Europe's energy markets

PRICE CONVERGENCE IN THE NATIONAL ELECTRICITY MARKETS

Internationalisation and deregulation of the European energy market continued in 2006, but a great deal remains to be done before certain markets can be regarded as liquid, effective markets. The year was also characterised by high and volatile energy prices.

In 2006, energy was at the top of the European agenda – among politicians as well as the general public. A number of major factors put their mark on the energy market during the year: high and fluctuating fuel prices, growing awareness about the climate issue, and the growing dependence on imports.

Deregulation in the EU electricity and gas markets is a key driving force in the development of the European energy market. The aim of liberalisation is to create effective price mechanisms, avoid unnecessary overcapacity, and to provide incentives for investment in new energy generation.

Deregulation began in 1989 in the UK, and thereafter a growing number of European countries have gradually opened their markets for competition. The Nordic countries, where deregulation has been completed, is home to the largest regional electricity exchange, Nord Pool. Slightly more than 40% of total trading in wholesale energy is done on Nord Pool's spot market, which was established in 1993 in Oslo. Prices on the electricity exchange are set when supply meets demand and form a benchmark for bilateral trading throughout the Nordic countries.

One of the purposes of deregulation of the energy markets has been to achieve lower consumer prices through competition. However, in recent years, prices have been at historically high levels. This has given rise to intensive debate and media attention, where the very notion of deregulation and the benefits of an open market are being called into question. Critics point to high profits and a high level of market concentration.

For the large energy companies, the market's development has thus entailed continued challenges: stricter regulations, tougher oversight of competition and heavy pressure from public opinion and politicians with respect to prices and how the companies are dealing with environmental issues. At the same time, deregulation has opened new opportunities for the energy companies. Through acquisitions across national borders, many energy companies have advanced their positions and gained access to new and larger markets. As a result of continuing consolidation, fewer but larger players are active in the European energy market (read more on page 26).

Far to go before full competition is achieved

The EU's electricity and gas market directive from 2003 calls for all countries to deregulate their electricity and gas markets and open them to competition by 1 July 2007 at the latest. Many have deregulated their markets, but many still have a long way to go. In spring 2006 the EU sent formal notices to 17 of the Member States in which it criticised the countries for not fulfilling their obligations according to the directive. Moreover, high energy prices in 2005 and 2006, and the sluggish implementation of the EU's directive, have prompted the EU's competition authority to conduct a sector inquiry to find out if the market is working satisfactorily. In its final report, which was published in early 2007, the EU Commission has recommended continued active measures and tougher rules in order for the internal energy market to become a reality.

Bottlenecks in transmission capacity

The idea of deregulation in the EU is that consumers should be able to freely choose suppliers throughout Europe. The goal is to merge national markets into regional markets and thereafter to build these markets together into a uniform European market.

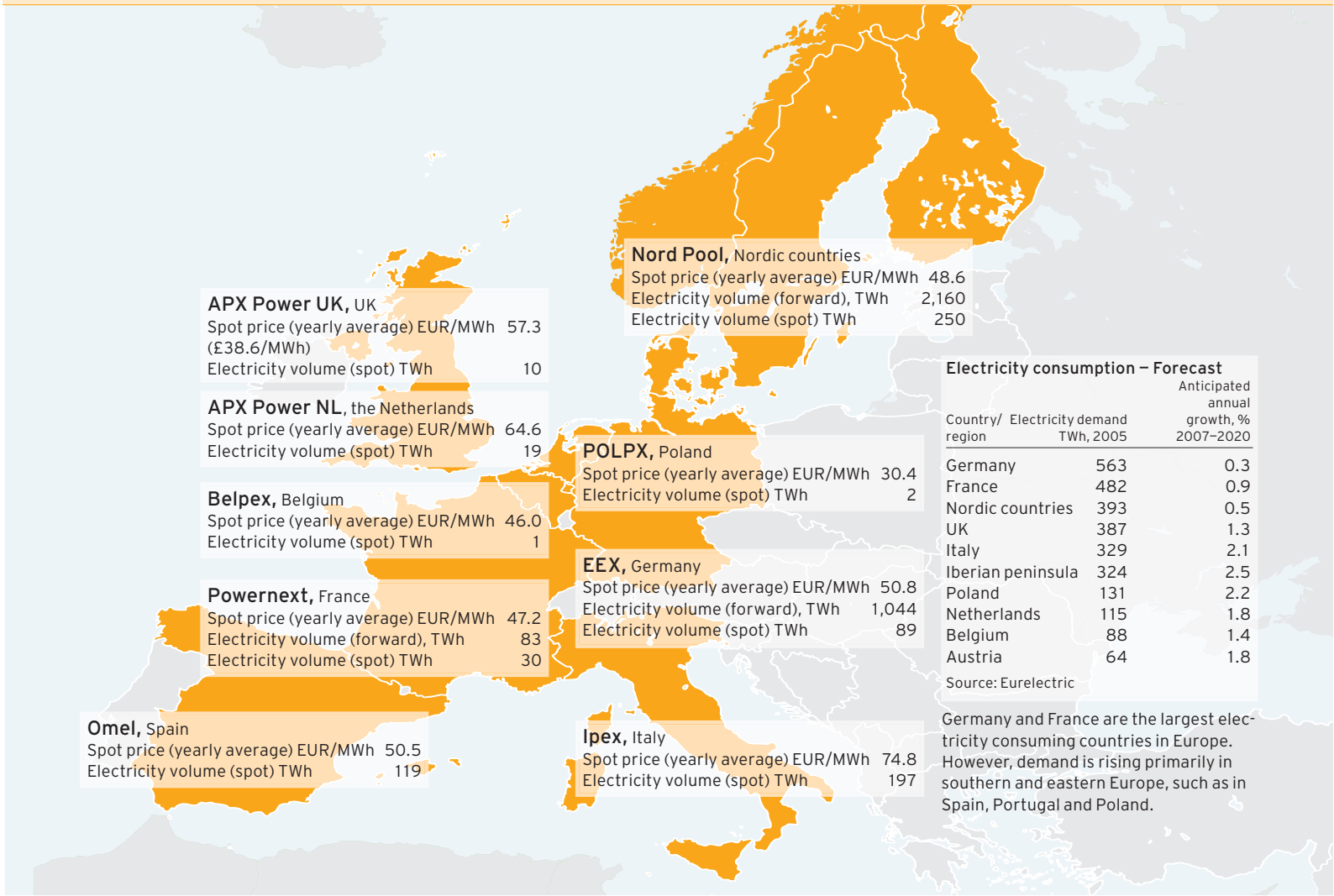
However, the technical conditions for doing this are still lacking. Electricity networks are fundamentally national, and transmission capacity between and within the EU's Member States is insufficient. Less than 10% of trading takes place between countries. As a result, Europe has become divided into a number of different price areas. Strengthening electricity connections and removing transmission bottlenecks through investment are top-priority matters within the EU.

Measures of this type during the year included the inauguration of the Estlink cable (350 MW) between Finland and Estonia. In addition, a cable is currently being laid between Norway and the Netherlands (700 MW). Yet another cable (800 MW) between Sweden and Finland is planned and is expected to come on stream in 2010.

Record-high energy prices

Energy prices reached new record levels in early 2006. The average spot price for electricity in Europe rose by an aver-

Prices and demand in the electricity markets



Electricity consumption – Forecast

Country/ region	Electricity demand TWh, 2005	Anticipated annual growth, % 2007–2020
Germany	563	0.3
France	482	0.9
Nordic countries	393	0.5
UK	387	1.3
Italy	329	2.1
Iberian peninsula	324	2.5
Poland	131	2.2
Netherlands	115	1.8
Belgium	88	1.4
Austria	64	1.8

Source: Eurelectric

Germany and France are the largest electricity consuming countries in Europe. However, demand is rising primarily in southern and eastern Europe, such as in Spain, Portugal and Poland.

A growing share of Europe's electricity trading is conducted on the electricity exchanges, where electricity generators, retailers and very large industrial companies trade in electricity. Some of the largest players consist of both generators and suppliers on the electricity exchanges, i.e., they both buy and sell electricity on the exchanges. Trading is conducted either for direct delivery, on the spot market, or for future delivery in the forward market.

The Nordic (Nord Pool) and German (EEX) electricity exchanges are by far the largest exchanges in terms of volume and number of traders. Relatively large volumes are also sold on the spot markets in Spain (Omel) and Italy (Ipex). Trading is also conducted in emission allowances on several of the electricity exchanges.

age of 70% in early 2006 compared with the same period a year earlier.

In the Nordic countries, the system price on Nord Pool in early 2006 was approximately EUR 40–50/MWh (compared with EUR 25–30/MWh in 2005). This was mainly due to low water levels in hydro reservoirs, a very cold winter and the impact of the price of CO_2 emission allowances. During the summer, Nordic electricity prices were still high due to low replenishment rates in reservoirs. However, electricity prices fell during the autumn, mainly due to a high water supply to dams combined with unusually mild weather and lower prices for emission allowances.

Even though the EU is divided up into different price areas, electricity prices are converging to a higher degree between the various national and regional markets, due to an increase in international trading. Another contributing factor to this is trading in emission allowances, which began in 2005. The aim of emission allowances is to introduce market principles and thereby effectively reduce CO_2 emissions in the aim of achieving the EU's climate objectives under the Kyoto Protocol. Companies each receive a certain amount of emission allowances. If this level is inadequate, they must purchase additional emission allowances.

In early 2006 the price of emission allowances was approximately EUR 30/tonne, which increased electricity prices by approximately EUR 18–20 per MWh of electricity. This was a result of high oil and gas prices, which led to higher demand for coal-fired electricity generation – and thereby also increased the price of emission allowances.

In May the EU presented data on the actual emission levels in 2005, which were at a considerably lower level than had been anticipated. This led to an immediate drop in prices to approximately EUR 10/tonne before prices stabilised at around EUR 15/tonne. Electricity prices quickly followed suit.

It is difficult to project future prices of emission allowances. In November 2006 the European Commission decided on national allocation plans for ten countries for the second trading period 2008–2012. Through its decision the Commission is demanding a significant reduction in the amount of emission allowances. Nine of the ten countries reviewed have received demands for cuts in the amount of emission allowances.

Major investments needed

According to EU estimations, Europe's energy dependence will be rising sharply in the coming decades. Today approximately 50% of the EU's primary energy is imported from non-EU countries. By 2030, estimates indicate that approximately 70% will be imported – in many cases from countries with unstable political conditions. This was illustrated early in the year when the Russian company Gazprom choked gas supplies to Ukraine due to a disagreement over prices, which sent a shock wave across large parts of Europe.

Against this background, the issue of security of supply has come into focus in the EU. In a Green Paper published in March 2006, the EU Commission estimates that EU countries will have to invest over a trillion euro in the next 20 years in order to meet electricity demand. This would involve replacing old generation facilities as well as expanding existing capacity with efficient and modern plants that meet high environmental standards.

The EU is home to approximately 240 million electricity consumers, of whom nearly 20% are in Germany. Total electricity demand is roughly 3,200 TWh per year. During the period 2005–2020, demand is expected to increase by approximately 1.4% per year. The rate of growth is highest in eastern and southern Europe. In northern Europe the rate of growth is expected to be lower, with the Nordic countries and Germany posting the lowest growth, at approximately 0.3%–0.5%.

In the Nordic countries, the supply of electricity generation is satisfactory during "normal" years, i.e., when the hydrological balance is at average levels. The upgrading of existing nuclear power plants in Sweden and the construction of a fifth nuclear reactor in Finland (ready in 2010/2011), as well as new gas power plants in Norway and Sweden, will lead to further increases in capacity. Over time, generation of renewable energy is also rising in the Nordic countries due to major investment in wind power, mainly in the Baltic Sea area.

In Germany, the rise in demand for electricity is ex-

Varying regulatory models for network companies

Deregulation of Europe's energy markets has resulted in a break in the value chain. Generation and sales have been exposed to competition, while transmission (high-voltage) and distribution, which are natural monopolies, are still regulated.

Consequently, the tariffs for using the networks are monitored and regulated by independent national authorities. The principles for this vary from country to country, and various models are used: return regulation, cost-based regulation and incentive-based regulation.

In Sweden, the so-called network performance assessment model was introduced in 2004. This model uses a virtual network to assess companies' performance and indicates a permissible income level. The relation between this level and actual income then forms the basis of the regulator's determination of network tariffs.

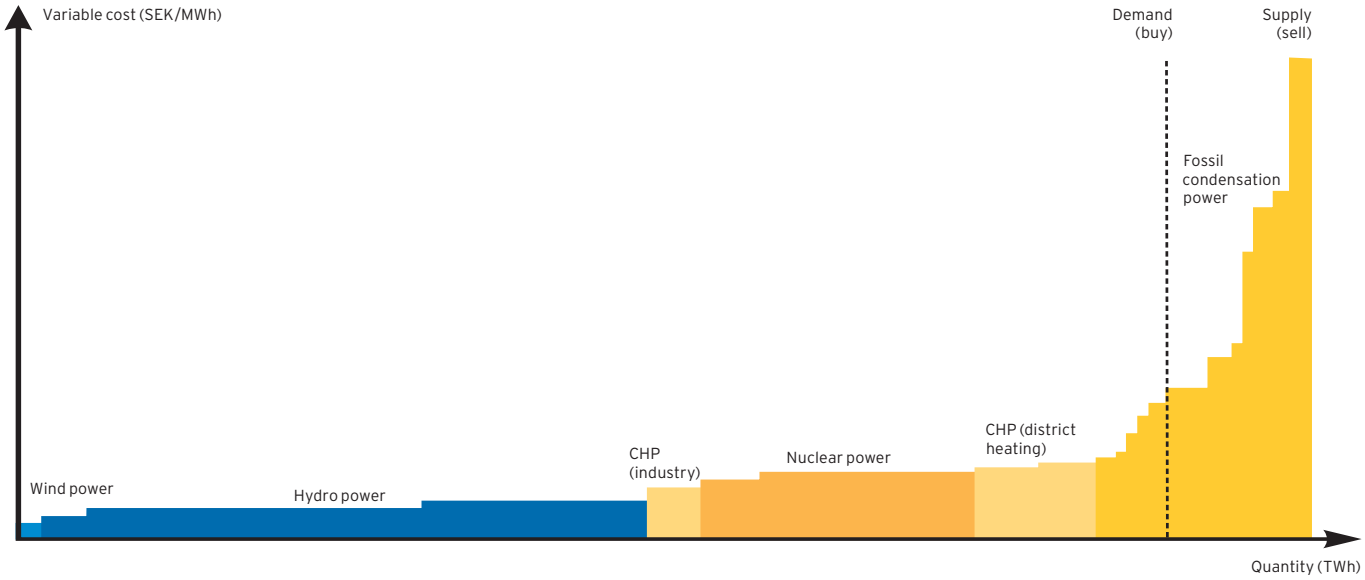
In Finland, a return-based model was introduced in 2005, which sets a maximum level for returns.

In Germany, all tariffs must be approved by the Germany network regulator. This regulation is cost-based, but in 2008 an incentive-based regulation model will be introduced, which will give network companies greater incentives to improve efficiency.

In Poland, network tariffs are approved in advance. This model is cost-based.

The UK has an incentive-based regulation system which gives energy companies stable conditions and opportunities to achieve a reasonable return on invested capital.

Merit Order Curve[1]



Pricing in the Nordic electricity market

In Nord Pool's spot market, players trade in hourly contracts for the next day. Every morning the traders submit their buy or sell offers. Bidding closes every day at 12 noon, and a buy and a sell curve are then plotted. The market price for the next 24 hours is set at the point where these curves meet, at the so-called market point. Vattenfall's variable generation cost is very low, but since its hydro power can be store in reservoirs, the water value is used instead of the variable generation cost in bidding on Nord Pool. In this way, the favourable regulating ability of hydro power is used in an optimal way. The market price on Nord Pool is thus often a water value which reflects the hydrological balance and cost of the fossil power generation that hydro power replaces.

Due to competition in the electricity market, pricing is based on this market price, which in turn leads to the most efficient use of generation resources. Normally, the cheapest forms of generated electricity are used first, while more expensive forms are not used until required by demand.

This market pricing ensures that every electricity generation plant is covered for at least its variable cost for electricity generation. Wind power, hydro power, nuclear power and combined heat and power plants have the lowest variable costs in the Nordic region. When these resources are inadequate, fossil condensation power must be drawn upon.

Market pricing is also transparent, and all customers receive their electricity prices according to the same terms.

Free market pricing also sends clear signals on whether future investments will be economically feasible or not.

In the Nordic countries, pricing is primarily dictated by water supply. However, capacity development, fuel prices, temperature and the price of CO_2 emission allowances also affect the price of electricity.

In many other countries, such as in Germany, the merit order curve is considerably flatter, resulting in narrower price variations.

1) The order in which generation capacity is utilised.

pected to be weak, however, the country has a great need to replace older generation facilities. The same applies for Poland, although demand there is expected to rise faster in the years ahead, by approximately 2.2% per year.

Stable heating market

The market for district heating looks different from place to place in Europe. In all there are some 100 million district heating consumers in Europe, while district heating market shares vary from 1% to 50% in the various countries.

The largest district heating markets in Europe are Poland, Germany, Sweden the Czech Republic and Slovakia. The district heating market is characterised by stability and a relatively low rate of growth.

In parts of the district heating sector, especially in the Nordic countries, a shift is currently taking place from oil and coal to gas and renewable fuels, which is contributing to a smaller CO_2 footprint.

A large part of district heating comes from combined heat and power (CHP) plants. But the differences are great from country to country: in Finland and Denmark, 75%–80% of heat is generated by CHP plants, compared with 35%–40% in Sweden and Poland. In Sweden and Poland, a gradual conversion is taking place of thermal power plants to CHP plants.

Higher gas prices

Natural gas prices rose sharply during the year due to higher oil prices. The market for natural gas is equivalent to slightly more than 5,000 TWh, which is 60% greater than for the electricity market. The three largest markets are the UK, Germany and Italy, which account for 50% of this volume. The largest application areas for natural gas are heating, electricity generation and industrial processes.

Most natural gas comes from European fields – mainly in the North Sea and the Netherlands – while approximately 40% of gas is imported, mainly from Russia and Algeria. Most is transported via pipelines, however, in recent years the use of liquid natural gas (LNG) has risen. This gas is cooled to a liquid state and transported in tanker vessels. It is then converted to gas again and delivered by gas pipelines.