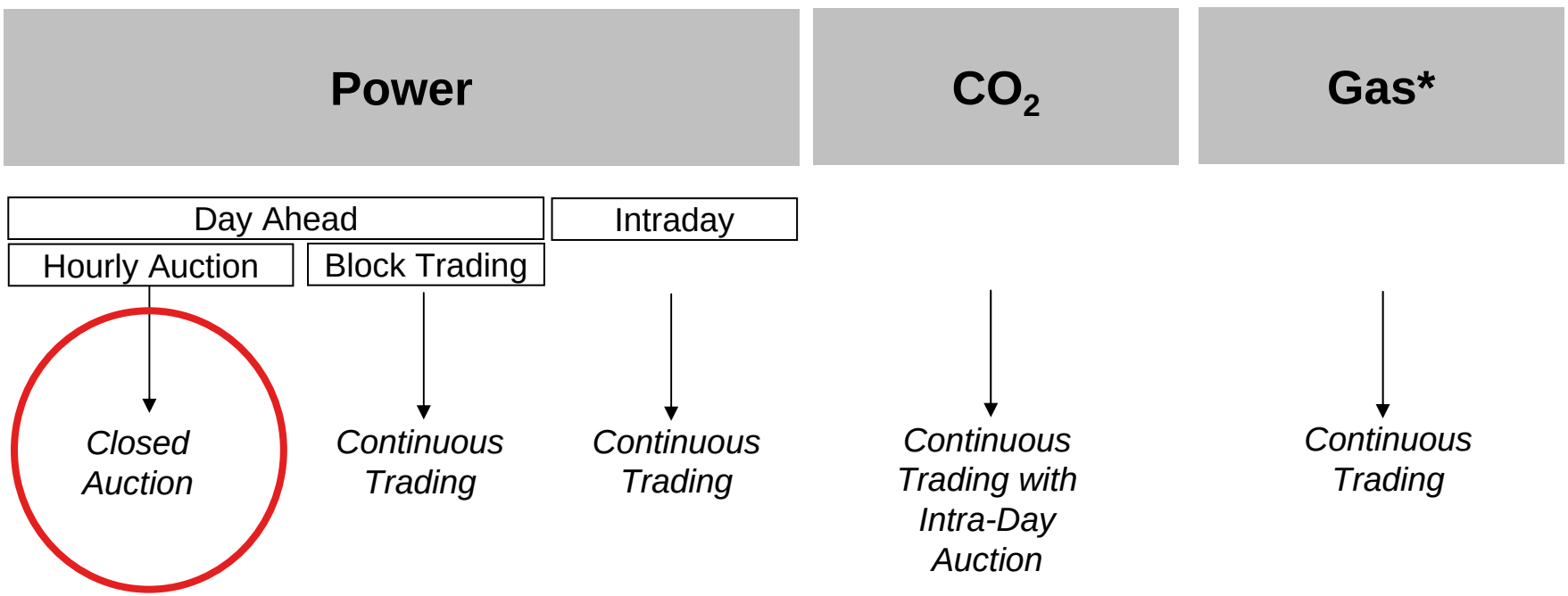
Trading on the Spot Market



Hourly Power Contracts
Trading Process

Hourly bids and block bids

Auction

(Equilibrium Price)

„Physical Electricity Index“

Hourly Power Contracts

Types of orders – Hourly bids

- Examples of hourly bids

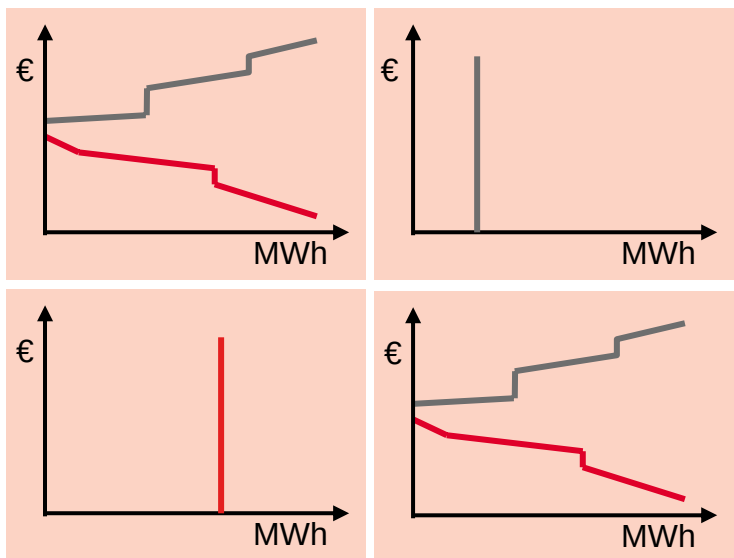
Hour	0	6.9	7	16.9	17	17.1	17.2	149.9	150	3000
1	**200.0**	**200.0**	**100.0**	**100.0**	**0.0**	**-75.0**	**-75.0**	**-75,0**	**-275.0**	**-275.0**
2	**154.9**	**154.9**	**42.6**	**42.6**	**6.3**	**6.3**	**0.0**	**0,0**	**-20.0**	**-20.0**
3	**-57.0**	**-57.0**	**-100.0**	**-100.0**	**-100.0**	**-175.0**	**-175.0**	**-175,0**	**-325.0**	**-325.0**
4	**200.0**									**200.0**

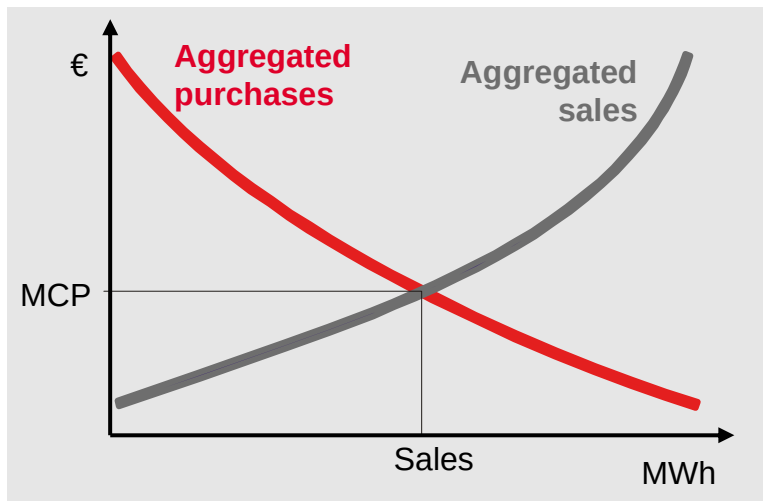
- Bid = Plan for purchases and sales
  - Price-dependent bid = function MWh/h(P)
  - Price-independent bid = MWh/h known, price not known

Aim: Trading a market-clearing balance!

Hourly Power Contracts
Auction principle

Hour	0	6.9	7	16.9	17	17.1	17.2	149.9	150	3000
	200.0	200.0	100.0	100.0	0.0	-75.0	-75.0	-75.0	-275.0	-275.0
2	154.9	154.9	42.6	42.6	6.3	6.3	0.0	0.0	-20.0	-20.0
3	-57.0	-57.0	-100.0	-100.0	-100.0	-175.0	-175.0	-175.0	-325.0	-325.0
4	200.0									200.0

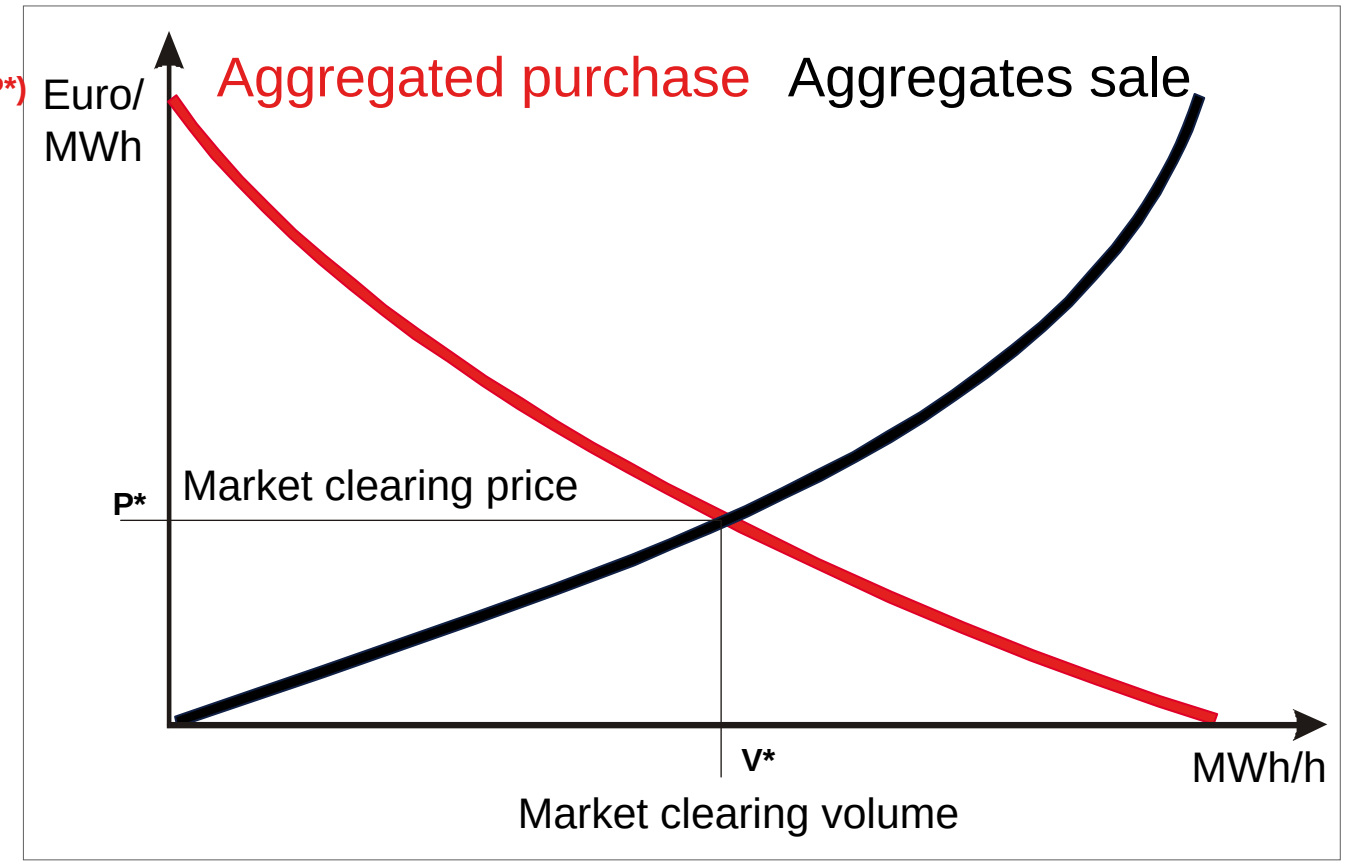




Hourly Power Contracts
Pricing

- Calculation of the market-clearing balance without consideration of grid restrictions

Purchase (P*)
10
62
12
1
89
296
111
84
56
85
2
13
111
V*= 932

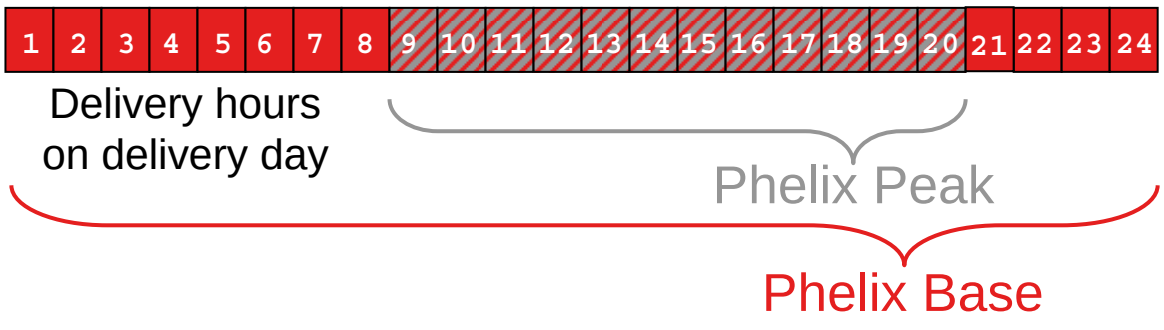


Sale (P*)
-109
-20
-25
-36
-8
-16
-256
-186
-3
-29
-65
-87
-92
V*= -932

Hourly Power Contracts
"Physical Electricity Index"

Market Clearing Price

Phelix Daily Index



Delivery days in delivery month

29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2

Phelix Monthly Index

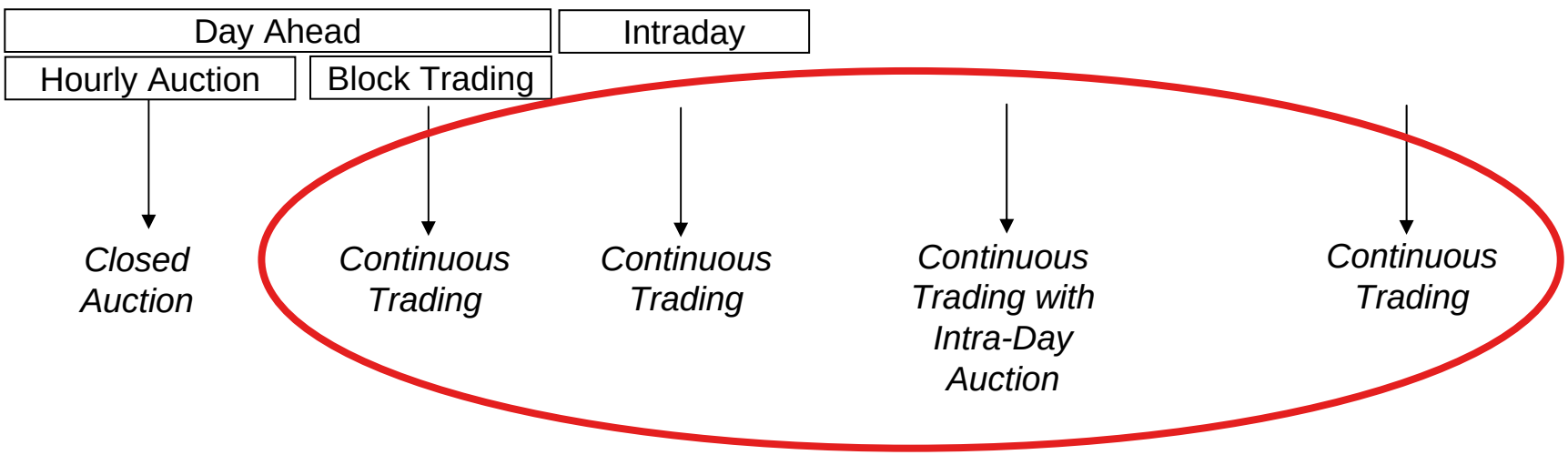
Final settlement price

Phelix Peak

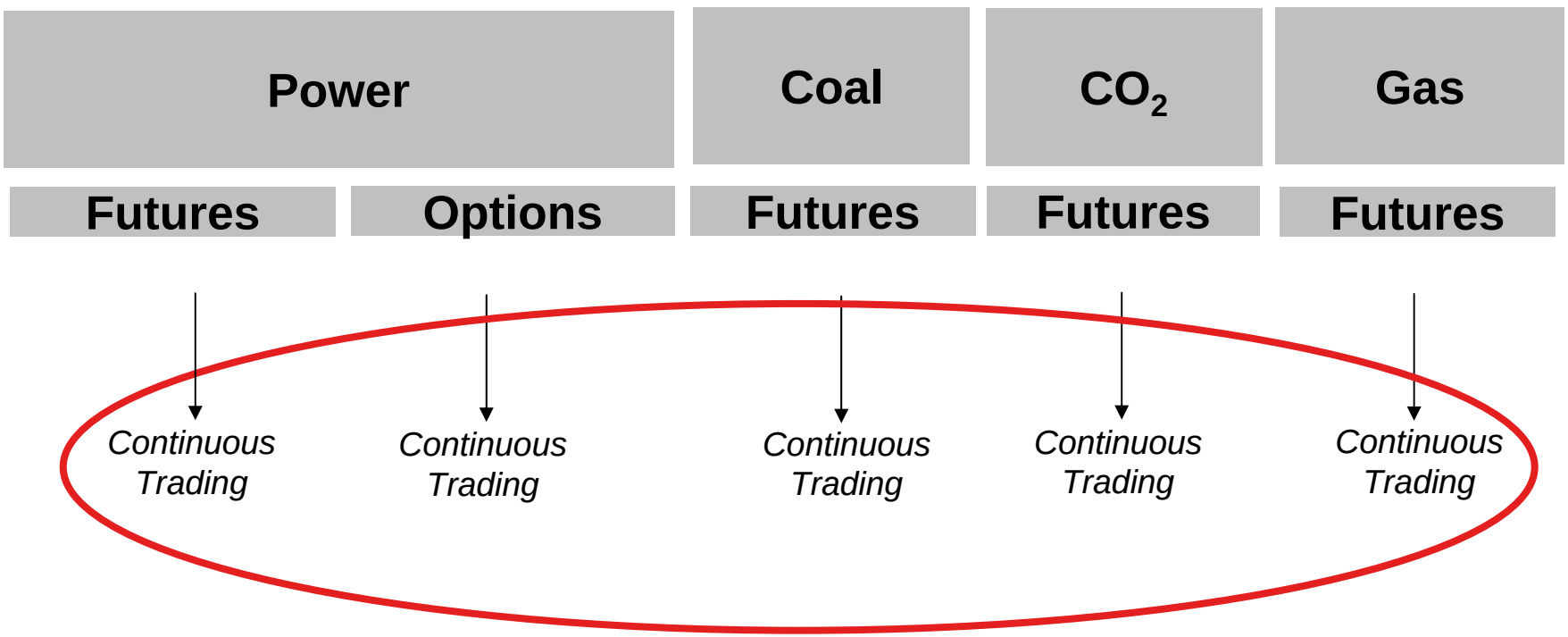
Phelix Base

Trading on the Spot Market

Power	CO_2	Gas



Trading on the Derivatives Market



Continuous Trading

Trading Processes

Order Type

Continuous Trading: Matching Algorithm

Auction: Principle of Most Executable Volume

Trading: Continuous Trading

Types of orders - Overview

- **Limited orders**
  - Limit Order
  - Stop Limit Order
- **Unlimited orders**
  - Market Order
  - Stop Market Order

Trading: Continuous Trading

Matching – Continuous trading - Overview

* Last exchange price traded or, upon beginning of trading, last transaction price for the same day of the previous‘ week.

Incoming orders	Existing orders on the opposite side of order book: Market Order	Limit Order	Market Order and Limit Order
Market Order Buy	Reference price* (1)	Lowest sell limit (5)	Reference price* or sell limit (minimum) (9)
Market Order Sell	Reference price* (2)	Highest buy limit (6)	Reference price* or buy limit (maximum) (10)
Limit Order Buy	Reference price* or buy limit (minimum) (3)	Lowest sell limit (7)	Reference price* or limit (minimum) (11)
Limit Order Sell	Reference price* or sell limit (maximum) (4)	Highest buy limit (8)	Reference price* or limit (maximum) (12)

Trading: Continuous Trading

Matching – Continuous trading - Case 7

- Order book:

Buy			Sell		
Contracts	Time	Limit	Limit	Time	Contracts
			25.50	09:10	20
			25.80	09:15	12
			26.10	09:20	10

Entry of the
Buy Limit Order
35 contracts
Limit: 26 €/MWh

Buy			Sell		
Contracts	Time	Limit	Limit	Time	Contracts
3	09:25	26.00	26.10	09:20	10

Reference price: 25.50 €/MWh

- Execution:
  - 20 contracts at the limit price of 25.50 €/MWh.
  - 12 contracts at the limit price of 25.80 €/MWh.
  - 3 buy contracts with a limit of 26 €/MWh remain in the order book.
  - 10 sell contracts with a limit of 26.10 €/MWh remain in the order book.
  - 1st and 2nd limit order executed completely, 3 limit order not executed.

Trading: Continuous Trading

Trading process – Intraday Auction

Continuous Trading

Intraday Auction*

Continuous trading

Random end of the call

Call

- Entering, changing, deleting of orders.
- Display of:
  - indicative auction price or best bid/ ask limit.
  - indicative volume and surplus.

Price Determination

Market Balancing

- Changing and deleting of orders not possible.
- Surplus can be accepted at the auction price.

Orders which have not been executed unless these are restricted to the auction.

10^{30}

* Analogue to opening and closing auction

10^{36}

Trading: Continuous Trading

Sorting in the order book

Sorting criteria

- All orders are sorted in accordance with a price-time priority.
- Example: Order book in freeze state (before matching)

Buy		Sell	
Volume	**Price Bid**	**Price Ask**	**Volume**
17	15.25	15.20	11
15	15.23	15.23	12
16	15.16	15.25	15
		15.28	17

Trading: Continuous Trading

Matching - Auctions

- In auctions the price is established in accordance with the principle of most executable volume.
- The auction price is the price at which the highest volume is traded. If the maximum volume is calculated for several prices, the lower surplus is decisive.
- Example:

Price	Buy	Sell	Executable volume	Surplus
15.16	48	0	0	48
15.20	32	11	11	21
15.23	**32**	**23**	**23**	**9**
15.25	17	38	17	21
15.28	0	55	0	55