

New Nordpool Data Reveal European Bottlenecks

Nordpool Spot has since 4 July 2019 published hourly electricity spot prices for several European countries outside the Nordpool spot market. See <https://www.nordpoolgroup.com/historical-market-data/> and select for instance "Elsot Prices_2019_Hourly_EUR".

The sheet includes spot prices for the Nordic price zones and for Austria, Belgium, Germany-Luxembourg, France and the Netherlands. The easy access to these data has made it easier to study the mutual influence between the European electricity markets.

The first full month with the new data is August 2019

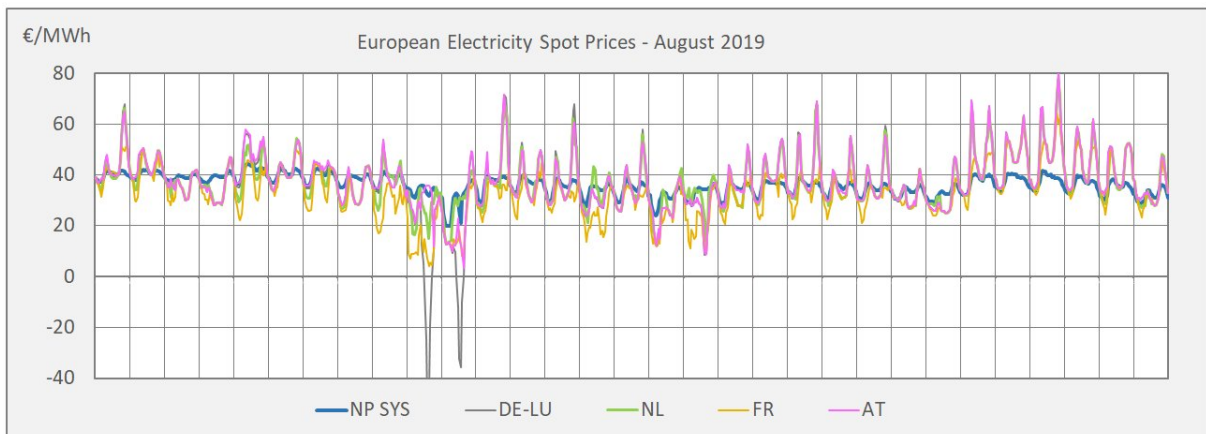


Fig. 1 - Selection of European spot prices - August 2019

It is difficult to track each price curve in fig. 1, but it is possible to make some observations:

€/MWh	SYS	DK1	DK2	DE-LU	NL	BE	FR	AT
August	36,11	37,87	39,49	36,85	37,44	33,72	33,39	37,71

Table 1 - Average European spot prices August 2019. "SYS" is Nordpool Spot's System Price.

- Austria used to be a part of the German price zone, but is now a separate electricity market. The change gave Austria slightly higher and more volatile spot prices than Germany, particularly in daylight.
- If Germany had been divided into two price zones, the Austrian prices show a possible profile of the spot price in a South German price zone.
- France had in most cases lower spot prices during nights than its neighbours.
- A wind peak on Saturday 10 August caused negative spot prices in Germany during the weekend. Germany had 30 GW wind and 15 GW solar on Saturday afternoon, and 15 GW wind and 25 GW solar on Sunday afternoon.
- The overflow affected the price levels for all neighbouring countries.
 - The negative prices spread to DK1 (Denmark west), but not to DK2 (Denmark east).
 - The Nordpool system price was the most stable (low volatility).

The Cobra cable between Denmark and the Netherlands will soon be ready for commercial operations. It may loosen the binding of the West Danish price zone to Germany and reduce price fluctuations.

Price differences indicate bottlenecks or market deficiencies

Europe has several electricity markets. Each spot market can have one or more price zones. In a perfect market, all zones have the same price for each time step (typically one hour).

It is not realistic to build interconnections strong enough to eliminate bottlenecks. The price differences between price zones indicate the magnitude of the congestion problems. The narrowing range of quarterly spot prices suggests a certain improvement (fig. 2).

The UK and Italy have prices in the high end with Norwegian and Swedish prices in the bottom. The gap narrows from about 40 €/MWh in Q3 in 2015 to about 20 €/MWh in Q1 2019. The French prices oscillate between the high level (Italy and the UK) and the low level (Germany).

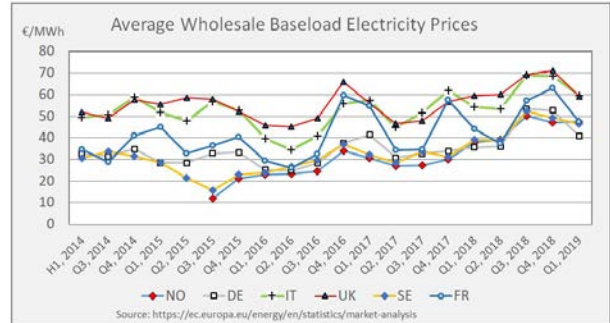


Fig. 2 - Quarterly spot prices for six European countries

In Q1 2019, Germany had the lowest average spot price among the six countries in fig. 2.

Hampered cross-border electricity trade in Europe

Table 2 is an example of use of the new Nordpool spreadsheet.

When there are different spot prices at the two sides of a border, the demand for transport exceeds the capacity in the day-ahead planning. A price difference suggests a bottleneck.

Table 2 shows the number of hours in August 2019 with price differences exceeding 1.00 €/MWh for 13 selected exchange points or borders. This information is an illustration of the demand for cross-border electricity transport. The links from Norway seem to be the busiest.

Month: 8	2019	Price-difference	Hours	Simult. pricedifference	Margin: Borders	Hours	1 €/MWh
DK1	DK2	135	18%	0	57	8%	
DK1	Kr.sand	467	63%	1	8	1%	
DK1	SE3	339	46%	2	92	12%	
DK1	DE-LU	140	19%	3	61	8%	
DK1	NL	320	43%	4	130	17%	
DK2	SE4	170	23%	5	80	11%	
DK2	DE-LU	251	34%	6	80	11%	
Kr.sand	NL	586	79%	7	74	10%	
AT	DE-LU	89	12%	8	48	6%	
DE-LU	FR	377	51%	9	54	7%	
DE-LU	NL	252	34%	10	47	6%	
NL	BE	365	49%	11	10	1%	
BE	FR	288	39%	12	3	0%	
	Total:	744		13	0	0%	

Table 2 - Barriers at the borders. "Kr.sand" is a price zone in the south of Norway.

Other Nordpool sheets can give a more accurate picture of load conditions for the interconnections, but only within the Nordpool electricity market, because announced transfer capabilities per hour are needed for the calculation. Fig. 3 demonstrates that the simpler method, used in table 2, is a fair estimate in most cases.

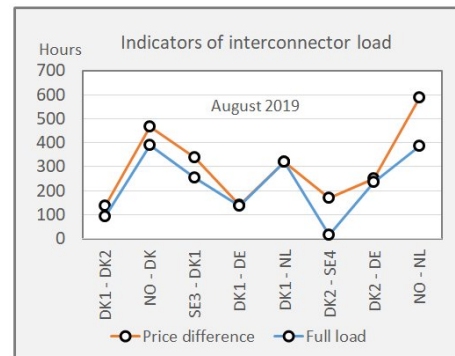


Fig. 3 - Price differences give fair estimates in most cases

Results for the Cobra-link DK1-NL may surprise, because the link was not yet ready for operation in August. The explanation is that DK1, DE-LU and NL had

several hours in August with identical spot prices. The model just counts the hours with spot prices within the margin.

Spot price differences across borders reflect that some demands for electricity transport have not been met in the day-ahead market. The electricity trade in Europe is far from unhindered.

Internal bottlenecks “pushed” to the borders

The transmission system operators must define the transfer capability for each interconnector and for each hour. Reasons for limitations can be the technical capacity at the border or stability problems in the interconnected grids. In some cases, internal congestion in a national grid can be relieved by a reduction of the interconnector capacity at the borders.

Moving internal bottlenecks to the borders will usually prevent an optimal international allocation of energy resources. Therefore, it is important that the competition authorities monitor the efficiency of the electricity markets.

One example is the border between West Denmark and Germany.

After intervention by the Directorate-General for Competition of the European Commission, the German system operator, TenneT, has entered into an agreement with Energinet in Denmark. The minimum transfer capacity from Denmark to Germany has been raised from zero to 700 MW (fig. 3).

The agreement does not remove the bottlenecks in the German grid. Therefore, the results of the German market procedure must be adjusted further by redispatch and feed-in control.

Wholesale prices help understanding the European electricity markets

It used to be necessary to collect hourly spot prices in different formats, country by country, in order to create a European overview. For some markets, it was necessary to pay for the data. For others, such as Denmark, the spot prices are published with one or two weeks delay.

Now, a free selection of European hourly spot prices is available the same day as a spreadsheet on Nordpool Spot's homepage. This is a welcome help for analyses of the electricity markets in Europe.

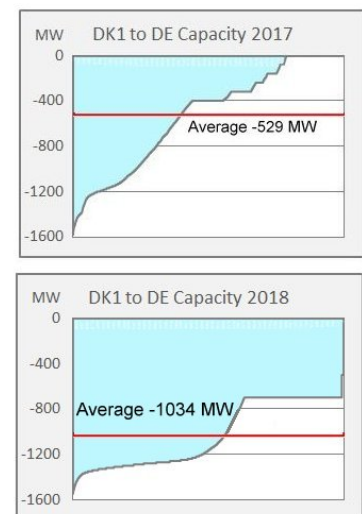


Fig. 4 – Duration curves. Agreement raised the minimum capacity from zero to 700 MW in 2018