

Nord Pool Market Model

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Executive summary

Key observations

- The Nordic power market has, based on its over 20 years of successful operation of a regional power market, been the blueprint for the development of the European integrated energy market;
- Its history has shown the need for pragmatic solutions and to allow for a stepwise approach as the basic method for market development – progress through evolution, not revolution;
- Having a regulated power market has proven beneficial, but with the regulation defining the principles and allowing the power exchange to develop its offerings together with its market participants;
- Transparency, neutrality and equal treatment (and access) for all parties are key cornerstones of a sustainable market.

Policy implications

- Stepwise implementation allowing all stakeholders to learn as the market evolves; this is relevant for both the market offerings as well as the geographical expansion;
- The regulatory framework should be based on principles, not detailed rules;
- Involvement of the transmission system operator (TSO) is needed to ensure that the coordination between market and system operation is maintained and developed based on the same principles.

1. Introduction

The Nordic power market is viewed as one of the most successful power markets in the world. The market was established in 1993 based on the Norwegian approach to liberalization and new energy act of 1991, and has through the years moved from being a Norwegian power market to becoming the Nordic power market in 2000. After this it continued its growth to include the Baltic States and the UK in addition to becoming a service provider for other markets in Europe and potentially other parts of the world. Therefore, in some ways, the term “Nordic” as part of the name is still an important heritage and foundation for Nord Pool Spot’s market and offerings, but the focus has during the last years become more European with the current developments in the European market framework.

This paper aims to highlight some of the important steps that have been part of this development. The focus is to create a set of “lessons learned” that could be applicable for other emerging markets.

2. What were the motivations for creating an integrated power market?

2.1 Prerequisites for the changes in Norway - economic efficiency and competitiveness

In the years from 1960 to the end of the 1980s, there was considerable expansion of new hydropower production facilities in Norway. The many small, municipality-owned power companies were responsible for the local power balance and supply obligations and were therefore entitled to expand or enter into contracts to balance out their power needs and demands in their own area. This led to an over-investment and the result was over-capacity in Norwegian hydropower production and subsequently low power prices during this period. Investments and potential profits for the companies literally disappeared ‘straight into the ocean’. Excess power was exported to Sweden at a lower price than that paid by Norwegian industry and households. Norway had a surplus situation, with a production capacity that far exceeded power consumption. A big issue was that Norwegian end-users paid a price that had been agreed with the local power company and did not profit from the surplus situation by being offered lower prices.

This organisation and administration of the power industry eventually led to a liberalisation process. The Ministry of Finance, not the Ministry of Oil and Energy, realising that the industry was based on uneconomic principles and operations, therefore raised the question of efficiency. Norway became one of the first countries in the world to discuss liberalisation and competition in the power industry, motivated by the low contribution made by the industry to national value creation as well as uneconomic incentives to invest in new power facilities. Also internationally, there was an increasing interest in reforming the electricity supply. Chile is recognised to be the first country to do a power sector reform followed by Norway.

The challenge was to develop a model tailored to an industry and a commodity that was produced and consumed at the same time (in real time) and that thus had special prerequisites and requirements. The reform model had to take into account technical production conditions as well as limitations in the power grid’s transmission capacity. The power companies’ need to optimise production within a robust, efficient marketplace based on sustainable economic principles was a considerable challenge.

The Ministry of Finance, the Norwegian School of Economics and Business Administration (NHH/Einar Hope), and the Ministry of Petroleum and Energy provided important premises in this process. Einar Hope was a business economist who worked at the NHH research foundation 'Centre for applied research' (SNF). His understanding of economic models applied to the physical needs of the power industry proved crucial for subsequent measures taken.

In retrospect, it is clear that the liberalisation of the electricity market encouraged a struggle and manoeuvring for position between the market liberalisers and the more conservative power industry – without there being clear dividing lines between the policies of those involved. Compromise became one of the basic criteria for the success in the market. A solution based on economic principles that lay the foundation for a reliable operation of the power system was – and is – the main reason for its success.

2.2 The political process

The Norwegian government first made a proposal for a new Energy Act in the late 1980s. The Brundtland administration introduced a proposal in 1989, but it was stopped after strong opposition in Parliament. The main objective of the proposal was to rationalise the organisation of the power industry, which at that time comprised as many as 20 regional and vertically integrated power companies (responsible for both generation and distribution), but to keep the framework for organisation and operation in the hands of the politicians. The largest municipalities in Norway were the main owners of these companies. At that time, up to 1991, the Directorate for State-Owned Power Plants (*Statskraftverkene*) was responsible for the state's production facilities and the main transmission grid.

After the general election in Norway in 1989, the Conservative Jan P. Syse became Prime Minister and leader of a right-wing coalition that led Norway until November 1990. This short period of right-wing government proved to be crucial for the new Energy Act and the liberalisation of the power industry. With Eivind Reiten as Minister of Petroleum and Energy, the new act was prepared, presented and approved by the Parliament.

Eivind Reiten disagreed fundamentally with the proposal from the Brundtland government, so he rewrote the Act and based it on a different framework. The revised proposal still had rationalisation and efficiency of the power industry as its objective, but included a clearer description of future ownership and responsibility relations in the industry. Unlike the earlier proposal, the reduction of the number of power companies was not to be enforced by the NVE (Norwegian Water Resources and Energy Directorate), but be voluntary, using market-based solutions. This implied that, while the aim was still a reduction in the number of power companies, control of the industry's development was left to the market rather than to the politicians. This important decision laid the foundation for Nord Pool and the success of the regional market.

The new Energy Act was passed after a fierce debate in the Parliament. The revised proposal was approved on 29 June 1990 and came into effect on 1 January 1991. It was to have great importance for the power industry's future in Norway – and in the rest of the Nordic countries.

2.3 *New Energy Act*

The new Energy Act required further clarifications and regulations in relation to the future organisation of power production, the transmission grid, system responsibility and operation coordination.

Several working groups were established to analyse and recommend alternative solutions for implementation of the Energy Act. The market working group and the grid working group became particularly important for the final solution. The majority in the grid group supported the unbundling of Statskraftverkene, in accordance with the Ministry's view. One of the challenging tasks for the market group was to decide who should be granted the licence to operate the marketplace, which was to be granted by the state.

The Ministry of Petroleum and Energy set up a new project group with a mandate to examine the unbundling of Statskraftverkene and the assignments and responsibilities of the new grid company. The Ministry of Finance and the Ministry of Petroleum and Energy had laid down detailed provisions in the mandate, and the project group was viewed with a degree of scepticism in the power industry. This working group established itself in an old transformer station, where it was well protected from lobbying and other influences. It cooperated closely with the Ministry of Petroleum and Energy, and a proposed proposition was forthcoming in spring 1991. It suggested a separation of the production and grid facilities of Statskraftverkene, and the establishment of a grid company.

In summer 1991 the Ministry concluded that Statskraftverkene would be broken up and that a new grid company, Statnett SF, would be in charge of system responsibility, operation coordination and concessions for the marketplace.

Eivind Reiten, the 'father' of the Norwegian Energy Act, and Einar Hope, its 'grandfather', were undoubtedly both instrumental in achieving this result. Mr Hope was one of the first to find solutions for a power market design where market concepts from the economists met the technical requirements from the engineers. With his swift handling of the proposition in the Parliament, Mr Reiten demonstrated both political flair and efficiency.

However, the result would probably not have been achieved without an efficient ministry apparatus. Sigurd Tveitereid, who is still active in the Ministry of Petroleum and Energy, played an important role in the implementation of the Energy Act. He has also been an important partner for Statnett, Statnett Marked and Nord Pool from the late 1980s onwards.

The division of *Statkraftsverkene* into Statkraft (generation) and Statnett (owner of the main transmission grid and central system operation) marked the end of a long, politically-conflicted discussion. In the following period, Statkraft faced major, fundamental challenges and organisational changes as a result of the competition principle that was introduced by the new Energy Act. The company's role changed fundamentally from ensuring access to cheap power for all of Norway to building up an industry that was competitive both in Norway and in the international markets.

Until 1992, there had been considerable resistance towards this development, with many people being unwilling to recognise the value of implementing the liberalisation legislation in the Energy Act.

Of course the implementation of the new market model had to not only consider the market itself but also respect the overarching requirement of security of supply. As the Norwegian power system was (and is) dominated by hydropower, to cater for seasonal variations was also important and has also played a key role in the development of the expansion of the market model.

3. What were the pre-existing conditions and pre-conditions at national level for building the integrated power market and later admitting new member nations?

3.1 Unbundling

As stated above, the starting point for the Norwegian reform was the over-supply in Norway and the inefficiency arising from this. This had two consequences: to allow the Norwegian customers to get access to the lower prices and then also allow for a more efficient (both technically and economically) management of cross-border flows.

One of the key tasks in most power sector reforms is the unbundling of the power companies. Historically, prior to a reform, a country's power sector is dominated by one incumbent, vertically-integrated power company. It is important to unbundle this into companies with the following separate functions:

- Transmissions system operator – owner of the main grid and also the national system operator. This needs to be regulated as a natural monopoly by the national energy regulatory authority.
- Distribution companies – distribution to end-consumers at a lower voltage level
- Generation company – taking care of the power generation. This could also be split in several companies
- Retailers (trading) company – selling power to the end-consumers – could be part of either a distribution company or a generation company.

This unbundling is vital to be able to create a competitive market and was important in establishment of the Nordic market. Depending on the situation, there might be other unbundling that is required. If the incumbent company has held full control of the power generation, it must be split (divested) in smaller companies – or join a bigger market.

All the Nordic countries started their reregulation process in the first parts of the 90's and essentially followed the same process. This was important to allow for an easy integration of the other countries into the Nord Pool market. The other Nordic countries had similar structures as a starting point and many of the processes followed the same path as Norway in many ways paved.

In the following sections, some of the different criteria will be discussed.

3.2 Privatization – a potential tool, but no requirement

One observation that is important – and that contradicts a lot of the requirements of some international organizations – is the requirement for privatization. In the Nordic countries (and for that sake Europe), the largest power companies in both generation and distribution are state-owned, either fully or as the majority owners. What is important is that these companies need

to be organized as any competitive company, with a professional management and board structure allowing them to operate on equal basis as private companies.

For Statkraft – the Norwegian incumbent power company - it took a long time to adapt to a ‘market’ way of thinking and a profit-run mentality. As with many other incumbent power companies, Statkraft was ‘shocked’ to discover that their former customers went to newly-established traders in order to buy cheap power traded on the power exchange. Therefore, their management quickly realised that if the company was to survive and continue to produce good economic results for its owners, the strategy and business concept had to be changed. A new vision was formed where the objective was to intensify market activities and develop product ranges in order to meet the requirements of the customers.

After market liberalisation, still the power companies had two alternatives: production could be based (as before) on long-term bilateral contracts, or the company could choose to exploit the potential of the new power markets. The choice needed to be based on risk assessment, since the new power market was starting with limited liquidity and high price volatility. Therefore, it is important to be patient and not expect high liquidity from the start – the market must be allowed to earn trust and, based on this, liquidity will develop.

From the mid-1990s, Statkraft increasingly shifted its trading to the market, motivated by growth of the market and its development towards an integrated Nordic power market. Statkraft had an advantage in the market with its comprehensive hydropower-based power portfolio spread out over the entire country, which meant that it had in-depth knowledge of the fundamental market drivers. Statkraft’s organisation had engaged in a fundamental analysis of the underlying values in the power industry in Norway for many decades. The company had acquired expertise and models that could be used for the trading strategy in the market – with increased potential for good earnings. This is also an important lesson learned from this process – instead of limiting and “destroying” the incumbent power company – let it become a national champion in the growing power market. Statkraft has held a strong position in the Norwegian market and their ownership share of the Norwegian generation fleet has remained strong during the period from 1991 until now. Their ownership in 1991 was approximately 32% of total generating capacity and is now (2014) approximately 34% (depending on how to value their part-ownership of some other Norwegian companies). So their dominant role has remained approximately the same but at the same time the company has grown in size due to its international presence.

This is another clear experience from the development of the Nordic power market – the history of the large incumbent power companies and how they have evolved together with the market. In all the Nordic companies the large companies (Statkraft in Norway, Vattenfall in Sweden, Fortum in Finland and DONG Energy in Denmark) have been allowed to grow with the market and all of the 4 national champions have developed to become some of the largest and most successful power companies in both Nordic countries and Europe. Their growth has been mostly by becoming more international (first in the Nordic market and then internationally). Therefore, it is important to carefully assess any required split of these companies.

Another method chosen by all these 4 companies to tackle the new competition was acquisition and consolidation. With the establishment of Nord Pool in 1996, the market changed and acquired a Nordic perspective. With the geographical extent of the market including all the Nordic countries, the size of the companies became an increasingly important competitive factor. To allow these companies to sustain their positions, it was crucial that the organisation

of these incumbent state-owned companies was based on a competitive corporate structure allowing management to be based on sound business rules and that the state-ownership was based on being a normal owner that does not interfere politically in the management.

All the Nordic countries are following the EU Competition laws; this includes also Norway, though it is outside the EU itself. As a condition for access to the EU internal market through the EEA (European Economic Area), Norway has implemented the same laws. It is also important that these companies are not favoured by the state, for instance when it comes to financing. One could actually argue that for some of these companies there is a disadvantage to be state-owned when it comes to financing as the profit of these companies to a large extent is directly given back to the state and the possibility to invest these funds is limited. For instance, in 2013, the Norwegian state took 99% of the profit of Statkraft.

These companies have participated in shaping developments in the Nordic power industry, and have gone from being government-run enterprises to becoming some of the most innovative power companies in Europe, that fully exploit the flexibility of hydropower. In retrospect, it seems a sensible strategic decision to have spent time on the necessary changes. The extension of knowledge and competence that has been acquired over many years, while simultaneously adapting to the new challenges and steadily increasing international competition, was made possible by this strategy.

3.3 Market liberalization

The liberalization of the market needs to be extended to the full market. However, in all the successful power sector reforms, this will have to be done in a stepwise process. The first task is of course the unbundling as discussed above. Next it is important to create an eligibility criteria for the demand side. What has been accepted as a good practice is to start with high criteria that will not be applicable for too many, but will be increasingly applicable for more and more companies over time.

The same will apply for end-users. Normally, before a power sector reform, all end-consumers have a regulated (and also fixed) tariff. The best practice is to have the same approach to this – a stepwise approach where you would expose the end-consumers progressively to competitive market prices – but do it as a stepwise approach to allow all parties to adopt and learn.

Another related topic that almost always will be discussed as part of this process, is the support for vulnerable customers. What is seen in almost any non-deregulated market is that the end-user tariff is not cost-reflective and kept at an artificial low value to include some support and subsidy element. This is one of the strongest forces against a power sector reform – how to not hurt the end-consumers with higher prices.

There are many good examples for how to implement a power sector reform and still have a scheme to protect the vulnerable consumers. The key is again to take these changes stepwise and allow for learning and adaptations as the changes are implemented.

3.4 Market regulation and pricing

One of the key elements of the power market reform in Norway and the other Nordic countries was to have full market opening – or full market liberalization. However, in Norway, as in any

other country facing the same kind of requirement, a stepwise process should be implemented. There is no need for having a fully liberalized market from the start.

In Norway, it took 2 years after the start of the Day-ahead market until the market was fully liberalized. In other markets this process have taken longer time. The main reason for the short time used for this in Norway was based on the fact that the power sector in Norway was very decentralized from the beginning and it was no need for any unbundling of companies.

However in other markets like in Turkey and Romania that have gone through similar processes, the power sector had to undergo several other reforms and unbundling to be able to achieve full market opening and therefore this process has taken longer time.

There are several reasons for promoting a stepwise approach. First of all, it is important that all the key stakeholders in the market be allowed to learn. In the initial phase of introduction of a new market, it can be expected that there will be relatively small volumes in the market and price formation will be effected by this. With a stepwise approach, the market participants will be allowed to learn and understand the use of the markets as part of the management of their assets. Experience also shows that having a voluntary market will assist in this learning. However, it will be important to have some liquidity-promoting measures in place. One of the most common solutions is to oblige the Transmission System Operator (TSO) buy all their transmission losses in the main grid from the market. This will ensure that there always will be a buyer in the market. There are many different other mechanisms that could be introduced.

One of the key liquidity-promoting measures in the Nordic power market has been that all available transmission capacity between the different market areas has been given to the market. This means that the market is the only route to cross-border trading. Other measures could be either horizontal or vertical obligation to participate: either certain participants are obliged to be in the market with all or some volumes, or that all market participants need to source at least a given percentage from the market.

4. Grid connectivity

In the EU, grid interconnection capacity has been a key constraint on developing the single energy market. The Nordic region can be seen as an example of how this can be managed over time. Since the introduction of the market in Norway in 1993 and up to this day, the demand for power has steadily increased, but the investments in new power generation has not had the same growth rate. The answer to this is that in the Nordics, the interconnection capacity between the countries has tripled in the same period. What we like to call this is “utilization of the differences in the region”, meaning that we have a very diversified power generation in the different countries:

- Norway dominated by hydropower offering short term flexibility and cheap hydropower in wet years;
- Sweden with a more diversified power sector, but with hydropower in the north and thermal (including nuclear) in the south;
- Denmark with a high penetration of wind power; and
- Finland with thermal resources (including nuclear).

This means in a season or year with high precipitation, Norway and northern Sweden have excess of cheap hydropower – but in dryer year would like to use the thermal base load from

southern Sweden and Finland. Or when the wind is blowing, Denmark has a lot of cheap (“free”) wind power, but in other times they are reliant on the support of its neighbors. In sum, this means that we have a better utilization of the power resources in the region allowing supporting each other with reserves in different situations.

This situation will improve the more interconnections that will be available. However, each of these infrastructure projects will have its own business case and it will be the regulatory authority that will grant the license for building this. Normally, the business case will include the sourcing of the finance that either will be done through the transmission tariff or by external financing. It is the TSOs that normally will be building these interconnections. This means that their business case will not only include purely economic reasons, but they will also consider security of supply and system services in their valuation of the interconnection.

Another of the key reasons for TSOs to build interconnections is that there is a regulation about this requiring the congestion rent¹ between the market areas will be given to the owners (normally the TSOs). In return, the regulation specifies that all the income from congestion rent shall be used in improving the network. In the Nordic market, all the Nordic TSOs cooperate and use this income to decide the best place for these investments. The Nordic TSOs have all the time had an agency for cooperation. In the beginning this was called NordEl, and after the establishment of ENTSO-e (The European Agency for Energy Transmission System Operators) this has been maintained as one subgroup with regular meetings. The same cooperation has been there for the NRAs (National Regulatory Authorities) – NordReg. Based on the history it can be said that this has worked.

This congestion rent is of course the only source for income for the TSOs. In the Nordic countries there is an ex-ante income cap based regulation where essentially the TSOs will, based on detailed documentation, create a budget that justifies a transmission tariff (for the main grid and system operation) that is approved by the NRAs.

It cannot be said that there is any minimum limit for having a regional market – as soon as there is some capacity, it can be utilized. The market model used in Europe, taken from the Nordic approach, is based on an implicit auction that will ensure that the power between the market areas will always be flowing from a low to a high price area. In addition to internal interconnections between the Nordic countries, there have been built several interconnections to continental Europe like for instance NorNed between Norway and Netherlands, ESTLINK between Finland and Estonia, SWEDPOL between Sweden and Poland and the BALTLINK between Sweden and Lithuania.

5. The growing membership of Nord Pool

The history of the Nord Pool market is essentially a history of changes and expansion. When Norway started its liberalization process, the same process started more or less at the same time in the other Nordic countries. As explained above, the Norwegian history is based on some visionary individuals that also had the ability to implement the required changes. When Sweden followed after three years, their liberalization process was based on some of the same issues as

¹ Congestion rent is an expression that relates to the income that is being generated when there is congestion between two market areas that will result in different prices in these areas. The market algorithm will ensure that the flow on the interconnection will flow from the low price area to the high price area. This will then mean for all volumes flowing on the interconnection will be bought in the lower priced area and sold in the higher price area generating a surplus of money – congestion rent.

Norway, but they also had a major market power challenge due to Vattenfall's dominant position in the national market. The discussions were - put in simple terms – shall we split Vattenfall in smaller entities or shall we join Norway and thereby allow them to be unchanged? We know the answer, they joined Norway and thereby took the important first step in creating the regional market. This was also thanks to pragmatism from the Swedish side allowing a simple implementation of this. This came to be based on a very good personal working relationship between the heads of the Norwegian and Swedish TSOs that allowed for open discussions on how to achieve this. This is also an important lessons learned from the Nordic history – a regional market can be itself be a means to reduce or eliminate dominant market power. The same applies if the countries are small (like for instance the Baltic states) – joining a larger market will increase the competition for the national champions.

This first step was extremely crucial, because this laid the ground for how to implement further expansion; the TSOs should be the owners and share an equal position. This has been the guiding principle for the expansion of the Nordic market to all the Nordic countries as well as the Baltics.

Essentially, it took 10 years to build the Nordic market (from the Energy Act in 1991 in Norway to the inclusion of Denmark in late 2000). The process for the initial market launch in Norway and the process for creating the common market with Sweden is described above. When it comes to Finland, their main challenge was the organization of their market before deregulation. It was a requirement from Statnett and Svenska Kraftnät that the power industry in Finland should have the same structure as in Norway and Sweden – with separate ownership of grid and production.

The Finnish power supply industry was dominated by two companies which also owned a high-voltage power grid. The state-owned company IVO (Imatran Voima Oy) dominated power production with more than 30% of the total production capacity in Finland. The private industry-owned PVO (Pohjolan Voima) was the second-largest company. In principle, the wholesale market was open in the sense that suppliers or industrial users could choose between long-term contracts and construction of their own power plants. But in practice, the latter was only a realistic option for a few parties.

Fingrid (the Finnish TSO) quickly realized that cooperation with other northern European countries could help Finnish power supply to become less dependent on Russia. Geographically situated in the periphery of Europe, Finland wanted to orientate itself towards Europe and their partners in the EU. Initially, from the date Finland became integrated in the market area, Fingrid was given observer status on the board until Fingrid became owners with the creation of Nord Pool Spot in 2002.

The liberalization process in Denmark was fundamentally different from that in the other Nordic countries. While the Ministries of Finance and Energy controlled the processes in Norway, Sweden and Finland, the process of market adaptation of the Danish power industry was run by the industry itself.

Another difference between Denmark and the other Nordic countries was that the Danish power supply comprised two separate grids. Elsam was responsible for operating the power system in Jutland and on Funen, while Elkraft was responsible for Zealand. There was no physical link between the two. Jutland and Funen were synchronized with the central grid in Europe, and Zealand with the Nordic countries. This physical division in Denmark was not only typical of

electricity supply, but rather a general outcome of the establishment of Danish industry over the years. There were strong differences of opinion between these two regions, and this was the reason for the country's integration into the Nordic power market in two steps. However, when the Danish politicians finally decided to support the development, the resulting Energy Act was based on the same principles as in the rest of the Nordic countries.

After this, Nord Pool started to support other exchanges that were launched. Both the German and French market were initiated based on support from Nord Pool, in the form of capacity building and software. During this process, Nord Pool Consulting (NPC) was established to allow this to be done in such a manner that the internal market operation was not affected by the new services. NPC has over the years supported the market establishment in many regions of the world.

Based on the development of the EU internal market, the focus on how to implement this has taken more and more time of the Nord Pool organization. There have been many market coupling solutions over time, the main being:

- Nord Pool grew to cover the KONTEK area in Germany allowing implicit cross-border trading between the Nordic area and Germany;
- The European Market Coupling Company (EMCC) was created by the power exchanges, TSOs and National Regulatory Authorities (NRA) in the North-West region of Europe implementing a volume-based market coupling; and finally
- The Price Coupling of Regions (PCR) project created by the largest power exchanges in Europe creating a common market clearing algorithm to be used by all the power exchanges allowing for a price coupled solution. This went live in 2014 and has been a great success allowing one common implicit auction covering all countries from Helsinki to Lisbon.

The market process in the Nordic countries as well as in Europe has been driven by the need for more economic efficiency. Without any market coupling in place, it was evident that the overall utilization of the power sector resources was not efficient. The object function of the market algorithm developed first in Norway and evolved both through the Nordic and European market is based on *“the maximizing the social welfare”* for all market areas.

5.1 Transparency

Since the very beginning transparency has been, and remains, central to sustaining Nord Pool's success. Why? A transparent market – where all participants have equal access to relevant information – is a prerequisite for a well-functioning, competitive and efficient market. It engenders trust, lowers barriers to entry and attracts new entrants - all of which helps generate liquidity. This has proved to be true across all of the markets and makes transparency a priority when expanding geographically.

Data provision has been a major contributor to the high degree of transparency created in the Nordic power market. Comprehensive data libraries storing more than a decade's data have been built. These data includes prices, capacities, flows, production, consumption, exchange and regulating power data. These are readily accessible for use, primarily by market members, and provide products developed from packaged historical data. Together this data helps keep the market transparent, as participants have equal sight of information that influences price.

In recent years, anti-market abuse legislation and regulation designed to boost power market transparency in the European Union (EU) electricity markets has added to the amount of data available. The Regulation on Energy Market Integrity and Transparency (REMIT) requires that all EU energy market players publish price-sensitive information and will implement the Nordic data reporting requirement for all EU countries. These rules will be implemented in all the Nordic countries – also in Norway as a non-EU member. The main portion of REMIT went live in October 2015 and Nord Pool has been a pioneer in establishing the rules and systems for this.

It is both regulatory demand and market expectation are driving greater transparency. As a result there is a focus on continuously develop improved accessibility in how data is presented. Transparency also goes beyond the market data. There is an equally important need for transparency in information from the whole market on developments that can affect prices; crucial among them are changes such as power outages or other information that may affect prices significantly if made public. All members are obliged to report such events according to the Market Rules, and to REMIT. They must publish information to the market, and are restricted in their trading until they do. Following up on this is the responsibility of the Market Surveillance team at Nord Pool Spot.

6. The management of the market

Since the start of the market in Norway, the ownership of the physical market has been by the TSOs. There are several reasons for this. Most importantly, all the markets for physical power will end up as a schedule that will be sent to the TSO for the ultimate balancing of the power system. Therefore, a close cooperation with the TSO will be extremely important to ensure that the overall market concept including all power markets operated by power exchanges, but also the internal markets at the TSO needs, be serving a common principle. In other words, all activities in the market are ultimately driven by planning. By having the TSO as an owner, connection and cooperation are ensured directly.

The current ownership of Nord Pool Spot is divided between the TSOs in the underlying markets according to the following shares:

- Statnett (Norway) 28.2%
- Svenska Kraftnät (Sweden) 28.2%
- Fingrid (Finland) 18.8%
- Energinet.dk (Denmark) 18.8%
- Elering (Estonia) 2.0%
- Litgrid (Lithuania) 2.0%
- Latvenergo (Latvia) 2.0%

The ownership shares are a result of the evolution of the markets: Norway and Sweden as the two first owners were also the financial market was part initially has the biggest share; Finland and Denmark has the same share while the Baltic countries got a smaller share when they joined. The shareholdings are both a result of the process of joining, but also a result of the increasing value of the market operator itself and the actual cost of buying a share. What is important is that all have a seat on the board.

Nord Pool Spot operates under a license issued by NVE. This license contains several requirements, but the most interesting for the operation of the company are:

- The licensee's revenue from the organisation and operation of the market place shall cover its costs and provide a reasonable profit through efficient operations;
- The licensee shall have an advisory board with broad representation from the parties in the market – meaning that most of the business development is driven by the market itself.

At the same time, the organization of the company is based on both having an efficient organization and also recognizing the regional character. Therefore Nord Pool Spot today is having offices in all the countries it covers. There are differences between the employees in each country, and each office has its own functions. The main office is still in Norway where approximately 50% of the staff is located. In addition, Finland has the second largest office where the IT organization is located. In Stockholm, the CEO has their office in addition to some of the resources on business development. In the other countries it is essentially market functions (sales & communication) that are present.

Nord Pool Spot is today a rather small organization with a head count just exceeding 100 people. That the main office is still in Norway is based on the history. It was here that the Nord Pool was started and the main operation has always been run out of Norway. It was also early agreed that even though the market was regulated in all the participating countries, the Nordic & Baltic NRAs agreed that NVE (Norwegian Directorate for Energy and Water Resources) should be the operational regulatory body for Nord Pool Spot, but with support from the other regulators. Nevertheless, all the NRAs have access to the same information and have equal rights, but to make the regulatory tasks more efficient, the day-to-day contact is with NVE. The organization is based on a normal setup, but with one unit that is specific for the market – market surveillance.

The Nordic market has had a market place license since the start, but was formally fully regulated in 2001. The experience shows that to have a regulated market has been good for the market development. To have a competent NRA that oversees the operation has proven to be valuable for the market.

Nord Pool can be seen as a long success story, but of course there has been several challenges throughout its development. One of the first challenges was when Finland and Denmark should become co-owners of Nord Pool. The problem arose from the success of the market that boosted the price that these countries would have to pay to buy a share of the company. This was mainly due to the fact that the financial derivatives market had become a success and thereby the valuation of the company was very high. This was solved by splitting Nord Pool into two main units: one for the physical markets that then was owned by all the TSOs and leaving the financial market to be owned by the two initial owners (Statnett – the Norwegian TSO – and Svenska Kraftnät, the Swedish TSO). This split also created some challenges in the management of these two different entities as Nord Pool Spot was in this process created to cover the physical markets while Nord Pool ASA still operated the financial market. The conclusion of this came in 2008 when the financial market was sold to NASDAQ and has been operated by them on commercial terms thereafter.

The process of integration with European markets has been challenging as it has been very resource intensive and required a lot of management attention. Therefore, in the organization of the company for several years, the business development unit was renamed “European integration”. However, with the PCR (Price Coupling of the Regions) project going live, this situation has improved.

Another important success factor of the market is that the regulation of the market is based on principles, not detailed rules. This gives the power exchange the possibility of developing its offerings within these principles. The Nord Pool Spot market license is 5 pages and just lists a set of principal requirements:

- The licensee shall as far as possible, contribute to efficient price formation and appropriate energy flows;
- The licensee shall act in a neutral and non-discriminatory manner, including ensuring all parties impartial and efficient access to information that is of importance to price formation;
- The licensee shall design a suitable infrastructure, regulations for trade, and contracts between parties, as well as systems for collateral and settlement that ensure confidence and predictability for the parties;
- The licensee's revenue from the organisation and operation of the market place shall cover its costs and provide a reasonable profit through efficient operations;
- The licensee shall have an advisory board with broad representation from the parties in the market;
- The licensee has a duty to disclose information to NRA;
- The licensee shall apply to NRA for approval of measures/changes well in advance of the time when the changes that have or may have an influence on price formation. The licensee must carry out an impact study in relation to the changes being presented, and the views of affected parties via the advisory board and possible comments from other market participants shall be submitted to NRA;
- Primary capital requirements;
- Market surveillance;
- The licensee is obliged to handle confidentially information concerning a market participants business which it will be of competitive importance to keep secret;
- Changes to conditions - In special cases, the established conditions may be changed in order to take account of the public interest;
- Withdrawal of concession - The license can be withdrawn if it was issued on the basis of incorrect or incomplete information regarding conditions that are of material importance, or if the licensee contravenes the Energy Act or regulations and ordinances issued pursuant to this act.

The detailed rules for the market can therefore be defined (and maintained) in the market participant agreements that include much more details.

This means that, for example, all the detailed bidding rules, order forms, settlement calculations, order types offered in the market, security requirements and other operational requirements are defined in the participant agreements and thereby can be adapted relatively easily as long as the main operation of the market is within the license requirements.

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