

# Power price discovery in Europe

Logical Information Machines' *Sandy Fielden* compares different price discovery mechanisms in European electricity markets

**E**fficient price discovery mechanisms are critical to risk management in electricity markets, because volatile electricity prices – caused by fundamental conditions, such as the absence of storage and vulnerability to capacity outage and weather extremes – are a constant concern.

For the risks associated with volatile prices to be managed, two sets of market conditions should ideally exist. To start with, market fundamentals data must be accessible to all participants, including data on weather (forecast and actual), water levels (for hydropower), demand (load) forecasts, generation capacity and outages, and transmission constraints. And market pricing structures must allow efficient price discovery, so that:

- trading participants accept and use common indexes or benchmarks to price physical deals;
- liquid forward and over-the-counter (OTC) markets provide accessible insurance against price volatility for physical participants; and
- futures and options exchanges provide credit confidence – through the clearing mechanism – and a long-term forward curve, so that financial participants can manage the risk portfolios they accumulate from providing insurance to the physical market.

The degree to which European power markets meet these ideal conditions turns out to be a good indication of how complicated risk management is for market participants – that is, the closer a market

is to the ideal scenario, the easier risk management is within that market. The market that comes closest is Nord Pool, the Nordic region power market.

Nord Pool is the most mature European power market. Set up in 1993 by Norway, Sweden, Denmark and Finland, Nord Pool has set the standard for others worldwide. One estimate from European electricity consultancy Prospec Research is that, in 2001, total Nordic trading exceeded 3,000 terawatt hours – or 8.7 times Nordic consumption. Nord Pool says gross turnover this year is up by 22% over last year, at a time when other European and US markets saw volumes plummet due to credit concerns and lack of market confidence.

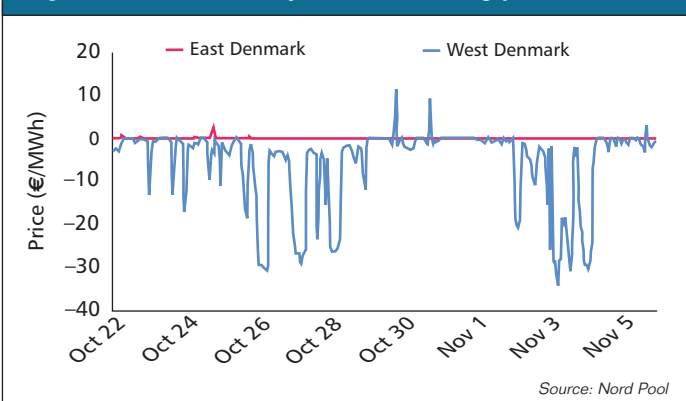
Nord Pool provides comprehensive production, consumption and weather information, as well as water level data critical to the Nordic hydro market. The exchange manages cross-border flows and transmission constraints via the day-ahead spot market auction process. A system-wide market clearing price is established. If there is congestion between the various pricing areas – such as East and West Denmark – prices diverge. There is a real-time market to adjust short-term balancing, called Elbas.

Nord Pool also has comprehensive forward, futures and options markets, which are financially settled but linked to the underlying system reference price. If area prices diverge from the reference price (see figure 1), then participants can hedge the difference through a contract-for-difference (CFD) market. Nord Pool also provides clearing facilities for over-the-counter (OTC), off-exchange transactions between participants. In comparison to Nord Pool, other European electricity markets fall considerably short of matching the conditions outlined above for optimum price discovery.

## UK market

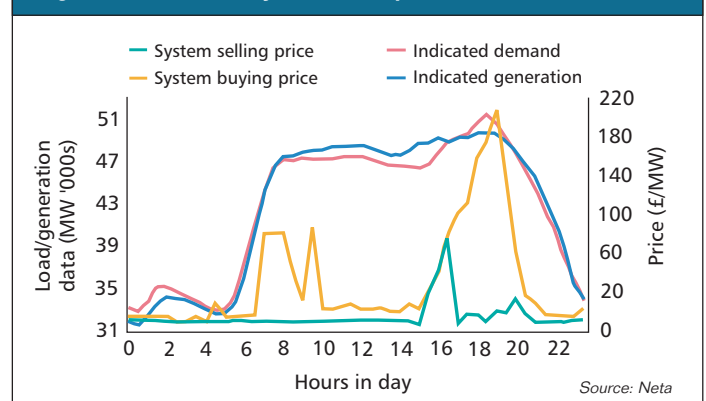
The nearest to Nord Pool in terms of providing fundamental market data is the UK, which has operated since March 2001 under the new electricity trading arrangements (Neta). Participants are free to make their own pricing arrangements, but must obtain balancing by buying from or selling to the balancing mechanism in a half-hourly market auction that concludes immediately before electricity flows (see figure 2). Buyers and sellers in the balancing market are penalised for errors in supply-demand management but have access to compre-

Figure 1: Danish hourly market clearing prices, 2002



Spread between East and West Denmark prices and the Nord Pool clearing system price, which is applied to all areas unless there is congestion. If there is congestion, Nord Pool increases prices in deficit areas and reduces prices in surplus areas to balance the load.

Figure 2: Half-hourly UK Neta prices, Oct 15, 2002



This figure shows system buy and sell prices for October 15, 2002 as well as the indicated load (demand) and generation. When demand exceeded generation between 6pm and 8pm, system buy prices rose rapidly.

hensive demand forecast information backed by weather data from the UK Meteorological Office, to help them plan their requirements ahead of time.

However, UK pricing arrangements are considerably less formal than those on Nord Pool, as there is no single day-ahead market, but rather a choice of privately run exchanges. The most successful of these are the UK Power Exchange and Automated Power Exchange in London, although neither command widespread support.

Instead, participants prefer the OTC market and trade through voice and screen brokers. This approach has the disadvantage of curbing the emergence of a clear benchmark price. The absence of a benchmark means futures markets struggle to identify an underlying physical price. In March 2002, for instance, the International Petroleum Exchange withdrew its UK electricity futures contract, which had failed to attract adequate liquidity.

So while Neta is judged a success and prices have fallen to all-time lows, questions remain as to how the system will handle price volatility shocks in the absence of a formal futures market.

### Other European markets

Outside the UK, market structures in the rest of Europe are less conducive to price discovery. The French market, Powernext, which was opened in November 2001, is dominated by a single player, Electricité de France (EdF). While Powernext provides a day-ahead hourly market clearing price, there is no futures market and the primary source of fundamental data is the system operator, RDF, an EdF subsidiary. As a result, the Powernext market represents a small fraction of the total French market, and its participants are heavily influenced by the export situation, since EdF is such a heavyweight within the country.

The German market, like the UK, has no mandated, central, day-ahead exchange, although competition between the Leipzig Power Exchange

(LPX) and the European Electricity Exchange (EEX) ended earlier this year when EEX bought out rival LPX to become the only liquid exchange. EEX offers spot and futures markets and has recently added an OTC clearing facility and the Phelix price indexes. However, the two exchanges still only accounted for about 6% of German consumption in 2001 and fared equally poorly in 2002 until the advent of the Phelix indexes in July and the EEX clearing facility boosted recent volumes.

The bulk of German trading is still in physical forward contracts in the OTC market. Financial trading has been limited because of the lack of an agreed physical benchmark reference price. There is, however, a quite lengthy forward market (see figure 3).

The market price discovery mechanism in Germany is further weakened by the lack of a central system operator, meaning transmission remains in the hands of the utilities. Network access is negotiated, not regulated. A side effect of this situation is that plant outage and demand data is not nationally available and price spikes are hard to predict or understand.

The Dutch market is characterised by regular price volatility (see figure 4) and is very reliant on outside suppliers – it imports up to a third of power requirements. While there is a day-ahead market at the Amsterdam Power Exchange (APX), there is no futures market, and since utilities outside the Netherlands – mostly German firms – control the transmission of imported power, capacity access is not really open.

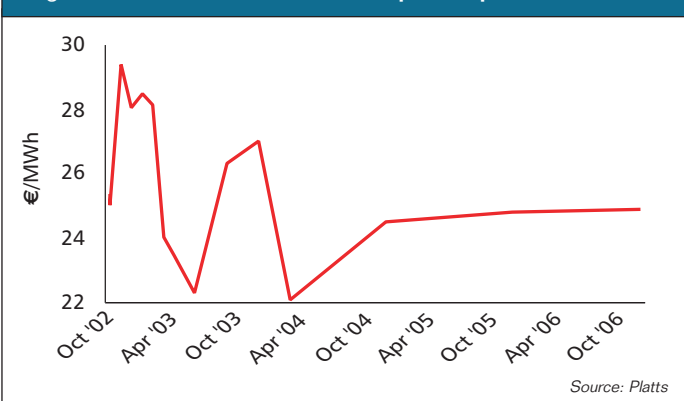
Spain has a day-ahead power exchange, run by Operadora del Mercado Espanol de Electricidad (Omel), which provides a market clearing price for each hour of the next day. Omel is dominated by a few big local players, and as yet there is no futures market. There is a small amount of OTC trading – less than 2% of Spanish consumption in 2002. Wholesale consumers have seen some price reductions, but the amount of trading occurring between independent players rather than the arms of vertically integrated parents is limited and restricts price discovery.

As for the rest of Europe, Austria opened the Energy Exchange Austria (EXAA) in March 2002 as a day-ahead hourly market, the success of which has yet to be gauged. The Italian market is dominated by one participant, former state monopoly Enel, and there are plans to open an exchange in 2002. Switzerland – not part of the European Union – is, like Austria and Italy, principally a cross-border participant in electricity and plans to open up its power market in 2003. [EPRM](#)

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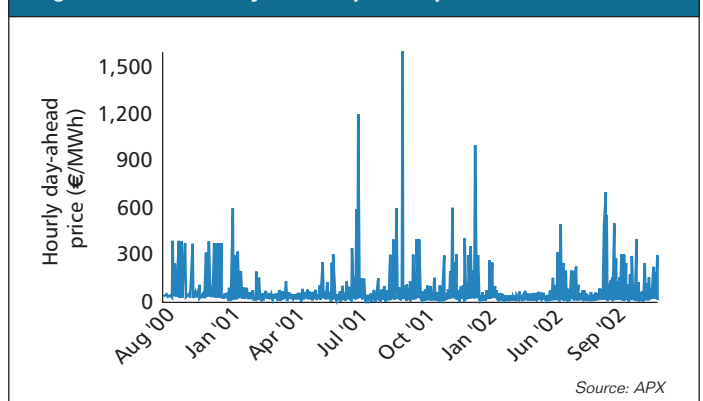
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Figure 3: German OTC forward power prices, Oct 11



The German OTC forward market has proved very successful despite competing efforts to establish electronic exchange systems such as the European Electricity Exchange (EEX). The OTC market is more liquid than the EEX and its forward curve trades out four years into the future.

Figure 4: Dutch day-ahead power prices



Volatility in day-ahead system prices on the Amsterdam Power Exchange shows frequent spikes. Heavy dependence on external generation makes the market susceptible to transmission interruptions or outages in surrounding markets.