

The Decreasing Wholesale Electricity Prices

Previous notes have indicated that the wholesale prices seem to be decreasing. They also demonstrated that consumer prices of electricity are increasing at a much higher rate than other consumer prices¹. This note will discuss the wholesale prices in more detail.

Nordic and European Market Prices

Denmark is a member of the Nordpool Spot Market. Nordpool is divided into a number of bidding zones, which can have individual spot price in case of bottlenecks in the grid. Denmark has two bidding zones, west and east of the Great Belt.

Due to the increasing amount of fluctuating generation in Germany and other countries, there is an increasing need for exchanges with Norway. Norway can sell balancing power from its hydropower system with very large reservoirs.

In most cases, the need for exchanges exceeds the transfer capability of the interconnections between Norway and the Continent. The bottleneck can be either between Norway and Denmark or between Denmark and Germany.

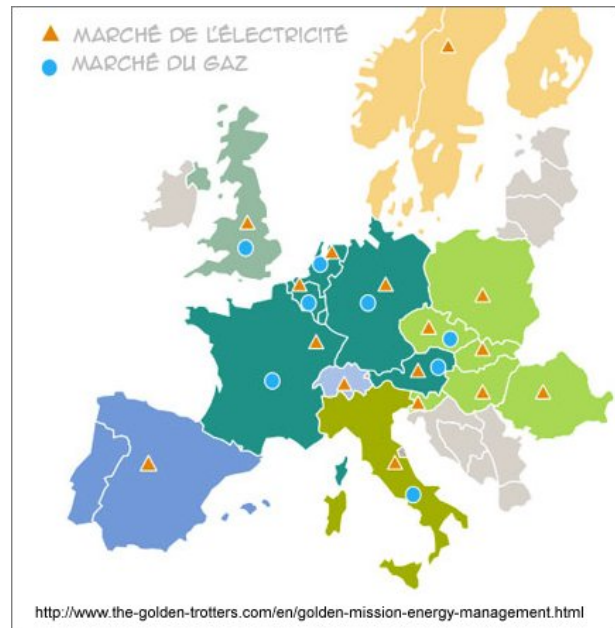


Figure 1 - European energy markets

Depending on the location of the bottleneck, most Danish spot prices are identical with either Nordic or German spot prices. In a few cases with bottlenecks in both directions, Denmark has spot prices of its own. The Danish average spot prices for a year are always somewhere between the Nordic and the German average for that year.

The chart with average Nordic and German spot prices for the years 2006 to 2014 confirms the decreasing trend of the wholesale prices.

The Nordpool price is slightly lower than the EEX price. The average annual decrease is about 4% in both cases.

The variations from year to year reflect changing energy balances in the two areas.

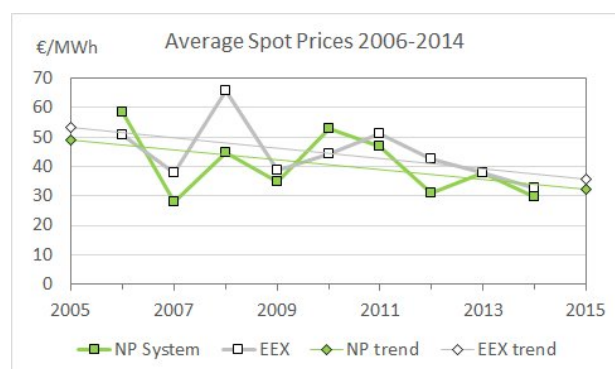


Figure 2 - Average spot prices from European Energy Exchange (EEX) and Nordpool Spot (system price)

¹ http://pfbach.dk/firma_pfb/pfb_falling_wholesale_prices_2015_09_15.pdf and http://pfbach.dk/firma_pfb/pfb_have_german_electricity_prices_stabilized_2015_10_22.pdf

In the Nordic area, the hydrological conditions are decisive to both energy balance and spot price levels.

The transition in Germany from fossil fuel and nuclear to renewable electricity (die Energiewende) seems to create an overproduction of electricity. Increasing amounts of electricity have low variable costs and can contribute to periods with low spot prices and consequently low wholesale prices.

The essential changes from 2006 to 2014 are the reduced nuclear output at about 70 TWh and the increased renewable output at about 90 TWh. Germany has been a net exporter of electricity all the years. The export has increased to 36 TWh in 2014 (same magnitude as Denmark's electricity consumption) and may have contributed to the descending price levels.

Germany	2006	2007	2008	2009	2010	2011	2012	2013	2014
Production TWh									
Fossil fuel	375.2	385.2	374.0	344.5	360.9	355.8	361.1	363.0	340.0
Nuclear	167.4	140.5	148.8	134.9	140.6	108.0	99.5	97.3	97.1
Fluctuating renewables	32.9	42.8	45.0	45.2	49.5	68.5	77.1	82.7	92.4
Dispatchable renewables	38.7	45.5	48.2	49.6	55.3	55.3	66.8	69.6	68.5
Other sources	25.4	26.6	24.7	21.4	26.8	25.6	25.7	26.2	27.0
Total production	639.6	640.6	640.7	595.6	633.1	613.1	630.1	638.7	625.3
Net export	19.8	19.1	22.5	14.3	17.7	6.3	23.1	33.8	35.6
Gross consumption	619.8	621.5	618.2	581.3	615.4	606.8	607.1	604.9	589.8

Source: <http://www.ag-energiebilanzen.de/>

Germany still has a long way to go before it can have a nuclear free and fossil free electricity sector. Therefore, it is likely that the pressure on the wholesale market will continue for the years to come.

Danish Spot Prices Switching between North and South

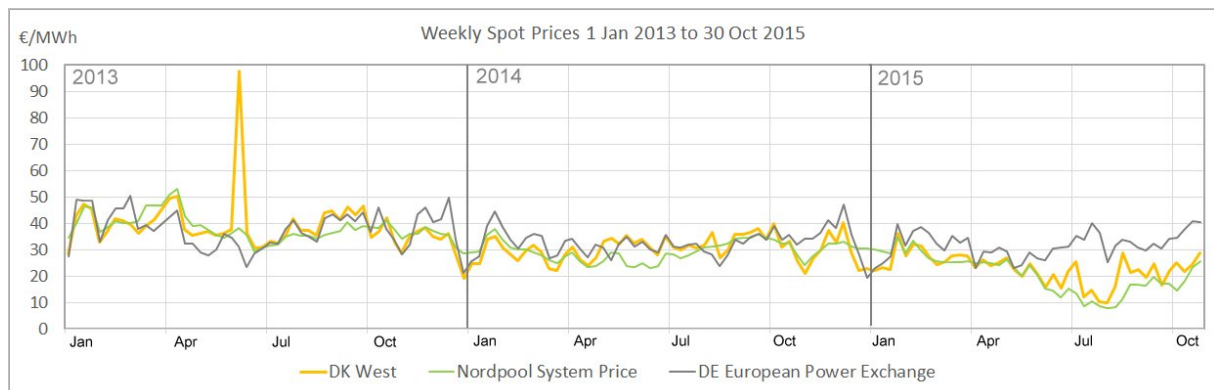


Figure 3 - Weekly spot prices for DK West, Nordpool system price and EEX spot price (Germany) from January 2013 to October 2015

The two Danish price areas have the same spot price in most hours. Fig. 3 shows only spot prices for DK West in order to keep the chart simple. With a single exception, the Danish spot prices follow the trends in the neighbouring countries, even for the weekly averages.

Unusual circumstances caused the peak for week 23 in 2013. The average spot price in West Denmark was € 97.60 per MWh. This price was the result of a shortage of resources on one

day, the 7th June 2013. Two large units and the Great Belt link were out of service for maintenance. A main transmission line in Jutland was being rebuilt and the forecasted wind power output was low. Besides, import from Norway on the Skagerrak link was limited from 1000 MW to 700 MW and there was no import from Sweden during the critical hours. The spot prices and the upwards regulation prices hit the price ceiling (€ 2,000 per MWh) from hour 8 to hour 12 (07:00 to 12:00).

The very low spot prices in Denmark during the summer 2015 was the result of two coinciding circumstances:

- High water levels in the Nordic hydro systems
- Start-up of a new 700 MW pole of the Skagerrak link between Denmark and Norway.

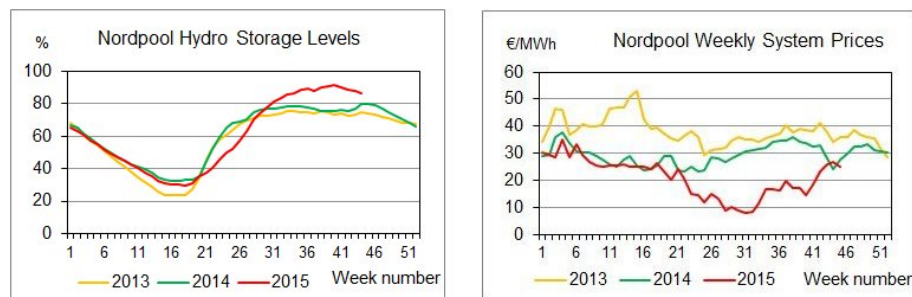


Figure 4 - Nordpool water levels and system prices 2013 to 2015

Fig. 4 demonstrates the market reaction to low water levels in the spring of 2013 and high water levels in the summer of 2015. In October, the conditions seem to approach the normal.

The increase of the capacity of the Skagerrak link from 1000 MW to 1700 MW from the beginning of 2015 moved a bottleneck from Skagerrak to the Danish-German border.

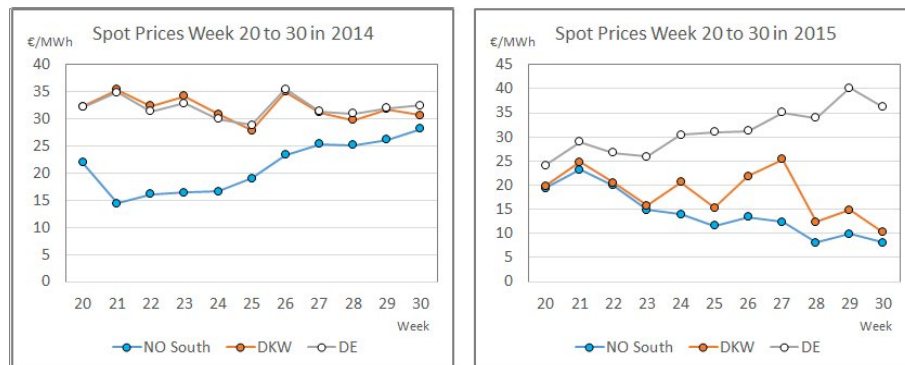


Figure 5 – In 2014, a bottleneck in Skagerrak gave German prices in West Denmark. In 2015, the bottleneck at the German border diminished German price influence.

The strong influence of Norwegian prices in 2015 caused Danish wholesale prices to approach Norwegian price levels. Later the planned reinforcements of the cross border capacity between Denmark and Germany² might switch the bottleneck back to Skagerrak.

² See http://pfbach.dk/firma_pfb/pfb_german_market_policy_limits_exchange_2014_04_14.pdf

Low Wholesale Prices without Influence on Consumer Prices

Most observers now realize that the energy transition has a cost. The electricity consumers must pay the cost. Falling revenues from the wholesale market must therefore be counter-balanced by increasing subsidies for the renewable production. That is exactly what has happened in Germany and Denmark.

For more than 15 years, the household electricity prices have increased by about 4% per year in Germany and 3% per year in Denmark³, while the wholesale prices according to this note have been decreasing since 2006, also by 4% and 3% per year.

Several traditional power plants are being decommissioned as result of the low wholesale prices of electricity. It will be necessary to install dispatchable backup capacity as replacement of some of the decommissioned units. The necessary reserve capacity must be paid by the consumers.

It seems most likely that the gap between wholesale prices and consumer prices will continue its growth.

³ http://pfbach.dk/firma_pfb/pfb_have_german_electricity_prices_stabilized_2015_10_22.pdf