

Overview of the Nordic market

Background

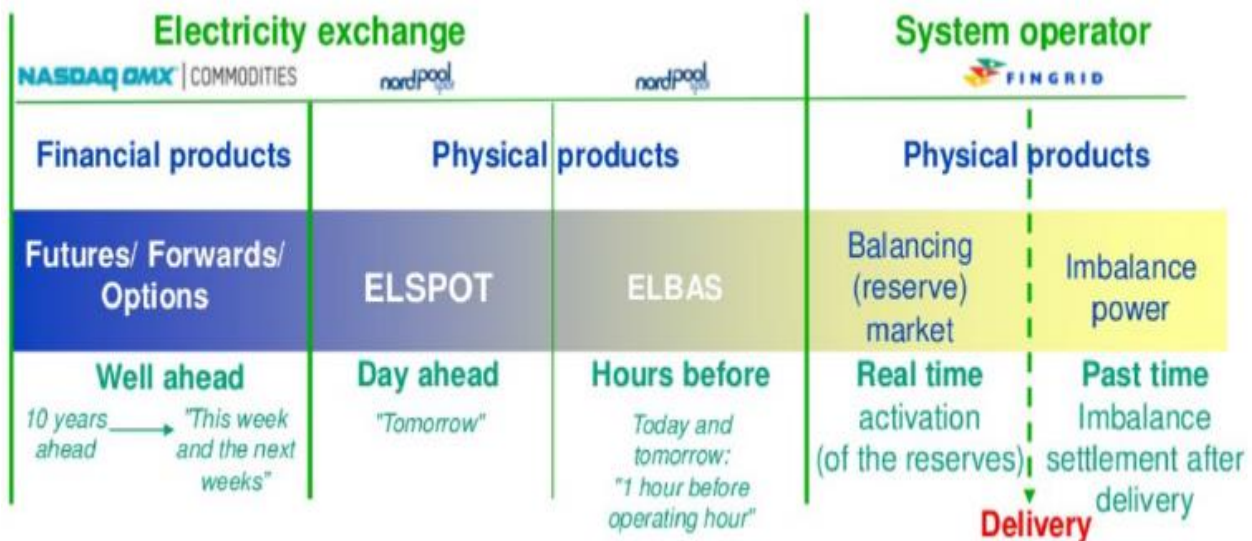
The underlying driver for the development of the Nordic market is the EU target to have a single European market for energy. Broad aims found in the [European market legislation](#) (third energy package) to ensure efficient market operation:

- unbundling energy suppliers from network operators
 - Storage still is typically considered as a generation asset - this is also the origin of the requirement/interpretation that TSOs and DSOs cannot use/own storage at all, or must use it only to ensure operational security
- strengthening the independence of regulators
- establishment of the Agency for the Cooperation of Energy Regulators (ACER)
- cross-border cooperation between transmission system operators and the creation of European Networks for Transmission System Operators (ENTSO-E)
- increased transparency in retail markets to benefit consumers

Based on above mandate from EU and guidelines from ACER, ENTSO-E develops network codes (common rules for electricity trading) with the aim to achieve market integration ([see here for more background information](#)). Network codes will be eventually become legally binding European technical regulations.

Nordic wholesale market

The Nordic countries implement the EU's target market model with electricity trade in different electricity delivery timeframes. The below picture provides an example from the perspective of Finland:



Futures / forwards...

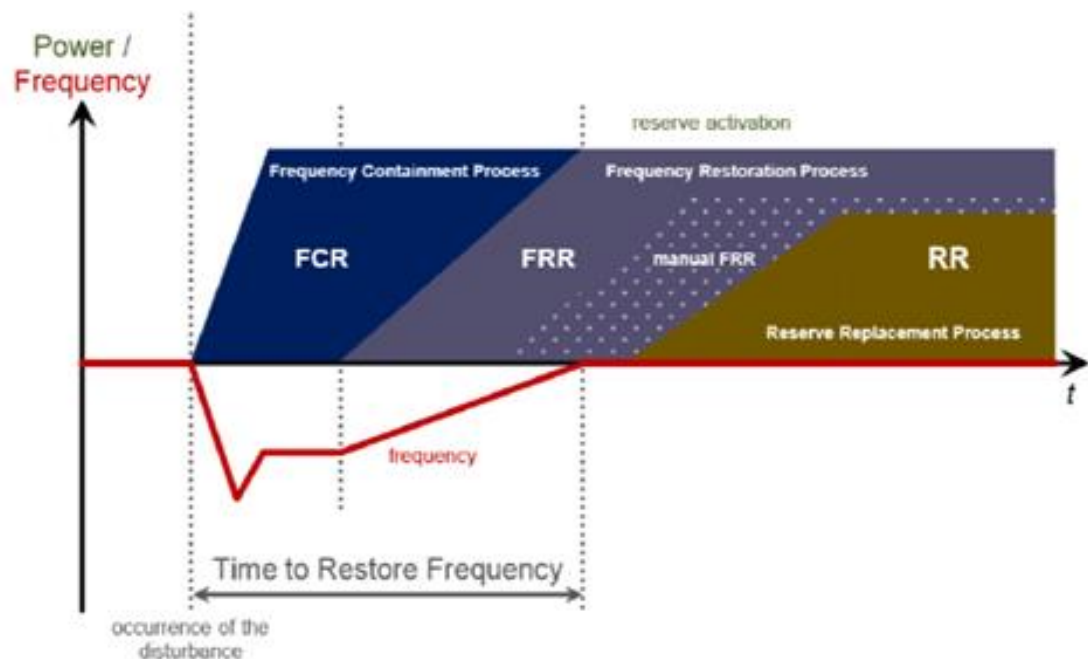
- Used to hedge price risk

Wholesale electrical energy market

- The liberalization of the energy market began 1990 in Norway ([historical milestones](#)). A common wholesale market ([Nord pool](#)) was created, generation was separated from transmission and distribution (natural monopoly)
 - Elspot is the wholesale market (majority of electricity trade happens hour by hour during day before)
 - Elbas supplements Elspot - Is used to adjust bids in the wholesale market closer to real-time (e.g. to correct for less than expected wind and resulting energy production...)

Balancing / reserve / ancillary service markets

- Purpose is to maintain operational security of the grid – match production and consumption in real time
 - Ancillary service products are split into faster and slower reserves (FCR, FRR, RR) according to terminology defined by ENTSO-E



- Balancing / ancillary markets are either run by several TSOs together or nationally by the local TSO
 - The common Nordic Regulating Power Market was introduced in 2002
 - Regulating Power Market = mFRR (manual Frequency Restoration Reserve)
 - National markets (operated by Nordic DSOs, example from Finland) for other ancillary services (FCR-N and FCR-D, aFRR). Countries share technical requirements for the reserve products and have close cooperation:
 - Total capacity needed to balance the Nordic system is divided between each country
 - High degree of cross-border-balancing (although TSOs operate most of the national markets, some of the ancillary services can be acquired from other Nordic countries (must retain some reserves nationally in case of major faults))

Imbalance settlement

- The purpose of imbalance settlement is to allocate costs of system balancing to the party who caused the imbalance (i.e. part of the cost of running ancillary balancing services is funded this way by electricity suppliers - another part may be paid by consumers as e.g. transmission tariffs).
- Cost of imbalance is set higher than the cost of being perfectly in balance (supplier predicting own production and consumption) – this gives each supplier an incentive to avoid causing system imbalances.
- The imbalance settlement is still carried out at national level, a Common Nordic imbalance settlement to be implemented in 2017.
 - Essentially when this is available, there is a common nordic market / process across the entire high-level timeline in the first picture (but only one ancillary service is in this market)

Retail market

The Nordic energy regulators are working toward a common Nordic retail market (started in 2006) where a customer can buy energy from any supplier in the Nordics. Main actions:

- Implementation of the Nordic Balance Settlement

- Will lower barrier of entry for retailers that wish to operate across different Nordic countries, potentially lower admin costs
- Roll-out of smart metering and implementation of data-hubs
 - The AMI meters have bi-directional communication, i.e. they typically have also the capability to control customer loads
 - The smart meters will track either consumption and generation separately or be four-quadrant meters which track the direction of active and reactive power
 - Data hubs are implemented to collect e.g. smart meter data in central locations (currently one / country) – will support transition between suppliers
- Smart DSO tariffs which incentivize efficient grid usage
 - Tariff should be cost reflective, providing more precision for hourly spot price signals to customers
 - Stronger price signals will incentivize household demand response
- Demand flexibility
 - Basic principles which are currently discussed:
 - If retail market is well functioning and competitive, implicit (customer reduces load independently) and explicit demand response (aggregator pools capacity of customers for wholesale market) will develop
 - Necessary that consumers are metered and billed at same resolution as price signals
 - Price signals should reflect scarcity or grid capacity or electricity production
 - No regulatory barriers expected as
 - Smart metering is widely in place (fully rolled out in ~2019), consumers can choose variable contracts with different suppliers
 - Below an overview of the Nordic retail markets ([source](#))

	Denmark	Finland	Norway	Sweden
Number of residential customers	2.750.000	3.100.000	2.540.000	4.600.000
Number of non-residential customers	487.000	371.000	360.000	700.000
Number of suppliers ⁸	51	74	140	123
Yearly supplier switching rate	8.0 %	9.8 %	12,5 %	10,4 %
Smart meter implementation	57 %	95 %	5 % ⁹	100 %
Rate of customers with contracts linked to the spot price ¹⁰	9 %	8 % ¹¹	56 %	47 % ¹²
Rate of customers with other variable price contracts	60 %	54 %	39 %	

Ends – document authored by Eaton (www.eaton.com). For more information contact: jonathandinkeldein@eaton.com