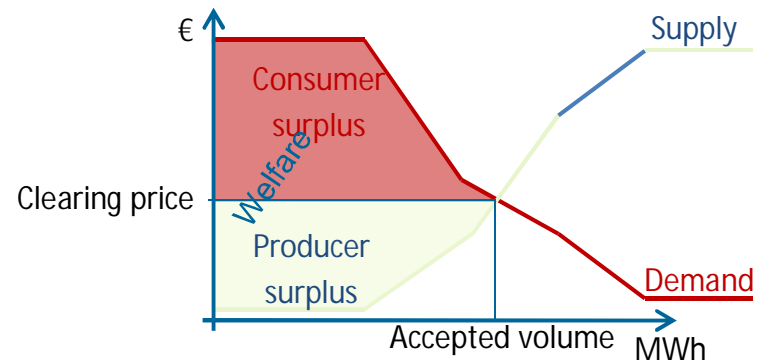


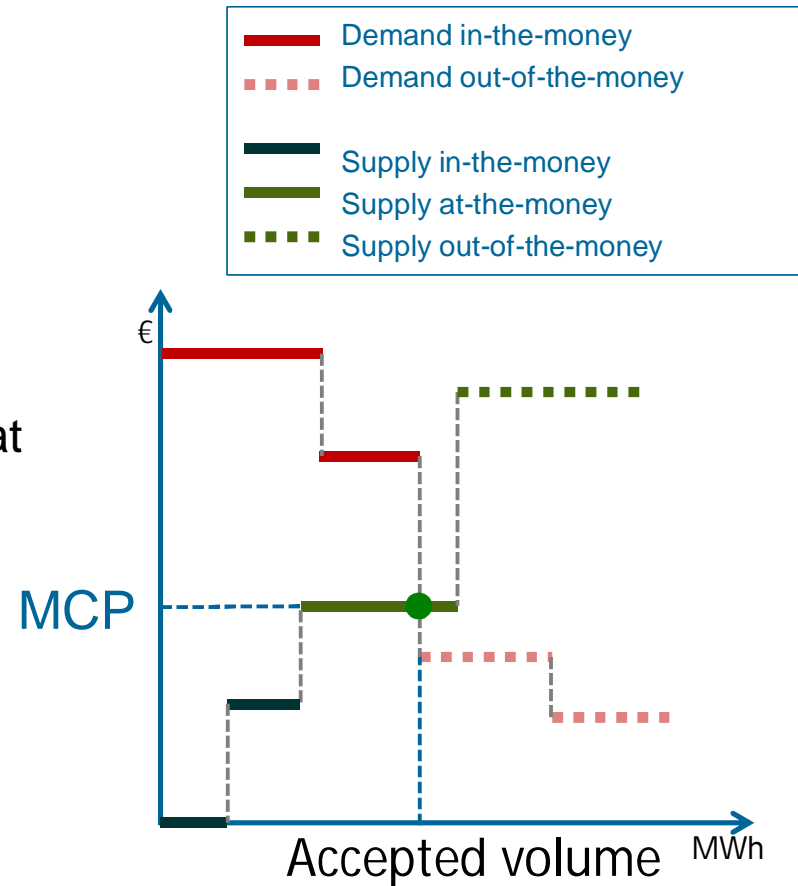


**Changes in the Day-ahead market due to 4M MC implementation**

- ❑ EUPHEMIA is an algorithm that solves the market coupling problem on the PCR perimeter.
  - ❑ EUPHEMIA stands for: EU + Pan-european Hybrid Electricity Market Integration Algorithm.
  
- ❑ It maximizes the welfare of the solution
  - ❑ Benefits for Power Exchanges:
    - ❑ Most competitive price will arise
    - ❑ Overall welfare increases
  - ❑ Benefits for TSOs:
    - ❑ Efficient capacity allocation

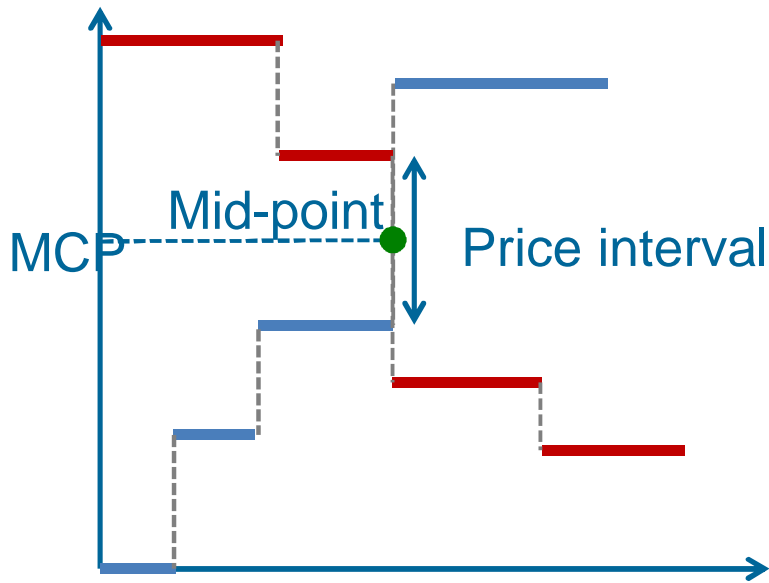


- ❑ Hourly step orders are defined by
  - ❑ A type (buy or sell)
  - ❑ A volume
  - ❑ A limit price
  
- ❑ EUPHEMIA provides solutions such that
  - ❑ Orders in-the-money are fully accepted
    - ❑ Supply at price < MCP
    - ❑ Demand at price > MCP
  - ❑ Orders out-of-the-money are fully rejected
    - ❑ Supply at price > MCP
    - ❑ Demand at price < MCP
  - ❑ Orders at-the-money can be curtailed



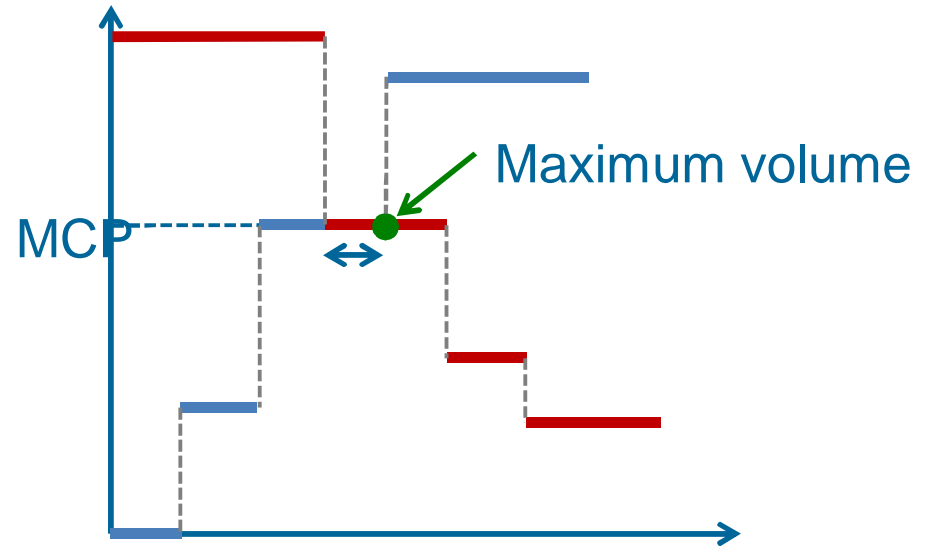
# PRICE AND VOLUME INDETERMINACY RULES

PRICE



Minimize the distance to the middle of the price interval

VOLUME



Maximize traded volume

## Current types of bids

- Standard bid (sell/buy)

## New types of bids

- Standard bid (sell/buy)
- Block bid (sell/buy)
  - Profile block bid
    - Exclusive group of block bids
    - Group of linked block bids
  - Flexible hourly block bid

## Current settings valid until 4M MC implementation

- Participant can submit **only one** standard bid for sell and **only one** standard bid for buy
- Bid can include up to 25 blocks
- Condition of volume indivisibility of hours can be set at the first block of a bid for sell
- Condition of Total block 1 acceptance can be set for bid for sell
- For standard bid modification: it is possible submit/send a new version which will replace current accepted bid

## Settings valid after 4M MC implementation

- Participant can submit **unlimited** number of standard and block bids for sell and/or buy
- There is a new terminology – term block is replaced by term segment
- It is possible to set condition of volume indivisibility of hours of the first segment for both types of a standard bid (sell or buy),
- It is not possible to set the condition of total block 1 acceptance. While submitting bid through XML file, it is necessary to skip the parameter of total acceptance of the first segment or enter value „N“. Bid will be rejected if value „A“ is entered in the parameter
- For bid modification it is necessary to identify the bid through its ID and version. A possible modified bid without these attributes will be accepted as **another bid**. We emphasise this necessity mainly for modification via XML file

- ❑ Bid Modification
  - ❑ [version and ID of bid](#) for all types of bids
  - ❑ [Group ID](#) is obligatory element for exclusive group of bids. (The modification without ID of exclusive group will be rejected with an error.)
  - ❑ [parent bid ID](#) is obligatory element for group of linked bids. ( Linkage will be cancelled if ID of parent bid is not stated.)
  
- ❑ Bid Cancellation
  - ❑ [version and ID of bid](#) for all types of bids
  - ❑ At group of linked bids it is necessary to cancel bids from the lowest level of the linkage. (It is not possible to cancel bid which has still a linked child bid.)

## Price

- Selling price has to be ascending with increasing number of segments for standard bid for sell. Buying price has to be in a descending order at standard bid for buy.

## Volume

- It is possible to specify any volume for each hour of a segment
- The possibility to place up to 25 segments
- It is possible to set volume indivisibility of hours at the first segment of bid for sell and buy.



- ❑ Commodity: Cash deposit, as today, is blocked for maximum possible liability from individual segment:
  - ❑ volume x price of bid for buy with positive price or of bid for sell with negative price

❑ Possible liability from the particular bids will be added up separately for buy and sell bids. The higher amount from these totals will be covered.

→ From FS point of view it is more efficient to submit 1 standard bid with 25 segments than 25 standard bids of 1 segment with the same overall parameters.

- ❑ Imbalance: Bids on the day ahead market enter in utilization of total current position of a participant as today -> no change.

- Ways of bid submission remain the same – web form, upload of XML file or via automatic communication



- Changes of web form:

**Bid:** Standard

**Number of segments:** 5

**Header data**

Delivery day: 09/19/2014 Participant: 859 1824 9999 05 RESTOVACI SZI, Kom. spol.

Settlement currency code: CZK Default settlement currency code: CZK

Type: Buy Sell

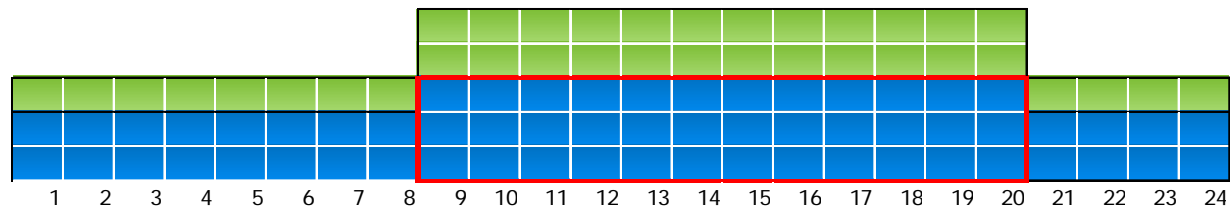
Comment:

**Currency calculator**

**Detail data**

Segment 1		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Volume*		10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15	15	15	15	15	10	10	10	10
Price EUR/HWh*		30	30	30	30	30	30	30	30	45	45	45	45	45	45	45	45	45	45	45	45	30	30	30	30
VolInd*		N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N

Segment 2		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Volume*		5	5	5	5	5	5	5	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Price EUR/HWh*		40	40	40	40	40	40	40	40	55	55	55	55	55	55	55	55	55	55	55	55	40	40	40	40



- Access to the bid overview through the OTE web interface
- Bid overview on the trading screen

List of bids

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Delivery day	Type	Ver	BidID	LinkTo	Volume	MinPce	MaxPce	CtgBl	ExclGrBl	Mar ty
26.10.2014	Buy	0	423 369		53,5	150,00	150,00			SPT
26.10.2014	Buy	0	423 374		3 000,0	-32,58	17,19			SPT
26.10.2014	Buy	0	423 376		4 970,0	-28,66	31,34			SPT
26.10.2014	Buy	1	423 378		682,6	32,74	128,71			SPT
26.10.2014	Buy	2	423 379		24,0	52,00	52,00			SPT
26.10.2014	Buy	0	423 382		2 125,0	600,00	600,00			SPT
26.10.2014	Buy	0	423 383		375,0	200,00	200,00			SPT
26.10.2014	Buy	1	423 384		363,4	-4,60	80,75			SPT
26.10.2014	Buy	0	423 386		307,1	46,50	97,00			SPT
26.10.2014	Sell	0	423 310		700,0	-500,00	-500,00			SPT

- In the DM reports: Bids by delivery day

Table

View: Default Items: 77, page 1 / 1. 80

Bid ID	Version	Participant	Type	Category	Delivery day	Valid	Replaced	Canc. for deliv. day	Cancellation timestamp	Submission timestamp	Total volume [MWh]	Min. acceptance ratio	Min. price [EUR/MWh]	Max. price [EUR/MWh]
424 104	0	859 1824 9998 06	Buy	PBO	03/29/2015	Yes	No			16.09.2014 08:43:19	10,0	100	10,00	10,00
424 000	0	859 1824 2331 08	Buy		03/29/2015	Yes	No			30.03.2013 10:59:45	2 453,0		17,17	45,83
423 959	1	859 1824 6682 07	Sell		03/29/2015	Yes	No			30.03.2013 10:54:46	834,4		0,00	30,00

- Profile block bid
  - Group of linked block bids
  - Exclusive group of block bids
  
- Flexible hourly block bid

## Price

- Fixed price for whole segment of a bid - price is compared with weighted average of the marginal price for matching.

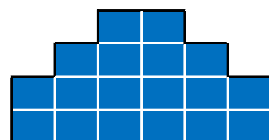
Hour	Volume	Bid price (P)	Marginal price	Weighted average of the marginal price (MCP)
1	10	150 EUR	149 EUR	151,86 EUR
3	200		152 EUR	

- In the money : Supply at price < MCP  
Demand at price > MCP

## Volume

- It is possible to enter only one segment within one bid
- It is possible to enter a different volume in particular blocks of a bid. (Smallest possible block is 1 hour)

Product	Min %*	Comment	Price (EUR/MWh)*	Hour																								Total
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
▼	100%		20,00	10,0	15,0	20,0	20,0	15,0	10,0																	90,0		



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

- Minimum acceptance ratio
  - Enables partial acceptance of the bid
  - The ratio „accepted volume/total submitted volume“ is greater or equal to the minimum acceptance ratio of the block and equal over all periods
  - At present is this entry pre-set on 100% - in the future it will be possible to edit also this entry of the form

Product	Min %*	Comment	Price (EUR/MWh)*	Hour																								Total
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
	100%		20,00	10,0	15,0	20,0	20,0	15,0	10,0																		90,0	

- ❑ Profile block bid is utilised according to the same principles as a standard bid
- ❑ Commodity: Each profile block bid is utilised in the amount of potential liability
  - ❑ volume x price of bid for buy with positive price or from bid for sell with negative price.
  - ❑ Possible liability from the particular profile bids will be added separately – for buy and sell bids. The higher amount from these totals will be covered.
- ❑ Imbalance: Profile block bids on the day ahead market enter the utilization of total current position of a participant as today -> no change

- It is possible to add bids to an exclusive group or create among them execution constraints by their linking to group of linked blocks.

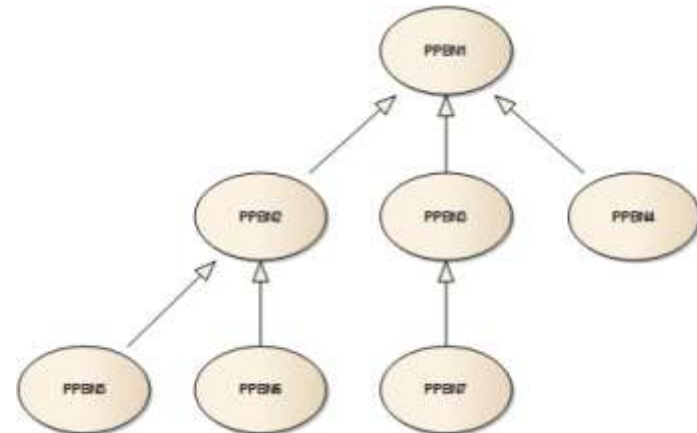
## Exclusive group of bids

- enables to execute only one bid from the profile block bids which are included in the given group



## Group of linked bids

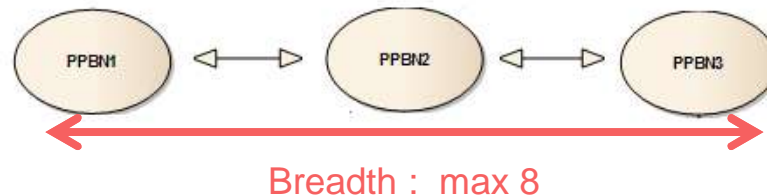
- enables to execute child bid only in case that its parent bid is executed





# Exclusive group of block bids

- ❑ Group of block bids from which only one bid can be executed
- ❑ It is possible to include both types of bid (buy/sell ) in one exclusive group
- ❑ From the exclusive group, based on the algorithm calculation, is executed the profile bid which maximizes social welfare the most
- ❑ Number of active bids within one exclusive group is limited
- ❑ Number of exclusive groups is limited for 5 groups per participant



This type of linked block enables to offer on the market various production patterns in various price strategies. This increases chances of having a block executed.

# Exclusive group of block bids

**New order on day ahead market**

**Bid:** Block

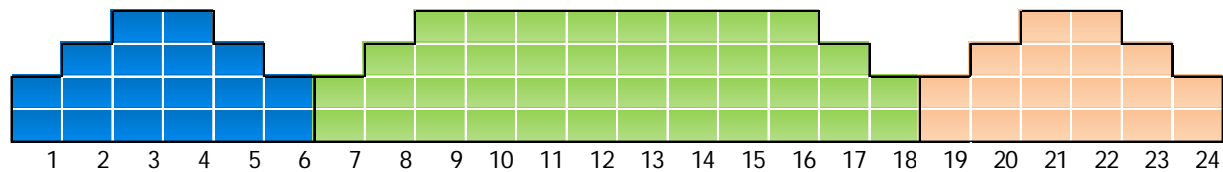
**Header data**

Delivery day: 09/18/2014 Participant: 859 1824 0000 07 OTE, a.s.  
 Settlement currency code: CZK Default settlement currency code: CZK  
 Type: Buy Sell Category: PBO

Exclusive group:  Yes  No  
 Exclusive group ID: 11

**Detail data**

Product	Min %*	Comment	Price (EUR/MWh)*	Hour																								Total	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
▼	100%		20,00	10,0	15,0	20,0	20,0	15,0	10,0																			90	
▼	100%		40,00							10,0	15,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	15,0	10,0									210
▼	100%		30,00																		10,0	15,0	20,0	20,0	15,0	10,0	90		
▼	100%																										0		



# Exclusive group of block bids

- Overview on the trading screen

List of bids

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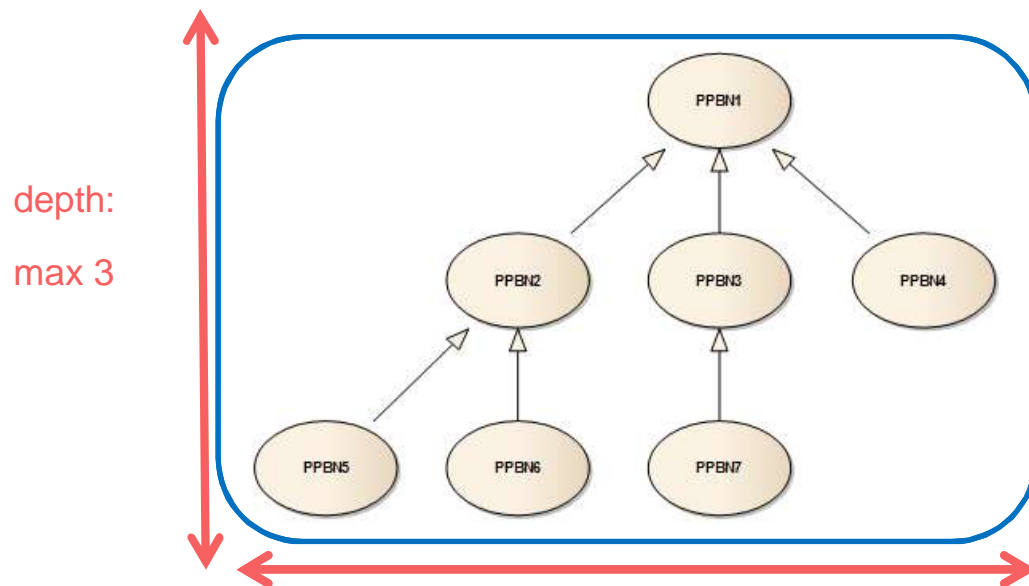
Delivery day	Type	Ver	BidID	LinkTo	Volume	MinPce	MaxPce	CtgBl	ExclGrBl	Mar ty
31.03.2015	Buy	0	424 203		90,0	150,00	150,00	PBO		SPT
31.03.2015	Buy	0	424 205		60,0	130,00	130,00	PBO	12345	SPT
31.03.2015	Buy	0	424 207		40,0	120,00	120,00	PBO		SPT
31.03.2015	Buy	0	- 424208	424207	60,0	130,00	130,00	PBO		SPT
31.03.2015	Buy	0	424 201		10,0	150,00	150,00	FHO		SPT
31.03.2015	Sell	0	424 206		40,0	120,00	120,00	PBO	12345	SPT
01.04.2015	Buy	0	421 608		90,0	150,00	150,00	PBO		SPT
01.04.2015	Buy	0	421 610		60,0	130,00	130,00	PBO	12345	SPT
01.04.2015	Buy	0	421 612		40,0	120,00	120,00	PBO		SPT
01.04.2015	Buy	0	- 421613	421612	60,0	130,00	130,00	PBO		SPT

- In the DM reports: Bids by delivery day

Bid ID	Version	Participant	Type	Category	Delivery day	Valid	Replaced	Canc. for deliv. day	Cancellation timestamp	Submission timestamp	Total volume [MWh]	Min. acceptanc ratio	Min. price [EUR/MWh]	Max. price [EUR/MWh]	Parent block order ID	Exclusive group	Settlement currency	System	Market type
424 208	0	859 1824 9999 05	Buy	PBO	03/31/2015	Yes	No			17.09.2014 08:56:42	60,0	100	130,00	130,00	424 207		CZK	OTE	SPT
424 207	0	859 1824 9999 05	Buy	PBO	03/31/2015	Yes	No			17.09.2014 08:55:32	40,0	100	120,00	120,00			CZK	OTE	SPT
424 206	0	859 1824 9999 05	Sell	PBO	03/31/2015	Yes	No			17.09.2014 08:54:47	40,0	100	120,00	120,00		12 345	CZK	OTE	SPT
424 205	0	859 1824 9999 05	Buy	PBO	03/31/2015	Yes	No			17.09.2014 08:54:06	60,0	100	130,00	130,00		12 345	CZK	OTE	SPT
424 203	0	859 1824 9999 05	Buy	PBO	03/31/2015	Yes	No			17.09.2014 08:52:20	90,0	100	150,00	150,00			CZK	OTE	SPT

- ❑ Commodity: Only one bid from each exclusive group will be utilised -> the bid which represents maximum possible liability:
  - ❑ volume x price of a bid for buy with positive price or of a bid for sell with negative price
  
- ❑ Imbalance: Only one bid from each exclusive group will be covered -> the bid which represents maximum possible liability:
  - ❑ parametric price of a given imbalance x volume - > separately from the total current position of the participant

- Profile block bids can be linked to each other – which creates a condition of execution constrains
- Child bid can be executed only if the parent bid which is linked to is executed
- Maximum number of linkage level is 3 (depth). Number of active bids of group (breadth) and number of groups of bids is limited



Number of groups	5
Linkage level	3
Active bids	7

Total number of bids : max 7

breadth: max 6

- ❑ Rules for creating linked bids:
  - ❑ The parent block bid can be linked to several child block bids
  - ❑ Child block bid can be linked only to one parent block bid
  - ❑ One linked bid can be member of several groups of linked bids
  - ❑ Groups of linked bids can be created only from one type of a bid (buy/sell)
  - ❑ Number of families of linked bids and number of bids in one group of linked bids is restricted
  
- ❑ The linkage of the bids through the web form is considered as a modification of the child bid and therefore its version is increased

# Linked block bids

**New order on day ahead market**

**Bid:** Block

---

**Header data**

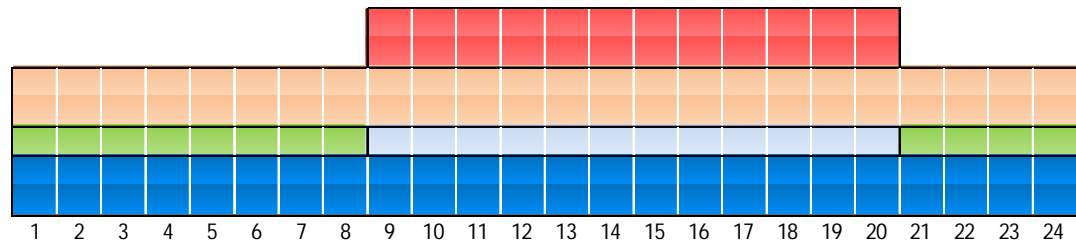
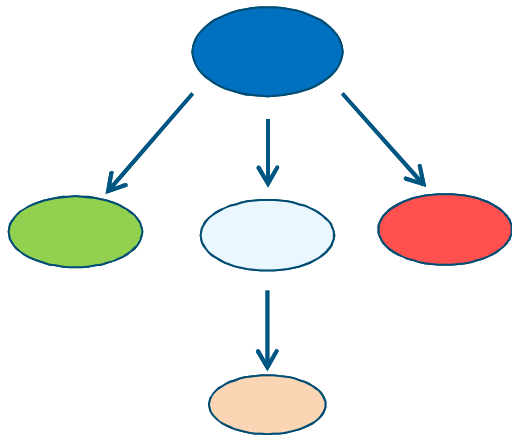
Delivery day:\*  Participant:\*  Exclusion group:  Yes  No  
 Settlement currency code:\*  Default settlement currency code: CZK  
 Exclusion group ID:\*

Type:\*  Buy  Sell Category:\* PBO

---

**Detail data**

Product	Min %	Comment	Price (EUR/MWh)*	Hour																								Total
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
BASE	100%	blue	10,00	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	240,0	
OFFPEAK	100%	green	15,00	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	60,0	
PEAK	100%	light blue	20,00								5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	60,0		
BASE	100%	orange	30,00	10,0	1,0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	11,0		
PEAK	100%	red	40,00								10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	0,0		



## □ Linkage of the particular bids via web form



Items: 80, page 1/8. 10

Delivery day	Type	Ver	BidID	LinkTo	Volume	MinPce	MaxPce	CtpBl	ExclGrBl	Mar ty
31.03.2015	Buy	0	424 203		90,0	150,00	150,00	PBO		SPT
31.03.2015	Buy	0	424 205		60,0	130,00	130,00	PBO	12345	SPT
31.03.2015	Buy	0	424 207		40,0	120,00	120,00	PBO		SPT
31.03.2015	Buy	0	- 424208	424207	60,0	130,00	130,00	PBO		SPT
31.03.2015	Buy	0	424 201		10,0	150,00	150,00	FHO		SPT
31.03.2015	Sell	0	424 206		40,0	120,00	120,00	PBO	12345	SPT
01.04.2015	Buy	0	421 608		90,0	150,00	150,00	PBO		SPT
01.04.2015	Buy	0	421 610		60,0	130,00	130,00	PBO	12345	SPT
01.04.2015	Buy	0	421 612		40,0	120,00	120,00	PBO		SPT

Linking of block order

Bid ID: 424 207 Version: 0

Linking of order:

Without link

Parent block order: 424203

Submit Close

- Linking of bids to groups through a web form is possible after creation of both bids (parent/child) -> this linkage is modification of the linked bid (child bid) – its version is increased.



## □ Linkage of bids via XML



- It is possible to link the bids (in one step) by filling ParentBlock element at submission of child bid.

```
<ISOTEDATA message-code="811" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" dtd-version="1" dtd-release="1" xmlns="http://www.ote-  
cr.cz/schema/market/data" answer-required="0" err-reaction="A" date-time="2014-04-08T09:08:57" id="76638">  
<SenderIdIdentification id="8591824011607" coding-scheme="14" />  
<ReceiverIdentification id="8591824999905" coding-scheme="14" />  
<Trade trade-day="2014-07-17" trade-type="N" acceptance="N" sett-curr="EUR" ParentBlock="311090" Category="PBN" AcceptRatio="100">  
<ProfileData profile-role="BC01">  
<Data period="21" value="30" unit="MWH" splitting="A"/>  
<Data period="22" value="30" unit="MWH" splitting="A"/>  
</ProfileData>  
<ProfileData profile-role="BP01">  
<Data period="21" value="130" unit="EUR" splitting="A"/>  
<Data period="22" value="130" unit="EUR" splitting="A"/>  
</ProfileData>  
<Party id="8591824999905" role="TO" /></Trade>  
</ISOTEDATA>
```

# Linked block bids

- Overview displayed on trading screen

List of bids

Items: 80, page 1 / 8, 10

Delivery day	Type	Ver	BidID	LinkTo	Volume	MinPce	MaxPce	CtgBl	ExcdGrBl	Mat ty
31.03.2015	Buy	0	424 203		90,0	150,00	150,00	PBO		SPT
31.03.2015	Buy	0	424 205		60,0	130,00	130,00	PBO	12345	SPT
31.03.2015	Buy	0	424 207		40,0	120,00	120,00	PBO		SPT
31.03.2015	Buy	0	424208	424207	60,0	130,00	130,00	PBO		SPT
31.03.2015	Buy	0	424 201		10,0	150,00	150,00	FHO		SPT
31.03.2015	Sell	0	424 206		40,0	120,00	120,00	PBO	12345	SPT

- Reports: Linked blocked bids by delivery day

Linked profile block orders by delivery day

Parameters

Delivery day from: 03/31/2015  
Delivery day to: 03/31/2015  
Participant: 8501824099905

Show

Table

View: Default, Items: 1, page 1 / 1, 30

Bid ID	Version	Participant	Order category	Parent block order ID	Type	Delivery day	Submission timestamp	Total volume (PWh)	Price per PWh	Currency	Settlement currency	System	Market type
424 207	0	859 1824 9999 05	PBO		Buy	03/31/2015	17:09:2014 08:55:32	40,0	120,00	EUR	02X	OTE	SPT

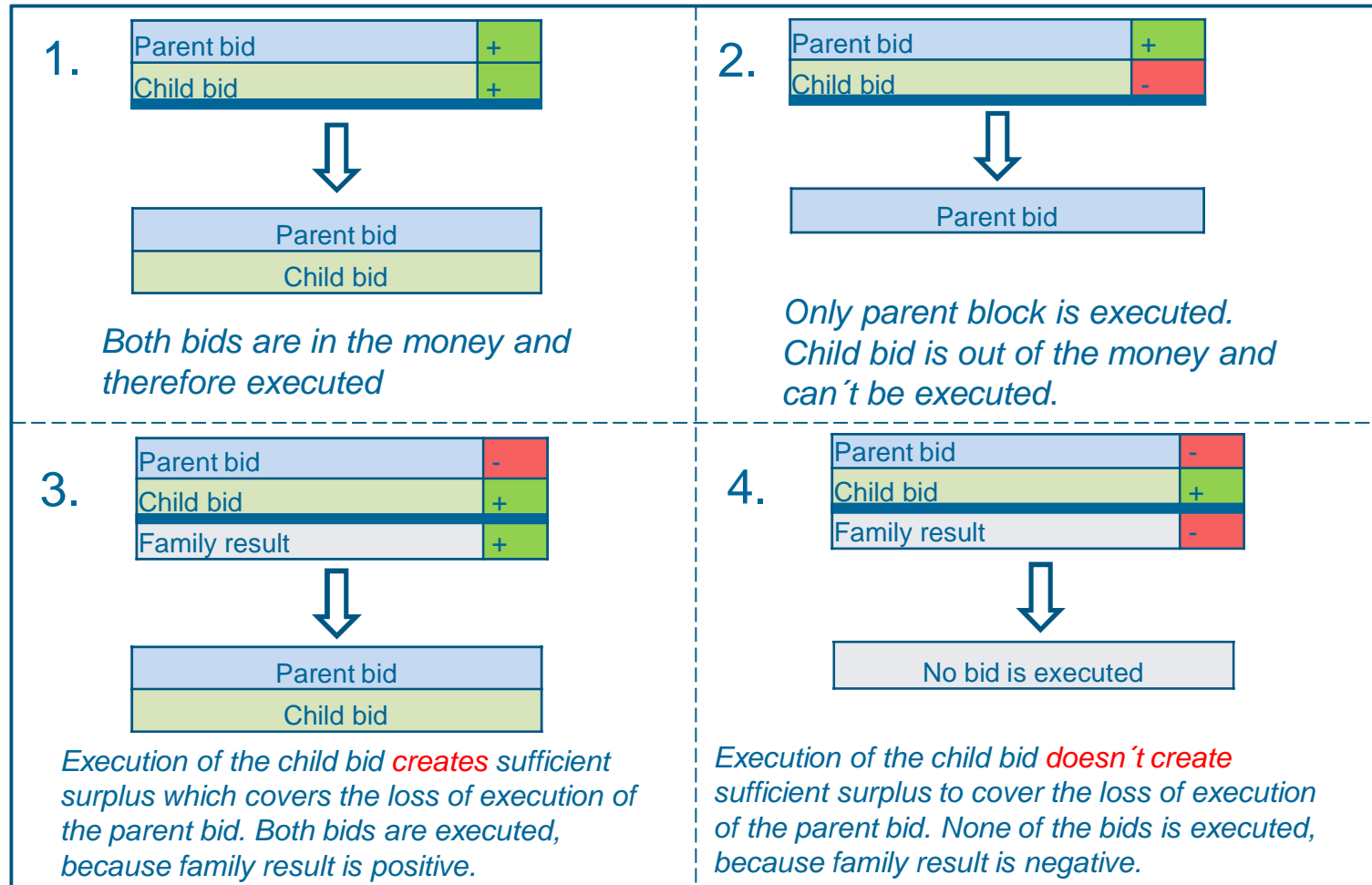
Linked profile block orders by delivery day

View: Default, Items: 1, page 1 / 1, 30

Bid ID	Version	Participant	Order category	Parent block order ID	Type	Delivery day	Submission timestamp	Total volume (PWh)	Price per PWh	Currency	Settlement currency	System	Market type
424 208	0	859 1824 9999 05	PBO	424 207	Buy	03/31/2015	17:09:2014 08:56:42	90,0	130,00	EUR	02X	OTE	SPT

- ❑ Parent bid can be executed alone, but child bid can be executed only if a parent bid is also executed.
  
- ❑ Parent bid which is out of the money is possible to be executed only in the case that execution of whole group will create surplus (child bid saves parent bid – this doesn't work vice versa)
  
- ❑ It is not possible to execute separately child bid

# Possible cases of matching within linked bids



+ bid execution creates surplus (in the money)

- bid execution creates loss (out of the money)

- ❑ Commodity: Each bid is utilised in amount of potential liability
  - ❑ volume x price of the bid for buy with positive price or of bid for sell with negative price.
  
- ❑ Imbalance: Profile block bids from group of linked bids enter the utilization of total current position of a participant

- ❑ Price
  - ❑ Fixed price
  
- ❑ Volume
  - ❑ Fixed volume
  - ❑ Possible to enter for one unspecified hour
  
- ❑ Matching
  - ❑ Specific hour is assigned to a bid by algorithm during matching process based on the principle of maximization of the total welfare.

# Flexible hourly bid

**Bid:** Block

**Header data**

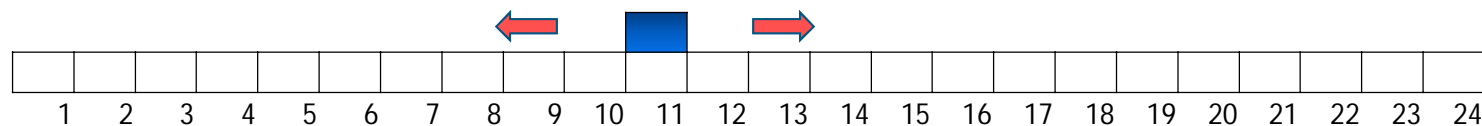
Delivery day:\* 09/19/2014 Participant:\* 859 1824 9999 05 TESTOVACI SZZ Avn. spol. Exclusive group:

Settlement currency code:\* CZK Default settlement currency code: CZK Exclusive group ID:\*

Type:\*  Buy  Sell Category:\* RHO

**Detail data**

Comment	Price (EUR/MWh)	Volume (MWh)
	50,00	16,0



- ❑ Commodity: Each bid is utilised in amount of potential liability
  - ❑ volume x price of the bid for buy with positive price or of bid for sell with negative price
  
- ❑ Imbalance: Each bid will be utilised in the amount of possible liability.
  - ❑ parametric price of a given imbalance x volume - > separately from the total current position of the participant



# Main changes - summary

- ❑ **Number of active bids at Day-ahead Market is not limited** – bid modification without it's unique identification leads to creation of a new bid



Delivery day	Type	Ver	BidID	LinkdTo	Volume	MinPce	MaxPce	CtgBl	ExclGrBl	Mar ty
31.03.2015	Buy	0	424 203		90,0	150,00	150,00	PBO		SPT
31.03.2015	Buy	0	424 205		60,0	130,00	130,00	PBO	12345	SPT
31.03.2015	Buy	0	424 207		40,0	120,00	120,00	PBO		SPT
31.03.2015	Buy	0	- 424208	424207	60,0	130,00	130,00	PBO		SPT
31.03.2015	Buy	0	424 201		10,0	150,00	150,00	FHO		SPT
31.03.2015	Sell	0	424 206		40,0	120,00	120,00	PBO	12345	SPT

- ❑ Total acceptance of the first block of a bid for sell is cancelled
- ❑ It is possible to set volume indivisibility of hours of the first block for both types of bid buy/sell
- ❑ New types of orders – profile block bid and flexible hourly bid
- ❑ Profile block bids can be linked or included into groups – this way we use specific rules for their matching

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**Thank you for your attention!**

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