NordREG
Nordic Energy Regulators

Nordic Market Report 2009

Development in the Nordic Electricity Market

Report 4/2009

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1 Preface

The Nordic Market Report 2009 is the fourth annual report in a row prepared by NordREG.

The report describes the status and development of the Nordic electricity market based on data and information for the year 2008 available in May 2009. The areas covered include generation, consumption, transmission, wholesale power market and retail markets.

A working group consisting of representatives from regulators from Denmark, Finland, Norway and Sweden has been responsible for preparing the report. The working group has put the relevant data together to produce a full picture of the Nordic electricity market. The members of the group were Henrik Gommesen (Energitilsynet, chairperson), Jan H. Pedersen (Energitilsynet), Anna Eriksson (Energimarknadsinspektionen), Mats Øivind Willumsen (Norges vassdrags- og energidirektorat) and Timo Partanen (Energiamarkkinavirasto).

Oslo, June 2009

Marit Lundteigen Fossdal
Chair of NordREG

2 Summary

The Nordic region is characterized by a unique mix of *generation sources* where the high share of hydropower, representing virtually all of the Norwegian and nearly half of the Swedish generation capacity, has a great influence on the market. The level of precipitation is thus vital when calculating and analysing potential generation levels. In addition, the Nordic region has significantly colder winters than any other European country, influencing the consumption as many households are electrically heated.

In 2008 the overall *electricity consumption in the Nordic region* was slightly higher – 1.6 per cent – than in 2007. During periods of peak consumption the Nordic power system proved sufficient to ensure security of supply without restrictions on consumption.

The Nordic region operates almost entirely as one synchronous power system through *transmission grid*. The continuous reinforcement of the Nordic transmission grid has enabled an increased security of supply as well as a more efficient use of the generation capacity. Increasing cross border power flows strain the transmission lines and increases the demand for transmission capacity. Possible congestions occurring between the Nord Pool bidding areas are handled through market splitting, while internal congestions in general are handled through counter trade or by reducing interconnector capacity at the bidding area borders.

The Nordic wholesale power market is a well functioning electricity market. Trade at Nord Pool has increased steadily since it was established in 1993. Although trading at Nord Pool Spot is voluntary, significantly more physical power is now traded on the power exchange than bilaterally – from 42 per cent of total Nordic consumption in 2004 to 76 per cent in 2008. During 2008 average spot prices at Nord Pool were considerably higher (approximately 60 per cent) than prices in 2007.

The Nordic retail markets are essentially four separate markets, influenced by national differences, but work on integration has started. Prerequisites for well-functioning retail markets are active customers who engage in the market. The share of customers switching electricity supplier differs considerably between the Nordic countries; from app. 2 per cent in Denmark to 8 per cent in Sweden.

NordREG has undertaken the assignment of developing a number of statistical indicators to describe and assess the functioning and status of both the wholesale and retail markets. The work on the indicators is complex and still ongoing. NordREG intends to launch a public consultation in the beginning of 2010.

3 Introduction: NordREG

NordREG is a cooperative organisation for Nordic energy regulatory authorities. The mission and common goal of the organisation is to actively promote a legal and institutional framework and conditions necessary for developing the Nordic and European electricity markets.

NordREG mission

In cooperation, we actively promote legal and institutional framework and conditions necessary for developing the Nordic and European electricity markets.

The specific strategic priorities of NordREG are to provide for a well-functioning Nordic wholesale market with competitive prices, be conducive to establish a common Nordic retail market with free choice of supplier, to ensure a reliable supply within the region, and finally, to regulate and monitor the transmission system operators (TSO's) with focus on efficiency and Nordic harmonisation.

NordREG has formulated its vision for the development of the electricity market

NordREG vision for the development of markets

All Nordic electricity customers will enjoy free choice of supplier, efficient and competitive prices and reliable supply through the internal Nordic and European electricity market.

4 Generation and consumption

Hydropower is a major source of electricity generation in the Nordic region. Other sources of electricity generation are condensing power generation, combined heat and power generation, nuclear power generation and wind power generation.

Electricity consumption in the Nordic region is relatively high per capita compared to other European countries. This is due to e.g. the influence of cold winters in combination with electricity heated houses and the relative high proportion of energy intensive industries.

4.1 Generation capacity

The Nordic region has a total of 94 624 MW installed capacity for power generation (see table 1 below). More than half of the installed capacity comes from renewable power sources. Hydropower alone – mainly located in Norway and Sweden – accounts for more than half (52 per cent) of the total generation capacity. The large share of hydropower is mainly due to large rivers and significant quantities of precipitation in the mountains, filling the reservoirs during the spring flood.

CHP (Combined Heat and Power) is the second largest generation source accounting for almost 21 per cent of the total Nordic power generation capacity. The majority of the CHP capacity is located in Denmark.

The third largest power source is nuclear power, only located in Sweden and Finland and with a share of 12 per cent of the total Nordic generation capacity.

Wind power accounts only for about 5 per cent, but has increased considerably during the last few years.

Table 1. Nordic Generation capacity (MW) by power source, 2008.
Source: Nordel

	Denmark	Finland	Norway	Sweden	Nordic region
Installed capacity (total)	12 618	17 036	30 789	34 181	94 624
Nuclear power	-	2 646	-	8 938	11 584
Other thermal power	9 446	11 150	890	8 027	29 513
- Condensing power	784	2 935	-	2 271	5 990
- CHP, district heating	7 692	4 101	142	2 955	14 890
- CHP, industry	558	3 274	49	1 194	5 075
- Gas turbines etc.	412	840	699	1 607	3 558
Hydro power	10	3 097	29 474	16 195	48 776
Wind power	3 163	143	425	1 021	4 752

Vattenfall is the largest generator with a capacity of 15 926 MW and a 16.8 per cent share of the Nordic capacity. Statkraft is the second largest generator with a capacity of 12 610 MW amounting for about 13 per cent of the total Nordic generation capacity. Fortum has a total capacity of 10 643 MW and 11.2 per cent of the Nordic capacity.

Table 2. Generation capacity by producers, 2008
Source: Regulators and Nordel

	Capacity (MW)	Share
Denmark		
- Dong Energy	6050	6.4 %
- Vattenfall	2160	2.3 %
Finland		
- Fortum	4 882	5.2 %
- PVO	3 483	3.7 %
- Helsingin Energia	1 343	1.4 %
Norway		
- Statkraft	12 610	13.3 %
Sweden		
- Vattenfall	13 766	14.5 %
- E.ON Sweden	6 019	6.4 %
- Fortum	5 761	6.1 %
Other generators	38550	40.7 %
Total Nordic region	**94 624**	**100 %**

4.2 Generation

Total power generation in the Nordic region amounted to 391.4 TWh in 2008 – a small decrease of 0.2 per cent compared to 2007.

The development of the total power generation in the Nordic region during 2006-2008 is illustrated below (see figure 1). The development shows the same trends in yearly power generation in all three years.

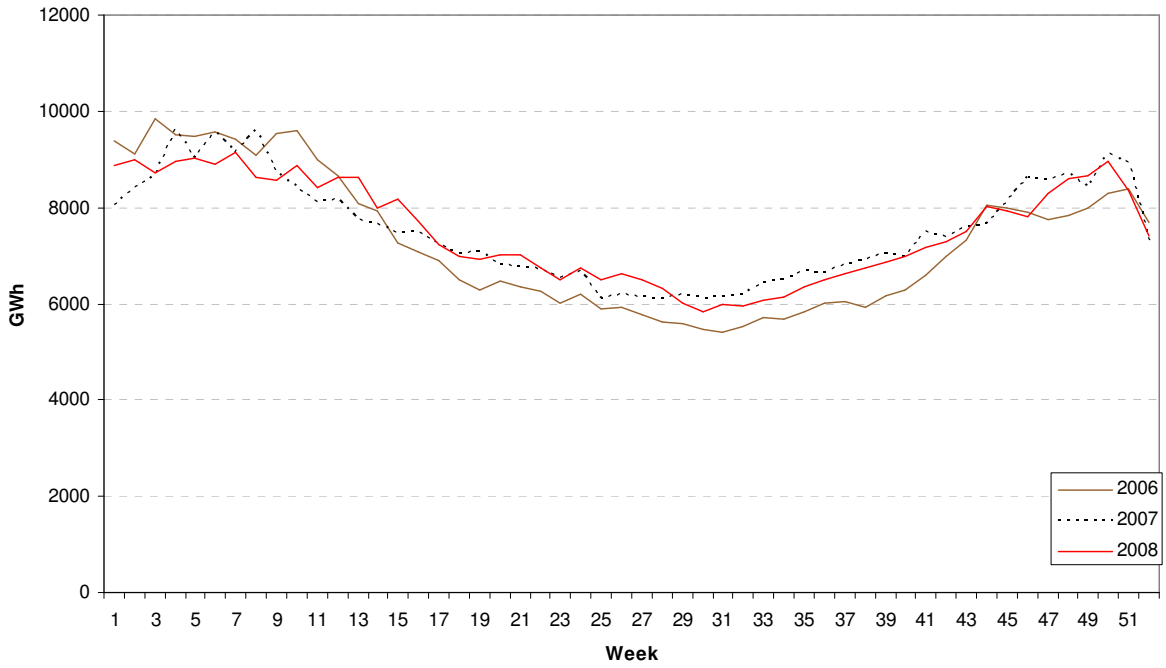

Figure 1. Total power generation in the Nordic region, 2006-2008
Source: Nord Pool

In general, thermal power generation (Finland and Denmark) in the Nordic region acts as a "swing-production" determined by the level of hydropower generation in Norway and Sweden.

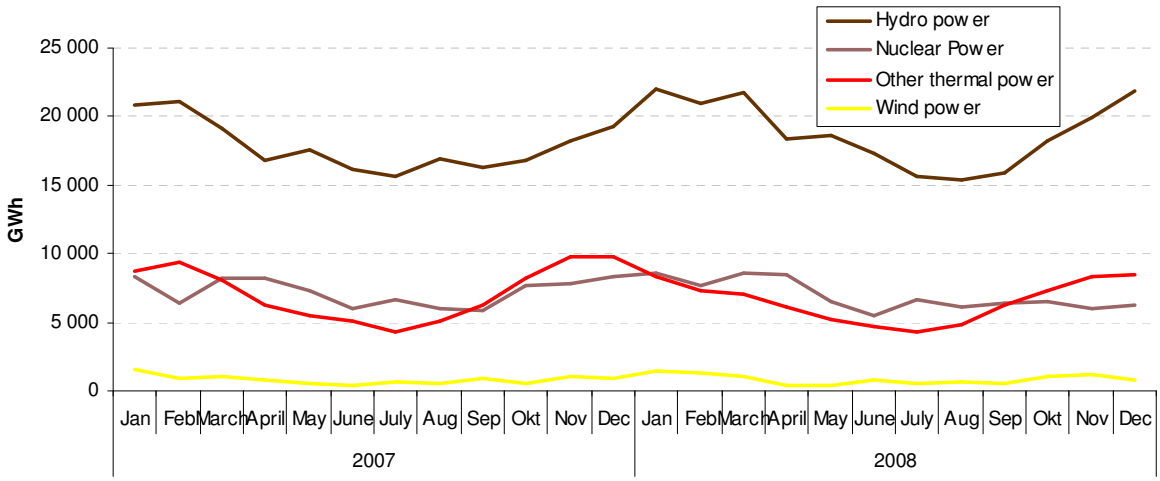

Figure 2. Power generation by power source in the Nordic region, 2007 and 2008
Source: Nordel

4.3 Consumption

The electricity consumption in the Nordic region varies widely due to specific conditions in each country (see figure 3).

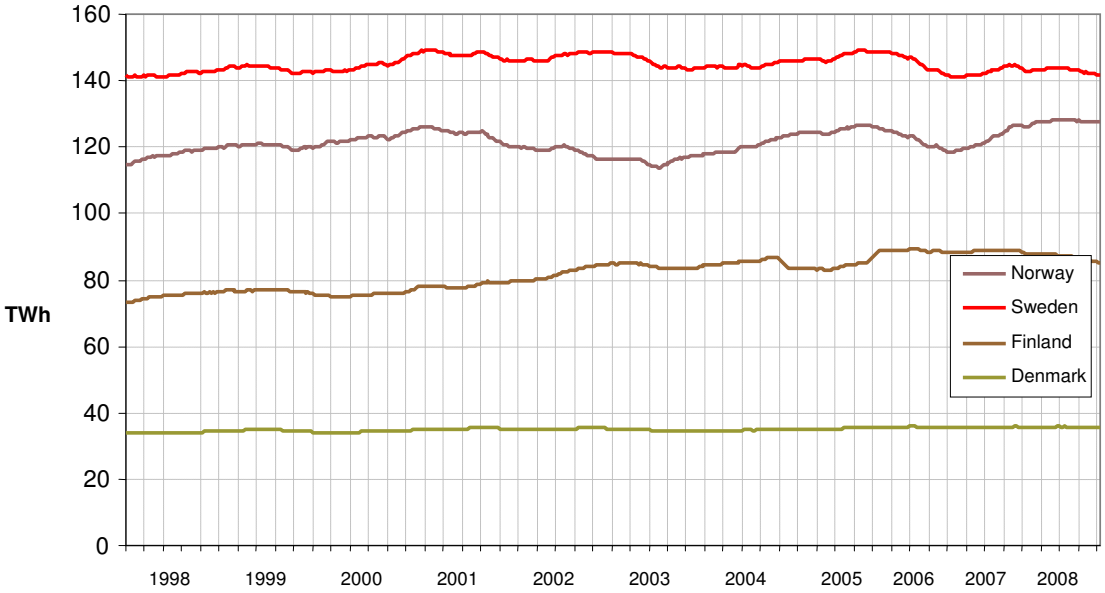

Figure 3. Electricity consumption in the Nordic countries (last 52 weeks), 1998-2008
Source: Nord Pool Spot

Denmark, with relatively warm winters and a small amount of electricity heated houses, has less seasonal variation in electricity consumption than the other Nordic countries. This in addition to a relatively small share of energy intensive industries leads to considerably lower electricity consumption than the other Nordic countries. The Danish electricity consumption has been very stable in the period 1998 – 2008. In 2008, the total electricity consumption in Denmark was 35.8 TWh, which is about the same level as 2007.

Finland has significant seasonal temperature variations and a large amount of electricity heated houses, and hence a much more fluctuating electricity consumption than Denmark. Furthermore, Finland also has a large share of energy intensive industries leading to relatively high electricity consumption. The total electricity consumption in Finland was 87.3 TWh in 2008, a decrease of 1.5 per cent compared to 2007.

Norwegian electricity consumption increased steadily from 2004 until mid 2006, when the consumption decreased somewhat. In 2007 electricity consumption increased slightly again. Much like Finland and Sweden, Norway has significant seasonal temperature variations and a large share of electricity heated houses. The share of

energy intensive industry is also relatively high and the consumption tied to petroleum activity is increasing. The total electricity consumption in Norway was 127.5 TWh in 2008, an increase of 5.4 per cent compared to 2007.

Sweden has the highest total electricity consumption of the Nordic countries. Swedish electricity consumption is highly influenced by a large share of energy intensive industries as well as a large share of electricity heated houses. In 2008, the total electricity consumption in Sweden was 143.2 TWh, which is almost the same level as 2007.

Total electricity consumption in the Nordic region has increased steadily during the last ten years, see figure 4. However, during the second half of 2006 and first half of 2007 the consumption decreased significantly mainly due to warm weather. During the second half of 2008 consumption also fell as a result of the turbulence in the financial market which lead to a falling demand. The total electricity consumption in 2008 was 393.8 TWh, an increase of 6.1 TWh or 1.6 per cent compared to 2007.

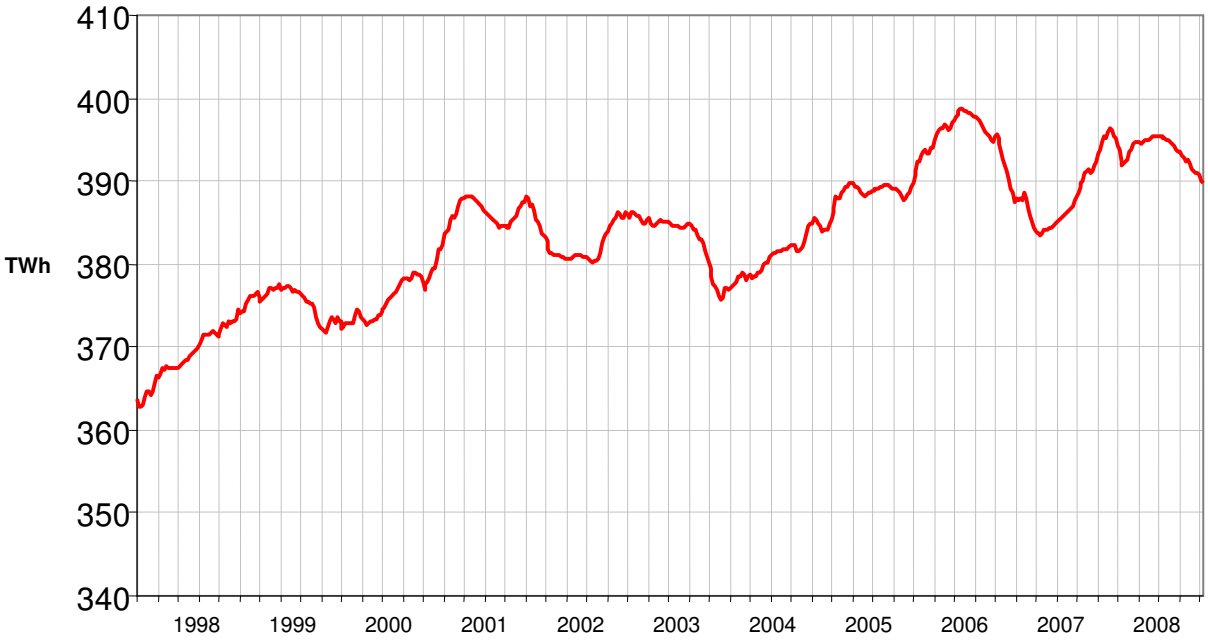

Figure 4. Development of the total electricity consumption (last 52 weeks) in the Nordic region, 1998-2008
Source: Nord Pool Spot

Figure 5 illustrates the development of the total electricity consumption in the Nordic region during 2005-2008. The figure shows the effects weather conditions have on the demand when compared with figure 6.

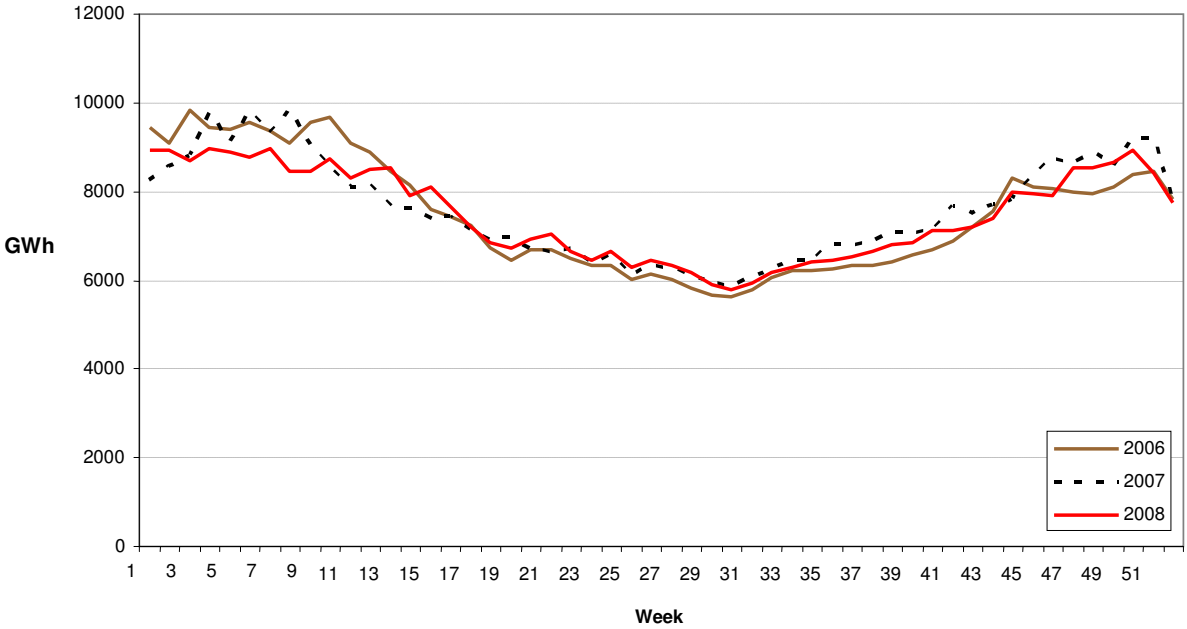

Figure 5. Electricity consumption in the Nordic region (GWh/week), 2005-2008
Source: Nord Pool Spot

All Nordic countries except Denmark have high electricity consumption per capita compared to other European countries, see table 3. A common feature of countries with high per capita electricity consumption is that they have a high heating requirement due to a cold climate and/or have a large share of energy intensive industries.

Table 3. Electricity consumption per capita, 2008*
Source: Nordel

	Denmark	Finland	Norway	Sweden	Nordic region
Total electricity consumption (GWh)	36 102	87 047	128 851	144 059	396 059
- household consumption (GWh)	9 837	21 558	36 501	38 800	106 696
Population (million)	5,5	5,3	4,8	9,3	24,9
Household consumption per capita (kWh)	**1 788**	**4 068**	**7 604**	**4 190**	**4 413**

* Please note that all figures in the table are preliminary

The customer categories in the Nordic countries are quite similar as shown in table 4.

Table 4. Electricity consumption for different customer categories, 2008
Source: Nordel

	Denmark	Finland	Norway	Sweden	Nordic region
Households	29%	26%	32%	29%	29%
Industry (incl. energy sector)	28%	53%	44%	45%	46%
Trade and services (incl. transport)	33%	20%	22%	21%	22%
Other (incl. agriculture)	10%	1%	2%	5%	3%

In three countries – Sweden, Finland and Norway – industry is responsible for a considerable amount of total consumption due energy-intensive industries. Danish consumption is much more evenly distributed between households, industry and transport etc. and with farming consuming a significantly larger share of electricity than in the other Nordic countries. Norwegian households consume considerably more electricity than households in the other Nordic countries while in Finland the share of electricity consumption by industry is significantly larger than in the other three countries.

4.3.1 Temperatures in the Nordic region

2008 was characterised by the relatively high temperatures in the Nordic region throughout the year. The warm weather reduced the demand for electricity for heating.

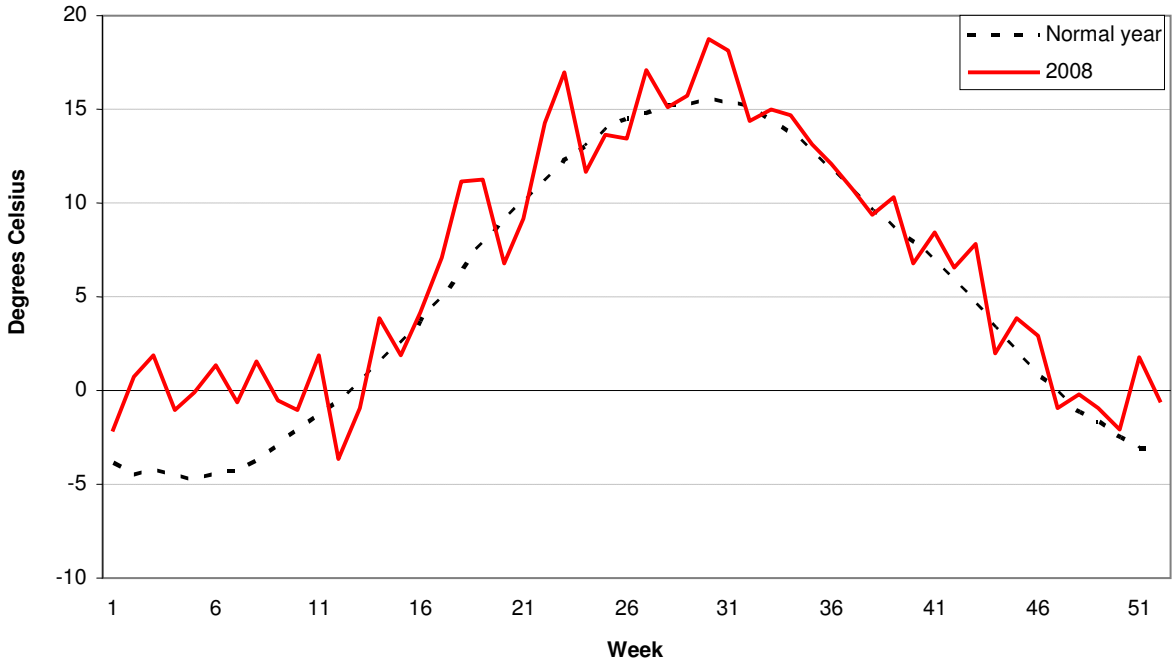

Figure 6. Mean temperature in the Nordic region[1] in 2008 compared to a normal year
Source: Nord Pool Spot

4.3.2 Peak load

Peak load[2] usually occurs during periods of cold spells. In 2008, the peak load in the Nordic region was 63 085 MW and took place on January 3, hour 18. In Denmark the peak load took place on January 3, hour 19 with a load of 6 408 MW. The Finnish peak load happened on January 4, hour 18 with a load of 13 770 MW. Norway had its peak on January 14, hour 10 (21 589 MW) while the Swedish consumption peaked on January 23, hour 18 (24 500 MW).

The load during week 1, i.e. the Nordic peak load situation, is illustrated in figure 7. The load decreases significantly during night-time and peaks during the morning and late afternoon. The morning peak coincides with the time people arrive to their place of work while the afternoon-peak is related to cooking, washing, increased heating demand and turning on TVs when getting home from work.

[1] Temperature measured weekly in 12 Nordic cities (Oslo, Bergen, Trondheim, Tromsø, Helsinki, Ivalo, Stockholm, Gothenburg, Östersund, Luleå, Copenhagen and Billund).
[2] Peak load is defined as the maximum instantaneous electricity consumption or the maximum average electricity consumption over a designated interval of time.

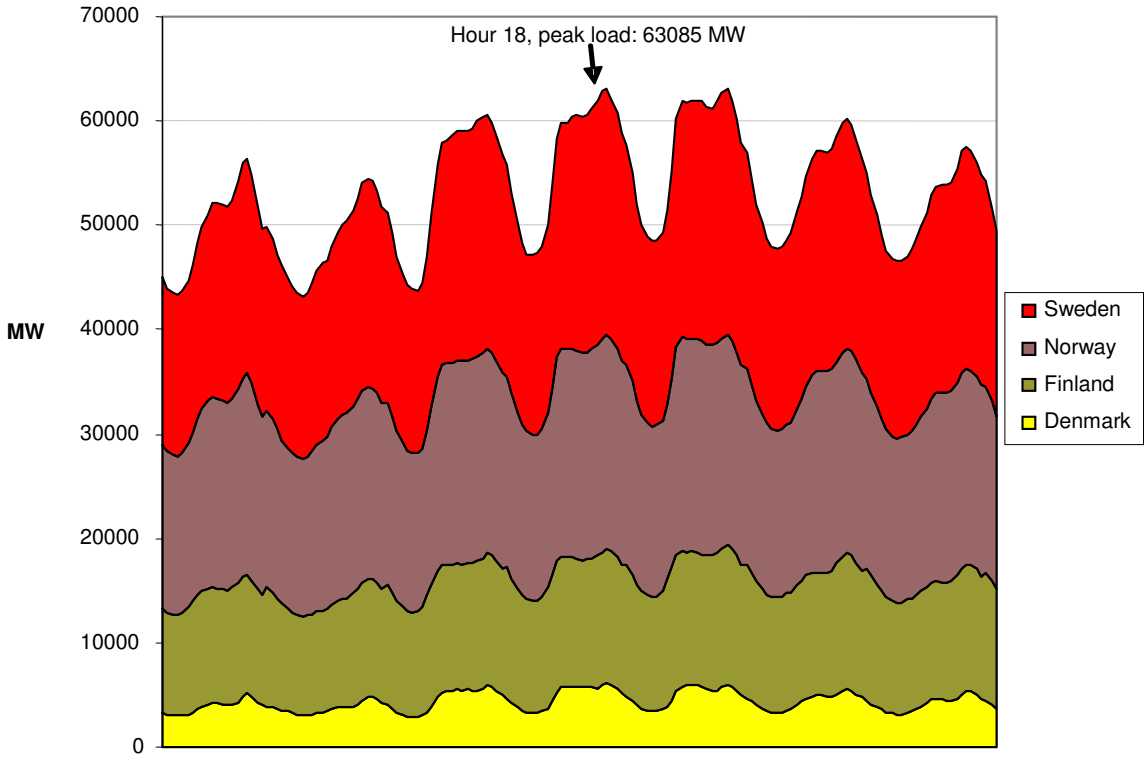

Figure 7. Load in the Nordic region during week 1, 2008
Source: Nord Pool Spot

During the most strained hour in the Nordic region in 2008, January 3, hour 18 the aggregate production in the Nordic area exceeded the aggregate consumption leading to a net exchange (net export) of 477 MW to from adjacent countries, see figure 8. In cold spells, such as week 1, most of the available generation capacity of the Nordic region is taken into operation.

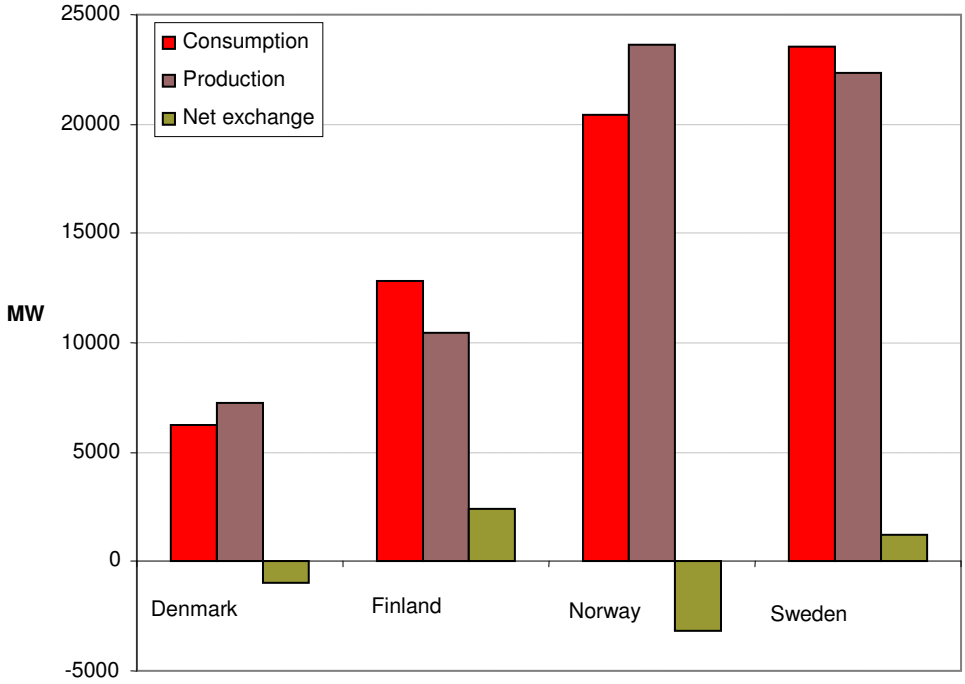

Figure 8. Consumption, generation and exchange in the Nordic region, January 3, hour 18
Source: Nord Pool Spot

4.4 Security of supply

4.4.1 Finland

In the winter season 2007 – 2008, the average hourly demand for electricity reached its peak value of 13 770 MW. During the consumption peak, the amount of electricity generated in Finland was approx. 10 720 MW (average hourly demand), and electricity imports from the neighbouring countries amounted to approx. 3 050 MW. At the end of 2007, the largest amount of electricity generated simultaneously in Finland was approx. 11 600 MW. In 2008, electricity consumption amounted to 87 TWh, 4 per cent down from the previous year.

In the winter season 2008 – 2009, the peak demand was forecasted to be approximately 15 300 MW (maximum hourly demand), i.e. approximately 2 000 MW higher than the available electricity generation capacity. It was estimated that the electricity transmission capacity from the neighbouring countries to Finland in the winter season 2008 – 2009 was 3 850 MW. The resulting output deficit (2 000 MW) was forecasted to be covered by electricity imports from the other Nordic countries, Estonia and Russia.

During the consumption peak in January 2008, the domestic generation capacity and electricity import capacity were sufficient to cover Finland's electricity consumption, due to which there was no need to restrict consumption.

In 2011, the electricity transmission capacity will increase when a new transmission connection from Sweden to Finland (800 MW Fenno Skan 2) is scheduled to be in operation.

4.4.2 Sweden

The electricity consumption in 2008 peaked in January at a level of 24 500 MW. The electricity production in Sweden was then 24 165 MW and the net import was 335 MW. There were good margins in both generation capacity and in electricity transmission capacity during the entire year.

The addition from new electricity generation capacity amounted to 113 MW in 2008. A large number of projects in new generation capacity are planned for the next few years. There is a great deal of uncertainty about these projects but if all of them will be launched, it will be possible to increase the electricity generation capacity by 1 300 MW by 2012. Wind power projects stands for about half of this increase.

4.4.3 Denmark

Electricity consumption in Denmark peaked in January but production exceeded demand. The surplus was exported to adjacent countries. Both generation capacity and transmission capacity was adequate to support the consumption throughout the year without interruptions or restrictions in consumption.

At present there are no plans for major addition to the total Danish generation capacity, however, an increased development and use of renewable energy sources – i.e. wind power – is scheduled for the coming years.

4.4.4 Norway

Norwegian electricity consumption peaked February 14, hour 10, with a level of 21 589 MW. There were Norwegian net export at the time, as the electricity production was 22 693 MW. In Norway, more than 95 percent of the installed capacity is hydro based, thus production is highly dependent on weather conditions. In 2008, there was almost 10 percent more water inflow than normal in Norway. High inflows contributed to Norway beeing net exporter during most of the year.

Installed Norwegian power production capacity was 30 789 MW at the turn of 2008 - 2009, an increase of 476 MW from the year before. The Nor-Ned cable (700 MW) connecting the Norwegian and Dutch power systems was in commercial operation in May 2008. The cable contributes to improved sequrity of supply in Norway.

4.5 Generation and consumption: Conclusions

The unique mix of generation sources in the Nordic region in combination with the different weather situations in the region has to be taken into account when comparing electricity generation and consumption patterns with other European countries.

The high share of hydropower, representing virtually all of the Norwegian and nearly half of the Swedish generation capacity, has a great influence on the amount of electricity generated from various sources, thus making levels of precipitation vital when calculating and analysing potential generation levels. In addition, the Nordic region has significantly colder winters than any other parts of the Europe, influencing the electricity consumption as many households are electrically heated.

During periods of peak consumption in year 2008 the Nordic power system proved sufficient to ensure security of supply without restrictions on consumption or interruption based on capacity constraints.

5 Electricity transmission

The transmission grids in the Nordic region are closely linked together providing a solid foundation for a common Nordic electricity market. The transmission grids were originally built to meet the needs of each individual country, but early in the development of the national power systems it was recognized that the differences in generation mix between the countries meant that linking the systems together would enhance security of supply and make possible a more efficient use of the existing generation capacity.

5.1 Transmission network

The Nordic transmission grid is part of the transmission network in north-western Europe, as shown in figure 9.

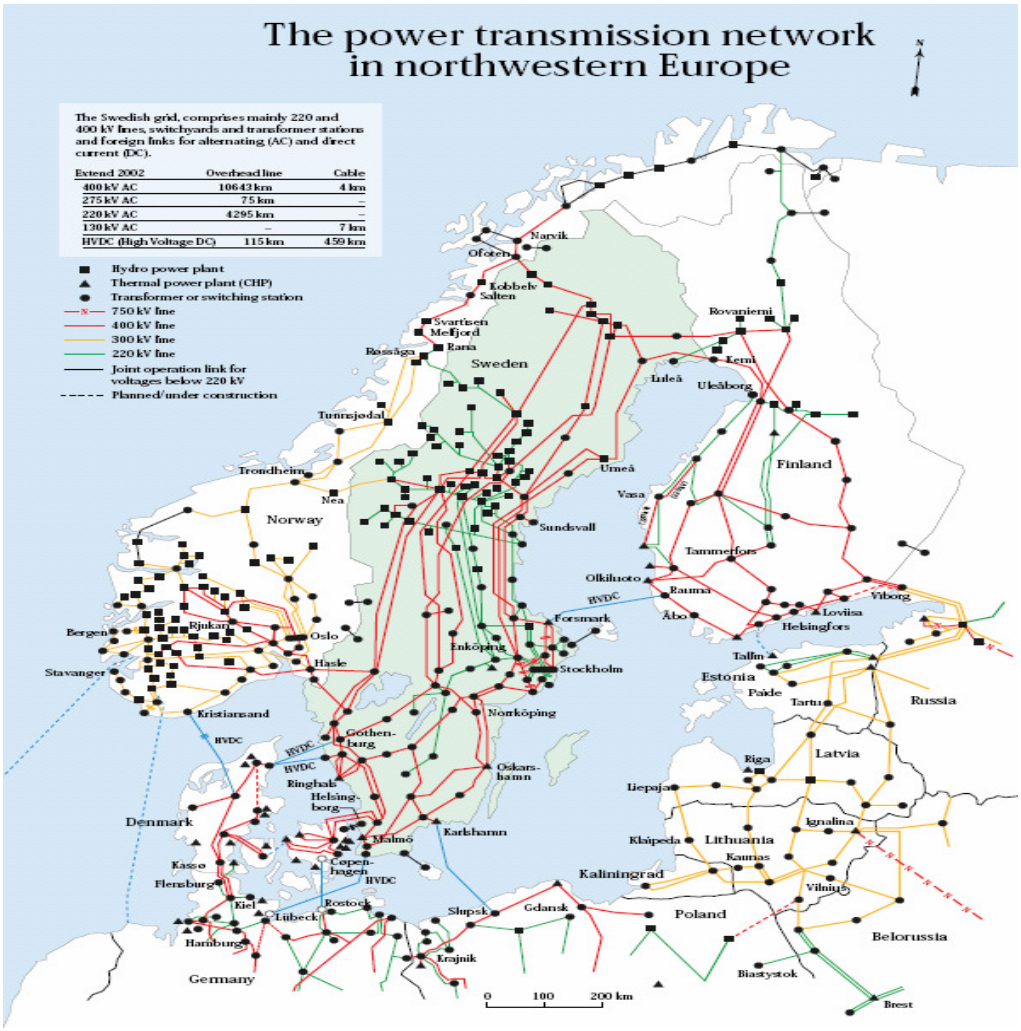

Figure 9. Transmission networks in north-western Europe
Source: Svenska Kraftnät

The Nordic transmission grid basically combines the whole Nordic region to one synchronous power system (excluding western Denmark). Interconnectors also link the Nordic power system to Germany, Poland, Estonia and Russia and from May 2008 a cable between Norway and the Netherlands was taken into commercial operation. However, as illustrated in the figure 9, there are no transmission lines connecting western Denmark to eastern Denmark. Eastern Denmark is in synchronous operation with the Nordic grid while western Denmark is in synchronous operation with the continental Europe. However a cable linking eastern Denmark and western Denmark is planned to be operational in spring 2010.

Each Nordic country has appointed a Transmission System Operator (TSO). The TSO's are responsible for the secure operation of the grid while allocating as much interconnector capacity as possible to the market.[3] The Nordic TSO's have the overall responsibility to ensure balance between supply and demand of electricity during the operating hour.

5.2 Congestions in transmission

Between the Nordic countries the generation mix, generation costs and consumption patterns vary. The electricity price in the Nordic wholesale market is determined on a day-ahead auctioning process. As the demand patterns vary over the entire area subsequently a need for transmission of electricity through the Nordic grid emerges. This transmission demand may sometimes even exceed the available transmission capacity introducing price differences across congested transmission connections. Eliminating entirely these congestions that lead into regional price differences would require substantial investments in the transmission grid.

Congestions in the Nordic spot market are handled through market splitting, while internal congestions within TSO control area are handled through counter trade or by reducing interconnector capacity at the bidding area borders. Counter trade is mainly used after gate closure of the day-ahead markets.

Market splitting was enforced in 90.5 per cent of the time in 2008, meaning that there were one or more bottlenecks between the spot areas within the Nordic power system. Bottlenecks occur when the demand for transmission exceeds available capacity. In these hours, there will be different prices in two or more areas, and the price differences reflect the value of increased interconnecting capacity between areas. For different reasons the allowed exchange capacities are often lower than the normal transmission capacities. Figure 10 shows the average curtailment of capacities between the different bidding areas expressed as percentages of the annual capacities in 2008.

[3] Energinet.dk in Denmark, Fingrid in Finland, Statnett in Norway and Svenska kraftnät in Sweden.

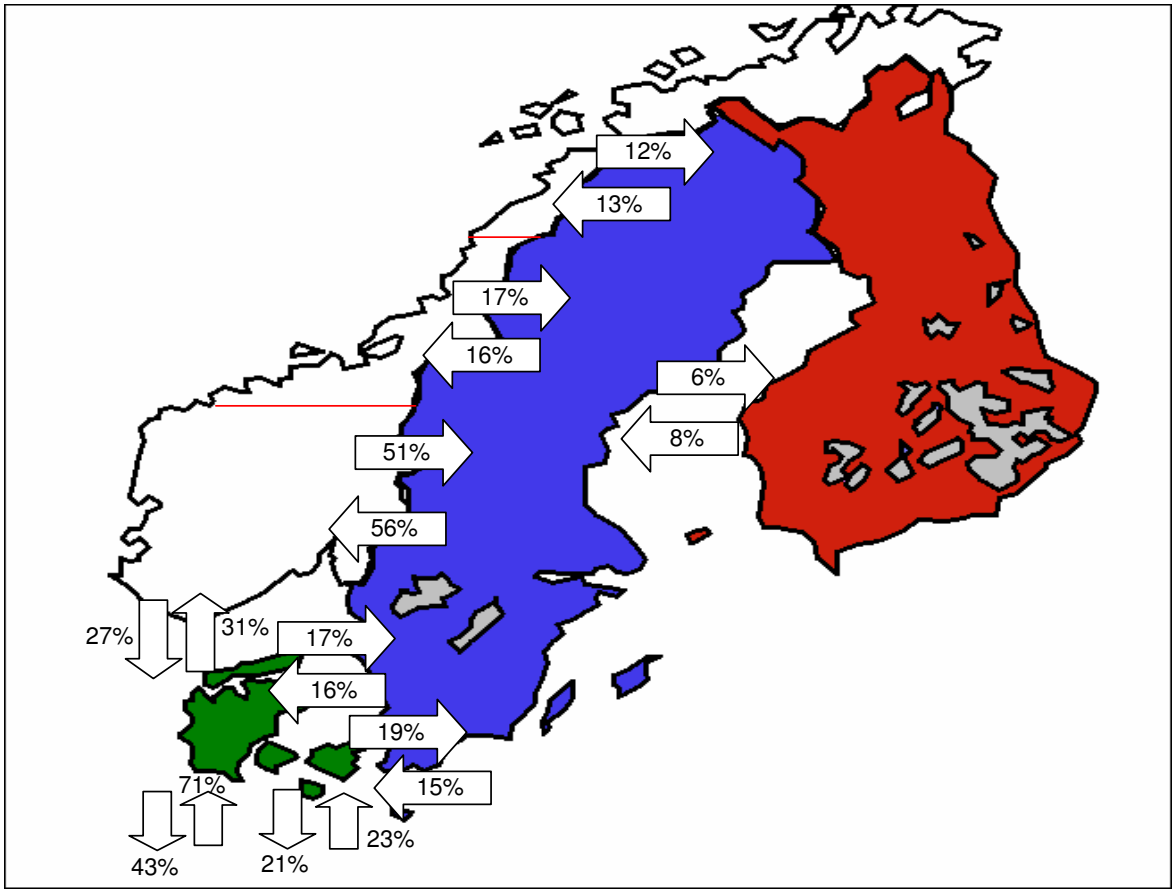

Figure 10. Average curtailment of capacities between the different bidding areas expressed as percentages of the annual capacities in 2008

Substantial reinforcements in the Nordic transmission system are planned to be made in the coming years, generally it is not economically efficient to expand the network capacity to a level where the demand for transmission is met in all hours and at all interconnectors.

The Nordic transmission system operators have identified the following five areas, or cross-sections, where the electricity network should be strengthened:

- The South-West Link between central/southern Sweden and southern Norway
- The Great Belt Link in Denmark
- The new Fennoskan 2 Link between Finland and Sweden
- The new Nea-Järpströmmen Link between Norway and Sweden
- The new Skagerrak Link between Denmark and Norway

Four of the five cross-sections listed above have already been decided[4], while Energinet.dk and Statnett has established a letter of intent on the new Skagerrak link. If

[4] Prioritised cross-sections reinforcement measures within the Nordic countries, Nordel 2006.

all goes according to plan, the reinforcements to the first four links will be commissioned between 2008 and 2014. The aim of the investments is to prevent transmission congestions and to increase security of supply in the Nordic market.

The present Regulation (EC) 1228/2003 provides in Article 8(4) for the Commission to "… amend the Guidelines on the management and allocation of available transfer capacity of interconnections between national systems set out in the Annex, in accordance with the principles set out in Articles 5 and 6, in particular so as to include detailed guidelines on all capacity allocation methodologies applied in practice and to ensure that congestion management mechanisms evolve in a manner compatible with the objectives of the internal market. …"

The guidelines in the Annex (usually referred to as the Congestion Management Guidelines) have been amended for the management and allocation of interconnection capacity by the 1st of December 2006. They are based on the following principles arising from the Regulation:

- economic efficiency and promotion of competition,
- maximization of capacity available and use of interconnectors,
- transparency on a non-discriminatory basis,
- secure network operation, and
- revenue neutral mechanism.

According to Article 9, the regulatory authorities, when carrying out their responsibilities, shall ensure compliance with this Regulation and the guidelines adopted pursuant to Article 8. Where appropriate to fulfill the aims of this Regulation they shall cooperate with each other and with the Commission.

According to the national legislation, the roles and responsibilities of the regulatory authorities in the Nordic countries with regard to capacity allocation and congestion management vary but the main responsibility for implementation of this issue lies within the transmission system operators. The responsibility of the national regulatory authorities with regard to the system operators differs, from a wide responsibility in Norway, to a very limited role for the Swedish regulator, where the TSO is its own authority. The 3rd package will introduce changes to this. An amendment (new article 37 (6)) to the Electricity Directive requires that the National Regulatory Authorities (NRAs) shall be responsible for fixing or approving sufficiently in advance of their entry into force at least the methodologies used to calculate or establish the terms and conditions for access to cross-border infrastructures including the procedures for the allocation of capacity and congestion management. In case the competent NRAs have not reached an agreement or if they jointly request, it will be the new body, ACER (Agency for the Cooperation of Energy Regulators) that prepares such a decision.

5.3 Electricity transmission: Conclusions

The Nordic region operates almost entirely as one synchronous power system through transmission grid. The combined system has enabled an increased security of supply as well as a more efficient use of the generation capacity – during wet years hydropower flows southwards and eastwards whereas during dry years thermal power flows northwards and westwards.

However, increasing cross border power flows also strains the transmission lines and increases the demand for transmission capacity. Sometimes this leads to congestions. Congestions occurring between the Nord Pool Spot's bidding areas are handled through market splitting, while internal congestions in general are handled through counter trade or by reducing interconnector capacity at the bidding area borders. Counter trade is mainly applied after gate-closure of day-ahead market.

6 Wholesale power market

The wholesale power market is a common Nordic market, where electricity is traded on the Nordic electricity exchange, Nord Pool. The market participants at Nord Pool – more than 400 members from over 20 countries – are electricity generators, electricity suppliers, portfolio managers, industrial companies and other large electricity consumers.

Nord Pool was founded in 1993 in Norway as Statnett Marked. In 1996 Sweden joined the power exchange and the world's first multinational exchange for trade in power contracts was established. Statnett Marked was renamed as Nord Pool. In 1998 Finland joined Nord Pool and in 1999 Western Denmark joined the market place. In 2000 the Nordic wholesale power market became fully integrated when Eastern Denmark joined Nord Pool.

Trading at Nord Pool is voluntary, however all day-ahead cross-border trading must be done at Nord Pool Spot. About 75 per cent of the power generated in the Nordic region is traded via Nord Pool Spot's physical spot market. The remaining 25 per cent is traded bilaterally. The Norwegian Water Resources and Energy Directorate (NVE) are responsible for regulating Nord Pool Spot.

The Nordic region consists of several bidding areas at Nord Pool Spot. During 2008, there were two areas in Denmark and one in Finland and Sweden respectively. In Norway there were three areas until 17 November, from that date and onwards there were two. The capacities for the exchange of electricity between the bidding areas are calculated and coordinated by the TSO's and distributed to Nord Pool Spot, before price calculation at Nord Pool Spot. The prices for the spot areas and the flow between the areas are then calculated. This ensures an exchange where electricity flows from a low price area to a high price area. If the available capacity between the areas is adequate, the prices will be equal. If not, there will be price deviations between the spot areas.

The physical market at Nord Pool consists of two sub-markets, the day-ahead market *Elspot* and the intra-day market *Elbas*. In the day-ahead market, electricity is traded for the next day's 24 hours. In the intra-day market, participants in Norway[5], Finland, Sweden, Germany and Denmark can trade for the forthcoming day after the day-ahead spot market has closed. Remaining transmission capacities or capacities in the opposite direction of the day-ahead outcome is available for the intra-day market. In the financial market the players can secure prices for future purchases or sales of electricity.

The Nordic market also has a common regulating market in order to ensure the balance between generation and consumption in the hour of operation. The different market solutions are used depending on the distance to the operating hour, see figure 11.

[5] Norway joined the Elbas market on 4 March 2009.

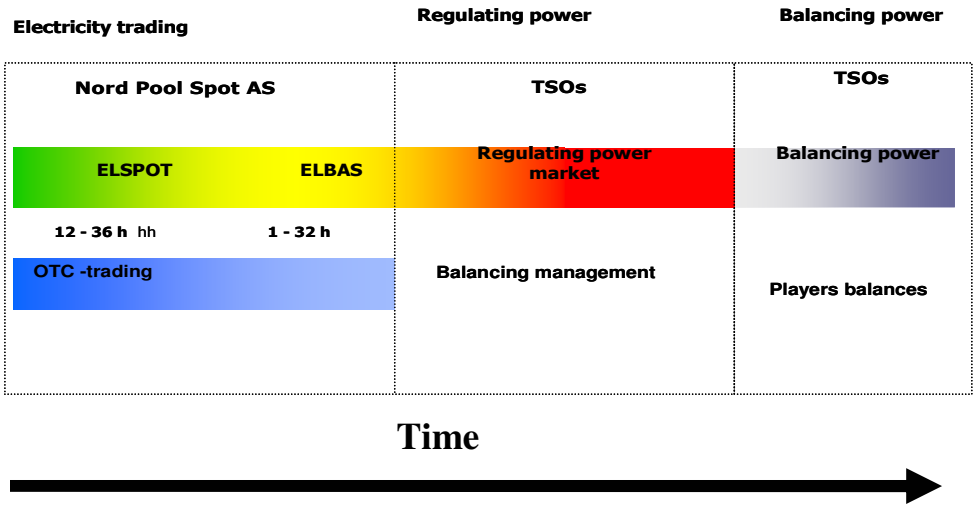

Figure 11. Timeframes for Nordic physical electricity markets

Market players can list their available generation/limited consumption volumes and accompanying price to the TSO's for the regulating market (common bid ladder for Nordic TSOs). This is a helpful tool for the TSOs, which have the overall responsibility to ensure the balance between supply and demand within the operational hour. The TSO's can then employ the right regulating object after taken into consideration location and capacities in the network.

6.1 Price development in the spot market

The Nord Pool system price[6] has varied considerably since 1996 (see figure 12). In 2008 the average system price was 44.74 €/MWh, compared to 27.88 €/MWh in 2007. The average price in 2006 was 48.64 €/MWh. The highest monthly spot price in 2008 was noted in September, when the average system price reached almost 68 €/MWh.

[6] The system price is calculated as the price that will be realized if there are no congestions between elspot areas.

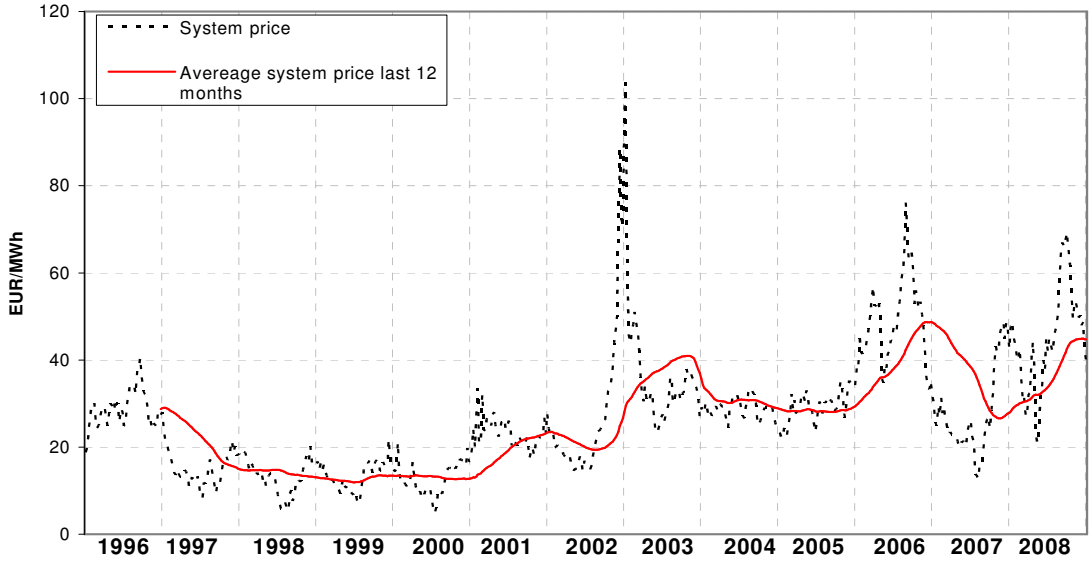

Figure 12. Development of monthly system price at Nord Pool Spot, 1996-2008
Source: Nord Pool

There are significant price differences between the different Nord Pool spot areas, see table 6. The highest average price during 2008 was in eastern Denmark while South Norway had the lowest average price. The average price in South Norway was more than 10 € lower than the next lowest average price. High hydro power production and reduced export capacity contributed to the low average price in South Norway.

As the table shows, prices were higher in the Nordic region in 2008 than in 2007. Higher reservoir levels in 2007 than last year contributed to that. Higher generation costs for thermal power plants for most of 2008 also pushed prices upwards. Reduced export capacity out of South Norway led to lower prices in South Norway, but increased the demand for thermal power in other Nordic countries and thereby had a price increasing effect in these areas. Furthermore, export from Norway to the Netherlands may also have contributed to the price increase.

Table 5. Average price in the different Nord Pool spot areas, 2008
Source: Nord Pool Spot[7]

Spot prices €/MWh	2008	Change from 2007
Finland	51.02	70 %
Western Denmark (DK1)	56.43	74 %
South Norway (NO1)	39.16	52 %
Middle Norway (NO2)	51.17	73 %
North Norway (NO3)	49.82	69 %
Sweden	51.12	69 %
Eastern Denmark DK2)	56.64	72 %

[7] NO2 and NO3 was a joint area until 19 November.

The price differences between the spot areas in 2008 shows that the price in Sweden (SE) was lower than the price in Finland (FI) in only 0.3 percent of the hours in 2008 (see table 6). The price in the Danish spot area DK1 was higher than the price in the Norwegian spot area NO1 in 72 per cent of the hours in 2008. Sweden was the spot area that most seldom constituted a separate spot area but reduced export capacity between Sweden and Norway should be noted though. In 2008 there was a common Nordic price for 9.4 per cent of the time.

Table 6 Price differences between Nordic spot areas, 2008
Source: Nord Pool Spot

2008		NO1	NO2	NO3	SE	FI	DK1	DK2
		Price less than						
NO1			3 %	4 %	4 %	5 %	9 %	4 %
NO2		80 %		29 %	14 %	16 %	21 %	14 %
NO3		78 %	3 %		9 %	11 %	18 %	9 %
SE	Price higher than	74 %	9 %	23 %		2 %	13 %	2 %
FI		73 %	9 %	23 %	0 %		13 %	2 %
DK1		72 %	44 %	50 %	41 %	42 %		24 %
DK2		75 %	33 %	40 %	28 %	30 %	24 %	

A duration curve of the spot prices in the Nordic region – listing the amount of hours the price has been below a certain level – reveals that the Danish price areas had higher prices than the other countries for a relatively long time. The highest price in Eastern Denmark was recorded for one hour at 240.02 €/MWh. That also constitutes the highest price in the Nordic region during 2008, see figure 13.

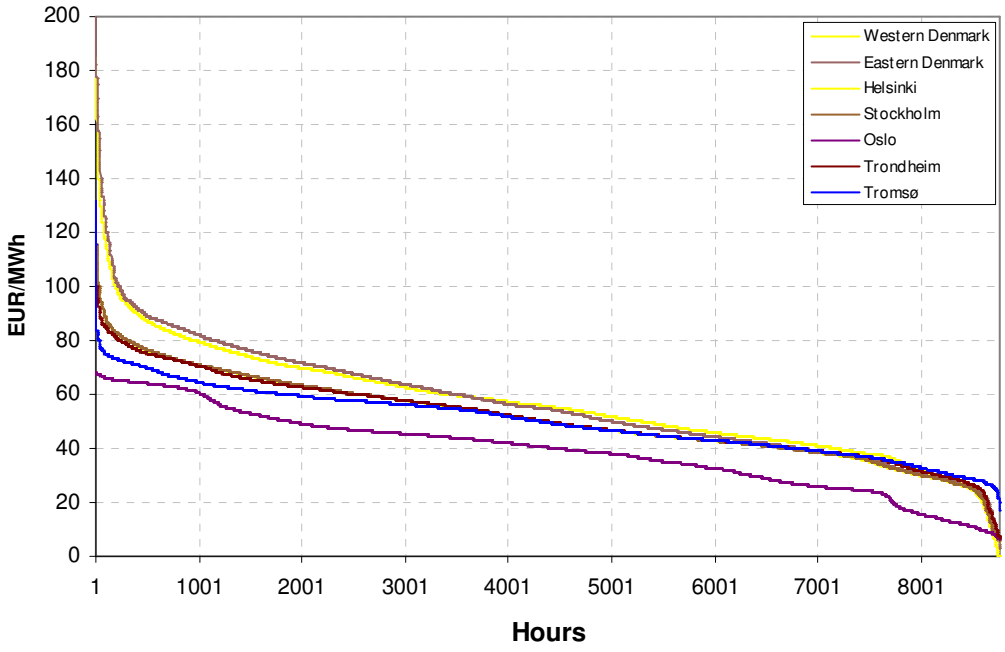

Figure 13. Duration curve of different spot prices, 2008
Source: Nord Pool Spot

As figure 14 illustrates there are considerable difference between a hydro dominated system and a system dominated by thermal power. In a hydro dominated system, it is easier to respond to demand changes. Therefore intraday prices will vary more in a system like the German, where thermal power dominates. Fluctuations in wind power generation also contribute to volatile prices in Germany.

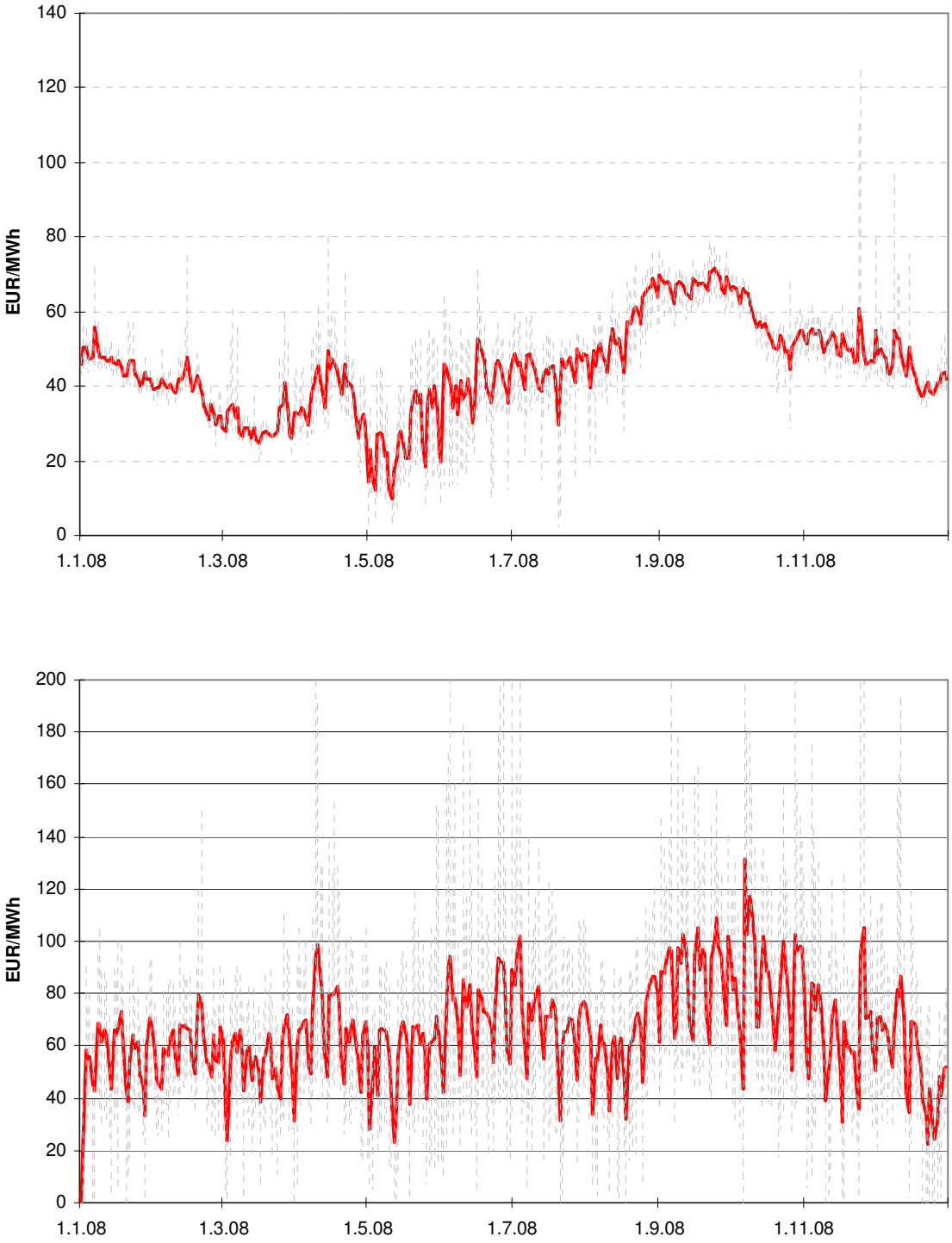

Figure 14. Comparison between the Nordic system price (upper figure, Nord Pool) and German wholesale price (lower figure, EEX).
Note: Red curve = average price, grey curve = max/min price.
Source: Nord Pool Spot and EEX (EEX is the German power and natural gas exchange)

Figure 15 illustrates the Nord Pool system price together with the forward price for the forthcoming period until 2011. In 2008 the average system price was 44.74 €/MWh compared to 27.88 €/MWh in 2007. High inflow levels influenced the system price downwards in the first half of 2008. Higher prices on fossil fuels and CO_2 allowances however had the opposite effect together with decreasing export capacity from Norway, and the system price rose significantly during the second and third quarter of the year. In week 19 the average system price was less than 21 €/MWh. By week 39 it had risen to just below 70 €/MWh. The breakdown in the world market economy in the last few months of 2008 was followed by a decreasing system price.

The price expectations for the next three years are a little lower than the average price for 2008. The forward price follows an expected cycle of lower prices during the summer and higher prices during the winter.

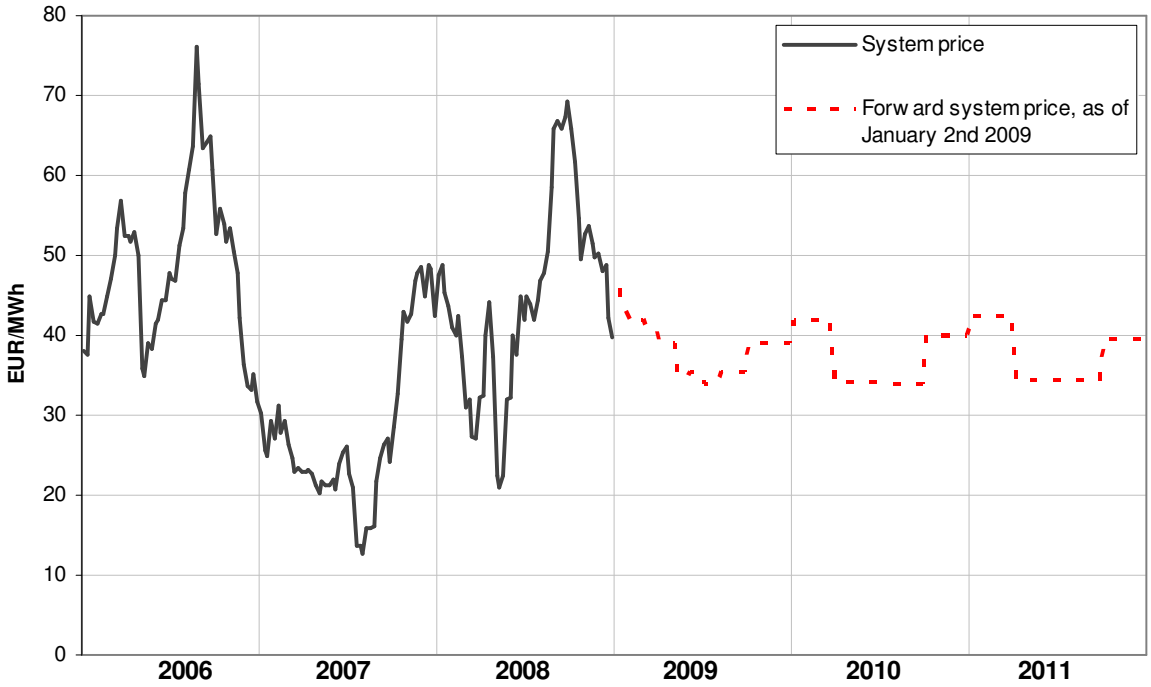

Figure 15. Weekly Nord Pool system and forward prices
Source: Nord Pool Spot

6.2 Conditions for generation

The two main sources of electricity generation in the Nordic region are hydropower and thermal power making inflow, reservoir levels and the price of CO_2 emissions important factors in the price formation of electricity.

Inflow and reservoir levels are of crucial importance for hydropower generation. Even though electricity in itself can not be stored, the water to be used in hydroelectric generation can be stored in reservoirs. The main bulk of the inflow to the reservoirs

occurs during the spring when the snow in the mountains melt and during rainy autumns.

In 2008 the inflow was generally a little lower than in 2007 but higher than in 2006 (see figure 16). While 2006 can be characterized as a dry year, both 2007 and 2008 had more inflow than normal.

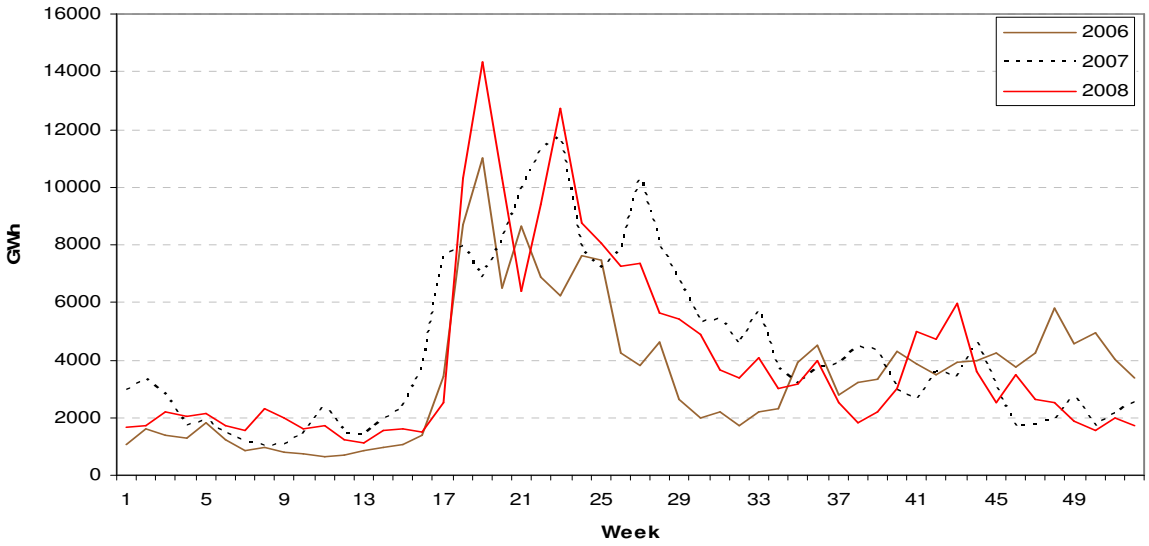

Figure 16. Effective inflow to the Nordic water reservoirs, 2006 – 2008
Source: Nord Pool Spot

Reservoir levels were mostly above the median level in the first half of 2008, see figure 17. In the second half of the year the reservoir levels fell below the median level. A weakening hydrologic situation was one of the factors behind the price increase in the third quarter of 2008.

At the beginning of 2008, the total reservoir levels in the Nordic region were 73 per cent of the total capacity. In Norway the reservoirs have a capacity of 84.1 TWh, of which 81.9 TWh is accounted for in this data set. Swedish reservoirs have a capacity of 33.8 TWh, while the capacity in Finnish reservoirs is 5.5 TWh. The total Nordic reservoir capacity is 123.4 TWh. At the end of 2008, the reservoir levels in the Nordic region had fallen to 65 per cent of the total capacity.

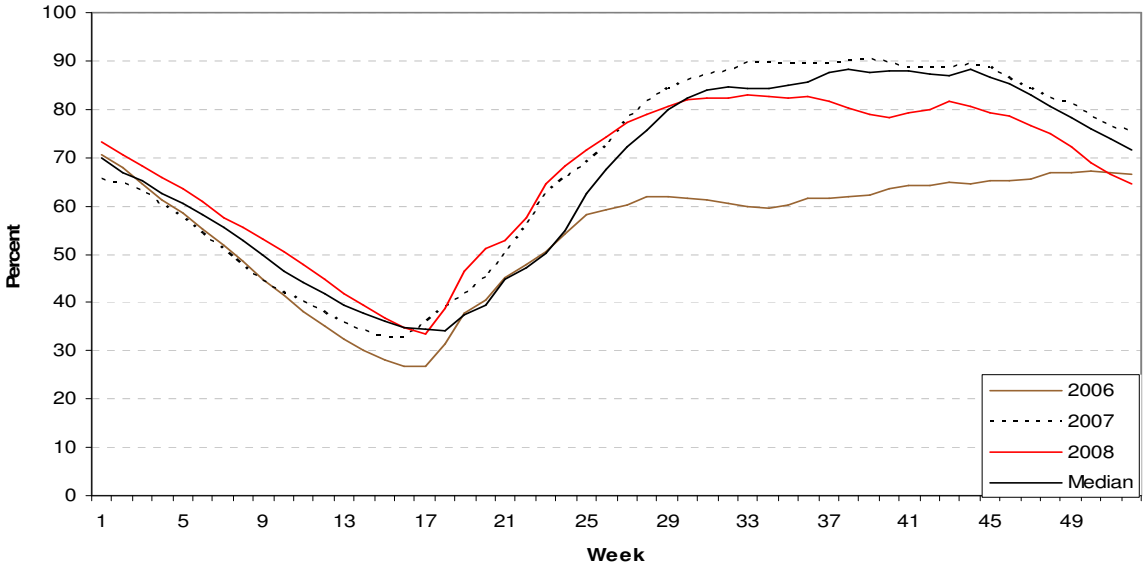

Figure 17. Reservoir levels in the Nordic region, 2006 – 2008
Source: Nord Pool Spot

The second largest generation technology in the Nordic region is thermal power. New costs were added to thermal power producers with the implementation of CO_2 quotas and tradable CO_2 allowances in 2005. This makes the price on CO_2 emissions an important factor influencing the price on electricity. Most of the thermal generation units within the Nordic region are located in Denmark and Finland.

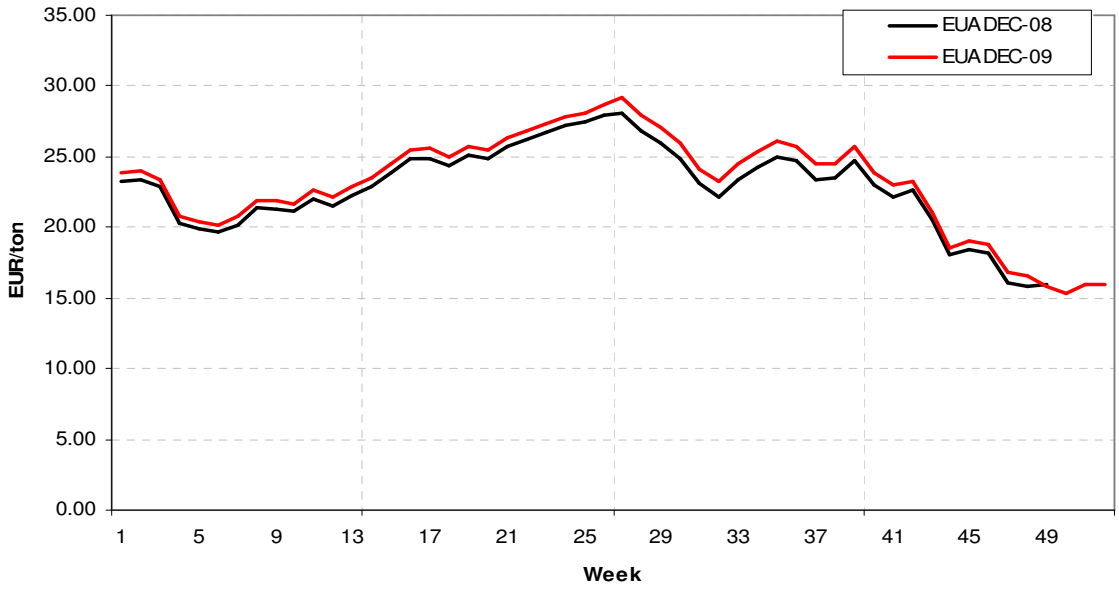

Figure 18. Price on CO_2 allowances on Nord Pool, 2008 and 2009
Source: Nord Pool Spot

Figure 18 shows the price of CO_2 allowances during 2008. Year 2008 marked the start of the new Kyoto period. After extremely low prices in 2007, the 2008 price of CO_2 allowances started at about 24 €/ton. The price increased during the first half of the year to a maximum close to 30 €/ton, before falling. At the end of 2008 allowances was traded at a price around 16 €/ton.

6.3 Volumes in the spot market

The volume traded through the spot market is often regarded to be a measure of liquidity in the spot market. With the exception of 2003, there has been a consecutive increase in volumes traded through the spot market since the formation of Nord Pool in 1993, see figure 19. Apart from last year, the volumes in the spot market have gone up with an increasing speed since 2004. This can to some extent be explained by the introduction of gross bidding. Particularly this has increased the volumes traded in Sweden at Nord Pool Spot from 40-45 per cent to approximately 90 per cent of total consumption. The incentives for some of the larger vertically integrated companies to notify both buying and selling were strongly improved, as the total fees rebated netting from producers with both buying and selling orders.

The total volume traded at Nord Pool Spot in 2008 was about 76 percent of the total Nordic electricity consumption. The total volume traded at Nord Pool Spot in 2008 was over 295 TWh, an increase of 2 percent from 2007.

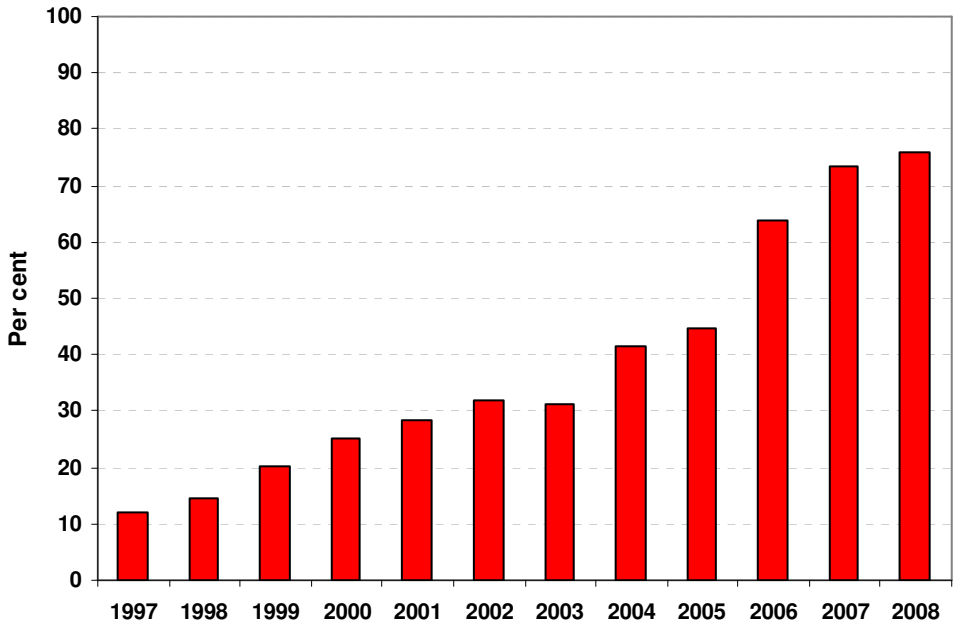

Figure 19. Volumes traded at Nord Pool Spot market as a percentage of total Nordic consumption, 1997 – 2008
Source: Nord Pool Spot

6.4 Cross-border power flows

Figure 20 shows the power exchange between the Nordic and the non-Nordic countries during 2008. The extent of the power exchange is highly influenced by the resource situation. In dry years the power flows north and west, while in wet years the power flows south and east. Likewise, changes in wind power generation influence the power flows, although with a time span of hours instead of months. This illustrates the flexibility of the Nordic power system; power is generated where it is cheapest and it is then transferred to more expensive areas and areas with not enough generation capacity.

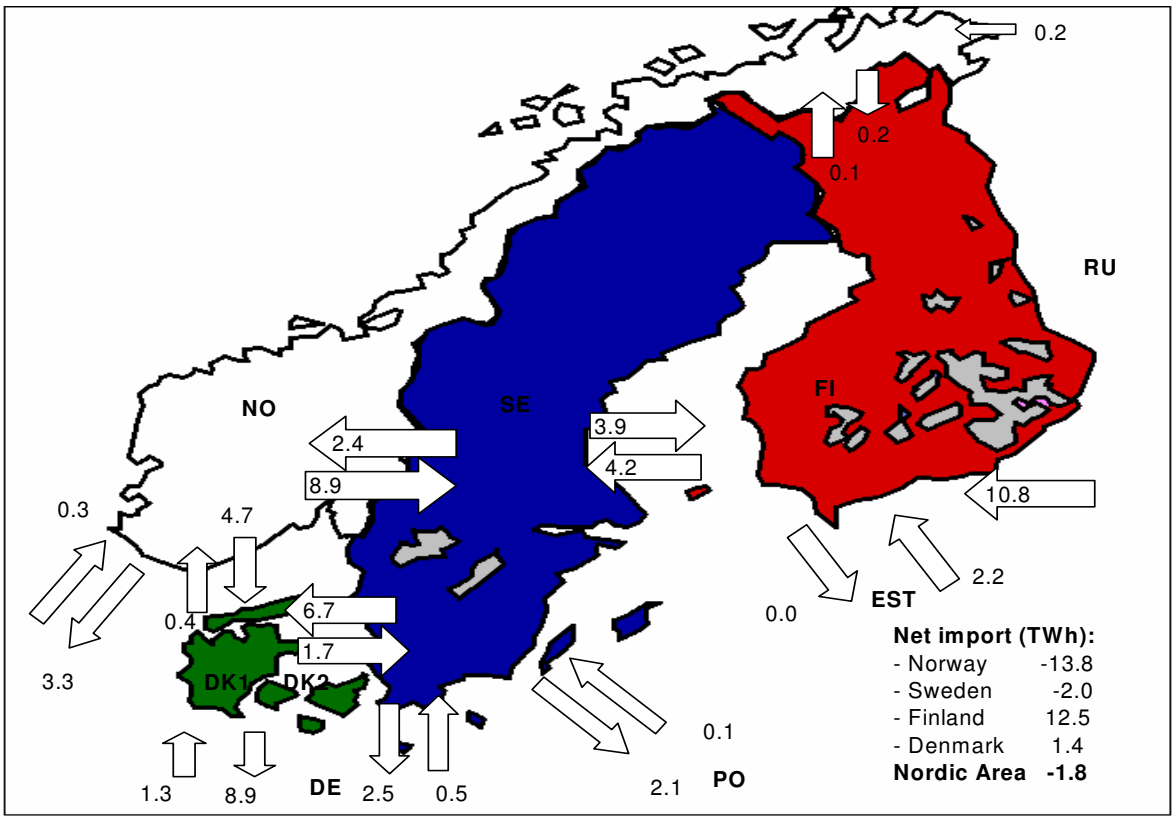

Figure 20. Power exchange, 2008
Source: Nord Pool Spot

The Nordic area has been a net importer of electricity for six of the last ten years. In 2003, 2004 and 2006 the net import was more than 10 TWh. The Nordic region was a net exporter in 1999, 2000, 2005 and last year. The biggest net export was 2.6 TWh in 2000. The import from Russia to Finland accounts for most of the total Nordic electricity import. Due to technical restrictions Nordic export on this connection is not possible. The exchange between the Nordic countries and Central Europe (Germany and Poland) varies more with weather conditions.

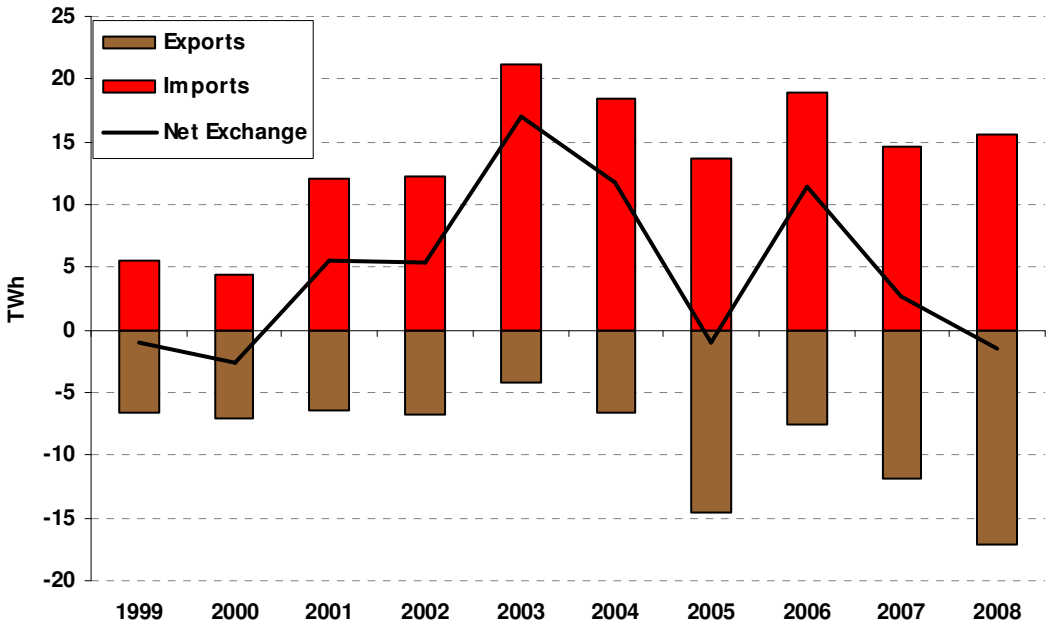

Figure 21. Nordic power exchange, 1999 – 2008
Source: Nord Pool Spot

In 2008, the net export of electricity from the Nordic power system was 1.8 TWh as opposed to a net import in 2007 of 2.8 TWh.

6.5 Balancing markets

A common Nordic balance management is an important part of the development of a common integrated end-user electricity market in the Nordic region.

A proposal to harmonize important features of balance management was presented in February 2007. The proposal consisted of:

- Common principles for cost allocation between balance responsible parties and grid
- Two balances – one for production and one for consumption
- Common model for the settlement of imbalances - one price settlement for the consumption balance and two price settlement for the production balance
- Common fee structure
- Elbas available in all Nordic countries
- Common gate closure for final plans to the TSOs

The Nordic countries have agreed on the common balance proposal. The new balance agreement was implemented in Denmark, Sweden and Finland from the beginning of 2009. In Finland production up to 1 MW is settled as consumption. The agreement for

common Nordic balance management with one imbalance price for consumption and two imbalance prices for production is expected to be implemented in Norway in autumn 2009, with an exemption for generation units under 3 MW installed capacity, which will be settled as consumption.
.
The purpose of balance settlement is in all Nordic countries to settle the imbalances that are the result of electricity deliveries between the parties in the electricity market. The system operators perform two types of balance settlement.

The first is the balance settlement between the countries. Balance power between two countries is priced and settled according to the Nordel System Operation Agreement. Since September 2002, bids from market participants with available regulating capacity are entered into a common price list in the common Nordic Operational Information System (NOIS). There is now a common regulation power market and the system operation agreement results in a balance control and balance regulation of the interconnected power system that is much harmonised.

The balance settlement inside the countries is a settlement between the system operators and the balance responsible parties. This settlement is governed by national balance agreements.
The balance agreements also describe how the balance responsible parties can participate in the regulation power market.

The total volume of the Nordic balancing market was app. 4.8 TWh in 2008, see table 7.

Table 7. Volume of Nordic balancing market 2008
Source: Nord Pool Spot

	NO1	NO2	NO3[8]	Sweden	Finland	DK2[9]	DK1[10]	Total
GWh	1554.6	337.0	463.8	1236.2	289.3	768.9	104.3	4754.1

Among the different Nordic price areas NO1 had the largest volume with close to 1.6 TWh while Sweden had the second largest volume with more than 1.2 TWh.

The total weekly balancing in the Nordic region is illustrated below in figure 22.

[8] From 17 November there was no NO3
[9] Sealand
[10] Jutland and Funen

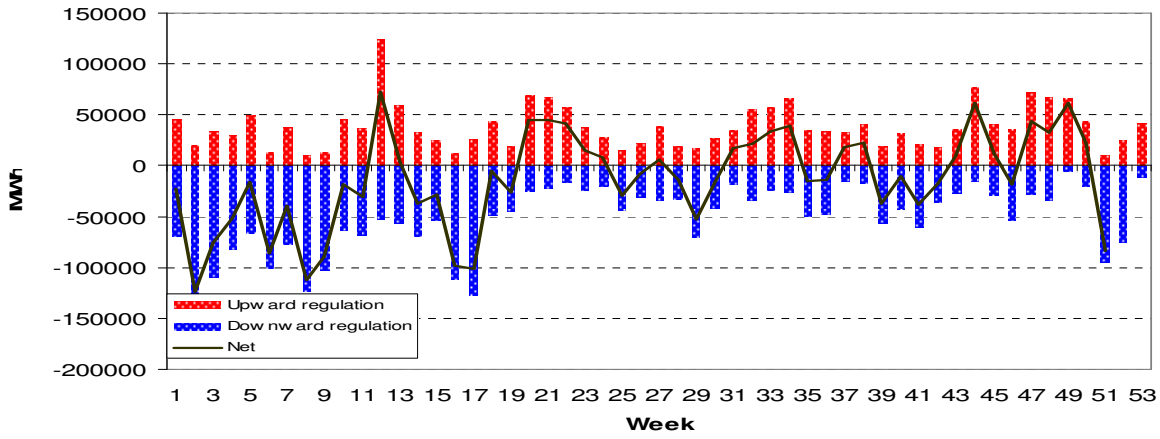

Figure 22. Weekly regulating volumes for the whole of Nordic area
Source: Nord Pool Spot

The largest downward regulation was in week 2 while the largest upward regulation was in week 12.

The balancing volume of an average week in the whole Nordic region is shown in figure 23.

Figure 23. Weekly regulating volumes for the whole Nordic area. MWh, absolute values
Source: Nord Pool Spot

6.6 Main players

Vattenfall AB is by far the largest electricity generator in the Nordic region. The company is owned by the Swedish state. In 2008, Vattenfall generated 73.5 TWh in the Nordic countries. Vattenfall has 41 per cent of the total Swedish generation capacity and 16.8 per cent of the total Nordic generation capacity.

Fortum Oy is majority owned by the Finnish state. In 2008, Fortum generated 51.6 TWh of electricity in the Nordic region. Fortum has about 30 per cent of the total Finnish generation capacity. When adding the Swedish division Fortum holds about 11 per cent of the total Nordic generation capacity.

E.ON Sverige AB is owned by the Germany Company E.ON. In 2008, E.ON generated 30.2 TWh in the Nordic region. E.ON Sverige AB has 21 per cent of the total Swedish generation capacity and around 6 per cent of the total Nordic generation capacity.

Statkraft is by far the largest of the Norwegian generators with more than 30 per cent of the total Norwegian generation capacity in a normal hydrological year. The market share becomes even higher if Statkraft's ownership in other Norwegian generation capacity is taken into account. The yearly amount of electricity generated by Statkraft varies heavily because of the large share of hydropower in Statkraft's generation portfolio. According to the annual report, Statkraft generated 48.8 TWh in the Nordic region in 2008.

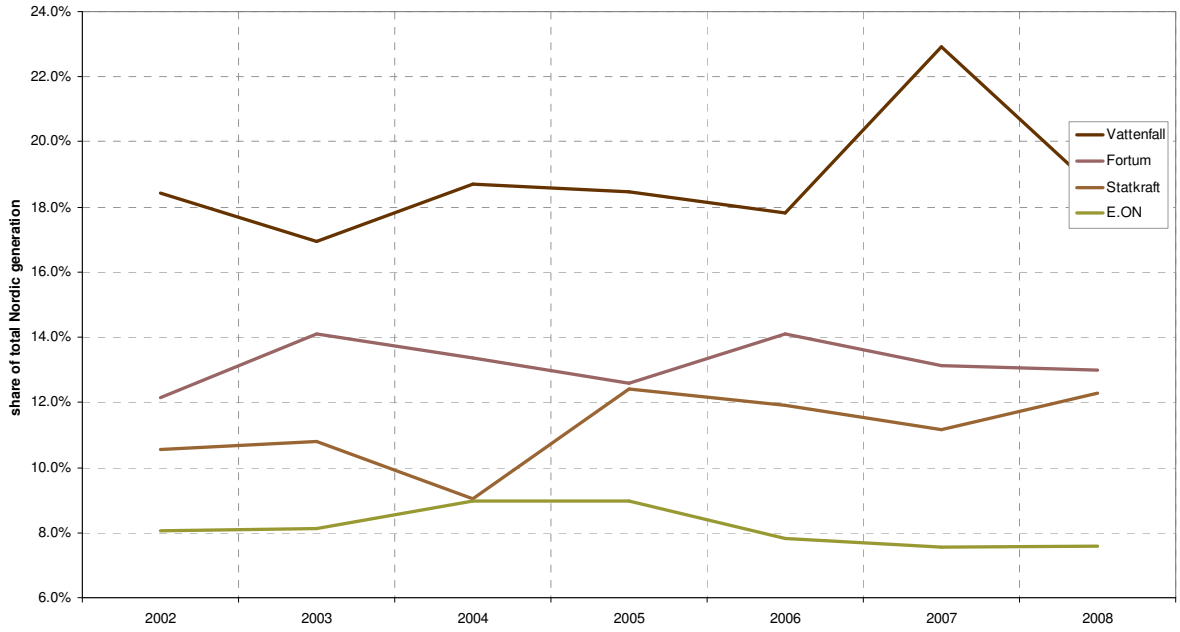

Figure 24. Share of total Nordic electricity generation by the four largest generators, 2002-2008
Source: Swedenergy, Nordel and regulatory authorities

6.7 Wholesale power market: Conclusions

The Nordic wholesale power market is a well functioning electricity market.

Trade at Nord Pool has increased steadily since it was established in 1993. Although trading at Nord Pool Spot is voluntary, significantly more power is now traded on the power exchange than bilaterally.

During 2008 average spot prices at Nord Pool were considerably higher than prices in 2007. Except from South Norway, the average prices for 2008 was also higher than the average prices for 2006. The highest monthly spot price during 2008 was noted in September when the average system price almost reached 68 €/MWh. Higher reservoir levels in 2007 than last year contributed to the price increase from 2007 to 2008 together with decreased export capacity from Norway and exports to the Netherlands. Higher generation costs for thermal power plants for most of 2008 also pushed prices upwards.

7 Retail markets

Unlike the integrated Nordic wholesale power market, the retail markets in the Nordic region are to a large extent still national in scope. There are several reasons for this. One reason is the lack of a common balance settlement within the Nordic region. Another is technical differences for instance in switching models and message formats.

NordREG has in May 2009 published a joint report about the creation of a well-functioning Nordic end-user market for electricity.[11] It suggests that no later than 2015, suppliers in the Nordic countries should be able to offer electricity to customers in any Nordic country on equal terms.

7.1 Development of retail prices

The retail prices for a house using electrical heating (20.000 kWh/year) in the Nordic countries in 2008 are shown below, see figure 25. During 2008 there has been a trend of decreasing prices in Norway and Sweden from January to May. During late spring and the summer the retail prices started increasing and this development continued until the end of September. Afterwards the retail prices again started to decrease and this trend continued the rest of the year. In Finland retail prices increased steadily through the year.

There is no information about Danish retail prices in figure 25 because the Danish retail market differs considerably from the markets in the other Nordic countries[12] e.g. regarding average consumption pr. consumer due to the fact that electric heating is generally not allowed in Denmark.

[11] The report "Market Design – Common Nordic end-user market" can be downloaded from: https://www.nordicenergyregulators.org/Publications/

[12] The supply obligation product covers approx. 90-95% of the Danish consumers (households and small businesses and enterprises). The Danish supply obligation product is a quarterly product supplied by companies granted a concession. The prices for supply obligation electricity apply for one quarter and are under supervision by The Danish Regulatory Authority (DERA). In 2008 the quarterly average prices (without VAT and subscription payment) for the supply obligation product were respectively 6.48 eurocents/kWh (Q1); 6.14 eurocents /kWh (Q2); 6.51 eurocents /kWh (Q3) and 8.83 eurocents /kWh (Q4).

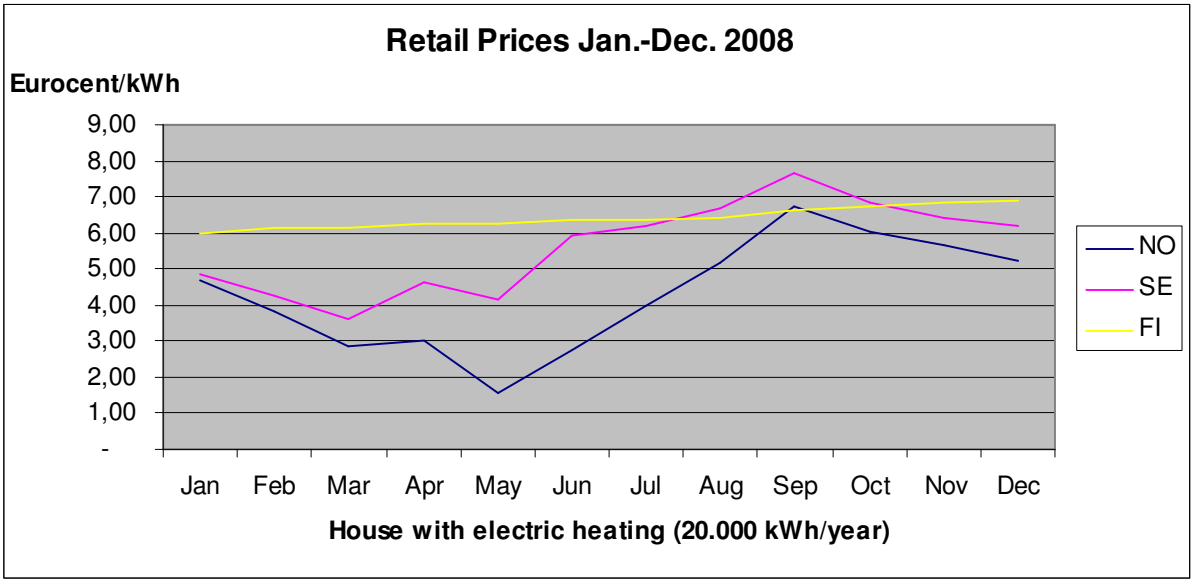

Figure 25. Development of retail prices[13] in the Nordic region, 2008
Source: Regulatory authorities

7.2 Supplier switching

Active customers are essential for a well-functioning electricity market. The share of customers having switched electricity supplier still varies considerably between the Nordic countries. The most active customers in 2008 have been observed in Norway and Sweden. The Danish and Finnish customers have not been as keen to switch supplier.

In the Finnish retail market, electricity prices provided by the local suppliers have increased at a smooth pace and the customers switching rate increased from 4.0 % in 2007 only to 4.4 % in 2008. Due to decreased wholesale prices in late autumn 2008 cheaper price offers in the Finnish retail market were available only just at the end of 2008. In Denmark as well, the low level of supplier switching can be derived from lack of incentives. The presence of regulated maximum prices reduces the possibility for a customer to save money by switching supplier. At the same time quite low electricity consumption per household compare with the other Nordic countries reduces the incentive to switch supplier. Also the combination of a high taxation of end user consumption and the fact that just approx. 45 per cent of the bill of a household is under competitive pressure pushes in the same direction.

The difference in switching activity can be explained by many factors. One of the most important factors is transparency about the price differences and the possibility to save money from switching electricity supplier. Customers having a limited budget who see that switching supplier can reduce their electricity bill are more likely to switch supplier

[13] Spot related prices without taxes. No information available for Denmark.

than others. The tendency to switch supplier also increases with the level of consumption – the bigger the amount of consumption, e.g. customers with electric heating, the larger the resulting absolute savings from lower prices. Obstacles to switching supplier can also be caused by lack of information. Customers who understand how the electricity market is functioning understand also that they can easily switch electricity supplier and have an access to information about suppliers and their price offers.[14] Other barriers may for instance be the absence of marketing activities by the suppliers, inaccurate supplying of metering and consumption data between the market actors or inflexible consumption patterns among some customers.

The collection of information about switching and definitions of key figures describing switching activity differ among the Nordic countries, which makes precise comparisons difficult.

In Denmark the Association of the Danish Energy Companies collects information on switching activity on a quarterly basis. Approximately 14 per cent of the large customers and almost 3 per cent of the small customers changed their electricity supplier in 2008. The switching rate for the large customers is lower than previous years, while the switching rate for the small customers is the same as the year before.

In Finland electric energy can easily be put out to competitive tender through the web portal www.sahkonhinta.fi maintained by the Energy Market Authority. Over 5.8 million searches have been performed through the web portal since opening of this service in 2006, which means that several hundreds of thousands of Finns have compared energy prices. However, only about 4.4 per cent of Finnish electricity users switched their electricity suppliers in 2008.

At the time of liberalization of the Norwegian electricity market, most customers continued to stay with their local supplier with a standard variable contract (where prices can be changed on 2-3 weeks notice). Since the liberalization of the market NVE has closely monitored the market development in the Norwegian retail market. At the end of 2008, 30 per cent of the household customers and 36 per cent of the industry customers had another supplier than the original supplier. Since 1997 there has been almost 2.4 million supplier switches in the household market and at least half the Norwegian households have switched at least once. Furthermore, there can be detected a tendency of customers switching away from the standard variable contract to spot related contracts. During the year 2008 the average share of household customers with standard variable contract and the share with spot contract were about the same. Only 13 per cent of the industrial customers had standard variable contract. In Norway an estimated 194 000 households (about 9 per cent) and 23 000 industry customers switched supplier during 2008.

Approximately 9 per cent of the Swedish household customers switched electricity supplier in 2008. This is a decrease of about 6 per cent comparing to last year. It is an

[14] Supplier switching in the Nordic countries, NordREG.

increasing number of customers with a low annual consumption that are switching from one supplier to another.

7.3 Main players

The number of electricity suppliers in Denmark is close to 57 – trading companies with supply obligation companies and trading companies without such obligation. The about 36 supply obligation companies have each been granted a concession for a specific geographic region where they supply households and small businesses having not concluded an individual contract. Approx. 90-95 per cent of the Danish households and small businesses are supply obligation customers. The approx. 21 trading companies supply the rest of the market i.e. mainly larger businesses and enterprises. Among the largest trading companies in Denmark are DONG Energy A/S, Energi Danmark A/S and Scanenergi A/S.

The number of electricity suppliers in Sweden has fallen since the deregulation of the electricity market. In 1996 there were over 220 suppliers in Sweden. By 2008, this figure has fallen to 124. About 104 of these companies operate throughout the country. The decline in the numbers of electricity suppliers is mainly due to mergers and acquisitions.

In Finland the number of retail suppliers of electricity has remained at a relatively high level since the opening up of the market in the late 1990's. To serve Finland's circa 3.1 million electricity customers, there are currently more than 70 retail suppliers of which approximately 35-40 suppliers are also giving price offers to customers located outside their traditional supply area. In the Finnish electricity retail market there are less than five electricity retailer suppliers with a larger than 5 per cent of share of retail market. The combined market share of the three largest suppliers in the retail market for small and medium-sized customers has been about 35-40 per cent.

In Norway the number of active suppliers varies over time. In week 25 in 2009 there were 26 suppliers with offers in all grid areas in Norway and a total of 97 suppliers in the whole country. Only five suppliers for the retail market have a market share of 5 % or more calculated by volume in 2008. Again three out of those five companies supply 32 % of the total volume delivered to households.

7.4 Retail markets: Conclusions

Even though the work of integrating the Nordic retail markets has begun there are still four separate markets. Therefore, comparisons between the markets should be done with caution.

Active customers are essential for a well-functioning electricity market. The share of customers switching electricity supplier differs considerably between the Nordic countries; from approx. 3 per cent in Denmark to about 9 per cent in Sweden and Norway.

NordREG's work towards a common Nordic retail market is of great importance to the Nordic electricity customers. Harmonisation of the regulation and processes related to supplier switching and agreeing on a common Nordic balance management would facilitate the work towards an integrated Nordic retail market. This development would lower obstacles for the suppliers to operate in various Nordic countries and thus increase competition in retail level. Possibility to choose between suppliers from all Nordic countries would most likely increase customer activity furthering innovation of new products, services and contracts. NordREG suggest in its latest published report that in 2015 suppliers in the Nordic countries should be able to offer electricity to customers in any Nordic country on equal terms. Increased activity of suppliers and customers would mean a more competitive Nordic retail market leading to more effective retail market to the benefit of the customers.

8 Market indicators for the Nordic electricity markets

The Nordic Market Report describes the status and development of the Nordic electricity markets. The report offers statistical information on the development of the Nordic market, description and data of the market structure and main players and information on the retail market.

A number of the data already in the market report can be seen as indicators of the markets in terms of competitiveness, function, structure etc. This goes for data such as supplier switching, market shares of largest market players and the like. However this data does not provide a comprehensive set of indicators in their present state.

As stated in last year's report, NordREG has undertaken a new task within the report – the development of a number of statistical indicators to describe and assess the functioning and status of both the wholesale and retail markets. The intention is to include a chapter on the chosen indicators in the report. The work on the indicators is complex and still ongoing. NordREG intends to launch a public consultation in the beginning of 2010.

9 Ongoing NordREG work

The market report has so far provided a general presentation of the recent development of the Nordic electricity market based on NordREG's running electricity market monitoring. But NordREG also makes deeper analyses on market issues and proposes changes to facilitate market development and market integration.

Some of NordREG's most important projects are presented in this chapter based on conclusions drawn in NordREG's reports published in 2008. The descriptions below are organised according to NordREG's strategic priorities:

- A truly common Nordic retail market with free choice of supplier
- A well-functioning Nordic wholesale market with competitive prices
- Reliable supply
- Efficient regulation of TSOs

9.1 A truly common Nordic retail market with free choice of supplier

The work during 2008 was addressed by the interrelated working issues of "harmonized supplier switching model", "costs and benefits of an integrated Nordic retail market" and "market design of the common Nordic end-user market".

NordREG published in February 2008 a suggestion on a harmonized supplier switching model. Based on the detected differences in the present supplier switching processes in the Nordic countries NordREG has proposed a harmonized switching model for the countries. The focus of the report was on residential and small business customers. NordREG has forwarded the suggestion also to the electricity market group under the Nordic council of ministers.

In January 2008 NordREG ordered a study on cost-benefit analysis of Nordic retail market integration from VTT. VTT studied the Nordic retail market integration by comparing on one hand the current retail prices between the different Nordic countries and the other hand corresponding retail margins. The other part of this study was dealing with the costs related to renewal of IT systems as well as the harmonization needed for operation in the Nordic area. The study made a qualitative assessment of the costs and benefits of an integrated Nordic retail market and identified the key elements of the costs and benefits of the integration. In 2008 also Econ Pöyry made a study on the costs and benefits connected with the creation of a harmonized Nordic retail market. This study was financed by the Nordic Council of Ministers and NordREG participated in this study by being a member of the reference group. The study was based on data collected through web based questionnaires sent to suppliers and DSOs respectively in the Nordic markets, and interviews with key stakeholders. However, it was only

possible to get responses from a limited number of respondents and therefore the results of this study were indicative only.

Also in 2008 NordREG started to prepare a report on market design of the common Nordic end-user market. The objective of this report has been to prepare a suggestion on a harmonized Nordic retail market model and a detailed implementation plan (road map). The objective of the end-user market integration is "to minimize the regulatory and technical obstacles for the suppliers willing to operate in the various Nordic countries". The vision is that in the future the roles and responsibilities of different market actors, processes between them and the framework for customer protection are harmonized enough between the Nordic countries to make it smooth, feasible and attractive for the suppliers to start operating also in other Nordic countries. The report of market design was finalized and published at the NordREG website in May 2009.

9.2 A *well-functioning Nordic wholesale market with competitive prices*

The Nordic Energy Ministers have a vision of a further integration of the Nordic electricity market. The vision was originally formulated at the ministers meeting in Akureyri in 2004. This has been supported by a process where Nordel, NordREG and also Nordenergi have been invited to contribute for the future.

While there is political support for the vision of one Nordic electricity market, there is not a common legal framework in all areas for the further integration of the Nordic market. The integration process that has been going on the last 15 years has implied that the Nordic wholesale market in many respects already functions as a common Nordic market. But there are still several issues where further development of the market model and increased harmonization are needed to establish a truly common and efficient Nordic wholesale market.

The following objectives relevant to the wholesale market are regarded as strategic issues by NordREG:

- to develop a common balance management and settlement system,
- to promote competitive market structures,
- to ensure smooth interaction with other European regions,
- to ensure a well functioning power exchange,
- to ensure adequate level of transparency in the market,
- to promote market-based or legal environment of security of supply,
- to ensure harmonized procedures for handling extreme situations,
- to regulate and monitor the TSOs with focus on efficiency and Nordic harmonization and
- to promote adequate transmission capacity and efficient market based congestion management methods.

All these issues are to some extent interrelated, and have been taken into account in NordREGs work on wholesale and transmission issues in 2008. The main activities in 2008 have, however, been the further development of a common balance settlement system, congestion management, peak-load issues and co-operation related to regulation of Nord Pool Spot.

In February 2008, NordREG published a report with NordREG's evaluation and conclusions related to the proposal from Nordel to harmonize important features of the balance settlement by 2009. NordREG concluded that the Nordel proposal has potential to enhance the functioning of the Nordic market and also strengthen the Nordic market in a regional and European context. The implementation of the agreement was completed in Denmark, Finland and Sweden during 2008. The agreement will be implemented in Norway in autumn 2009, with an exemption for generation units under 3 MW installed capacity, which will be settled as consumption. The intraday trading platform, Elbas, which was part of the Nordic agreement, and already in place in Denmark, Finland and Sweden, has been introduced in Norway from 4 March 2009.

The Electricity Market Group has, following the 2007 meeting of the Nordic energy ministers, invited NordREG to make an assessment of Nordel's proposal "Guidelines for implementation of transitional peak load arrangements" focusing on to what extent common Nordic principles are needed, and how these principles should be designed to minimize the impact on the market. The analysis should focus on implications for prices in the short term (extreme situations) and long term, power flows and investments.

NordREG commissioned an external consultant to analyze Nordel's proposed guidelines, and the results were discussed in a workshop arranged by NordREG in May 2008 where both Nordel and Nordenergi participated. NordREG's work on the Peak Load issue has been coordinated with a task and study on the same issue given to EI by the Swedish Government. In parallel with this study, the Swedish and Finnish TSOs have worked out new conditions for activation of the peak load reserves in Sweden and Finland. Nord Pool Spot and the relevant regulators have been consulted in the process. After approval by NVE regarding changes in the Nord Pool Spot rules, and approval by EMV to apply modified activation rules in Finland, the new activation model was introduced on 19 January 2009. The resulting procedures are a modification of the Nordel proposal for activation introducing more details and practical arrangements compared to Nordel proposal. A NordREG evaluation of the Nordel proposal was given to EMG by March 2009.

9.3 Reliable supply

Another of NordREG's priorities is to contribute to reliable supply of electricity in the Nordic region.

The priority has two dimensions:

- **To promote market-based or legal environment for security of supply**

- **To ensure harmonised procedures for handling extreme situations**

The roles of national regulatory authorities of the Nordic countries in relation to security of supply issues are very different. Other public authorities, too, have important responsibilities and in certain cases the responsibilities assigned to regulatory authorities are minor. NordREG during 2007 has been carrying out a review of the roles and responsibilities as well as of the legislation relevant to the issue.

9.4 Efficient regulation of TSO

TSOs play a crucial role in the efficient operation of the market, especially the wholesale market. Therefore the strategic priorities of "efficient regulation of TSOs" and of "a well-functioning Nordic wholesale market with competitive prices" are closely linked.

Congestion management is an issue of vital importance in the Nordic market. NordREG has investigated to what extent the Congestion Management Guidelines have been implemented in the Nordic market. In the report issues requiring Nordic approach in the implementation of the guidelines have been identified. Furthermore, some clarifications from the Nordic perspective in implementation are discussed and also issues irrelevant for the Nordic interconnections are identified and reasons omitting these issues in Nordic interconnections are given.

Implementation of the new EU Congestion Management Guidelines was more specifically addressed in a follow up study during 2007 resulting in the report Congestion management Guidelines – Compliance report. The report concludes among other things, that while the implicit auctions of the Nordic countries fully comply with the Guidelines, more transparency in the use of reduction of interconnector capacity as a congestion management tool is called for. The TSOs in addition are encouraged to increase mutual co-ordination and exchange of information as well as publication of relevant information to market participants in a fully non discriminatory way. In addition to such efforts to optimize the use of the present transmission system necessary new transmission investments should be promoted through increasingly coordinated planning and by monitoring of the use of congestion income by the regulatory authorities. A follow up report on implementation of the Congestion Management Guidelines in the Nordic market was published in 2008.

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