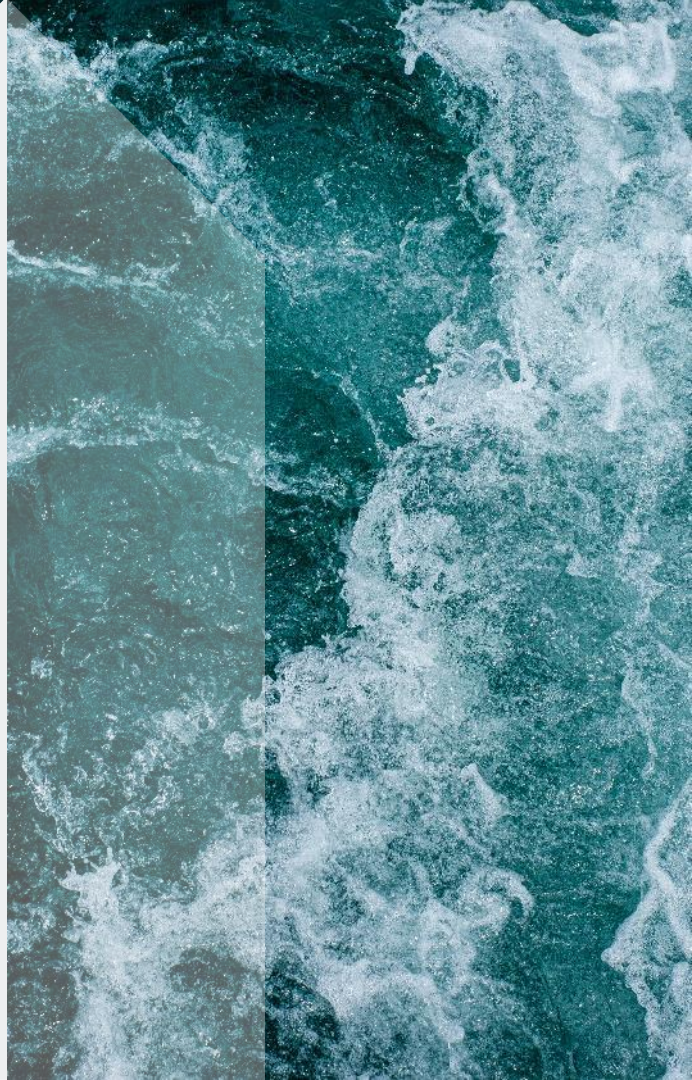




NORD POOL

A EURONEXT COMPANY

BRM Nord Pool Auction Platform Presentation





01

**Auction system and
API**

02

Auction order types

03

Auction UI DEMO



N DAY-AHEAD

User interface

- ▶ Low maintenance web based UI
- ▶ Always up to date – no installation or updates required
- ▶ Lightweight
- ▶ Single Sign On (SSO)

Orders

- ▶ Curve orders
- ▶ Blocks
 - ▶ Regular blocks
 - ▶ Profile blocks
 - ▶ Linked blocks
 - ▶ Spread blocks
 - ▶ Exclusive groups

Features

- ▶ Order copy + paste
- ▶ Excel import
- ▶ Copy from history
- ▶ Submit multiple delivery days
- ▶ Reasonability check

API (Application Programming Interface)

- ▶ Fast, simple and reliable API
- ▶ Easy to take into use
- ▶ Range of available ISVs

Auction API

WHY TRADE DAY-AHEAD VIA API

- ▶ Simplifies the trading process
- ▶ Easy to take into use
- ▶ Get – retrieve public market info and private data
- ▶ Post – submit orders
- ▶ Patch – change existing order
- ▶ gRPC – receive notifications
- ▶ Postman Collection – try it out using Postman
- ▶ Sample code in .NET or Java script

Auctions - by close for
bidding period

GET

Auctions - orders

GET

Auctions - trades

GET

Submit Block order

POST

Get Block order

GET

Change Block order

PATCH

Submit Curve order

POST

Get Curve order

GET

Change Curve order

PATCH

Auctions - prices

GET

Auctions - contracts

GET

Auctions - portfolio volumes

GET

gRPC API

ISV Partners

- Nord Pool and our ISV partners co-operate to promote and facilitate the efficient and secure use of Nord Pool APIs

 Brady Technologies +44 (0)20 3301 1200	 Ian Sloggett +44 (0) 7971 699047	 Jonas Bräuer +49 162 2631455	 Gunnar Van Fessem +31 6 51042346	 Sebastian Meyer +49 172 9905295	 Expektra +46 767 888 799
 Burkhard Niklasch +49 1774 050013	 Energy One Sales +33 1 84 17 75 65	 Maks Rozman +44 7899 837664	 Jyri Joutsu +358 407 357 899	 Christoph Malzer +43 660 9228 928	 Helmut Spindler +43 720 9000 18
 Mogens Heller Grabe +45 29 36 70 77	 smartPulse +44 7594 090783	 Peter Mischke +49 241 40023 553	 Radosław Turski +48 723 201 003	 Sales@trayport.com +44 (0)20 7960 5500	 Wince Wong +46 720 88 88 38
 sales@vtcenergy.com +90 535 665 6035					

Auction API – BRM as PX

INTRODUCTION · AUCTIONS

- One API user, with access to all portfolios
- Public URL for using endpoints: <https://auctions-api.test.brm-power.ro/api/v1>
- Get token for access: <https://sso.test.brm-power.ro/>
- Auction ID: BRM Auction ID

Customer support

- Primarily BRM responsibility
- BRM provides & ensures members can access

Auctions - by close for
bidding period

GET

Auctions - orders

GET

Auctions - trades

GET

Submit Block order

POST

Get Block order

GET

Change Block order

PATCH

Submit Curve order

POST

Get Curve order

GET

Change Curve order

PATCH

Auctions - prices

GET

Auctions - contracts

GET

Auctions - portfolio volumes

GET

gRPC API

Walkthrough of endpoints

INTRODUCTION · AUCTIONS

Walkthrough of different endpoints for members

Walkthrough of endpoints for BRM

- Auctions – orders
- Auctions – trades
- Auctions – prices
- Auctions – portfolio volumes
- gRPC API

Auctions - by close for bidding period	GET
Auctions - orders	GET
Auctions - trades	GET
Submit Block order	POST
Get Block order	GET
Change Block order	PATCH
Submit Curve order	POST
Get Curve order	GET
Change Curve order	PATCH
Auctions - prices	GET
Auctions - portfolio volumes	GET
gRPC API	

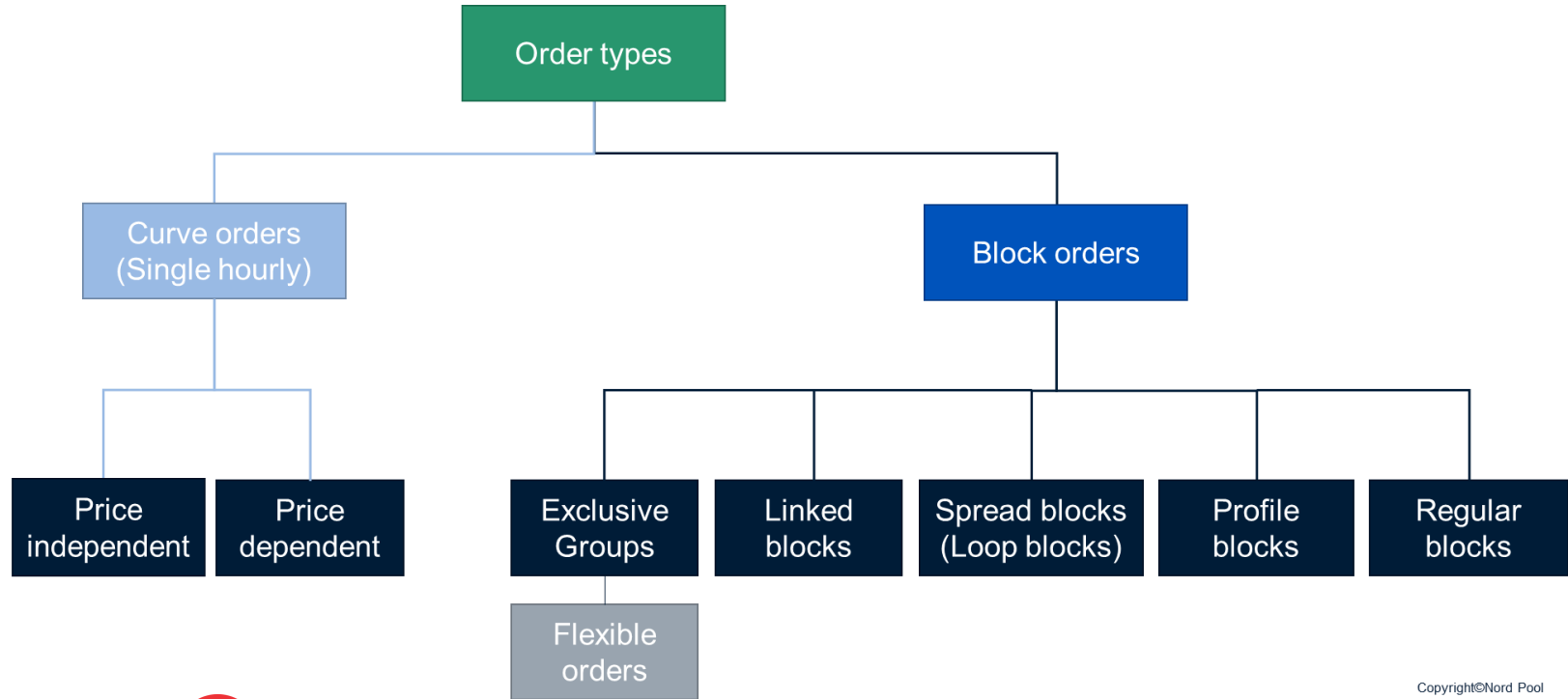


NORD POOL

A Euronext Company

Auction Products

Nord Pool auction order types



Copyright©Nord Pool

Day Ahead products

BRIEF DESCRIPTION

Curve orders

- To buy or sell – price and volume given separately for each time unit (hour)
- Participant specify price steps and corresponding volume to buy and or sell at each level of price
- Must include the min price -500€ and max price 4000€ - up to 200 price steps allowed per time unit
- piecewise

Block orders

- Block orders – spanning over a consecutive number of hours
- All or nothing condition
- Must specify three attributes; volume, price and duration
- Several product variations
 - Regular block orders
 - Profile block orders
 - Curtailable block orders
 - Linking of block orders
 - Exclusive groups
 - Flexible block order
 - Spread block orders

Curve orders

- Price and volume given separately for each hour (piecewise)
- Each participant selects the range of price steps for the hourly bid individually
 - Including min price -500€ and max price 4000€
- Each pair of price and volume represent a point on a curve with **linear interpolation** between the volume and price points
- Best suited for variable production and consumption

Price independent

Price Steps	-500.00	4,000.00
Hour 1	18.6	18.6
Hour 2	18.5	18.5
Hour 3	18.9	18.9
Hour 4	20.2	20.2
Hour 5	22.6	22.6
Hour 6	27.2	27.2
Hour 7	33.1	33.1
Hour 8	29.4	29.4
Hour 9	26.9	26.9
Hour 10	26.8	26.8
Hour 11	24.9	24.9
Hour 12	23.2	23.2
Hour 13	22.4	22.4
Hour 14	21.5	21.5
Hour 15	25.6	25.6
Hour 16	25.8	25.8
Hour 17	27.6	27.6
Hour 18	26.6	26.6
Hour 19	26.2	26.2
Hour 20	24.7	24.7
Hour 21	21.9	21.9
Hour 22	19.2	19.2
Hour 23	18.1	18.1

Price dependent

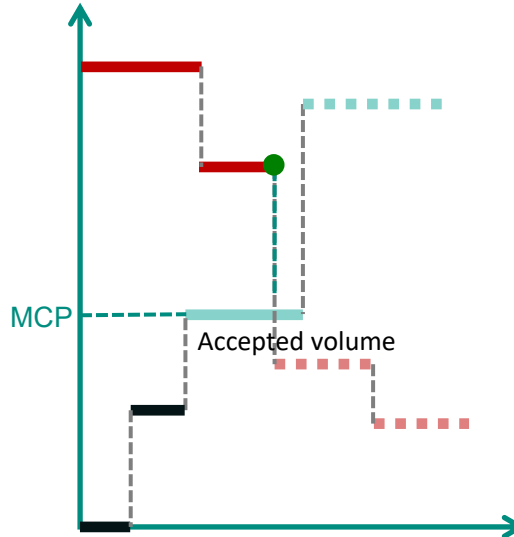
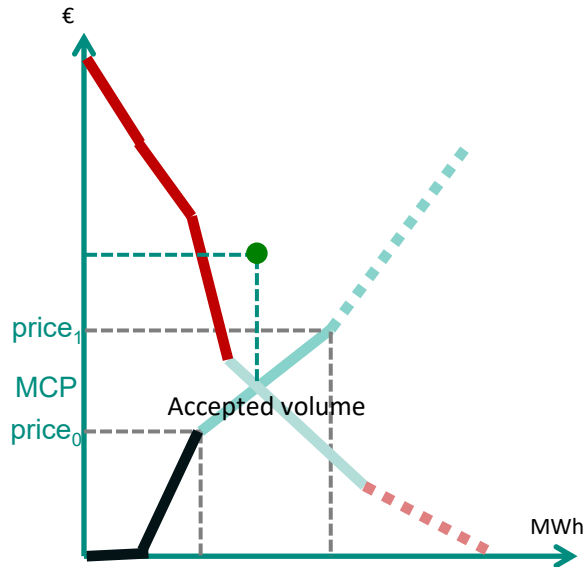
Sell

Price Steps	-500.00	-50.10	-50.00	750.00	750.10	4,000.00
Hour 1	0.2	0.2	0.2	0.2	0.0	0.0
Hour 2	1.9	1.9	1.9	1.9	0.0	0.0
Hour 3	0.0	0.0	-0.3	-0.3	-0.3	-0.3
Hour 4	0.0	0.0	-3.1	-3.1	-3.1	-3.1
Hour 5	0.0	0.0	-0.3	-0.3	-0.3	-0.3
Hour 6	0.0	0.0	-0.1	-0.1	-0.1	-0.1
Hour 7	5.0	5.0	5.0	5.0	0.0	0.0
Hour 8	5.0	5.0	5.0	5.0	0.0	0.0
Hour 9	5.0	5.0	5.0	5.0	0.0	0.0

Buy

Linear piecewise vs stepwise curve orders

BRM Auction



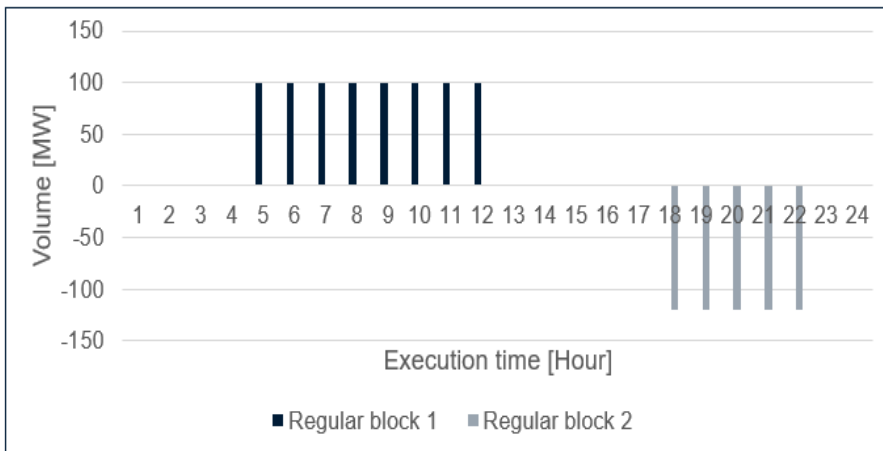
- Demand in-the-money
- Demand at-the-money
- Demand out-of-the-money
- Supply in-the-money
- Supply at-the-money
- Supply out-of-the-money

Regular block orders

MOST FREQUENT USED BLOCK ORDER TYPE:

Specification:

- Same volume and price across the whole period
- Either fully accepted or fully rejected
 - Buy order: Cleared if average MCP < price limit
 - Sell order: Cleared if average MCP > price limit
- One trading portfolio can contain up to 50 block orders



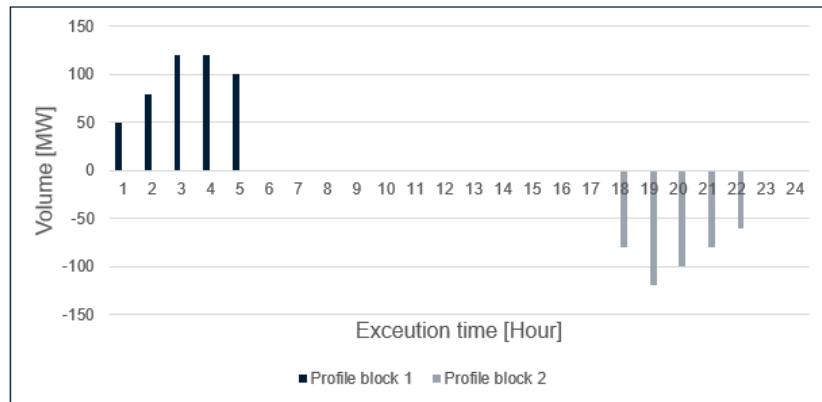
Example of regular blocks:

Name	From	To	Volume	Price	Min.%	Link	SpreadBlock	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5
Block1	05:00	12:00	100.0	25.00								
Block2	18:00	22:00	-120.0	35.00								

Profile block order

BEST SUITED WHEN VARIATION IN THE GENERATION OR CONSUMPTION PROFILE

- Same or different volume for each hour
- Same price across the whole period
- Weighted average price is used to decide if a block order will be activated or not
 - **Buy order:** Cleared if weighted average MCP < price limit of profile block
 - **Sell order:** Cleared if weighted average MCP > price limit of profile block



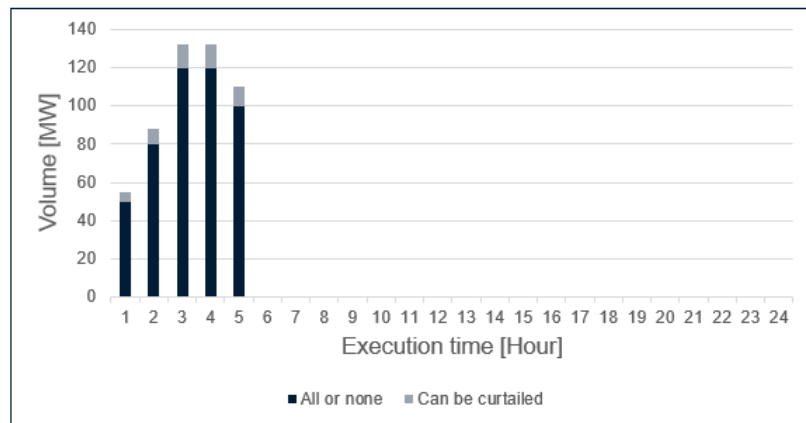
Example of profile blocks:

Name	From	To	Volume	Price	Min.%	Link	SpreadBlock	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5
Profile1	00:00	05:00		30.00				50.0	80.0	120.0	120	100
Profile2	18:00	05:00		50.00								

Minimum Acceptance Ratio (MAR)

BLOCKS CAN BE CURTAILED

- Curtailable block orders can be partially executed according to a user-defined Minimum Acceptance Ratio (MAR):
- Can be Regular, Profile, Linked and Spread blocks
- MAR: 0 – 100%
 - MAR = 100%: Fully accepted or rejected
 - MAR = 50%: May be curtailed up to 50%
 - MAR = 0%: Fully curtailable
- Same MAR for all hour



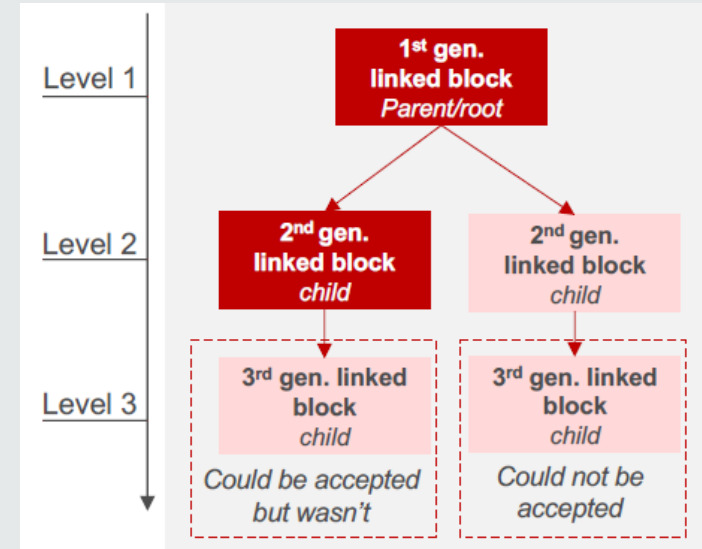
Example of curtailable regular block:

Name	From	To	Volume	Price	Min.%Link	SpreadBlock	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5
Profile1	00:00	10:00	-50,0	30.00	80.0%						

Linked block orders

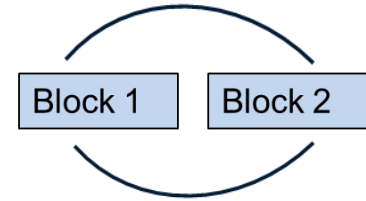
CONSIDERING DEPENDENCY BETWEEN ORDERS

- Linked blocks are evaluated as a group:
 - The whole group can be accepted although the first block would create a loss, as long as the group as a whole is profitable
 - A child block cannot be accepted without its parent being accepted
- Can be both regular and profile blocks with curtailment
- Possible to link altogether 13 block orders
 - One parent can have three children
 - Max 6 orders per level
 - Max 7 levels

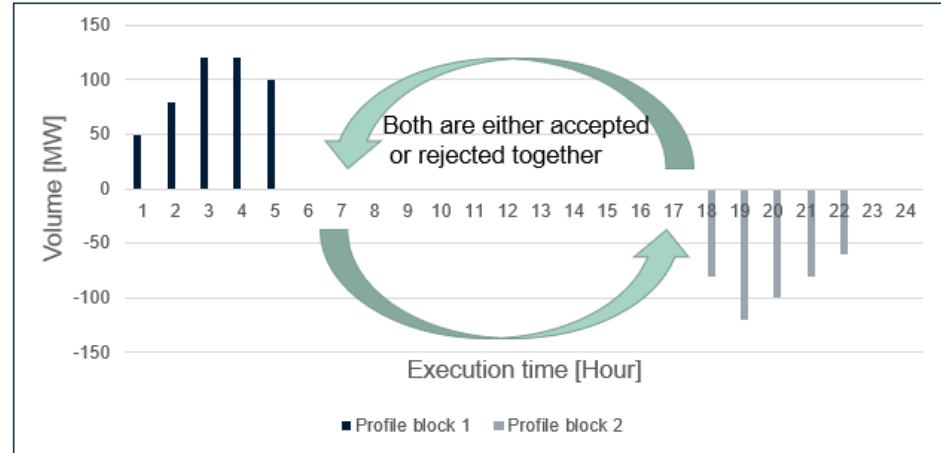


Spread blocks

A TYPE OF LINKING



- Mutually linked blocks between one buy and one sell order
- The pair of blocks are either executed or rejected together
- Can be both regular and profile blocks
- SpreadBlock = TRUE in the excel template



Example of spread blocks:

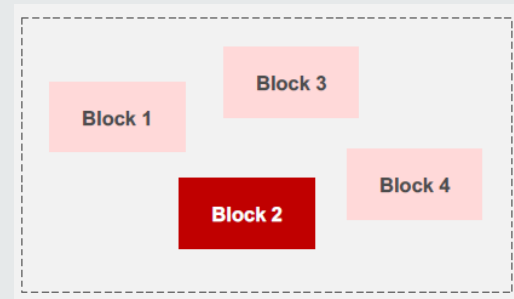
Name	From	To	Volume	Price	Min. %	Link	SpreadBlock	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5
Block1	05:00	12:00	100.0	25.00		Block2	TRUE					
Block2	18:00	22:00	-120.0	35.00		Block1	TRUE					

Exclusive Groups

A CLUSTER OF SIMPLE BLOCK ORDERS OUT OF WHICH ONLY ONE BLOCK CAN BE ACTIVATED

Specifications

- Minimum acceptance ratio: 50,1 – 100 %
- Only one of the blocks within an Exclusive group order can be accepted
- Regular and profile blocks



Name (14) ↑	From - To	Volume (~48 433,0 MW)	Min %	Price	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
Group1 (9)																													
Block1	06:00 - 12:00	avg	-364,3 MW	100,0 %	€ 104,90						-140,0	-430,0	-426,0	-422,0	-418,0	-350,0													
Block2	06:00 - 13:00	avg	-371,7 MW	100,0 %	€ 103,80						-140,0	-430,0	-426,0	-422,0	-418,0	-416,0	-350,0												
Block3	06:00 - 00:00	avg	-269,2 MW	100,0 %	€ 104,20						-140,0	-430,0	-426,0	-422,0	-418,0	-416,0	-350,0	0,0	0,0	0,0	0,0	0,0	-140,0	-416,0	-419,0	-421,0	-423,0	-424,0	
Block4	06:00 - 00:00	avg	-246,1 MW	100,0 %	€ 104,80						-140,0	-430,0	-426,0	-422,0	-418,0	-350,0	0,0	0,0	0,0	0,0	0,0	0,0	-140,0	-416,0	-419,0	-421,0	-423,0	-424,0	
Block5	06:00 - 00:00	avg	-269,1 MW	100,0 %	€ 104,20						-140,0	-430,0	-426,0	-422,0	-418,0	-350,0	0,0	0,0	0,0	0,0	0,0	0,0	-140,0	-416,0	-419,0	-421,0	-423,0	-424,0	
Block6	17:00 - 00:00	avg	-367,6 MW	100,0 %	€ 107,10																	-90,0	-380,0	-416,0	-419,0	-421,0	-423,0	-424,0	
Block7	18:00 - 00:00	avg	-359,7 MW	100,0 %	€ 109,00																		-90,0	-381,0	-419,0	-421,0	-423,0	-424,0	
Block8	17:00 - 00:00	avg	-349,9 MW	100,0 %	€ 108,20																	-90,0	-380,0	-416,0	-419,0	-421,0	-423,0	-300,0	
Block9	18:00 - 00:00	avg	-339,0 MW	100,0 %	€ 110,30																		-90,0	-381,0	-419,0	-421,0	-423,0	-300,0	
Group2 (5)																													
Block10	00:00 - 00:00	avg	-262,4 MW	100,0 %	€ 100,90	-78,0	-300,0	-300,0	-300,0	-300,0	-430,0	-430,0	-426,0	-422,0	-418,0	-350,0	0,0	0,0	0,0	0,0	0,0	0,0	-140,0	-416,0	-419,0	-421,0	-423,0	-424,0	
Block11	05:00 - 12:00	avg	-309,3 MW	100,0 %	€ 104,50						-36,0	-301,0	-419,0	-418,0	-416,0	-414,0	-161,0												
Block12	05:00 - 13:00	avg	-322,1 MW	100,0 %	€ 103,50						-36,0	-301,0	-419,0	-418,0	-416,0	-414,0	-412,0	-161,0											
Block13	17:00 - 00:00	avg	-320,7 MW	100,0 %	€ 106,60																	-18,0	-154,0	-410,0	-414,0	-415,0	-417,0	-417,0	
Block14	05:00 - 00:00	avg	-370,0 MW	100,0 %	€ 101,20						-36,0	-301,0	-419,0	-418,0	-416,0	-414,0	-412,0	-410,0	-409,0	-396,0	-250,0	-250,0	-411,0	-412,0	-413,0	-414,0	-415,0	-417,0	

Flexible order

OPTIMIZING TIME OF ACTIVATION - ONLY BLOCK ORDERS WILL BE ACCEPTED

- A type of exclusive group
- A sell/buy order with a length of one or more hours without a mandatory time restriction
- Flexible order is activated for the period it creates highest social welfare

NORD POOL Auctions Trading UI (DEV)

Fri, 01 Oct Test NordicBaltic Hour Day Ahead 30.09.2021 Zero Watts Oy NORDIC_TEST_FI Finland

Add Regular Block Add Flexible Block

Flexible Block	Volume	Min %	Price	Duration	From	To	
Test	75,0 MW	100,0 %	€ 50,00	4	10:00	20:00	Add Block

NORD POOL

Auctions

Trading UI (DEV)

7:06 CEST

test-markus.heggas@nordpoolgroup.com

Fri, 01 Oct

Test NordicBaltic Hour Day Ahead 30.09.2021

Zero Watts Oy

NORDIC_TEST_FI

Finland

From Clipboard

Export

Save

Close

Add Regular Block

Add Flexible Block

Flexible Block

Volume

Min %

Price

Duration

From

To

Add Block

Name (7) ↑	From - To	Volume (2 100,0 MW)	Min %	Price	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
Test (7)																													
Test_1	10:00 - 14:00	75,0 MW	100,0 %	€ 50,00											75,0	75,0	75,0	75,0											
Test_2	11:00 - 15:00	75,0 MW	100,0 %	€ 50,00											75,0	75,0	75,0	75,0	75,0										
Test_3	12:00 - 16:00	75,0 MW	100,0 %	€ 50,00												75,0	75,0	75,0	75,0	75,0									
Test_4	13:00 - 17:00	75,0 MW	100,0 %	€ 50,00														75,0	75,0	75,0	75,0								
Test_5	14:00 - 18:00	75,0 MW	100,0 %	€ 50,00															75,0	75,0	75,0	75,0							
Test_6	15:00 - 19:00	75,0 MW	100,0 %	€ 50,00																75,0	75,0	75,0	75,0						
Test_7	16:00 - 20:00	75,0 MW	100,0 %	€ 50,00																	75,0	75,0	75,0	75,0					

Reasonability check tool

AUTOMATIC REASONABILITY CHECK OF YOUR CURVE ORDERS

Specifications

- Makes identifying erroneous orders easier
- Both BRM operator and the trader notified in the UI
- Reference day used: previous weekday for weekdays, previous weekend day for weekends

Three chained calculations

1. *Absolute volume difference*
2. *Percentage difference*
3. *Standard Deviation*

☰

BRM

Auctions

Trading UI (MT)

Wed, 31 May

Test BRM Hour Day ...

Orders

Results

Bursa Romana de Marfuri

All Portfolios

Romania Delivery Area

ORDERS (22)

As Report

Curve (2)

Company	Portfolio ↑	Area	Sum Min (MW)	Sum Max (MW)	Last Updated	Updated By	Reasonability Check	Checked By	OrderId	Comment	⋮
Bursa Romana de Marfuri	PortfolioTestBuy	Romania Delivery Area	2.400,0	1.200,0	30th May 2023 07:37	brm-trader-joni	<input type="checkbox"/>		3a774ae1-31c-461f-86b0-37a539d1e75		⋮
Bursa Romana de Marfuri	PortfolioTestSell	Romania Delivery Area	-208,1	-1.398,2	26th May 2023 15:55	TEST_kristiane.jorstad@nordpoolgroup.com	<input checked="" type="checkbox"/>	Reasonability Check	2954bc55-0986-46b0-8f84-6816cda2afaf		⋮
			2.191,9	-198,2							

Add Curve

More product specification

PRODUCTS FLEXIBILITY IS INCREASING

	SDAC Markets
Tick Size (€ / MWh)	0,01
Trade Lot (MW)	0,1
Max block order size (MW)	900
Min number of consecutive hours in Block Orders	1
Max amount of Block Orders per portfolio	100
Max amount of Exclusive Groups per portfolio	5
Max amount of Block Orders within an Exclusive Group	24
Max amount of Flexible Orders	Type of exclusive group
Max amount of levels of linked block orders	7
Max amount of orders per linked level	6
Max amount of blocks in a linked family	13
Max amount of pairs of spread blocks (loop blocks)	3

<https://www.nordpoolgroup.com/en/trading/Day-ahead-trading/Order-types/>
<https://www.nordpoolgroup.com/en/trading/Rules-and-regulations/>, article 3.