NordREG memo to EMG on the price peaks in the NPS market

September 14th, 2010

1. Introduction

The Nordic wholesale power market prices peaked during the winter 2009-2010. For Sweden, Finland, Eastern Denmark, Mid and Northern Norway there were three very high price peaks that occurred on December 17th 2009 at 17-18 in the evening, on January 8th 2010 between 8-9 in the morning and on February 22nd 2010 between 8 and 9 in the morning. For these areas the prices during the three peaks were 1400, 1000 and 1400 EUR/MWh, respectively. The system price remained at 300 EUR/MWh or below. At the same time the price in Southern Norway and Western Denmark was low, at about 65 EUR/MWh.

Demand in the entire area was high due to the exceptionally cold weather. Much of the Swedish nuclear generating capacity was down due to maintenance and upgrading that had been taking much longer time than expected. The water reservoirs were below the long term average due to low precipitation levels.

This paper is based on a consulting assignment where NordREG contracted Gaia Consulting to describe the anatomy and causes for these price peaks. The steering group of the project consisted of representatives of the Nordic Energy Regulators and the Nordic Competition Authorities. This summary of the findings has been complemented by the views of the Energy Regulators and the Competition Authorities, though the opinions presented herein cannot constitute a legally binding opinion for any of the mentioned authorities.

There is a plan to arrange a workshop to discuss the results of the study where all the relevant stakeholders will be invited. Taking into account the outcome and feedback from the workshop NordREG will, if appropriate refine the preliminary proposals presented here

This paper first describes the process and identifies the issues that went wrong and resulted in the price peaks. Subsequently the paper introduces some ideas how the root causes for the price peaks could be eliminated on short and long term. The emphasis has been put on proposing short term actions.

2. What went wrong?

Winter 2009/2010 was very cold all over the Nordic area. This cold weather was caused when continental dry cold air from east and south east dominated the weather instead of wet air from the Atlantic that normally brings rain to the area. The cold weather subsequently increased electricity demand, especially in space heating while the low precipitation led to reduced water level in the reservoirs. Substantial upgrading and

maintenance operations (renewal operations aiming at increasing the generating capacity of the plants) had been started in some Swedish nuclear generating plants. This led to unexpected delays which prolonged the duration of the resulting outages and as a result the nuclear power generation capacity in some weeks was reduced by 40% compared to normal levels.

It is important to underline, that - although price peaks are unwanted - price increases in case of scarcity are inevitable results of the market functioning and give price signals to consumers to decrease demand and to producers to increase supply. However, we want to avoid unmotivated peaks due to eg. poor regulation, false forecasts, manipulation or use of market power or other reasons.

Transmisson capacity

The Nordic power market is interconnected by multiple transmission lines. One of the key lines connects Southern Norway to Sweden. This Hasle connection has a normal capacity of 2000 MW. The capacity is reduced when consumption in Oslo is high. This was the case for all three peak periods, and for the January 8 price peak, the TSO had reduced the usable capacity in this line to zero (0 MW).

In the current market design, the TSOs have to announce the transmission capacities between elspot bidding areas at 9.30 a.m., or 2,5 hours before the elspot closes at noon. As the capacity of an electric grid depends on the production and consumption across the complete grid the capacity announcement has to build on estimated generation and consumption for the entire grid. During the peaks the actual electricity consumption was substantially lower than the estimated consumption in the forecasts prepared by the TSO:s. An overestimation of the consumption may have resulted in lower than necessary elspot capacities for the transmission lines in the Nordic area.

Reserves utilization

As the aggregate amount of elspot sell bids in Finland, Sweden, Northern Norway and Eastern Denmark with the available imports were not sufficient to cover the aggregate amount of buy bids for several of the peak hour(s), peak load reserves in Sweden and Finland were bid into the power exchange according to agreed rules. Without the reserves, the Nord Pool price would have been 2000 Euro/MWh and there would not have been market clearing. Using the reserves NordPool SPOT settled the crossing point of the buy and sell curves at 1400 Euro/MWh, still a very high price level.

Deviations between elspot volumes and actual volumes

In all peak hours there were substantial down regulation in the high price regions. The cause for this can be two fold, it can be regarded as a sign of the capacity of electricity consumers to react on the price signals by cutting temporarily demand.

A further explanation can be that special regulations by the Swedish TSO in the southern parts of Sweden due to congestions rendered the system overbalanced. According to normal routines this situation would lead to a need for down regulation.

Demand flexibility

When we talk about price peaks, we talk about very short periods of high prices, and it is not known before the matching calculation how high the prices will be and when the price peaks will occur. On Nord Pool Spot it is possible for players to post price flexible bids of both supply and demand. In practice, a player posts buy and/or sell bids. In the case of flexible consumption, a player will post their normal buy bid but complement it with a flexible sell bid. This is due to the technical solution used in the NPS system. Due to this construction flexible demand will show up as increased supply while at least short time demand will remain the same. This means that short time flexibility will not show up on the demand curve as expected.

Another way to exercise flexibility is to react to the spot prices once they are known. This means that a customer who has hourly metering can decide to simply use less electricity during price peaks. It should be understood that the final customers are seldom the ones that are actively trading on NPS. Even in the case of large industries, the bidding is commonly done by the balance responsible supplier. Often the contracts between final customer and the retailer do not include a requirement to report any intentions to reduce consumption even at high prices. This can lead to a situation where the balance responsible party has to buy too much electricity for their customers and thus face an imbalance.

In total, at this time the flexibility on the demand side is not very large. Simulation has shown that even small degree of increased price elasticity could substantially cut the price peaks. This could be seen as an improvement potential of the trading system reflecting the present inability of the market participants to react on the price signals the market place provides.

3. Recommended short-term actions

The following is a listing of possible solutions to the problem with the focus on short term solutions. Some issues would require more analysis and simulation work. However, there is no one solution that would solve the problem, but a multitude of solutions would need to be implemented, some short term and some long term.

The following listing of possible actions to prevent re-occurrence of the price peaks in the coming years is divided into sub categories. Each of the categories contains multiple proposals that are not presented in priority order. However, all categories should require some attention.

Increase transparency in the market

The area bidding curves at NPS could be publicized to enhance the transparency of the market and to enable all the market participants to have access to the trading data. The time frame of this would need to be clarified. Additionally before implementation, a study would need to be prepared to clarify, whether this would have any implications on the competitiveness of the market.

Increased knowledge of high peak price behavior to retailers and producers in high price situations would need to be published. This could encourage the demand flexibility behavior.

Publishing individual bids may from a competition point of view be much more complicated on this oligopolistic market. However, with a time-lag, individual bids should be available for analysis and research.

Activate demand flexibility

Due to the prevailing characteristics of the market a study should be undertaken on how to promote demand flexibility in a coherent way.

The NPS market is very inflexible, i.e. the users do not in general react on the price signals. However, it seems that there is some flexible consumption among customers with hourly metering. Experience shows that many of these would rather react to price peaks when they are known, which in turn would lead to imbalance problems for their suppliers.

More price elasticity could be enabled through the introduction of hourly read smart meters, which would establish the capability for the end users to react on the price signals either autonomously or through a load aggregator. This could trigger changes in the retailers informing requirements in the legislation..

Adjust price areas

Dividing the market to more relevant and in some cases smaller bidding price areas could be studied further.

Market power does not depend on the regime used to handle bottlenecks in the grid. If a producer has market power under one regime, the same producer will have market power under another regime. It is only on which sub-market the market power may be exercised that is affected.

Ensure production availability

Harmonizing the scheduling procedures for the maintenance of major generating units should be analyzed for the entire area. One option could be not to permit maintenance between December 1 and the end of February, i.e. during the period when the highest demand occurs. Should, this become necessary a special permitting procedure would need to be used.

In Finland the legislation states that in order to improve the oversight of the supply and demand balance in the electricity market and to eliminate the chances for market price manipulation during high demand, regulators should have the mandate to approve or to postpone the maintenance outages of major generating plants (over 100 MW) scheduled for the winter period. One way to address the issue could be to introduce a system following the Finnish pattern to the entire Nordic area.

4. Long-term overview and other policy connections

The construction of the transmission link over Great Belt in Denmark, connecting thus the eastern and Western Danmark price areas will stabilize the system. Further investment

already described in the 2008 Master Plan, like the new link connecting Southern Norway to Sweden and the Ørskog-Fardal line will contribute to the stability of the Nordic power system. Additionally new connections to the continental markets and the introduction of the EMCC-CWE link will further impact the picture.

Additional actions that could be considered later include the calculating simultaneously the transmission capacities and the supply/ demand balance and the prices, closing the gap between day-ahead market and the real time trading. The use and pricing of reserve capacity could be reconsidered. Additionally the increased use of renewable generation and the subsequent impact on the overall power system structure should be studied.