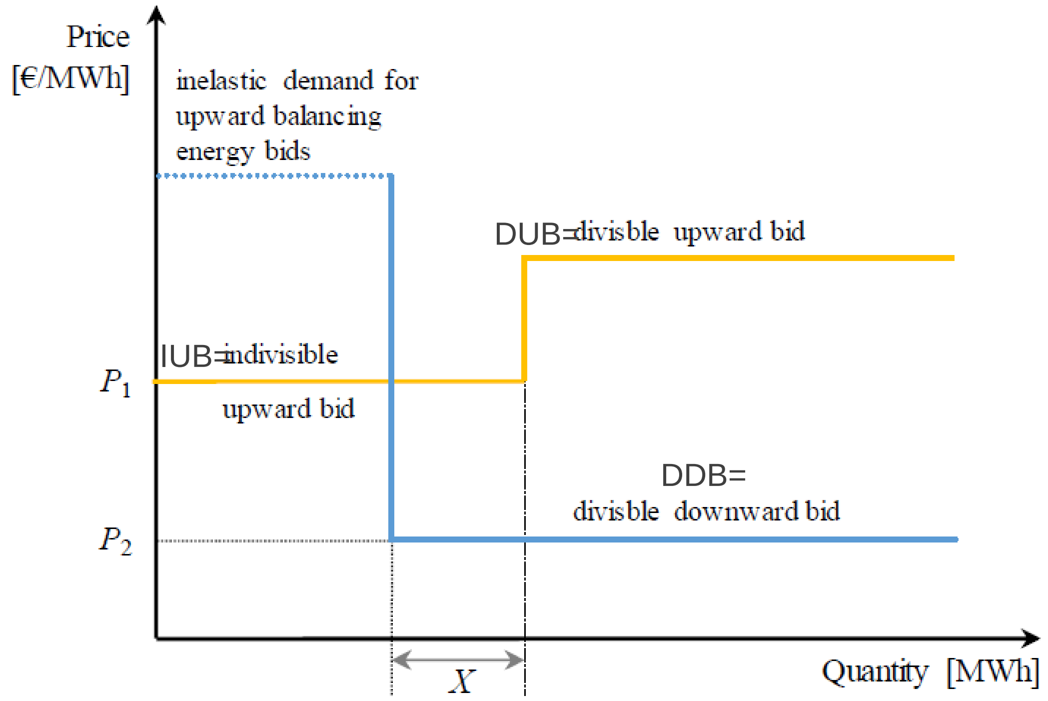
Because the first upward bid is indivisible, there are two ways to satisfy the inelastic demand:

- **Option 1: we accept the IUB as well as a part of DDB.**

We could either put the marginal price at P1 or P2. In both cases, we either have IUB or DDB that are paradoxically accepted.

- **Option 2: we reject offer IUB and we accept a part of DUB.**

In this case, we set the marginal price at DUB price. We have no paradoxically accepted bid.



UAB rule and link with pricing - options

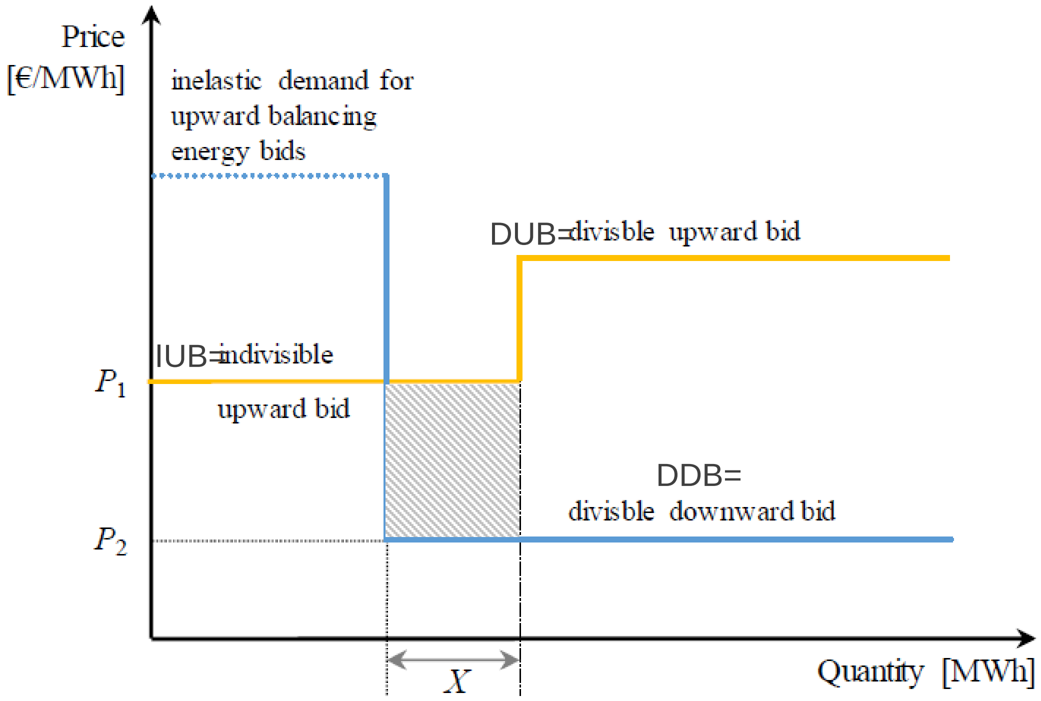
Thus, following the previous example, there are two UAB pricing rules:

We accept UAB (***option 1*** from previous example).

In such case, the marginal price does not comply with the rules that the bids have to be remunerated at least their bid price, at least for one bid. A side payment is needed for IUB and/or DDB offer to respect this rule. The cost of this side payment corresponds to the area ▨ is done at TSO level, further referred to as "missing money".

We reject UAB (***option 2*** from previous example).

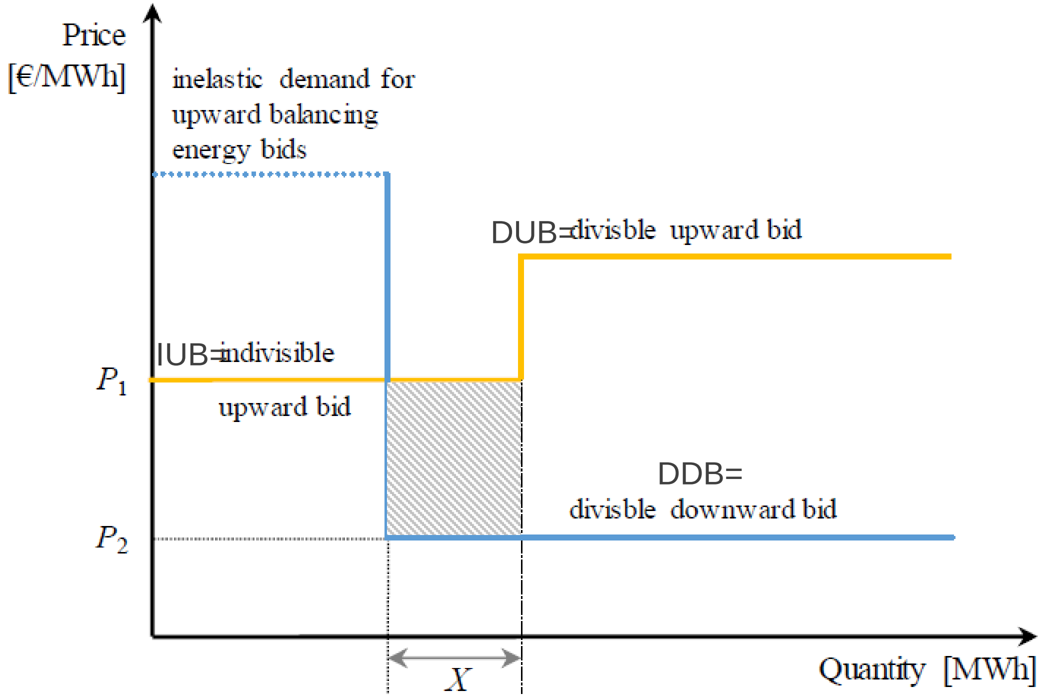
UAB can be rejected thanks to an appropriate set of constraints in the algorithm. The marginal price (price of DUB in the example) is then consistently used in all settlement processes. There is no problem of missing money.



UAB options pros and cons

	PROS	CONS
Accept UAB (side payments)	• Higher social welfare • Less complex algorithm	• A more complex settlement process is needed for the missing money • Different prices for balancing purpose (meaning prices of UAB offers do not set the MP)
Reject UAB (single MP)	• Unique price for balancing purpose • No mechanism is needed for the missing money	• Lower social welfare • More complex algorithm

Zoom on the acceptation of UAB



1. A rule to set the XBMP has to be defined:
   - Idea 1: intersection point
   - Idea 2: mid-point computation
   - Other approaches can be found

2. A mechanism to finance the missing money has to be found
   - Idea 1: the side-payment is paid by the connecting TSO without compensation mechanism
   - Idea 2: the missing money is financed through a common funding as integral part of the TSO-TSO settlement
     - Example 2a: a share of the congestion rent is used for this purpose
     - Example 2b: a share of the surplus arising from the netting of TSO demand is used for this purpose

- Other approaches likely possible

Zoom on the rejection of UAB

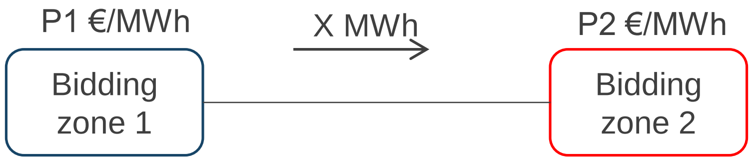
The UAB rule interferes with other market rules, like price convergence rule. In some situations, we need to decide which rule has priority.

In those situations, in order to satisfy an inelastic demand while guaranteeing UAB rejection, the prices of two bidding zones is allowed to diverge even without any congestion between those bidding zones.

This is called **price divergence**:

Different prices within an uncongested area

(this never happens inside the same bidding zone)



Always from the ***cheapest to the most expensive area*** → P1 < P2

An income is generated on this line which has to be shared

➢ **This case is theoretically identified but likelihood is likely low** (see example on next slide). Occurrences will be measured with tests on real datasets.

Zoom on the rejection of UAB rule
Price divergence - theoretical example

Available bids for Zone A:

IUB-A: indivisible upward bid of 30 MW @ 40 €/MWh

IDB-A: indivisible downward bid of 20 MW @ 60 €/MWh

Available demands and bids for zone B:

IUD-B: inelastic upward need of 20 MW @ 100 €/MWh (assumed market cap)

DUB-B: divisible upward bid of 10 MW @ 80 €/MWh

All bids are accepted and the inelastic demand is satisfied.

The price is 60 €/MWh in zone A and 80 €/MWh in zone B.

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Q&A

It's time for your questions.

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Any other business?

IGCC

International Grid Control Cooperation

MARI

Manually Activated Reserves Initiative

PICASSO

aFRR Platform Implementation Project

TERRE

*T*rans *E*uropean *R*eplacement *R*eserves *E*xchange

Thank you for your attention!!

entsoe

Back-up slides

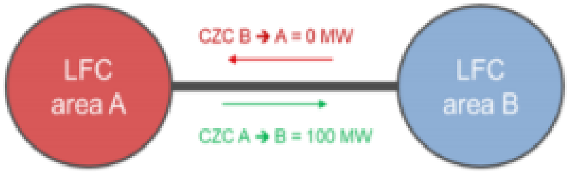
Optimisation-cycle BEPP

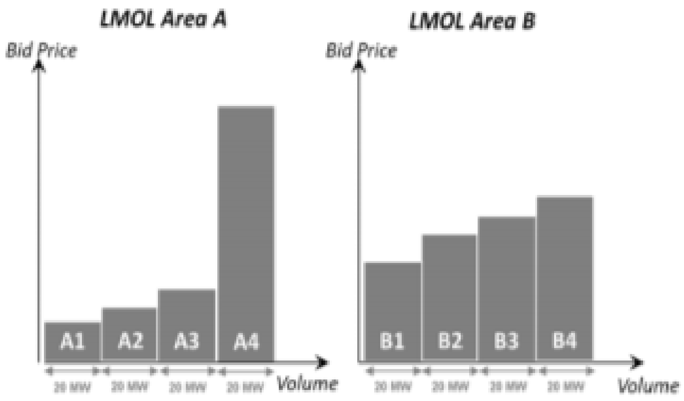
How to deal with differences between the time granularity of the **volume determination**, based on local control cycle, and the one of the **price determination**, based on global optimisation cycle:

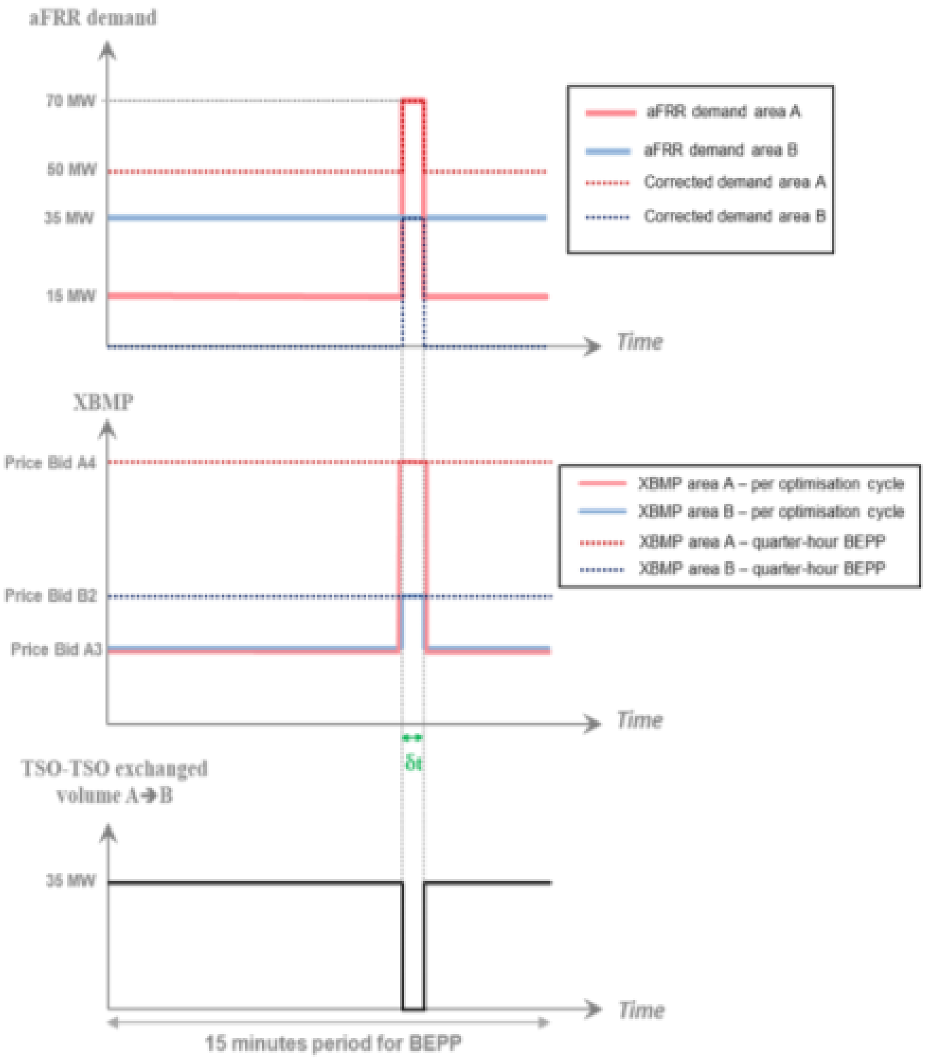
	AOF	TSO A	TSO B	TSO C	TSO D
Volume determination [control cycle]		2“	5“	3“	4”
Price determination [optimisation cycle]	10“	10“	10“	10“	10”

- For TSOs A and B, the same price could be used for a multiple of the control cycles
- For TSOs C and D, a simple rule can be defined for which volume for each optimisation cycle for the case where a local control cycle would be overlapping two optimisation cycles:
  - E.g. the volume of the whole control cycle is attributed to the optimisation cycle were the majority of the control cycle lies
  - E.g. the volume of the whole control cycle is distributed proportionally to each optimisation cycle

15-min BEPP: risk of negative congestion rent







Example

- No available CZC B→A, but available A→B
- Cheaper prices in A, except for a very expensive bid
- Due to a peak demand and no CZC available in importing direction: divergence and expensive XBMP in A

Negative congestion rent:

- The XBMP in A is set at the price of A4
- The XBMP in B is set at the price of B2
- There is an export from the high price area to the low price area
- The CZC price on the border is negative, leading to a negative congestion rent