

Why Multi-Regional Short Term Markets are Key for Handling of the Electricity Paradigm Shift

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A strong legacy as the world's first international power market



With a long growth success story



Volume traded in TWh

ORD OOL



... and consulting across the globe thanks to our expertise





At the same time we always want to be smart frontrunners Some examples include...





6

We expand into new markets...

- Appointed NEMO
- Serviced markets
- Norway not part of EU

(Nord Pool operate on a Licence from The Norwegian Water Resources and Energy Directorate)



We always innovate for our customers Smarter Intraday trading with extended Gate Closure Time (GCT)...

From 30 minutes to 0 (trading until delivery) within each DE TSO area Launched in Feb 2016

From 30 min to 20 minutes across DE TSO areas Live tomorrow (28 Sep) trading date







8

We accommodate the new market developments for a smarter electricity markets



API connections (trading)



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9

Agenda

1. Brief background to Nord Pool and EU Wholesale Markets we operate in and key on-going regulatory implementations

2. The importance of Day Ahead and Intra Day Markets

3. Why inclusion of "all liquidity", also DSR and RES, in Day Ahead and then in Intra Day, is key for efficient real-time balancing of the power system, hedging and investments

4. Reflections on perspectives for "smart electricity markets" stated today, and in projects such as by enera

Nord Pool - fundamentals in a Nordic-Baltic outlook

Nord Pool has been operating a now integrated Nordic-Baltic Day Ahead Market for 20 years

- In DA Nord Pool also operate market in UK, and both it and Nordic-Baltic DA is part of MRC via the PCR systems
- In Intra Day (Elbas) also Germany is part of the market run by Nord Pool for Nordic-Baltic, and separately also UK

Bidding Zones SE1, SE2, NO1, NO4, FI, etc. In SWE, NOR and DEN there are multiple BZs

All transmission capacity is available betwen the Bidding Zones in DA (MRC -> Single DA Coupling)

Balance Agreement is required in the respective country where companies are active in DA/ID.

In Nordic region the DA BZ prices are the «base prices» for imbalances, eg. when no up/down regulation is activated in real-time balancing

The Nordic market is based on a high level of transparency on fundamental data and outage info



Price Coupling of Regions (PCR)

Price Coupling of Regions (PCR); Power Exchange cooperation since 2010, now among Seven Power Exchanges, in order to achieve a common European day-ahead price calculation to ultimately achieve Single Day Ahead Coupling

- Common algorithm (Euphemia) used to calculate power prices, net positions per Bidding Zone and flows between Zones
- Common system design (PMB) ensuring robust price coupling operations within and between power exchanges and indirectly towards TSOs
- Each power exchange responsible for own operations, including market (customer) interfaces and pre-post processes, ex. bidding, result distribution, clearing/settlement
- Open for all European PXs based on contracts and different alternatives

Approaching a common European Day Ahead market (status Q3 2016)

Multi Regional Coupling (MRC) via the PCR solution4MMC also based on the PCR solution

Independent

A fair and transparent determination of day-ahead power prices and cross zonal flows is a key factor for the success of the integration of the European power market.

MRC via PCR seen as basis for Single DA Coupling



XBID Intra Day High Level Architecture

Still in development phase – is to eventually be basis for Single ID Coupling



Governance of NEMOs – Nord Pool is very actively involved

How should NEMOs govern themselves to deliver on CACM GL requirements?

These requirements are:

1) Methodologies, terms and conditions (Art 9.6):

Market Coupling Operator (MCO) Function – By 14th April;

- Maximum and minimum prices
- Products
- Algorithm
- Backup methodologies

By 14th October 2016 (ultimately Feb 2017)

2) Day to day operational matters – operation of single ID and DA coupling

2. Coupled DA and ID markets and price formations should be a key mechanism to reveal possible over-supply and scarcity, and provide operational planning and investment signals

Scarcity signals in DA/ID markets should be allowed to be reflected in Balancing Mechanism prices to trigger real-time adjustments

Regulatory framework development proposals should be geared to enable scarcity prices to emerge when fundamentals so require

Actions deemed essential to foster efficient markets and balancing may include:

- 1. Promotion of short-term, integrated cross-border ID and balancing markets,
- 2. Technical price limits should not distort fundamental price signals
- 3. That renewable generation is made balance-responsible, equally as all other sources
- 4. More coordinated approach to support schemes across Member States
- 5. Ensuring that bidding zones are appropriately designed
- 6. Ensuring capacity remuneration mechanisms cause minimal market distortions
- 7. Unlocking demand side response in DA/ID as well as in Balancing/Ancillary Services

Making renewable generation balance-responsible

- RES should not, where it is the case, remain insulated from the market through preferential dispatch or other exemptions from system requirements, such as no requirements for schedules or reactive power compensation.
- RES-E power plants are able to function on the market alone or through an aggregator a supplier or even a virtual power plant (VPP) system.
- Even the intermittency problem, often cited as a key drawback of most RES, particularly wind and solar PV, will decrease with progressive development of connected intraday and balancing electricity markets ¹.

1 Europex Position

Ensuring that bidding zones are appropriately designed

In theory, ideally only one Bidding Zones for the whole of EU.....but not technically or economically feasible or efficient...

Structural bottlenecks are best practical option as basis for subdividing countries/regions in to one or multiple bidding zones

Well-designed Bidding Zone can be useful to reveal scarcity or over-supply and drive investment in more generation or consumption, including DSR, in given Bidding Zones

Other factors are also key to consider linked to BZ delimitations, e.g. market power, liquidity, etc., as well as possible other measures to uphold capacities

Ensuring capacity remuneration mechanisms (CRMs) cause minimal distortions to markets

- 1. Need to be clear about what problems are CRMs meant to address short term shortages, or ensuring long term capacity adequacy?
- 2. Key to limit CRMs in size, duration, geographic scope and type of supply and demand resources to ensure they cover only what they are supposed to handle
- 3. If CRMs are part of the main physical liquidity market, eg. Day Ahead: ensure they have limited distortive effects on the flexibility provided in regular orders, eg. only activate the CRM/Strategic Reserve at prices above the highest priced commercial orders

Aggregators, industrial players and hedging

- There is a need to create a favourable framework for aggregators to participate in the DA and ID markets to handle among others scarcity situation
- Likewise key to incentivise industrial players to be more active in DA and ID markets & thereby also more actively involved in influencing forwards market
- Long Term Hedging is important <u>but hedging products need not to be</u> <u>engineered through regulation but will be created by markets when markets</u> <u>predict that high volatility, including scarcity, may reasonably occur</u>

<u>BUT</u>

 Hedging has also some negative repercussions: <u>full hedging may limit</u> <u>flexibility of players (e.g. industrial) participating in DA/ID markets</u>

3. Why inclusion of RES and DSR in Coupled DA and ID also helps balancing and ancillary services in general

- 1. Coupled DA/ID markets give longer planning horizon, eg. more cost efficient scheduling and chance for longer activation period for RES and DSR resources
- Activation via the competitive price formation in DA and ID from 33 to less than 1 hour before delivery hour indirectly makes more "flexible" generation and demand available for real-time balancing
- 2. Development of more DSR continually reflected in DA and ID strenghtens liquidity and trust in the competitive price formation, just as full inclusion of RES
- 3. When large industrial consumers, "demand aggregators", etc. have established technical, contractual and operational routines to be active with DSR and RES in DA/ID the ability to be fit for purpose as balancing resources also increase
- 4. With enhanced ability for the whole market to trade and become in planned balance through the DA and ID Markets the real-time Balancing Arrangements can mainly be geared at handling residual needs due to unexpected events

4. Reflections on perspectives for "smart electricity markets" stated today, and in projects such as by enera

- 1. The challenges to make market arrangements flourish on single DSO (MV/LV) levels are significant, but also critical and some wholesale, multi-country concepts and fundamentals applied on wholesale can partially be re-used.
- 2. It is key to establish market arrangements on DSO (MV/LV) levels that work for different production/consumption mixes, including levels of wind/solar RES
 - Especially to enable efficient trade and security of supply handling between DSO and central HL grid within a Bidding Zone/country and cross border
- 3. Transparency for and sharing of key fundamental data is critical to enable stakeholders, including individual or groups of households, to act on DSO level and thereby at least indirectly on the wholesale multi BZ/country level
- 4. Exchanges such as Nord Pool which traditionally have facilitated/developed organized long and short term wholesale markets can have key roles to play also in this key transition towards smart <u>markets</u> on the DSO (MV/LV) level



THANK YOU! TAKK!

...and in all main languages of the CE region:

DANKE! MERCI! GRAZIE! DANK JE! Dziękuję!

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Backup slides on details of Nord Pool's organization and relevant (wholesale) market design etc.

Current markets operated by Nord Pool

Nordic/Baltic and UK – day-ahead and intraday

German market – intraday, also connected to Nordic

Serviced markets, currently Day Ahead

Volumes traded in 2015 (2014)

Elspot Day Ahead Nordic-Baltic 374 (361) TWh

Elbas Intra Day Nordic-Baltic & Germany 5.0 (4.9) TWh

N2EX Nord Pool UK Day Ahead 110 (136) TWh

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Nord Pool operations and offices

Day-ahead and intraday markets

Intraday market only

Service provider

Nord Pool office



Europe's leading power market - also related to CACM GL implementation

Nord Pool now appointed Designated DA/ID NEMO in 13 MS

- Serviced Markets
- Norway not part of EU

(Nord Pool operate there on a Licence from The Norwegian Water Resources and Energy Directorate)



NORD POOL

We have reorganized the company structure to reflect the more and more commercial nature of our sector



28

NORD POOL

Timeframes and related markets in Nordics

Financial market (Nasdaq Comm.) Cash settled futures, forwards and options. Clearing services.

Elspot market (Nord Pool)

Day-ahead implicit auction. Equilibrium of supply and demand set for delivery next day.

Elbas market (Nord Pool)

Intraday market with continuous implicit trading to one hour before delivery. Max 32 hours open when next day's ID trading opens at 2 p.m.

Regulating Market – Balancing

Operated by TSOs for adjustments to achieve real time balance between supply & demand within synchronous Nordic grid. TSOs are single buyer/seller. Base Price is DA Bid Zone prices.



Turnover all markets 1993-2014 (TWh) in current Nord Pool's physical and NASDAQ financial markets in Nordic-Baltic region



NORD POOL

NORD POOL SPOT STATISTICS

Scarcity prices will materialize ONLY when there is the right market design to underpin them

Once scarcity prices materialize in DA/ID and Balancing timeframes, regulators/members states should allow them to work – otherwise they will have no impact on operations and investments

Capacity remuneration mechanisms (CRM) and support for renewables should not be so pervasive as to reduce role of organised markets to a residual one:

If this happens, scarcity prices on DA/ID organised markets may still materialise, but will NOT drive investments - capacity mechanisms and renewable support schemes will be the real driver

Technical Price Limits (caps) in the markets

1. Technical Price Limits should be wide, and should not set artificial restrictions

Still it is also key to ensure that a flexible, fully functioning, competitive market exist and operates within the lower and upper technical limits

2. When Technical Price Limits are set, then the markets should be allowed to reach such prices, including curtailment of orders, without political intervention

However, if such limits are reached limited mechanisms could be set up to help short term balancing of the power system in the short term planning stage, e.g. such as the Swedish/Finnish Strategic Reserve

There should also be a review and change process for technical limits on EU level (for Single DA/ID Coupling) if there are fundamentals supporting a change

Cont. Ensuring that bidding zones are appropriately designed

Nord Pool supports investments in new interconnectors that will facilitate creation of larger bidding zones then what current structural limits supports

Such investments can also enable maintaining of larger bidding zones than what today, based on structural limitations, may be more efficient to subdivide

Subdividing bidding zones should be done to reflect permanent, or at least likely long term, structural bottlenecks

Well-designed Bidding Zones can be used to enhance role of scarcity pricing and provide investment signals

- 4. If a CRM is <u>not</u> part of the DA Market (DAM), but is meant to supply reserves to TSOs for real time system management: need to justify why this would be a better approach than keeping the CRM within the DAM
- 5. Regardless of whether a CRM is included in the DAM, it is key to recognise that there is a finite level of resources, which do not become any larger or easier to use if kept as last resort rather then made available to the market

Also it is key to ensure that:

- all flexible production & consumption is first made available in the DAM, then in the ID market and finally in real-time Balancing arrangements.
- Price signals set in the DA, ID and Balancing markets are respected, and not adjusted afterwards through regulatory measures, if the resulting market prices are deemed to be politically sensitive

Promotion of short-term, integrated cross-border DA and ID markets and balancing arrangements

Use existing DA and ID markets <u>also</u> as tools to handle a scarcity situation

A liquid balancing arrangement is not a targets in its own right - <u>BUT it is</u> essential to establish integrated cross-border balancing markets (e.g. Nordic region balancing essentially integrated since 2002)

TSOs should be allowed to handle their needs more in DA and ID markets

- Balancing arrangements should ideally be limited to managing unexpected, residual situations
- The balancing arrangement should be "allowed to be illiquid" as long as it is able to with some margin handle unexpected events, and the DA/ID markets enable market participants to balance their energy portfolios
- No need for TSOs to build up massive reserves for Balancing