Quarterly Report on European Electricity Markets

Directorate-General for Energy

EUROPEAN COMMISSION

- MARKET OBSERVATORY FOR ENERGY

VOLUME 3, ISSUE 4: OCTOBER 2010 – DECEMBER 2010

EUROPEAN COMMISSION
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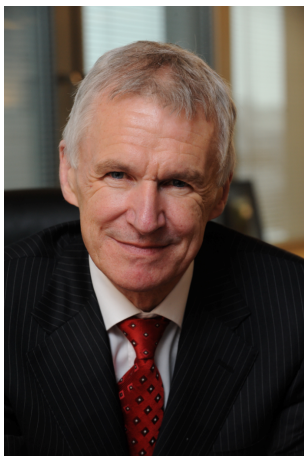
Director-General



Dear readers,

In the fourth quarter of 2010 economic growth in the EU contributed to higher electricity consumption and increasing traded volumes on the European power markets compared to the same quarter of 2009. Growth in the levels of electricity consumption and those of power traded on EU markets were influenced by the colder-than-usual weather, implying higher residential demand for heating. As a result, power prices were lifted to two-year highs on many European markets by the end of 2010. Spot prices of energy commodities, such as gas, oil and coal also underwent significant increases during the fourth quarter of 2010.

In the current report the presentation of adverse power flow indicators, which were first introduced in the last issue, are extended to the majority of the European power markets.

The "*Focus on*" part of the report deals with market couplings that took place in some European power regions during the fourth quarter of 2010. The current report also tries to capture the impact of market coupling by computing price differentials and by analysing the adverse power flows between power markets before and after the coupling took place.

The relative volatility indices (RVIs), measuring the volatility of power markets on regional and European levels are introduced in the current report as a new feature and will be regularly presented in the forthcoming reports.

On behalf of the editing team, I would also like to kindly invite you to fill in the questionnaire on *Quarterly Reports on European Electricity Markets* in case you have not done so yet. The questionnaire is available here:
http://ec.europa.eu/energy/observatory/index_en.htm

Philip Lowe

HIGHLIGHTS

- In the fourth quarter of 2010 European economies continued to show signs of solid growth. Compared to the same quarter of 2009 EU-27 GDP grew by 2.1%. The economic growth also contributed to both growth in electricity consumption and higher traded volumes on power markets in the majority of the European countries.

- The weather was colder than usual in the fourth quarter of 2010, resulting in higher residential heating demand in many countries in October and especially in December. The weather factor helped to propel monthly average power prices to two-year high levels in December 2010 in the countries of Western and Northern Europe.

- In October 2010 a wave of protests and strikes against pension reform plans exerted an influence on nuclear power generation in France. The reduction in nuclear power availability also contributed to the increase of power prices in the Central Western European power region.

- Oil, gas and coal spot prices showed significant increases in the fourth quarter of 2010. Brent crude oil prices showed the least increase among these three fuels in Q4 2010. Coal prices showed a more rapid increase and gas prices underwent a sharp upturn in December 2010 on most of the European hubs in consequence of the cold weather. Although year-ahead fuel prices moved in the same direction, the increase was less sharp than that of spot prices in Q4 2010.

- Renewable energy sources continued to play an important role in the power mixes in many countries. While in Germany and Spain wind power generation had a significant impact on the evolution of prices. In Central and South East European countries, hydro-power helped to keep prices lower than in other parts of Europe.

- The 'focus on' topic in this issue deals with the market coupling that took place in the countries of the Central Western Europe (CWE) region on 9th November 2010. This resulted in an immediate alignment of power prices on different markets in mid-November. Later in the quarter, market coupling between CWE and Nordic regions and between Nordpool and Polish markets were also launched.

NEW FEATURES IN THIS REPORT

- The evolution of a Relative Volatility Index (RVI) which measures the relationship between one-month and one-year backward looking volatility of day-ahead baseload prices of each power market on a daily frequency on both a regional and European level is reported in this issue and will be a permanent feature of the report.

- The analysis of the adverse power flows (FAPDs) which was introduced in the last quarterly report has been extended to other European power markets.

Market Observatory for Energy

EUROPEAN COMMISSION Directorate-General for Energy

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QUARTERLY REPORT ON EUROPEAN ELECTRICITY MARKETS

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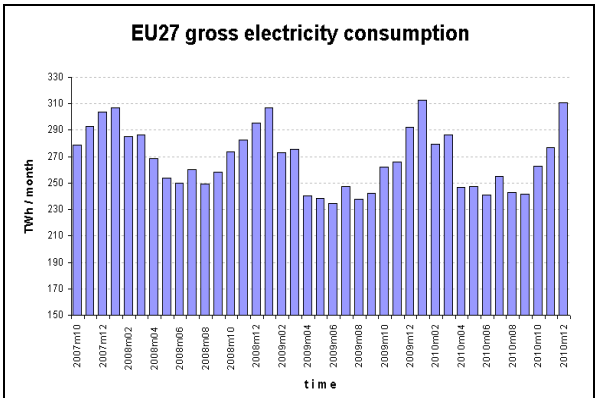
A. Recent developments in the electricity markets across Europe

Gross inland consumption of electricity in the EU-27 was 850.6 TWh in the fourth quarter of 2010. This was 15% higher than power consumption in Q3 2010 and 3.6% higher than in the same quarter of 2009. Increasing electricity consumption in the fourth quarter of the year is usual as the beginning of the heating season implies higher demand for residential heating.



Source : Eurostat
Eurostat's Principal European Economic Indicators.

Nevertheless, the month-on-month increase in the fourth quarter of 2010 was higher than usual, as the weather was colder compared not only to the previous two years but also to long term averages.

The next table shows the evolution of Heating Degree Days (HDD[1]s) in the months of the fourth quarter of 2008, 2009 and 2010 and provides the long term average HDD values for these three months between 1980 and 2004.

EU 27 Heating Degree Days in Q4
Values for 2008, 2009, 2010 and 1980 – 2004 average

	October	November	December
2008	221.93	372.18	483.96
2009	249.62	318.69	520.91
2010	269.28	385.58	609.43
LT avg.	236.95	391.82	512.14

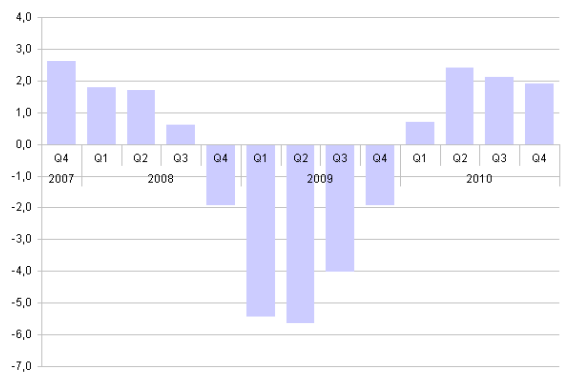
Source : Eurostat /JRC

Monthly HDD values in Q4 2010 were higher than the long term averages and those of the previous two years. This was especially true for December 2010 when temperatures were significantly colder than usual. This was reflected in December 2010 electricity consumption in the EU-27 (310.8 TWh) which was the highest December monthly value in the last decade.

Besides colder weather, the improving economic performance of the EU-27 was another factor that drove up the consumption of electricity. In the fourth quarter of 2010, EU GDP was up by 2.1% compared to the same period of 2009.

[1] Heating degree days (HDDs) express the severity of a meteorological condition for a given area and in a specific time period. HDDs are defined relative to the outdoor temperature and to what is considered as comfortable room temperature. The colder is the weather, the higher is the number of HDDs. The 'long term average' is the average HDD value for the years between 1980 and 2004. These quantitative indices are designed to reflect the demand for energy needed to heat a building.

Almost all EU economies showed signs of growth in the fourth quarter. The increase in economic value added was especially robust in the industry sector (6.1% - including energy). On the other hand construction activity which is one of the energy intensive sectors shrunk by 1.7%.



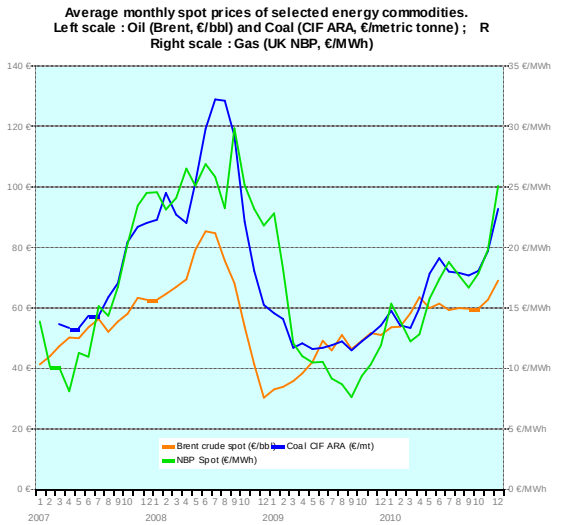
Source : Eurostat.
Selected Principal European Economic Indicators
** Gross domestic product (GDP) at market prices is the final result of the production activity of resident producer units. It is defined as the value of all goods and services produced less the value of any goods or services used in their creation. Data are calculated as chain-linked volumes (i.e. data at previous year's prices, linked over the years via appropriate growth rates). Growth rates with respect to the same quarter of the previous year (Q/Q-4) are calculated from raw data.*

In the countries having functioning power markets the average growth of electricity consumption in Q4 2010 was 3.9% compared to the same quarter of 2009. In some power regions the growth rate was substantially different from this average value. In the Nordic region, electricity consumption was up by 6.9% and in the British Isles power consumption grew by 6.4%. In the countries of the Nordic region, economic growth was generally above the EU-27 average and the Q4 2010 HDDs exceeded the Q4 2009 respective values, leading to a stronger increase in power consumption. In the British Isles, the main driver for higher power consumption growth was the cold weather. In the Apennine peninsula, where

economic growth remained moderate and temperatures did not generate significantly higher residential demand for heating, consumption of electricity grew by only 2.6% compared to Q4 2009.

A.1 Wholesale markets

In the fourth quarter of 2010, crude oil, coal and gas spot prices all increased.



Source : Platts.

Monthly average Brent crude oil spot rose from 59.6 €/bbl in September 2010 to 69.1 €/bbl in December 2010 while CIF ARA coal prices[2] went from 70.8 €/Mt to 92.7 €/Mt, a 31% increase, during the same time period. UK NBP monthly average gas hub prices rose by more than 50% from September to December 2010 (from 16.6 €/MWh to 25.0 €/MWh).

In December 2010, European gas prices reached the highest level on a monthly average since October 2008, mainly because of the consequence of cold weather and the importance of this fuel in residential heating.

Coal prices also reached a twenty-six month high level in December 2010. In a number of EU Member States, coal represents an important part of the power generation mix. As cold weather conditions generated an excess power demand for heating during the fourth quarter of 2010, coal prices rose significantly. Besides this excess demand from the power generating sector, demand for coal also came from industry as economic progress continued in most of the EU economies.

The spot price of Brent rose by 16% from September to December 2010, which was much less than the prices of coal and gas. This achievement points to a partial decoupling of the price of crude from the price of the other two competing fuels.

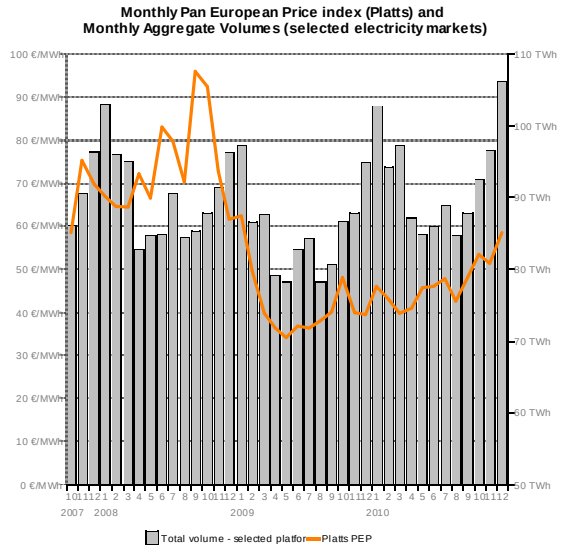
Changing exchange rates also supported the growth in the price of dollar denominated energy commodities such as crude oil as the euro slightly depreciated against the USD in the fourth quarter of 2010. On the 1st of October the USD/EUR exchange rate was 1.373 while on the 31st of December it was 1.336.

[2] Price for a metric tonne of coal (calorific value of 6 000 kcal/kg) delivered at the Amsterdam-Rotterdam-Antwerp area with cost, insurance and freight covered.

A.1.1 Day-ahead

EU wholesale markets

The monthly average of the Platts Pan European Power Index (PEP) increased during the fourth quarter of 2010. In September 2010 the monthly PEP stood at 48 €/MWh, in October it rose to 53.4 €/MWh and after a temporary halt in November it increased to 58 €/MWh in December 2010 which was the highest level since January 2009. This price rise was supported by the cold weather in many EU countries. Good performance of the EU economies and rising fuel prices gave a further support to power demand.



Source: Platts (price index) and selected European electricity wholesale markets (volumes). The selected markets are :
Nordpool Spot A.S ;
European Energy Exchange (EEX) ;
Amsterdam Power Exchange (APX Power NL) ;
Powernext Day-ahead S. A. ;
Belpex Spot ;
Energy Exchange Austria (EXAA) ;
Gestore del Mercato Elettrico (IPEX) ;
Mercado de Electricidad (OMEL) ;
Operator trhu Elektrinou (OTE) ;
Towarowa Gielda Energii S.A. (PolPX) ;
Hungarian Power Exchange (HUPX);
APX Power UK ;
Operatul Pietei de Energie Electrica din Romania (OPCOM) ;

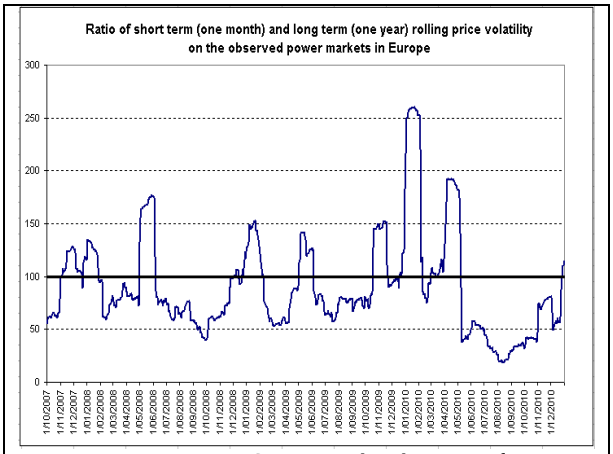
(••••••), Hellenic Transmission System Operator

Similarly to the gross inland electricity consumption of the EU, the volume of traded power on the selected wholesale markets[3] rose to a record high in December 2010 (106.8 TWh). Similarly to the power price level the extra demand for power that stemmed mainly from residential heating gave a boost to traded volumes on many European power markets.

The quarterly traded volume in Q4 2010 on these selected markets was 295.3 TWh. This volume was 9.6% higher than in Q4 2009 and 13% higher than in Q3 2010. The traded volume in the fourth quarter of 2010 represented 35% of EU-27 gross inland electricity consumption for that quarter.

[3] The Quarterly Report intends to cover all Member States, Candidate countries and countries from the European Economic Area that have developed a functioning wholesale market for electricity. For the time being, the selected countries are: Austria (AT), Belgium (BE), the Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU) Italy (IT), the Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Spain (ES), Sweden (SE), Slovakia (SK), the United Kingdom (UK) and Norway (NO).

The Relative Volatility Index (RVI[4]) of the European markets started to rise in Q4 2010 and by the end of the year it was above 100. Volatility of the European power markets was mainly affected by the strikes in France in October and the price hikes in the wake of the cold weather in December.



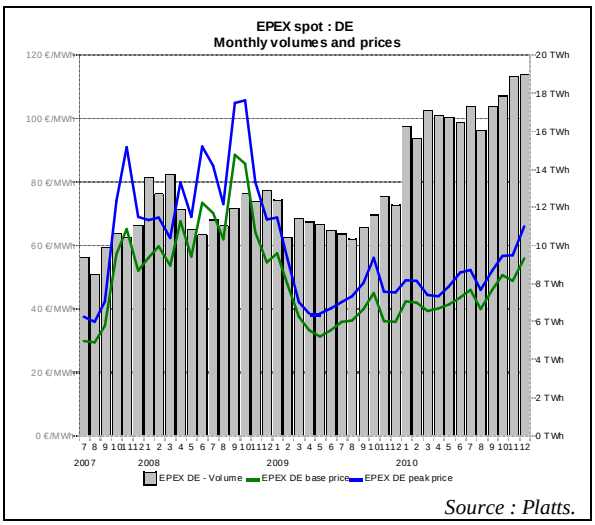
Source: Market observatory for Energy.

Regional markets

Central Western Europe

Germany

Wholesale electricity prices showed a noteworthy increase on the German market in the fourth quarter of 2010. While the monthly average base-load price was 45.9 €/MWh in September 2010, in December it rose to 55.5 €/MWh. The peak-load monthly average went up from 51.8 €/MWh to 65.8 €/MWh during the same period, reflecting an increasing spread between baseload and peakload prices.



Source : Platts.

The average baseload power price in the fourth quarter of 2010 increased by 17.4% compared to Q3 2010 and it was up by nearly 33% compared to the fourth quarter of 2009.

Several factors played an important role in the upward trend of German power prices. In the fourth quarter of 2010, the weather was generally colder than the long term average, and the quarterly HDD value was 14% higher than the twenty-five year average measured between 1980 and 2004. Colder weather conditions contributed to higher residential heating demand during Q4 2010, giving support to German day-ahead wholesale electricity prices.

As a cold snap hit the European continent in the last days in November and it exerted an enduring influence on power demand in

[4] Relative Volatility Index (RVI) measures the relation between the short term volatility and the long term volatility on a given trading day. Short term refers to a one month backward looking volatility while long term period means a one-year time period. Volatility index is calculated from day-ahead baseload wholesale daily average power prices on each trading day. If the RVI's value is greater than 100 the short term volatility is higher than the longer term volatility, implying that current market conditions are more volatile than usual. See more about the methodology of the RVI in ' Methodological description and interpretation of the volatility index for electricity markets' on the webpage:http://ec.europa.eu/energy/observatory/electricity/electricity_en.htm

the following weeks, December average power prices rose to a nearly two year high. German Monthly HDD was 31% higher than the long term value.

On the supply side some unplanned nuclear plant outages (e.g..: Gundremmingen-B reactor in the first half of November or Biblis-B reactor in mid December) contributed to the tightness of the power system. In October 2010 when a strike wave resulted in decreasing domestic power generation in France (*see page 10*), the whole CWE power region (including Germany) was affected. However, the events in France did not have a long lasting impact on German power prices.

Wind based power generation was generally lower than usual during the fourth quarter of 2010. This must have contributed to high power prices during the first half of December 2010 when cold weather also exerted an upward pressure on prices. In the second week of December there were several trading days when hourly baseload prices exceeded 100 €/MWh during the evening peak demand periods. Nevertheless, on the 12th of December in the early hours of the day (from 01:00 to 03:00) hourly baseload prices were negative, primarily owing to low week-end demand and higher short term wind power generation forecasts.

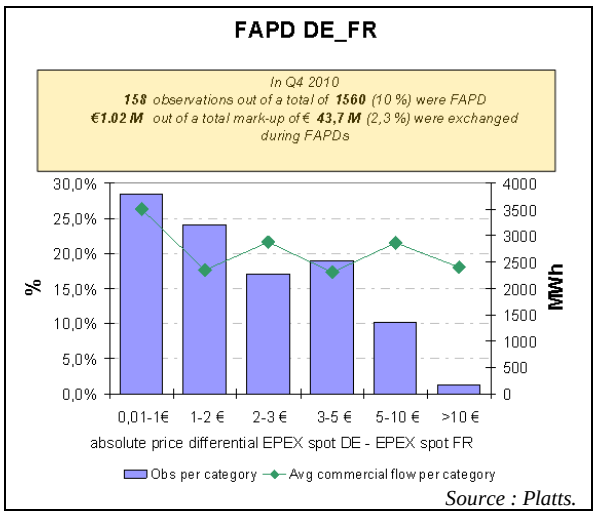
Traded volume of spot power on the EPEX platform significantly rose in the fourth quarter of 2010. Compared to Q3 2010, it increased by almost 10%, corresponding to seasonal effects, as the beginning of the heating season drives up the residential power demand. However, compared to the last quarter of 2009, traded volume of power went up by 54%. This huge increase can partly be explained by the growth of residential demand due to colder weather. Robust industrial power demand might also have contributed to the increase in traded volume, as the German economy grew by 4% in Q4 2010 on a year-on-year basis. Traded power volume was 55.7 TWh, equalling 43% of gross inland electricity consumption of Germany in Q4 2010.

The Central West European power region underwent important changes after the market coupling[5] of the markets of the region that took place on the 9th of November 2010. Prices within the CWE region aligned and two weeks after the coupling, settlement prices on the markets of the region were reported to be identical during most of the trading period. As a second step, the CWE power region and the Nordic power region were also coupled.

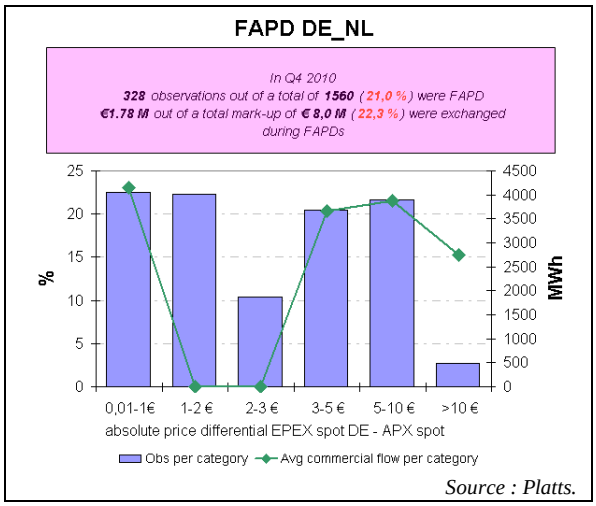
The impact of the market coupling within the CWE region can also be captured by looking at the frequency of adverse flows. The next two charts show the flows against the price differentials (FAPD[6]s) before the 9th of November 2010 between the German and the French markets and those between the German and the Dutch markets:

[5] Market coupling brings power markets together using implicit auctions in which players do not actually receive allocations of cross-border capacity themselves but bid for power on their exchange. The exchanges then use the available cross-border transmission capacity to minimize the price difference between two or more areas. *See more in the 'Focus on' part.*

[6] An event named 'flow against price differentials' (FAPD) occurs when commercial nominations for cross border capacities are such that power is set to flow from a higher price area to a lower price area. The FAPD chart provides detailed information on adverse flows. More information on FAPDs can be found in the July 2010 - September 2010 issue of the Quarterly Report on European Electricity Markets,



Source : Platts.

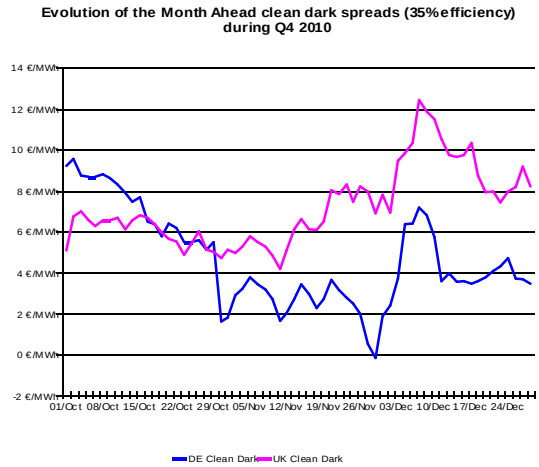


Source : Platts.

The ratio of FAPDs between the German and French markets out of the total observations was lower (10%) than in Q3 2010 (34%). The ratio of FAPDs between Germany and the Netherlands (43%) did not show a remarkable change compared to the third quarter of 2010.

After the market coupling took place on the 9th of November 2010, adverse power flows could not be observed either between Germany and France or between Germany and the Netherlands.

The next chart shows the evolution of clean dark spreads[7] in the fourth quarter of 2010. At the beginning of Q4 2010, German clean dark spreads began to decline from their quarterly peak and on the 30th of November they even fell below zero, implying temporary non-profitability of power generation from coal. This was mainly due to the rapid increase in coal prices that outstripped the power price rise on the German market.



UK values are quoted in € using the €/£ daily exchange rate as reported by Platts

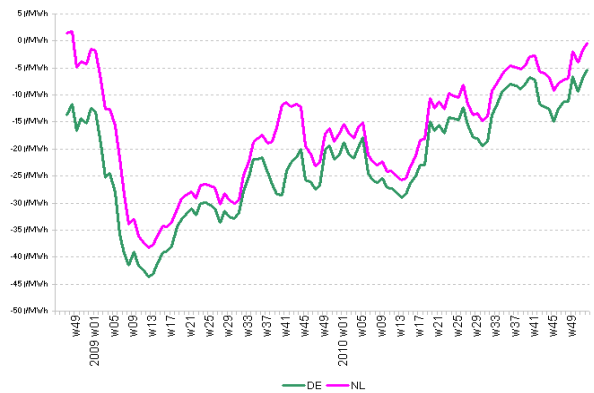
Source : Platts.

As power prices in the UK showed an even more rapid increase in October and November 2010, UK clean spark spreads remained positive during the whole quarter and from December 2010 the evolution of

[7] Dark spreads are reported as indicative prices giving the average difference between the cost of coal delivered ex-ship and the power price. As such, they do not include operation, maintenance or transport costs. Spreads are defined for a coal-fired plant with 35 % efficiency.
Dark spreads are given for UK and Germany, with the coal and power reference price as reported by *Platts*.
Clean dark spreads are defined as the average difference between the price of coal and carbon emission, and the equivalent price of electricity.

UK and German clean dark spreads recoupled.

In the fourth quarter of 2010 biomass spreads[8] on the German market continued to get closer to zero from a negative range, implying the improving profitability of power generation from wood pellets. The improvement in profitability was supported by increasing wholesale power prices, although wood pellet prices also went up during Q4 2010.



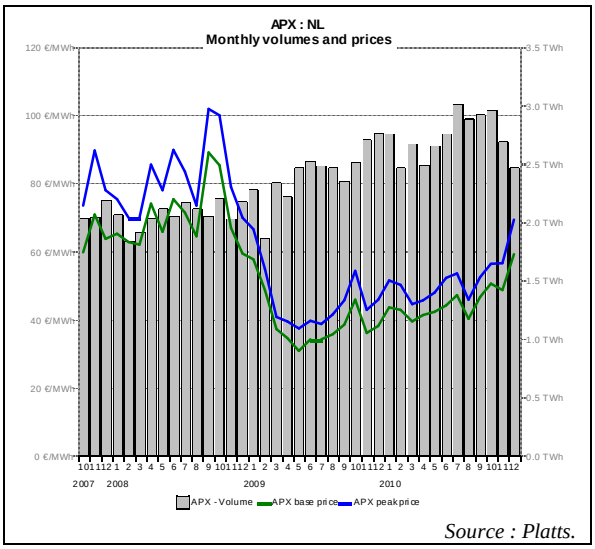
Source : APX – Endex (wood pellets, industrial grade) ; Platts (electricity and emission prices; freight rates)

The drop in biomass spreads during October 2010 was mainly due to the temporary increase in dry bulk freight rates on the Rotterdam-Cologne inland river transport line. In the last week of 2010, the German wood pellet biomass spread was -4.5 €/MWh, which was the highest level since the beginning of the observation in 2008.

[8] Biomass spreads are indicative values giving the average difference between (1) the combined price of electricity and carbon emission on the corresponding day-ahead market and (2) the price of industrial wood pellets (delivered month-ahead ex-ship at Rotterdam).
Biomass spreads do not include operation and maintenance costs. However, the German spreads include transport costs of shipping the pellets along the Rhine (Rotterdam – Cologne area).
Specific calculation assumptions: conversion factor of 1 ton of standard wood pellet contains 4.86 MWh of energy; generation efficiency of coal and biomass fired power plants equals 35%; the price of carbon emission is defined as the difference of the German dark and clean dark spreads, calculated according to the methodology of *Platts*.

The Netherlands

On the APX market in the Netherlands both baseload and peakload monthly average power prices rose to a two-year high in December 2010. In this month, the average baseload power price was 59 €/MWh while peak load rose to 69.4 €/MWh. In September 2010, the respective monthly averages were 40.2 €/MWh and 45.8 €/MWh.



Source : Platts.

The increase in power prices was primarily influenced by weather conditions, the tightness of the grid in the CWE region, and the fluctuation of wind power supply in Germany.

In October 2010 the prices in the CWE region as well as those in the Netherlands were affected by reduced power generation in France. In November 2010, Dutch baseload power prices retreated a bit on a

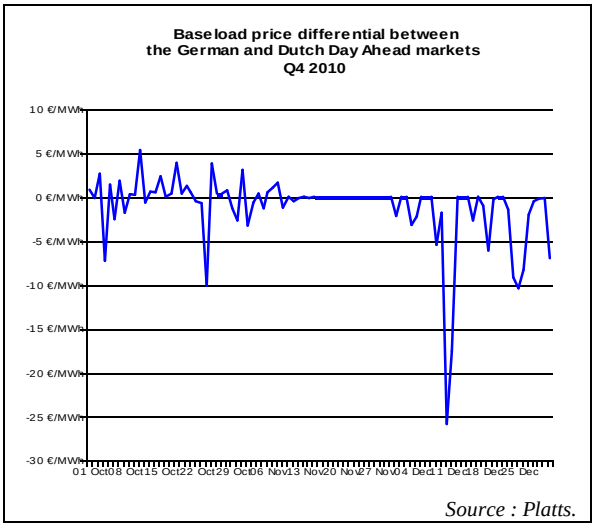
monthly average after the price spike in October, while peakload prices continued to rise.

Contrary to October and November, when weather conditions fitted the seasonal trend, December 2010 temperatures were very low. Similarly to the other countries of the CWE region this exerted an important influence on Dutch power prices.

An interesting evolution in monthly traded volumes could be observed in the fourth quarter of 2010: while on the other markets of the CWE region traded power volumes grew on a monthly basis in Q4 2010, on the APX platform volumes fell. This occurred in spite of the cold weather and the growth in gross inland consumption of electricity in the country (+ 18% compared to Q3 2010 and +5.4% compared to Q4 2009).

One possible explanation is that as a result of the market coupling that took place in mid-November a part of the volume normally traded on APX might have been traded instead in another region, e.g.: on the Belgian market when December traded volume rose significantly – *see page 12*). The quarterly traded power volume represented 25% of the Dutch gross inland electricity consumption in Q4 2010.

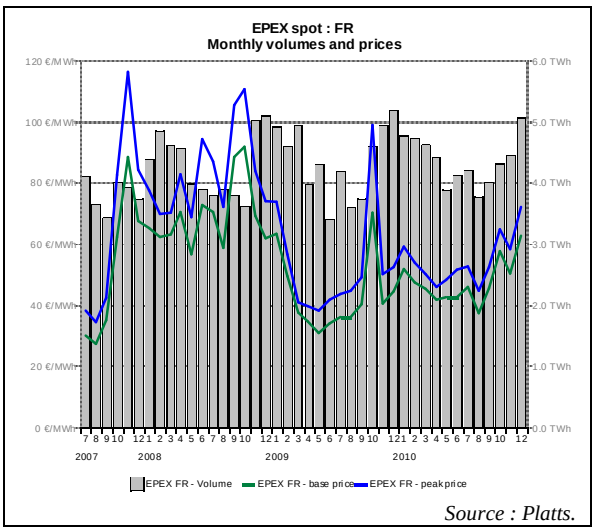
Price differentials between Dutch and German day-ahead markets showed a high degree of stability during Q4 2010. In mid-November when the market coupling in the region was realised, there were almost no differentials for several weeks. In October and in December 2010 there were a couple of days when German prices suddenly dropped (mainly on Sundays). On these days, the Dutch-German price differential widened as Dutch prices remained stable.



Source : Platts.

France

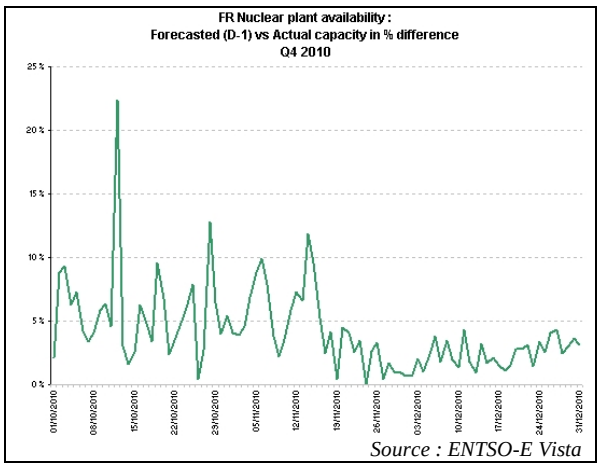
Similarly to other power markets in the Central West European region, French electricity prices also rose in the fourth quarter of 2010. Baseload monthly average prices rose from 45.6 €/MWh in September 2010 to 62.8 €/MWh in December. Meanwhile, monthly peak-load average prices went up from 52.3 €/MWh to 72.1 €/MWh, amounting to a near two year high peak (taking not into account the October 2009 monthly prices that were driven high by temporarily price spikes in some trading hours.)



Source : Platts.

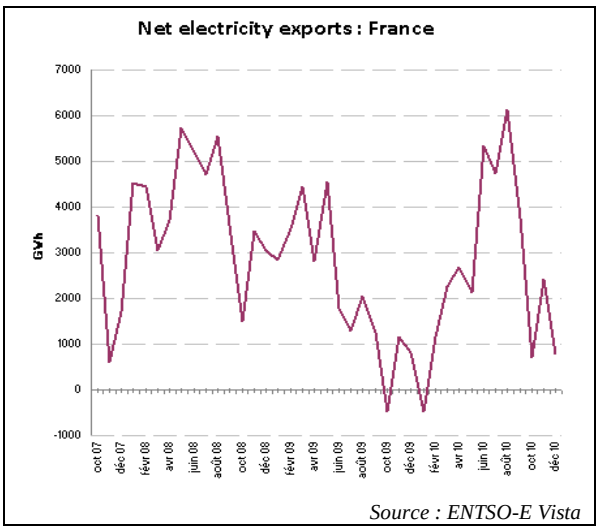
The first price increase within Q4 2010 occurred in October 2010 when colder-than-usual weather conditions (HDDs were 15% higher than the long term average) prompted higher residential heating demand, putting an upward pressure on power prices. On the supply side a series of strikes and protests against the pension reform plans triggered a drop in the power generation of some nuclear plants, making the grid tighter. During the last week of October 2010 there were several trading hours when prices exceeded 100 €/MWh, and on the 26th of October French daily average power prices reached their peak in Q4 2010 (85.8 €/MWh).

The following chart also reflects the nature of unplanned cuts in nuclear power generation. In mid-October there were some trading days when the actual nuclear power capacity was significantly lower than that of projected from the data a day earlier. In the second half of the quarter these unforeseeable circumstances normalised and the difference between forecasts and realised power generation decreased.



Source : ENTSO-E Vista

The net export position of the country diminished from its highs recorded during the summer of 2010, putting a pressure on the power prices in the whole CWE region.



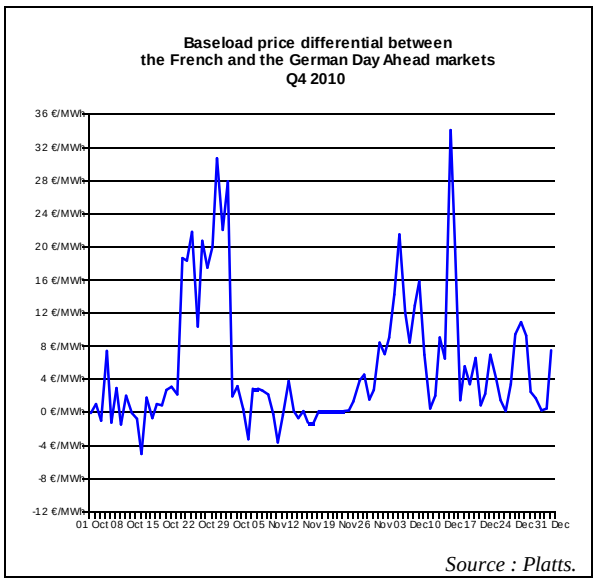
Source : ENTSO-E Vista

In November 2010 both monthly baseload and peakload prices retreated from October's highs as the situation on the electricity market normalised and the weather became milder compared to the seasonal norms. In the second half of the month daily prices started to rise again, which was mainly due to the cold snap that hit the European continent. On the 3rd of December 2010 the daily average price (of 79.3 €/MWh) was close to its quarterly peak registered in late October 2010, while hourly prices on some trading days even exceeded 200 €/MWh during the early period of December.

In the second half of December 2010 as temperatures eased and increasing hydro generation in the Alps helped to boost power supply in CWE region, power prices also went down. Ahead of the Christmas holidays and in the last week of 2010, industrial demand for power decreased and this helped to keep prices lower despite the return of lower temperatures.

Although power consumption in Q4 2010 in France was 9% higher than in the same

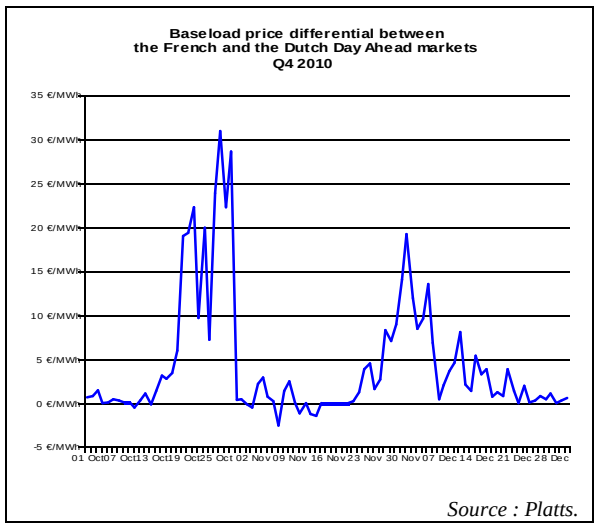
quarter of 2009, traded power volume on the EPEX platform was 6% lower in the fourth quarter of 2010 than a year before. The quarterly traded volume corresponded to 9% of the country's gross inland electricity consumption in Q4 2010, lower than in Germany, Belgium or the Netherlands. The market coupling in the CWE region might have affected the choice among the trading platforms on which the power trading was carried out.



Source : Platts.

Taking a look at the chart of French-German power price differentials, the impact of the strike in October 2010 can be seen as French price premium peaked at nearly 30 €/MWh in the last days of that month. Prices on the German market seemed to be more resilient to the cold weather in December 2010, probably owing to a more diversified power generation mix that can respond better to increasing heating needs.

In mid-November 2010, as markets in the CWE region were coupled, the French-German price differential was very close to zero for a couple of days.

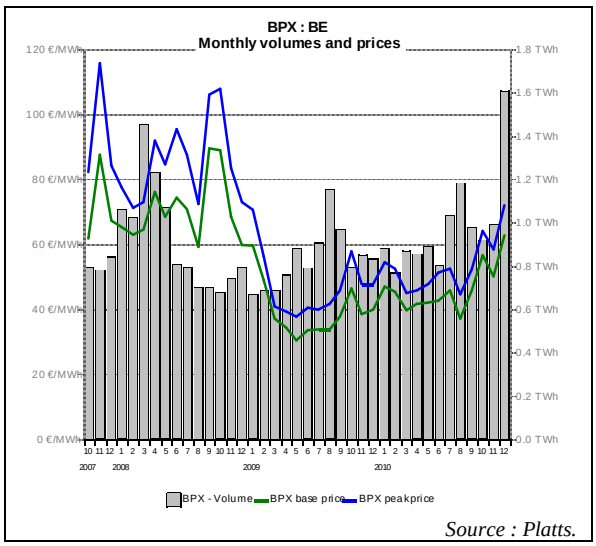


Source : Platts.

As the Dutch and the German power prices were strongly correlated in Q4 2010 (*see page 9*), the French-Dutch price differential curve looked similar to that of the French-German one.

Belgium

Similarly to the previous quarters, Belgian day-ahead power prices closely followed those of France. Monthly average baseload prices began to rise in September 2010 while in October they reached 56.5 €/MWh, in November they declined a bit (to 50.1 €/MWh) and in December 2010 they reached their highest level (62.6 €/MWh) since November 2008. Peakload prices followed a similar trajectory, peaking in December at 72 €/MWh on a monthly average, which also signalled a two-year high.

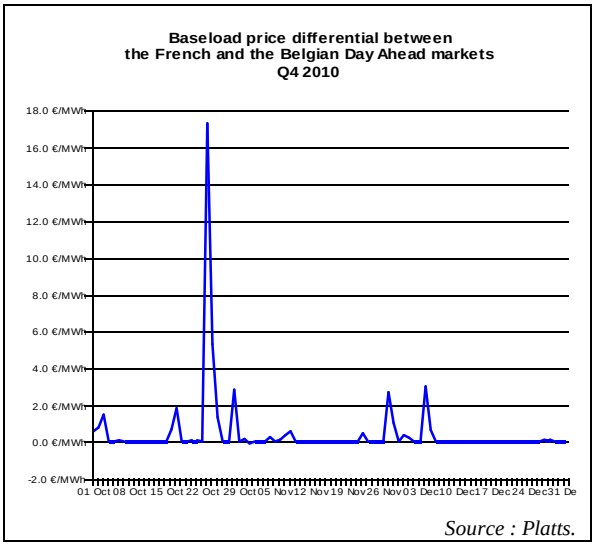


Source : Platts.

Taking a closer look at the daily and hourly price data, it can be concluded that in the whole CWE region, Belgian prices were mostly affected by the volatility of French prices during October 2010. Belgian daily average prices reached their quarterly peak in the last week of October (above 80 €/MWh) and during the cold days of early December they moved close to this level again.

Monthly traded volumes in December 2010 reached the highest value since the beginning of the observation period (1.6 TWh). Although in consequence of cold December temperatures heating demand must have exerted a pressure on both power prices and traded volumes, taking into account the decreasing traded volumes on the Dutch market it may be the case that a part of power traded in the Netherlands was redirected to the Belgian market (*see page 9*). The amount of the power traded on the Belgian market was 14% of the country's gross inland electricity consumption in Q4 2010.

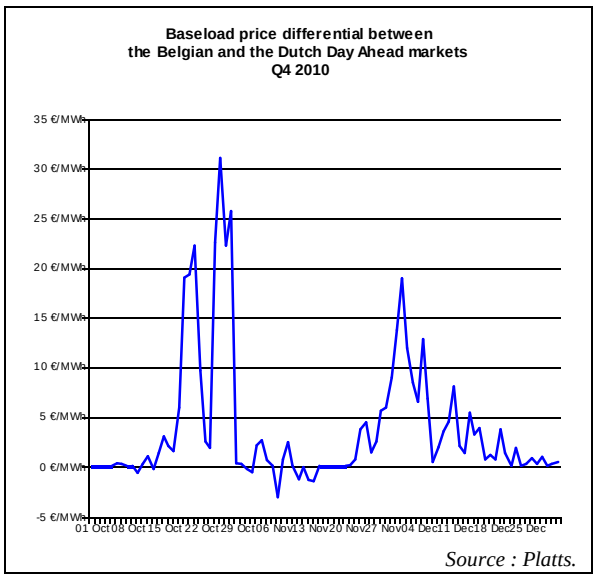
The next chart which depicts price differentials between the Belgian and French market illustrates the strong correlation mentioned in the previous paragraphs.



Source : Platts.

On the 23rd of October 2010, Belgian prices temporarily dropped but on the next trading days they strongly realigned to the French prices.

As the Belgian market is strongly correlated with the French market and the Dutch APX closely followed the German market in the fourth quarter of 2010, the Belgian-Dutch price differential curve was quite similar to that of the German-French one.

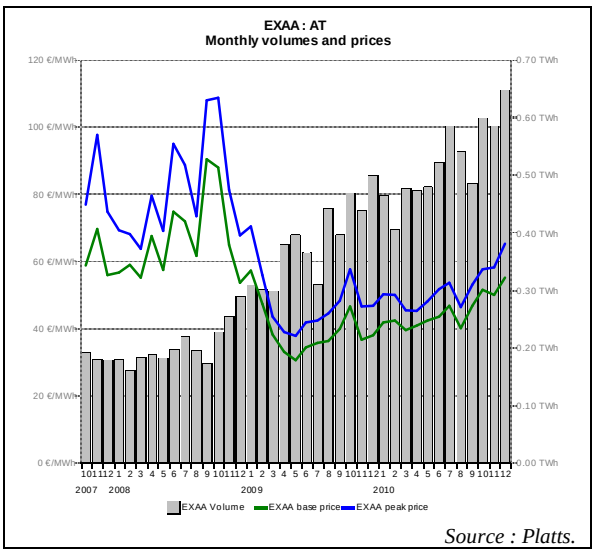


Source : Platts.

During Q4 2010 no FAPDs occurred either in French-Belgian or in Belgian-Dutch power market relationships.

Austria

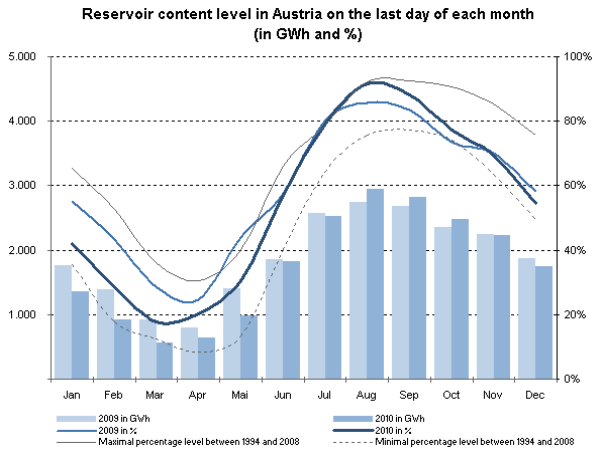
Wholesale power prices on the Austrian market, which started to rise in September 2010 continued their upward trend in the fourth quarter of 2010. The monthly average base-load power price was 46.5 €/MWh in September while it reached 55 €/MWh in December 2010. Monthly average peak-load power prices went up from 52.8 €/MWh to 65.2 €/MWh in the same period, rising to nearly two-year high levels.



Source : Platts.

This significant price increase might be explained by higher residential heating demand as a consequence of colder weather in Q4 2010. HDDs were more than 25% higher in October and were 14% higher in December 2010 than the respective long term average values.

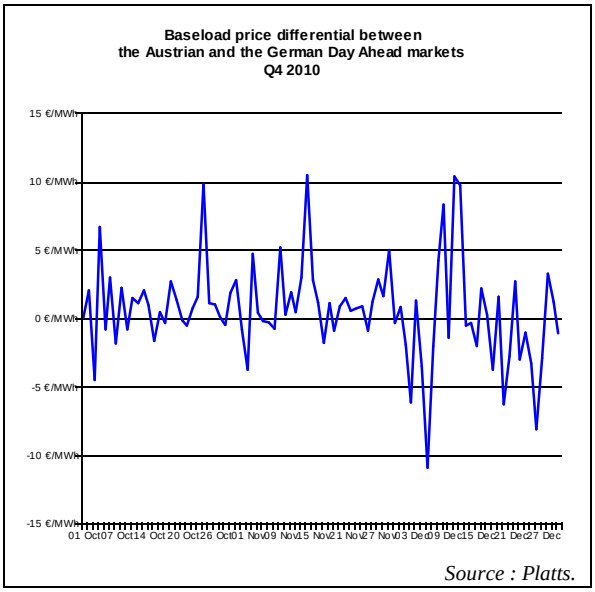
On the other hand low hydro reservoir levels might have also contributed to increasing power prices during Q4 2010. In Austria more than 60% of power supply is assured by hydro generation. As hydro based power generation decreased gradually throughout Q4 2010, lower domestic power supply put pressure on prices. At the end of December 2010 the level of hydro reserves was close to its fifteen year low (54.6% actual vs. 49.6% historical low for this time of the year).



Source : E-Control GmbH, Austria

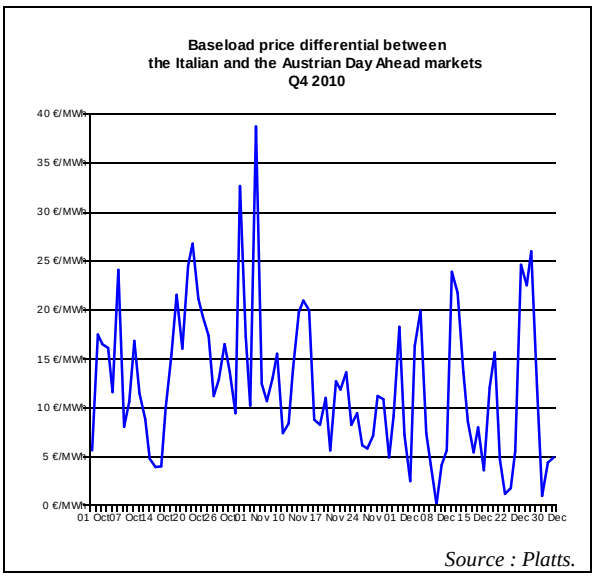
Volume of traded power continued to rise during Q4 2010; it amounted to 1.8 TWh, which was 13% higher than in Q3 2010 and more than 30% higher than in the fourth quarter of 2009. Similarly to the previous quarter, the traded volume of power on the Austrian market represented less than 10% of the country's gross inland electricity consumption in Q4 2010.

Austrian base-load power prices closely followed the German market. In both countries, daily average base-load prices peaked in mid-December during Q4 2010, exceeding 70 €/MWh. However, for some trading hours prices were above 100 €/MWh.



Source : Platts.

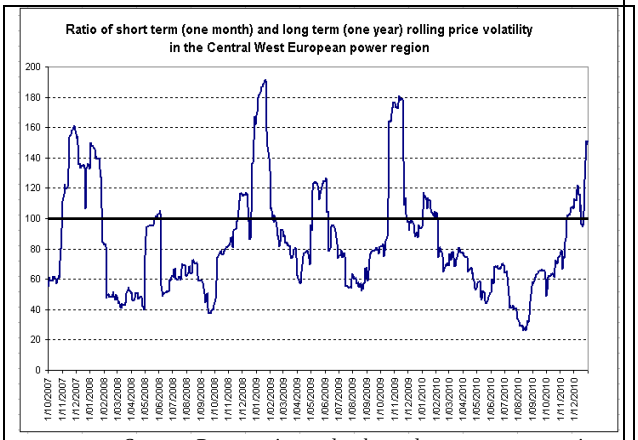
Italian power prices were constantly above Austrian prices during Q4 2010. In early November, the Italian price premium almost reached 40 €/MWh. In the second half of December, as Italian prices diminished, the premium fell.



Source : Platts.

Electricity price volatility in the CWE region increased considerably during the fourth quarter of 2010. Since the beginning of October until mid-December the RVI was increasing and after a short break it reached its record for 2010 at the end of

the year. Volatility must have been affected by the reduced power supply in October as a consequence of strikes in France and by the extremely cold weather during December in the whole CWE region.

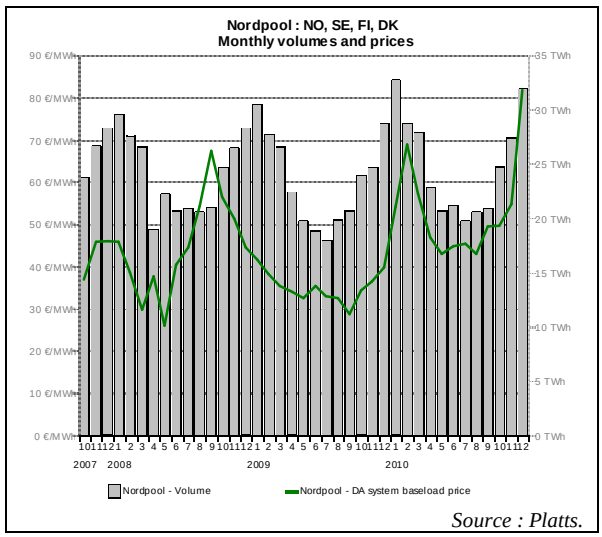


Source: Power price and volume data, own computations.

Northern Europe

The Nordpool spot average monthly system price experienced an important increase in the fourth quarter of 2010. While it was below 50 €/MWh both in September and October 2010, in November it rose to 54.8 €/MWh. This moderate growth was followed by a huge jump in December, when it rose to 81.7 €/MWh. This was the highest monthly average system price since the beginning of the available time series.

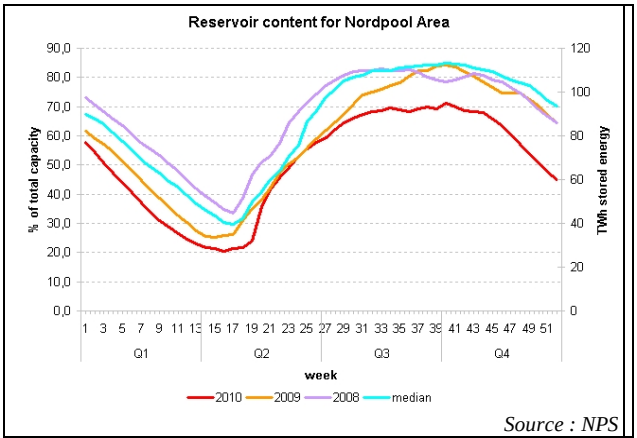
Looking at the daily average baseload prices, Q4 2010 can be divided into two parts: until mid-November prices hovered around 50 €/MWh. In the second part of the quarter they started to rise and they peaked at above 100 €/MWh on 13th and 14th December, and remained at high levels for the remainder of the month.



Source : Platts.

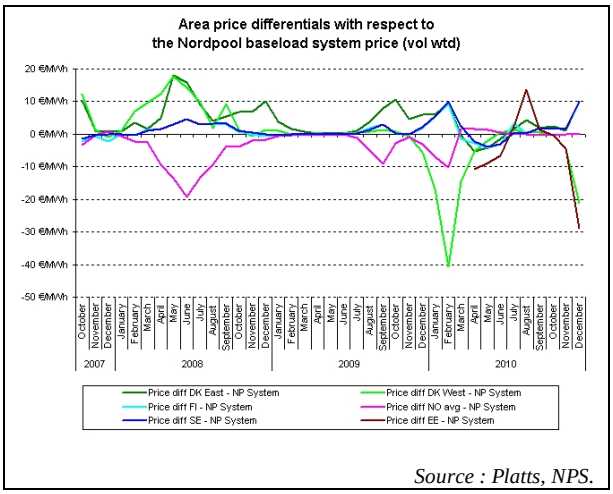
The most important factor behind this significant price increase was the colder weather conditions. In the countries of the Nordpool region (Norway, Sweden, Denmark, Finland and Estonia) November 2010 HDD values were 10-20% higher than the long term average, while the country-specific HDDs in December exceeded the long term averages by 20-40%.

On the supply side the low levels of hydro reserves put a constraint on hydro generation, exerting an influence on the tightness of the system. While in the first week of Q4 2010 the level of hydro reserves in the NP region was 13% below the median of the period of 1990-2006, in the last week of December this difference amounted to more than 25%. This also led to higher baseload power system prices.



Source : NPS

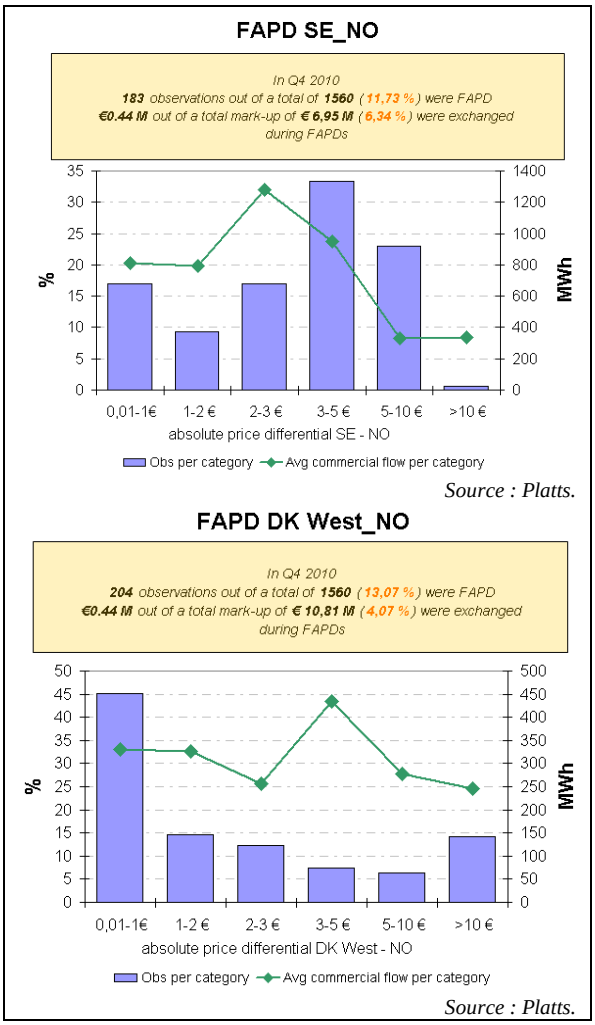
The extremely high daily prices in mid-December were also influenced by the reduced availability of the Ringhals-4 nuclear reactor in Sweden, putting an additional element of uncertainty in the already tight system. This temporary capacity reduction of the Swedish nuclear power plant contributed to the positive deviation of Swedish area prices compared to the NPS system average (+10 €/MWh on a monthly average)



Source : Platts, NPS.

Due to high daily prices in the first half of December 2010 (and to extremely high hourly prices - 2000 €/MWh observed on the 7th of December between 17:00 and 19:00) DK East monthly area prices were 10 €/MWh higher in the last month of 2010 than the NP system prices.

In contrast, DK West and Estonian daily area prices were not following the general upward price trend in the region. The possible reason for this might be alternative power import sources (from other regions of Europe), thus these areas were less affected by the tightness of the system described above.



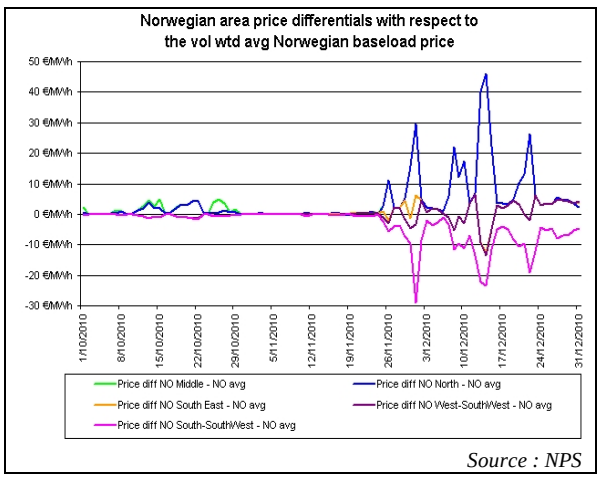
Source : Platts.

Source : Platts.

In Q4 2010, a significant amount of adverse power flows could only be observed between DK West and Norway and between Sweden and Norway areas in the Nordpool power region. This may have been related to the price deviation of these power areas compared to the NP system price. In the Swedish-Norwegian FAPD

relation, the reduced nuclear plant availability in Sweden (mentioned on the previous page) may also have played an important role.

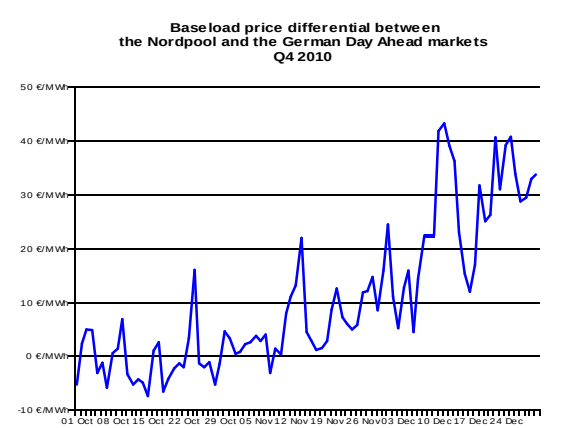
Until the beginning of December 2010, only minor price differentials could be observed among Norwegian system and area prices. In the last month of the year, daily prices of the South-Southwest region were generally lower than the national baseload price, contrary to North area prices that generally overshot the Norwegian system average. This might have been a consequence of the uneven impact of the low hydro levels and unplanned outages in the NP system on different Norwegian price areas.



Source : NPS

Although in October 2010 NP baseload system prices were generally traded at a discount to German prices, from November this discount turned to an increasing premium that reached 30 €/MWh in the last week of December 2010. Compared to the rapidly increasing NP system prices, the increase in German prices was moderate.

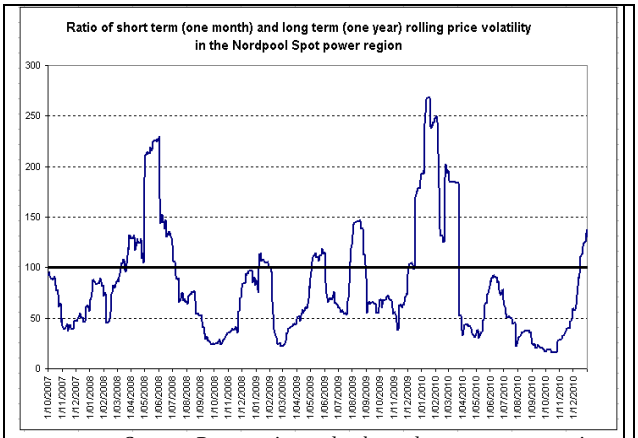
Although the market coupling took place between CWE and NP regions on the 9th of November 2011 (*see page 6*), German and Nordpool system prices did not show an immediate alignment. This might have been the consequence of the limits of inter-connection capacities between the two power regions. It seems that only the DK West price area showed an alignment with the CWE region.



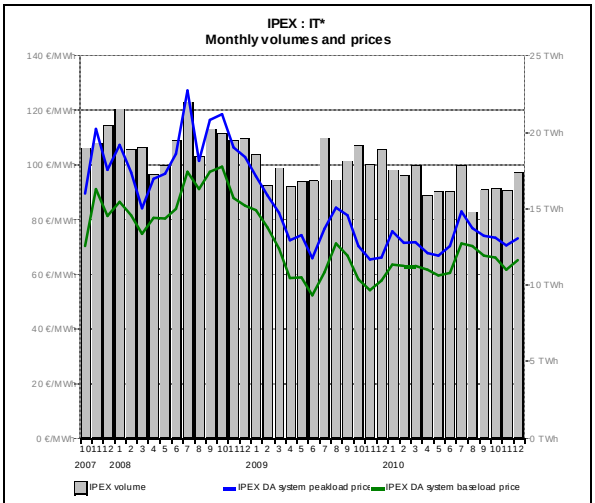
Source: Platts.

On the 15th of December 2010, market coupling between the NP region and the Polish POLPX market was officially launched, although it had a limited impact on these two power markets in the remaining two weeks of 2010.

At the beginning of the fourth quarter of 2010 the RVI of the Nordpool Spot power region was at its lowest level since the beginning of availability of the data. However, from late October 2010 volatility began to rise and by the end of 2010 it reached its highest level since March 2010. Both demand side factors (such as higher heating needs) and supply side factors (availability of nuclear power plants and low hydro reserves) resulted in this rapidly increasing volatility.



Source: Power price and volume data, own computations.



Source : Platts.
** Trade on Italian (IPEX) and Iberian (OMEL) electricity markets is incentivised by regulatory means.*

Apennine Peninsula

Italy

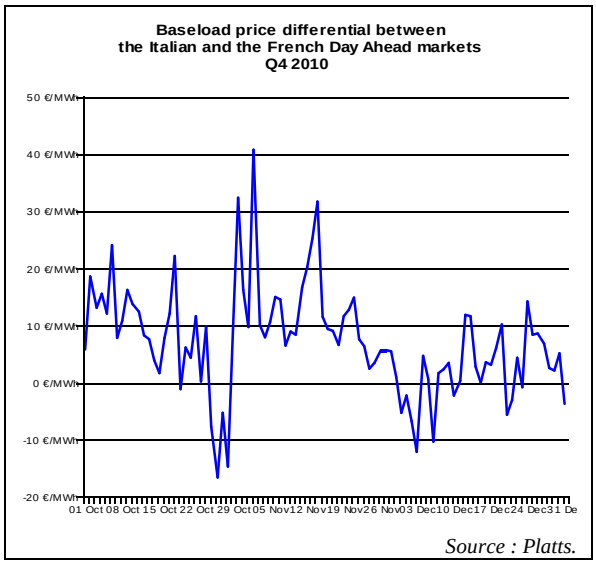
Monthly average baseload power prices in Italy moved in a narrow range during the fourth quarter of 2010. Continuing its decline from the peak measured in the middle of the summer, October baseload power price was 65.8 €/MWh on average. In November, the monthly baseload average slightly decreased (to 61.4 €/MWh) and it rose back to 64.9 €/MWh in December 2010. Monthly peakload average prices generally followed the same trajectory, retaining their 7-8 €/MWh premium to the respective baseload averages.

The highest daily average power prices on the Italian market occurred in the second half of October 2010 and in mid-December. High prices in the former period might have been related to the relatively cold weather in October (HDDs were up by 47% compared to the long term average). In mid-December, high daily average power prices were mainly due to low temperatures and increased domestic heating needs.

The highest daily average price in Q4 2010 (91.3 €/MWh) was measured on the 2nd of November. On this day, there were a couple of hours when prices fluctuated in a very high range (130-160 €/MWh).

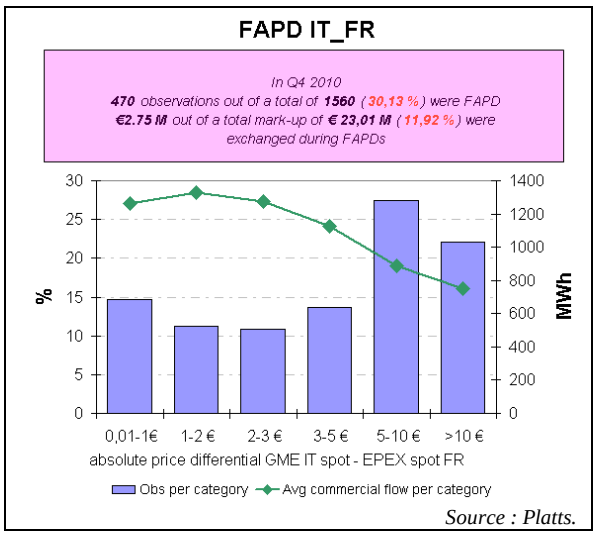
Italian electricity day-ahead contracts are normally traded at a significant premium to their French counterparts. During Q4 2010, there were several occasions when Italian daily average prices were lower than those in France. Italian price discounts in late October were mainly due to high prices in France (as a consequence of reduced power supply amid strike action – *see page 9*). Italian power prices did not follow the

hike in French prices in early December 2010 as the weather in Italy remained milder (monthly HDDs were only 8% higher compared to the long term average.).



Source : Platts.

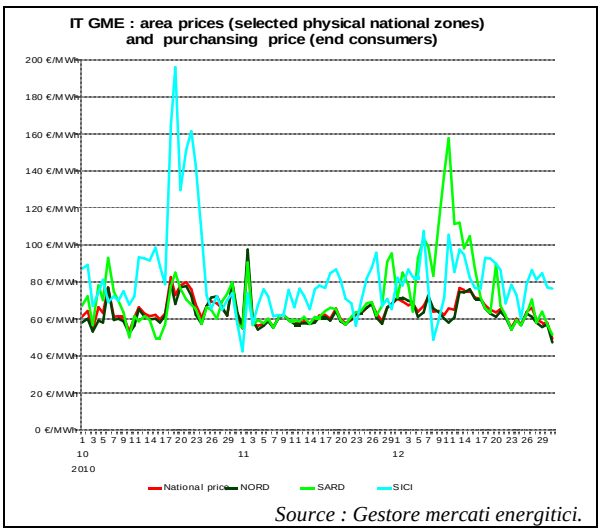
Italian price discounts resulted in increased power exports to France. The quarterly power export of Italy to France amounted to 65.5 GWh, which was the highest value in the last four years.



Source : Platts.

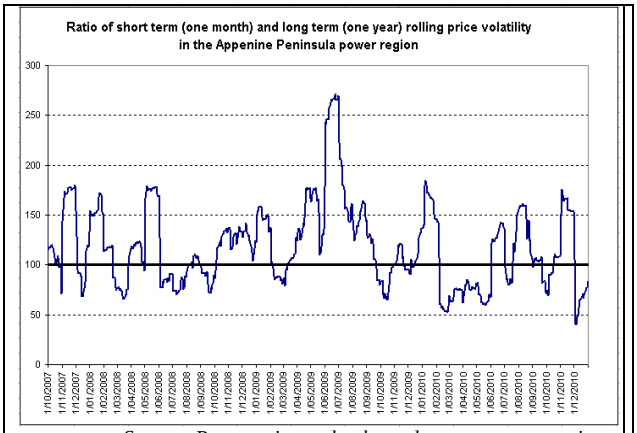
This unique situation was also reflected in the high ratio of adverse flows between the two countries. The ratio of adverse flows was more than 30% of all observations and even high price differentials could not always justify the economically reasonable power flow direction. Among all FAPD observations, over 20% were more than 10 €/MWh, reflecting the frequent actual price deviations from the expectations of the day before.

The next chart shows the price evolution of selected area prices in Italy during the fourth quarter of 2010. The Sicilian daily area prices peaked between the 18th and the 23rd of October 2010. During these days hourly area prices were over 150 €/MWh during most of the time. Sardinia area prices reached their quarterly peak on the 11th of December 2010.



Source : Gestore mercati energitici.

It seems that unusual grid conditions (power exports to France or cold temperatures) exerted a more intensive influence on isolated power areas (like Sicily, Sardinia, or Corsica), pushing the prices higher as the supply decreased in the national grid.



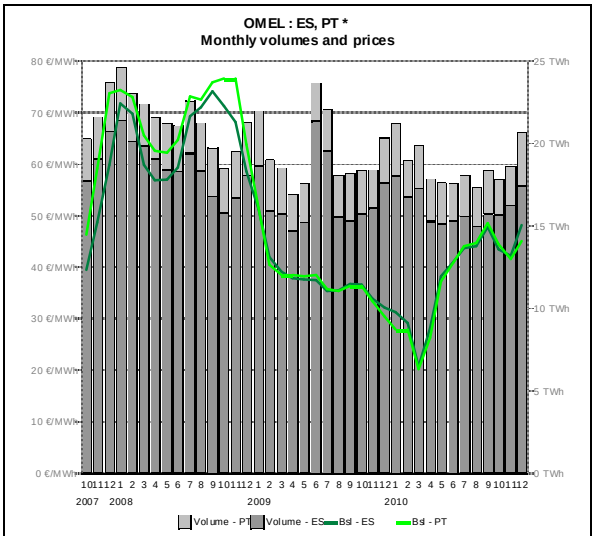
Source: Power price and volume data, own computations.

The volatility of the Apennine peninsula region (Italian market) was different than that of Northern and Western Europe. At the beginning of Q4 2010 the actual market volatility was below the long term value. In late October, as Italian prices jumped in consequence of reduced domestic power supply (increasing exports to France), the price volatility significantly increased. As domestic supply conditions normalised, the volatility went back to low levels again. In December 2010, volatility only slightly increased. Contrary to other markets in Europe that were affected by the cold weather, in Italy the temperatures remained milder.

Iberian Peninsula

Spain and Portugal

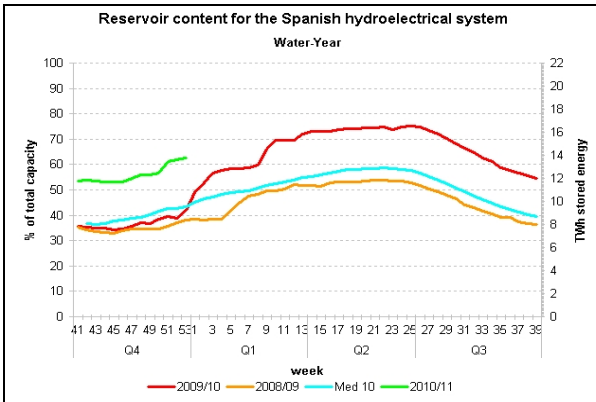
Contrary to the markets in the Central West European Region, which experienced significant increases in monthly average power prices in the fourth quarter, prices on Iberian markets fell in October and November.



Source : Platts.
** Trade on Italian (IPEX) and Iberian (OMEL) electricity markets is incentivised by regulatory means.*

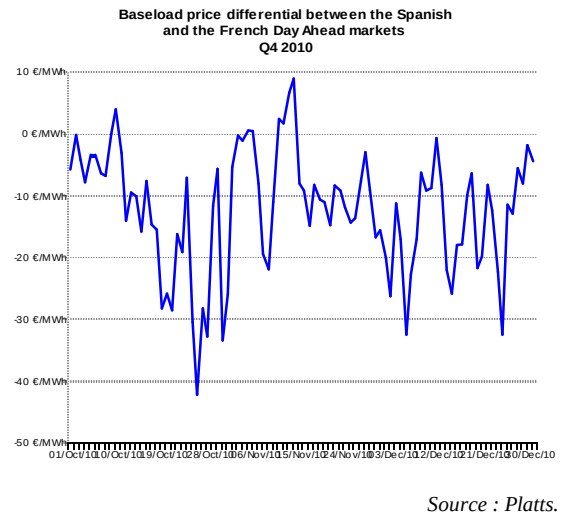
Spanish baseload prices reached their peak in September 2010 (47.6 €/MWh), dropped to 42.1 €/MWh in November and then rose to 48 €/MWh in December. Portuguese monthly average baseload prices decreased from 48.4 €/MWh in September 2010 to 41.4 €/MWh in November, while increasing to 45 €/MWh in December. Portuguese power prices were trading at a 3 €/MWh discount to their Spanish counterparts in the last month of 2010.

The evolution of baseload power prices in the region must have been influenced by the good level of wind-based power generation and higher-than usual level of hydro reserves. In the fourth quarter of 2010, the average level of hydro reserves in Spain was 16% higher than the ten-year median.



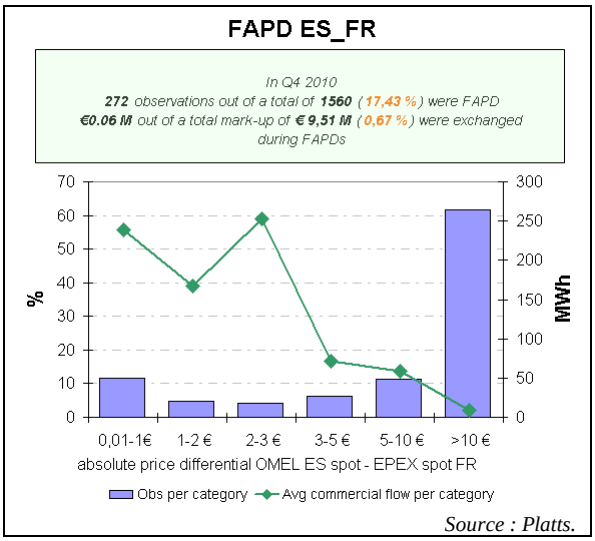
Source : Ministerio de Medio Ambiente, y Medio Rural y Marino, Gobierno de España

These two renewable energy sources reduced the importance of fossil fuels in the power mix in Q4 2010. This was perfectly illustrated by the growing Spanish price discount to the French market during October 2010. Spanish prices remained stable in spite of increasing prices in neighbouring France. In fact, only a couple of days can be found in Q4 2010 when Spanish baseload power prices exceeded those of France.



Source : Platts.

An interesting phenomenon could be observed in Q4 2010 regarding the FAPDs between Spain and France: while 60% of the adverse flows were higher than 10 €/MWh, the average amount of adverse flow was very low in this category. This might have been related to volatile price differences between the two countries, especially in October 2010.



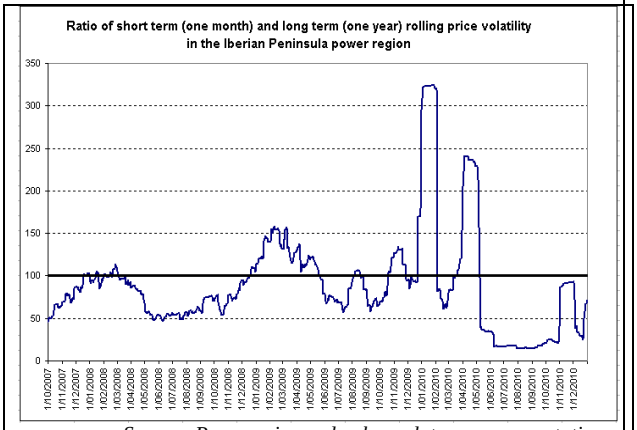
Source : Platts.

Spanish daily average baseload prices decreased significantly on two occasions ahead of public holidays during Q4 2010: On the 31st of October, the daily average power price was 10.7 €/MWh and on the 25th of December it was 15.7 €/MWh. Besides reduced industrial power demand ahead of public holidays, the high level of wind power generation also played an important role in the temporary fall in power prices.

On the other hand, hydro-based and wind-based power generation also contributed to the resilience of the Spanish power system to the excess heating demand arising from the cold weather in early December. Spanish daily average baseload prices peaked on the 1st of December 2010 (57.2 €/MWh), which was substantially lower than the quarterly peaks of other European markets (above 70 €/MWh during the early days of December 2010).

Gross inland electricity consumption in Spain was up by only 4% in Q4 2010 compared to the fourth quarter of 2009 and the volume of traded power on OMEL did not change significantly during the same period. The Spanish economy showed signs of limited growth (GDP was up by only 0.6% compared to Q4 2009), which also contributed to moderate power demand.

Short term volatility remained below the one year backward looking index during the whole fourth quarter of 2010 in the Iberian Peninsula region.



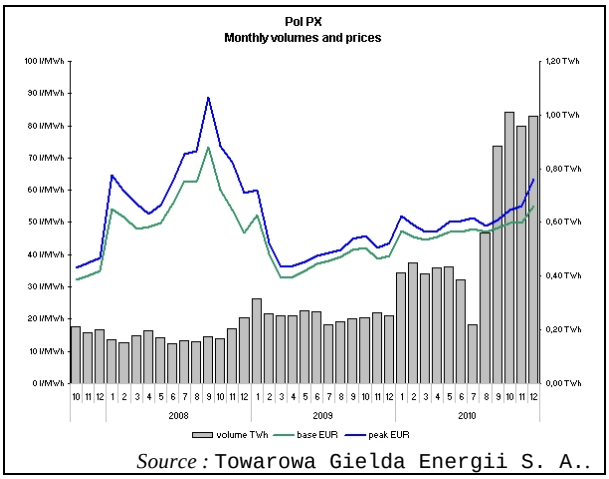
Source: Power price and volume data, own computations.

The RVI experienced a jump only twice at the beginning of November and at the end of December when power prices showed a temporary decrease due to decrease of power demand ahead of public holidays and healthy wind power generation.

Central Eastern Europe

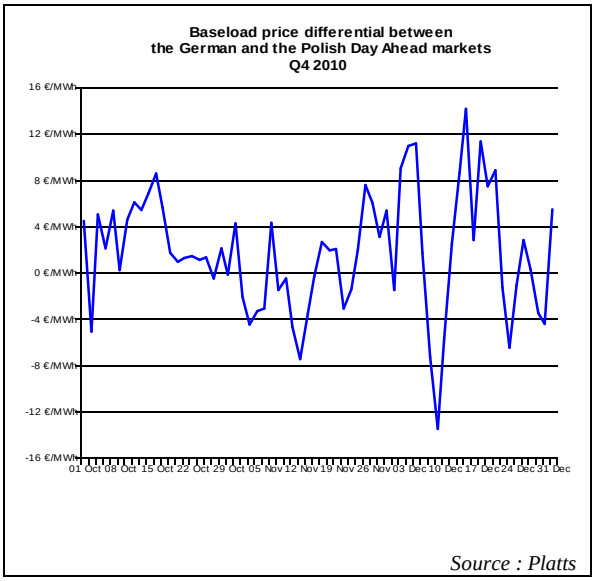
Poland

Fourth quarter traded volumes on PolPX were higher than in the past. Volumes had increased already in Q3 2010, as a consequence of the amendment of the Energy act, requiring 15% of the annually produced electricity to be sold on the regulated market. Total volumes in Q4 2010 increased by almost 300% compared to the total volumes in Q4 2009, representing 7% of the Polish gross electricity consumption during the same quarter.



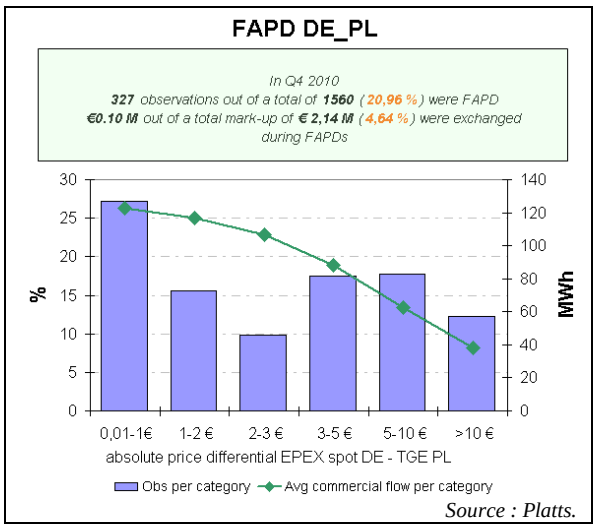
Source : Towarowa Gielda Energii S. A..

As for volumes, prices were lower in Q4 2009 as the weather was warmer. In Q4 2010, the weather was significantly colder. In December the temperatures were often around -10 °C degrees, and at the beginning of the month even below -15 °C. As a consequence, the increased demand and CO2 prices pushed up power prices.

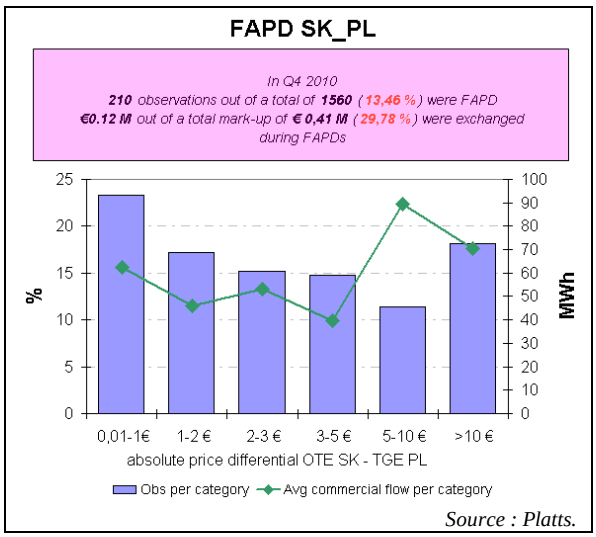


Source : Platts

At the beginning of December, the German baseload was sold at a discount of 13.5 €/MWh. Even though temperatures were low in both markets, German producers were more flexible due to large wind and hydro power availability. However, this also made the price differential volatile: for example, when there was a combination of high demand and low production from wind turbines, the German price reached a premium of 14 €/MWh.



Source : Platts.



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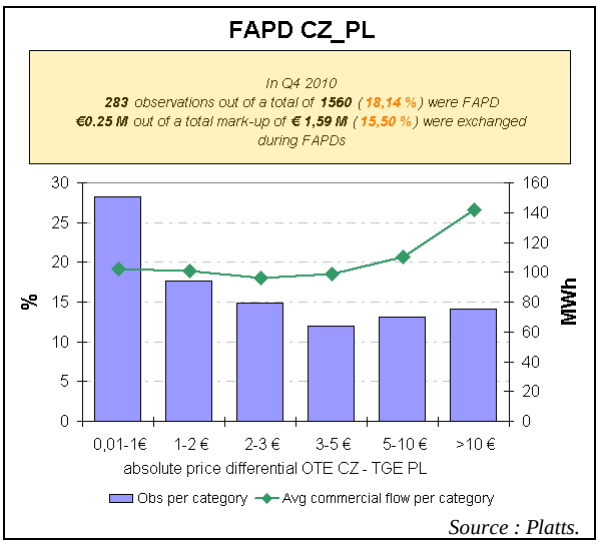


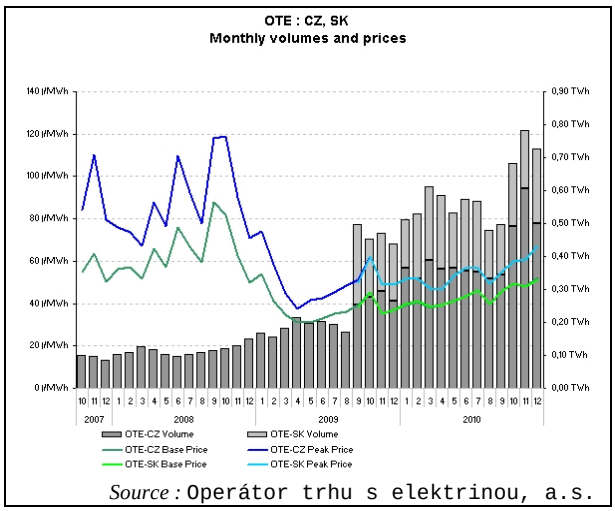
Source : Platts.

An analysis of adverse flows (flows from a high-price area to a low-price area) between Poland and the neighbouring countries shows that most of the adverse flows occurred on the border with Germany, with every fifth observation counting as an adverse flow. On the other hand, adverse flows on the border with the Czech Republic and Slovakia were higher in monetary terms. This is related to the fact that average commercial flow per category was larger at bigger price differentials.

Czech Republic and Slovakia

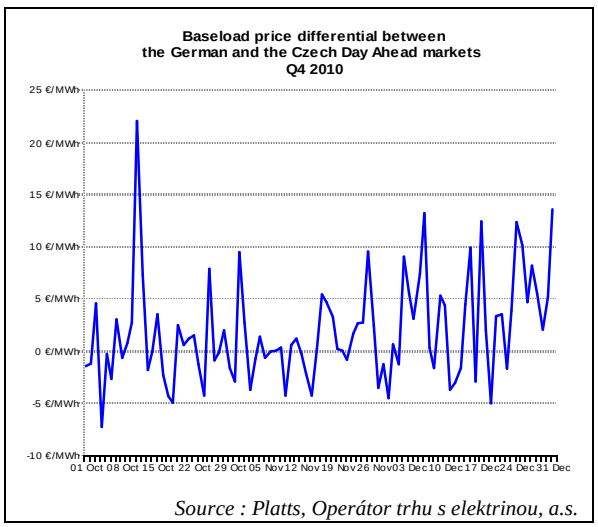
Traded volumes on both the Czech and Slovak power exchanges continued to follow an increasing trend. However, they still represented only a small portion of the electricity consumed in these countries. In 2010, the sum of traded volumes reached 7.1 TWh, whereas annual consumption was around 80 TWh.[9]

[9] The latest official figures by Eurostat show that in 2008 the gross inland market consumption of electricity was 25 TWh in Slovakia and 58 TWh in Czech Republic.



Source : Operátor trhu s elektrinou, a.s.

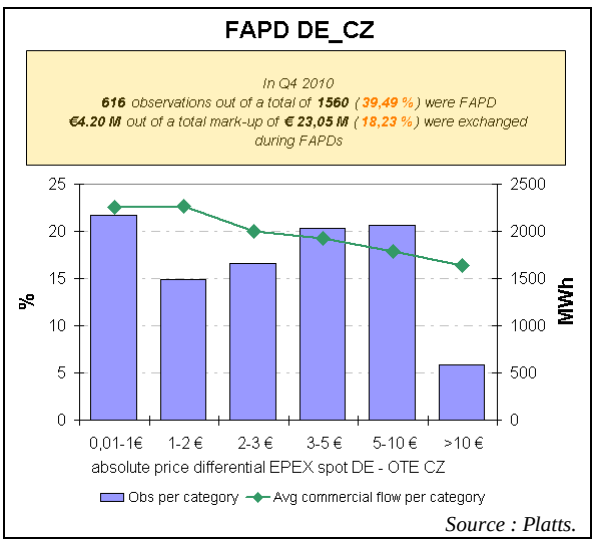
The average monthly price increased following a trend that began in September. Falling temperatures in the following months represented a main driver behind this trend. As per usual, developments in Germany had also a strong impact on the Czech and Slovak prices. When the baseload price on both exchanges reached 69.2 €/MWh on the 7th of December (a level last observed in November 2008), this was not only the result of lower temperatures in Central Europe, but also due to lower levels of wind and nuclear power supply in Germany.



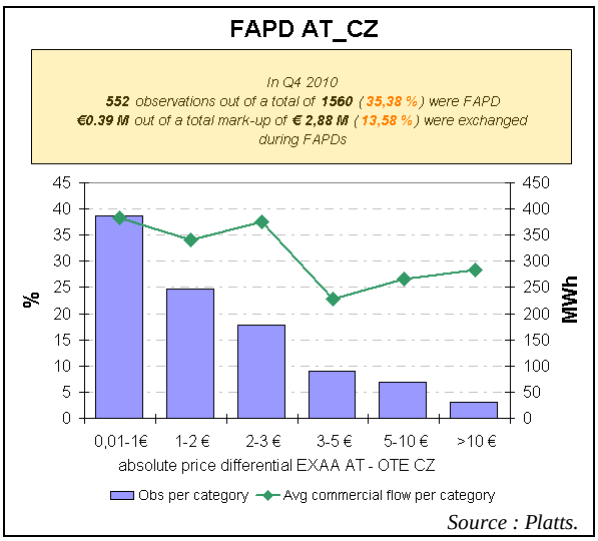
Source : Platts, Operátor trhu s elektrinou, a.s.

A similar combination of drivers, i.e. low temperatures, low wind power and unforeseen nuclear outage, caused the German premium to spike in the beginning of October 2010.

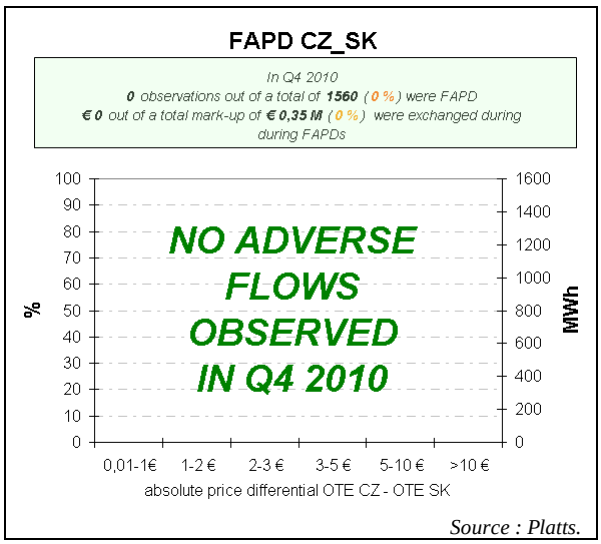
Apart from such events, the price differential between the German and the Czech price was frequently changing from premium to discount by the end of November. However, in December the Czech baseload was sold at a large discount. This can be explained by high hydro levels in South Eastern Europe, from where electricity was exported at a lower price.



Source : Platts.



Source : Platts.

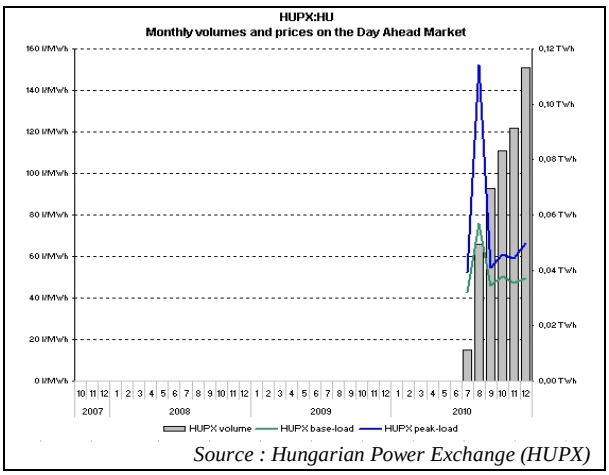


Source : Platts.

Between the Czech Republic and Slovakia, no flows against the price differential (FAPD) were observed, contrary to the Czech-Austrian and Czech-German border. As the Czech and the Slovak markets are closely linked, it can be reasonably concluded that as the markets are integrating through better interconnector capacities and common trading platforms, the number of adverse flows should be decreasing.

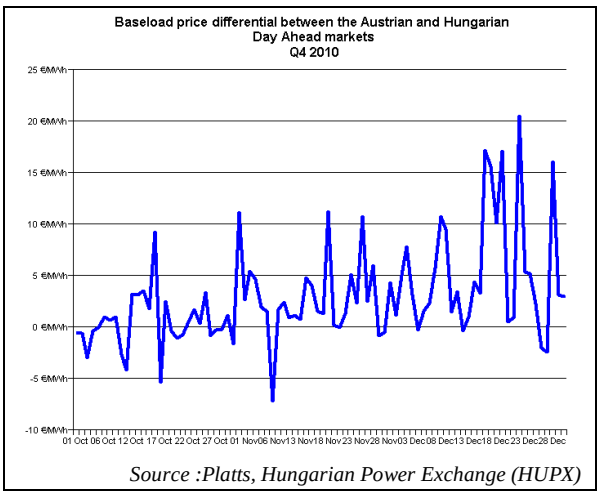
Hungary

As trading on the Hungarian power exchange began in July 2010, it still remains to be seen how liquidity is going to develop. So far, monthly volumes traded on HUPX have been growing. In Q4 2010, total traded volumes corresponded to 2.5% of the Hungarian gross electricity consumption.



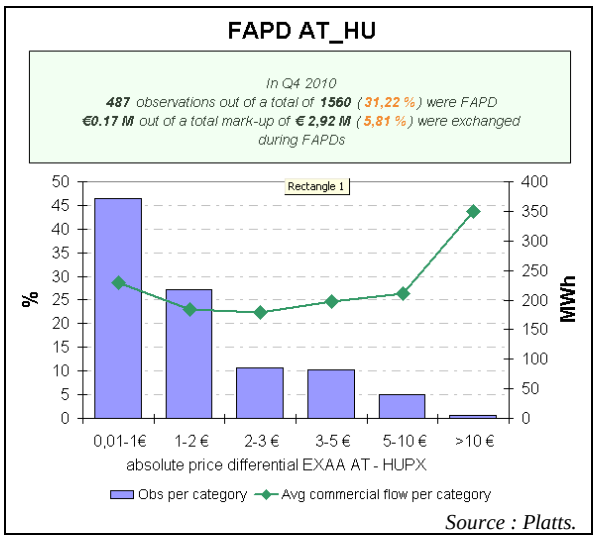
Source : Hungarian Power Exchange (HUPX)

An analysis of the Hungarian and Austrian price differential gives similar results as the analysis of the differential between the Czech and German baseload prices. Most of the quarter the Hungarian baseload was sold at a discount which began increasing in December, owing to abundant hydro levels in South Eastern Europe, from which the Hungarian wholesale market appears also to have benefited.

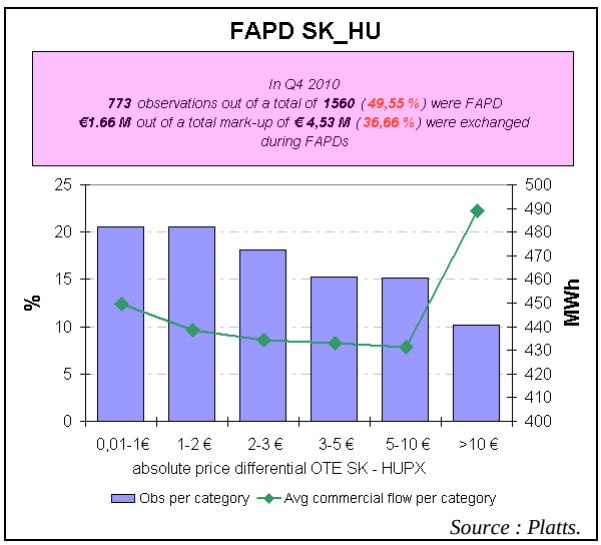


Source :Platts, Hungarian Power Exchange (HUPX)

A significant number of adverse flows could be observed on Hungarian borders to Austria and Slovakia. As the Hungarian wholesale began to operate just recently it cannot yet be said whether this is normally the case.

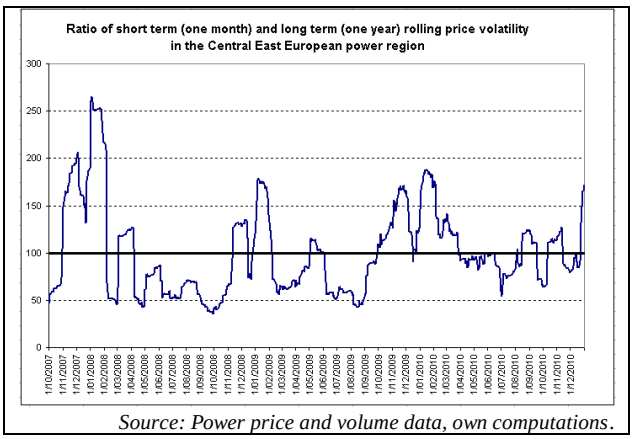


Source : Platts.



Source : Platts.

Price volatility in the Central Eastern European Region was less than usual at the beginning of Q4 2010. In mid-October, the market events in the CWE region began to exert an influence on these countries and prices became more volatile.



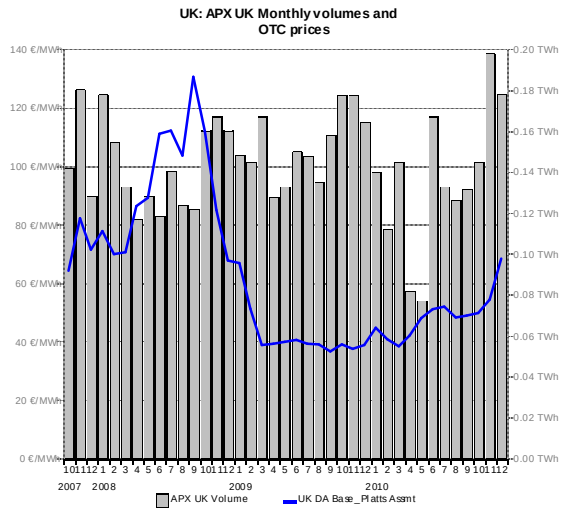
Source: Power price and volume data, own computations.

It seems that colder-than-normal weather in December 2010 did not exert as strong an influence on price volatility in the CEE region as in Western Europe. Nevertheless, the holiday season at the end of December resulted in some temporary price drops that increased the volatility in the region.

British Isles

UK

Increasing power prices led to a high average in December. The monthly average day-ahead price was assessed at 68.4 €/MWh, the highest value for the last two years.



UK values are quoted in € using the €/£ daily exchange rate as reported by Platts.

Source : Platts.

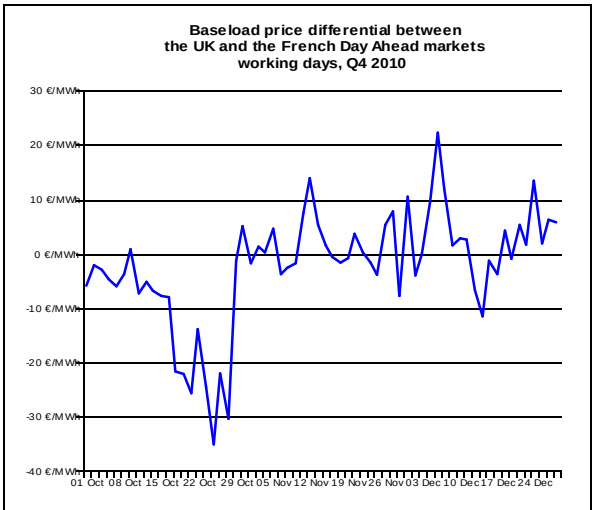
The price movements in Q4 2010 were mainly driven by changes in gas prices and changes in temperatures. Additionally, in October the UK-French interconnector operated at reduced capacity for two weeks due to maintenance works, causing the price to increase[10].

[10] The UK-France interconnector is a HVDC link with a capacity of 2000 MW. The ownership is shared between the National Grid and Réseau de Transport d'Electricité. It is 70 kms long, 45 kms of which is under water. In Q4 2010 the capacity was reduced several times as the table shows. (Source: National Grid)

Dates	Capability Reduction (MW)	Duration (days)
1 Oct.	500	1
11 Oct. to 16 Oct.	1,000	6
18 Oct. to 24 Oct.	1,000	7
7 Dec. to 8 Dec.	1,000	2
23 Dec.	500	1

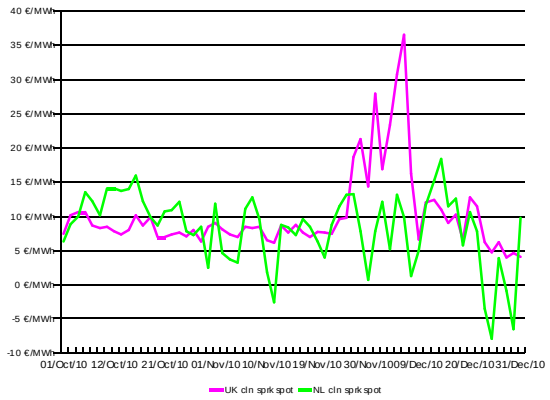
In the second half of November, the price started to increase. The peak for the observed quarter was reached on the 7th of December, when the Platts baseload assessment reached 92.1 €/MWh (this level was reached for the last time during the winter 2008/2009). The main reasons for the growth were lower than average seasonal temperatures and the related increase in power demand. Additionally, the spike was also related to tighter supply, as some power plants were taken offline and the UK-FR interconnector was again operating at reduced capacity (for two days).

Regarding the price difference between the baseload prices in the UK and France there was a period when French prices traded at a premium at the end of October. This happened because of the high power prices in France. It appears that the French markets reacted more strongly to colder weather, strikes in the power sector and lower availability of nuclear power plants.



Source : Platts

The clean **spark spread**[11] showed a decreasing trend in both the UK and the Netherlands.

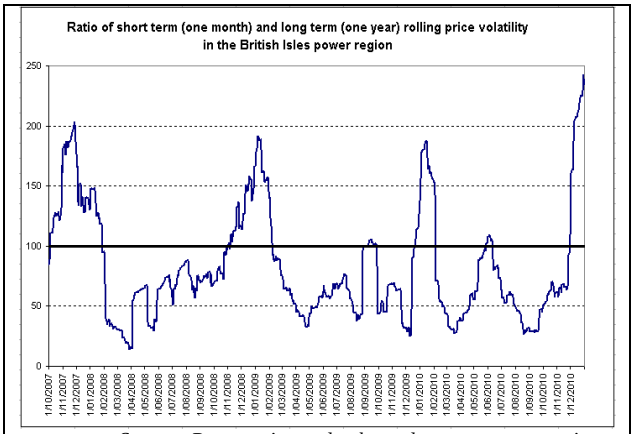


UK values are quoted in € using the €/£ daily exchange rate as reported by Platts

Source : Platts

The UK clean spark spread began the quarter at 7.3 €/MWh and ended it at 4.0 €/MWh. In the beginning of December, it resulted in a spike at 36.5 €/MWh. Although gas prices were increasing due to higher demand, this spike was a result of high electricity prices. On the 7th of December, the price of electricity was assessed at above 92 €/MWh, the highest value in the quarter. When power plant availability improved and temperatures dropped, the price of electricity fell quickly.

The fourth quarter of 2010 saw an increase in the price volatility on the UK power market. Until mid-November, the market was relatively calm, but from the last week of the month power prices started to rise rapidly and this also increased the volatility as temporary price corrections occurred on some trading days. During the holiday season at the end of December the impact of decreased industrial power demand and cold weather brought a period of price movements with frequently alternating direction.



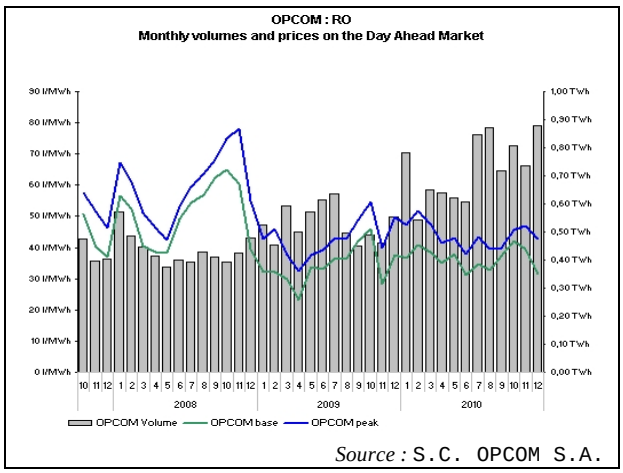
Source: Power price and volume data, own computations.

[11] Spark spreads are indicative prices showing the average difference between the cost of gas delivered on the gas transmission system and the power price. As such, they do not include operation, maintenance or transport costs. The spark spreads are calculated for gas-fired plants with standard efficiencies of 50% and 60%. This report uses the 50% efficiency.
Spreads are quoted for the UK, German and Benelux markets.
Clean spark spreads are defined as the average difference between the cost of gas and emissions, and the equivalent price of electricity.

South Eastern Europe

Romania

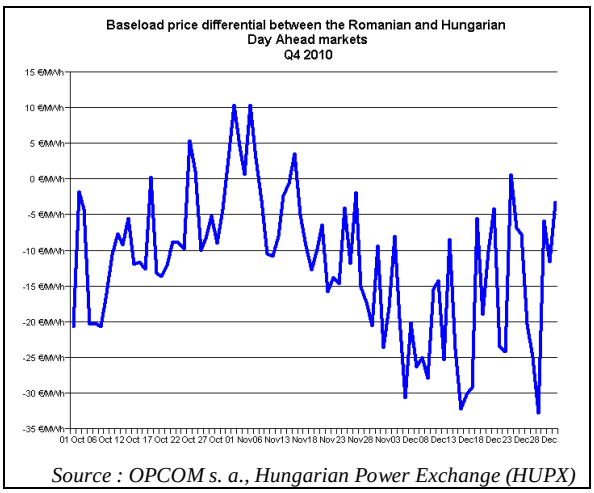
Traded volumes on OPCOM increased during 2010. Compared to 2009, the annual traded volumes increased by 37%.



Source : S.C. OPCOM S.A.

In December 2010, the level of traded volume reached 879 GWh, equivalent to 16% of Romanian consumption in that month. Apart from the growing trend of trading on OPCOM, this also corresponded to the lowest temperatures in the winter months.

Baseload power in October traded at an average of 42.0 €/MWh. The average price for peakload power in the same month was 45.5 €/MWh and in November 46.8 €/MWh. However, by the end of the quarter both baseload and peakload prices dropped significantly. It appears that the decrease was related to the high hydro levels in that period in South Eastern Europe.

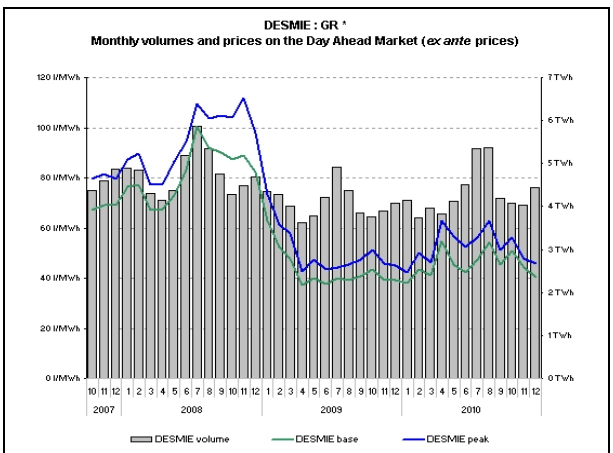


Source : OPCOM s. a., Hungarian Power Exchange (HUPX)

Relative to the Hungarian wholesale market, Romanian baseload power was trading at a discount most of the quarter. The discount increased in December, sometimes exceeding 30 €/MWh. This indicates that there is potential for more cross-border trading in this region.

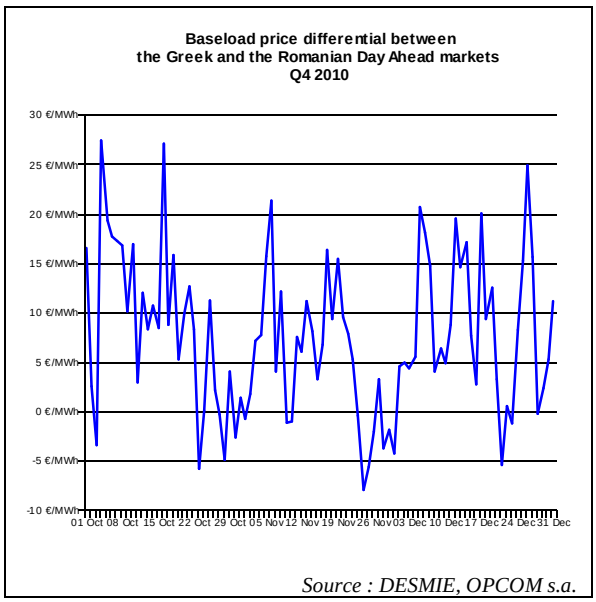
Greece

The baseload power price on the Greek wholesale market decreased in the last quarter of 2010. From 50.8 €/MWh in October it fell to 40.5 €/MWh in December. Within the same period, the price for peakload power decreased from 56.4 €/MWh to 46.0 €/MWh.



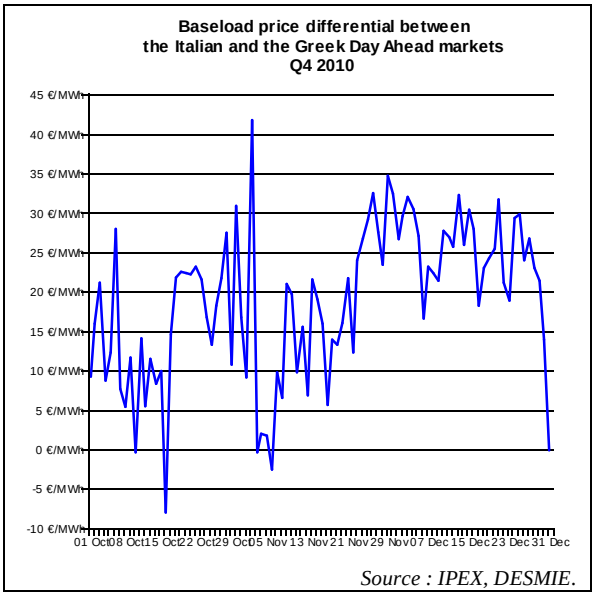
Source : Platts.
** Trade on the Greek mandatory pool (DESMIE) is incentivised by regulatory means.*

These low price levels were comparable to Q1 2010 when PPC, the largest Greek power generation company, increased hydropower production due to weather conditions. In Q4 2010, hydro levels were again very high, leading PPC to produce more power out of this source.



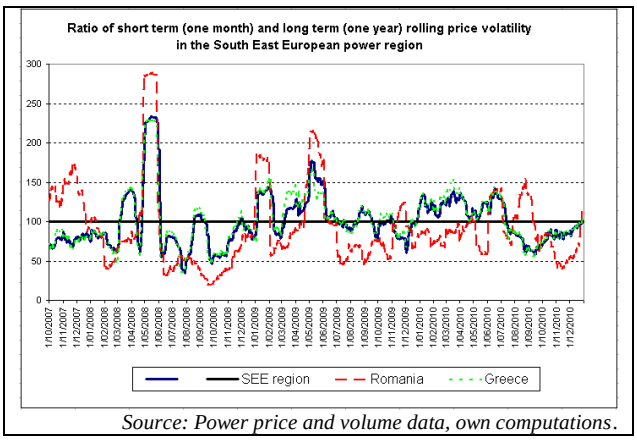
Source : DESMIE, OPCOM s.a.

Although prices fell both in Romania and Greece (both systems were well supplied, especially by hydro power generation), the Greek baseload traded at a premium for most of the quarter. Nevertheless, the average Greek baseload premium was 7.6 €/MWh in Q4 2010, still considerably lower than in Q3 (14.2 €/MWh) and Q2 (12.7 €/MWh), but higher than in Q1 (2.2 €/MWh).



Source : IPEX, DESMIE.

On the other hand, when compared to the Italian wholesale market, the Greek baseload traded at a discount most of the quarter and also most of the year. The average premium of the Italian baseload was 22.2 €/MWh in Q1, 12.9 €/MWh in Q2, 20.0 €/MWh in Q3 and 18.8 €/MWh in Q4.



Source: Power price and volume data, own computations.

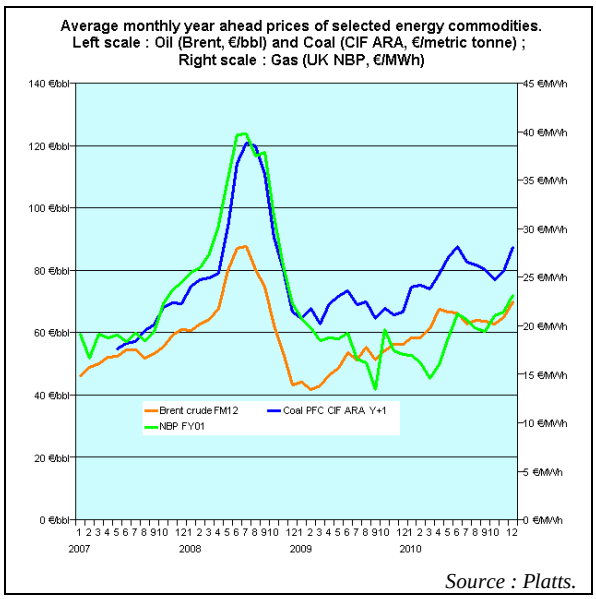
In the fourth quarter of 2010, volatility increased on both markets. In Greece, a gradual increase in volatility could be measured, while in Romania volatility suddenly jumped in the second half of December 2010. With the exception of the last couple of days, the short term volatility

remained below its usual level, which could be explained by milder-than-usual temperatures in November and December 2010 and the role of hydro-power that helped to stabilise price movements.

A.1.2 Forward markets

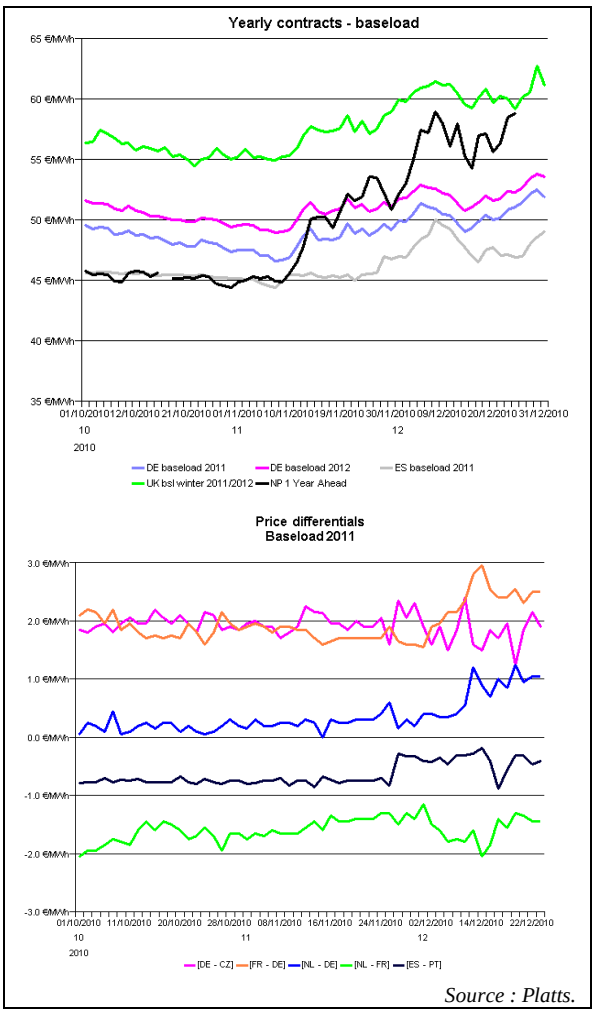
The monthly average of year ahead prices in the main energy commodities increased in Q4 2010, continuing the trend that began at the beginning of 2009.

In Q4, 2010 markets were reacting to the signs of global economic recovery, and most notably to high demand for energy from China. On the other hand, market participants were also cautious due to the fears of a double-dip recession, the situation in the Eurozone and disagreements between China and the US on exchange rate policies.



Source : Platts.

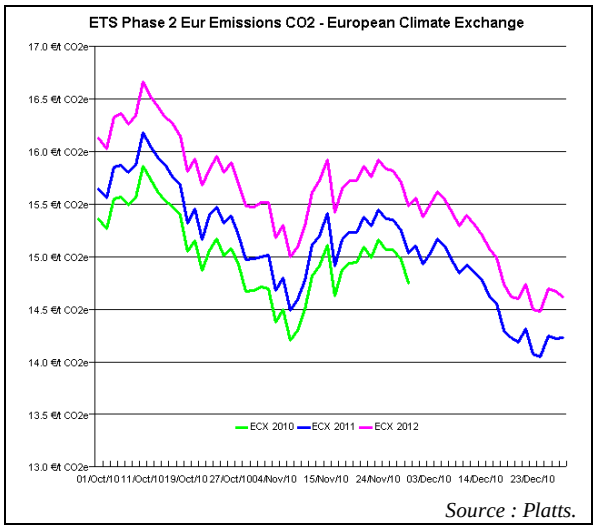
Having a closer look at the European power markets, a drop is visible in October and in the first half of November for yearly contracts. Prices were decreasing because of lower fuel and carbon prices. When the weather became colder and underlying fuel prices increased, forward prices followed the increase on the day-ahead markets. As seen on the chart below, the yearly contracts on Nordpool increased more than other exchanges. In the second half of the quarter, the day-ahead market on Nordpool was under pressure due to the combination of very cold weather, low temperatures and reduced power production in Sweden (*see the chapter on Northern Europe for more details*).



Source : Platts.

Carbon prices fell throughout the whole quarter, influencing gas and power prices. Both 2011 and 2012 carbon prices fell in October under the threshold of 16 €/t, and later in December further under 15 €/t. However, for the past two years carbon

prices under the ETS have averaged at 15 €/t. The drop in Q4 2010 could be to some extent linked to higher coal prices, which motivate the use of less polluting natural gas instead.

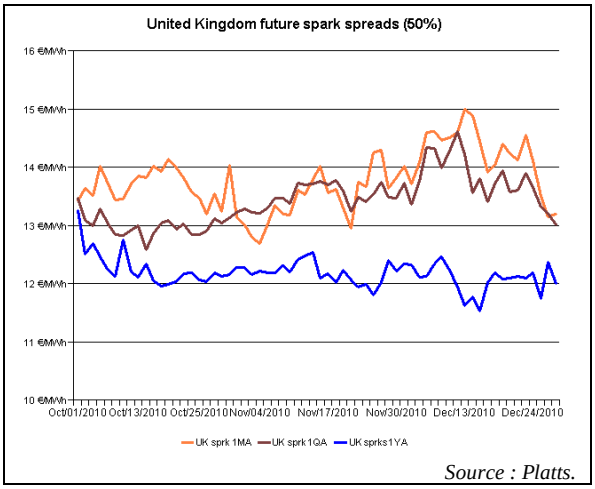


Source : Platts.

UK future spark spreads increased on the month-ahead and quarter-ahead basis. However, these spreads have actually been decreasing during the last years (as the table below shows).

	2009	2010
Average monthly future spark spread	17.3 €/MWh	14.7 €/MWh
Average quarterly future spark spread	16.4 €/MWh	14.9 €/MWh
Average yearly future spark spread	12.9 €/MWh	13.2 €/MWh

The average yearly spread, although a bit higher in 2010 than in 2009, decreased on the long-term, because in 2007 it stood at 18.9 €/MWh. The driver behind this trend could be increased imports of LNG at competitive prices.



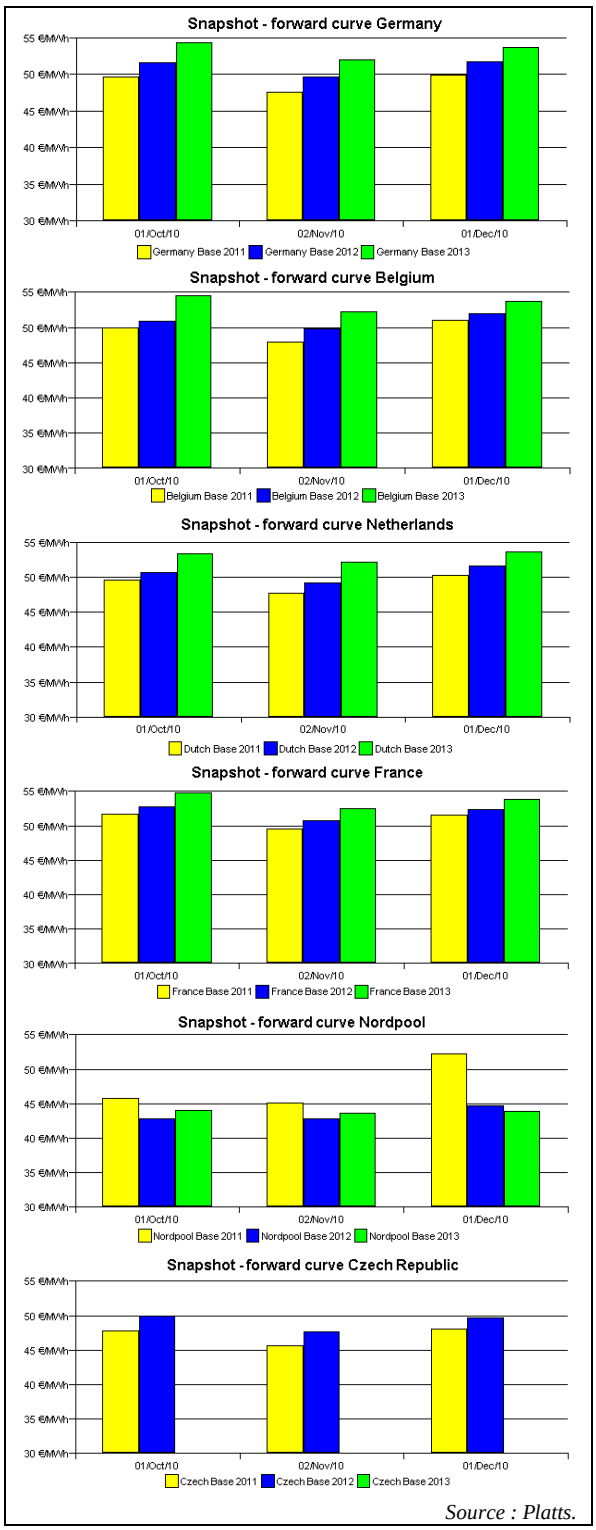
Source : Platts.

The snapshots show a clear contango[12] on all exchanges except Nordpool. As the Central Western European markets began to couple, this situation was expected.

In Nordpool, backwardation[13] was present, and it was particularly strong in December. It appears that the forward price followed the steep rise on the day-ahead market, which reacted to temperatures below the seasonal December average. However, for the years 2012 and 2013 market participants did not appear to expect the intense price growth they witnessed in Q4 2010.

[12] A situation of contango arises when the closer to maturity contract has a lower price than the contract which is longer to maturity on the forward curve.

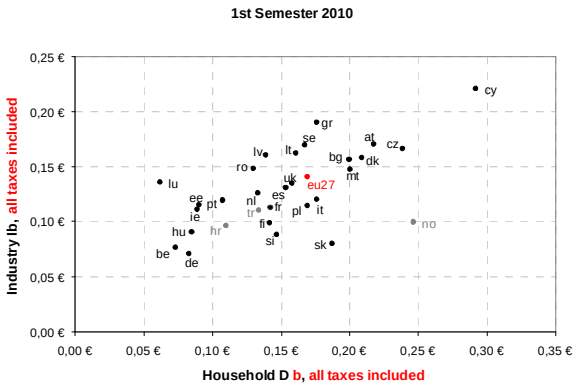
[13] Backwardation occurs when the closer-to-maturity contract is priced higher than the contract which is longer to maturity.



Source : Platts.

A.2 Retail markets[14]

The next two charts show the electricity prices paid by household consumers that use between 1,000 and 2,500 kWh and industrial consumers that use between 20 MWh and 500 MWh annually (consumption bands *Db* and *Ib*, according to Eurostat consumption categories). Besides EU member states, price data for Croatia, Norway and Turkey are also presented. The first chart shows the household and industrial customer prices including all taxes (gross prices), while the chart that follows shows prices without taxes (net prices).[15]



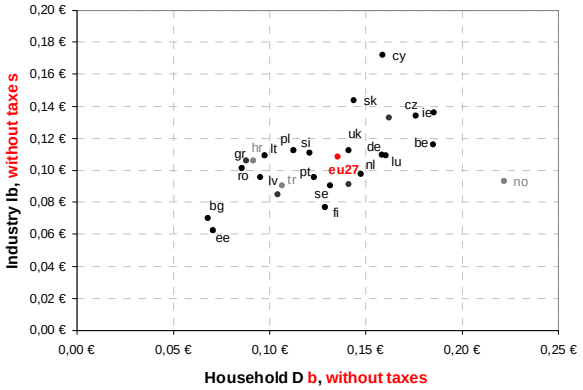
Source : Eurostat
Range for annual consumption of :
Household band Db : [1.000 kWh – 2.500 kWh] ;
Industry band Ib : [20 MWh – 500 MWh]

Note: Data for Austria, Hungary and Malta are not available

[14] Eurostat only provides data on retail market prices on a biannual basis. For this reason these alternate between reporting on prices for median level consumption bands consumers in the first and third quarter and on prices for low level annual consumption band consumers in the second and fourth quarter of a given year.

[15] It should be noted that the indicative Eurostat categories of household and industry consumers are not necessarily representative of the average customer for a given Member State due to different consumption patterns across the EU.

During the second semester of 2009 and the first semester of 2010, the ratio between the cheapest and most expensive gross prices for households slightly increased, while at the same time it decreased somewhat for industrial consumers. In absolute terms, the range between the cheapest and most expensive net prices for household and industrial consumers amounted to 22 €cents/kWh for households and cents 11 €cents/kWh for industrial consumers.

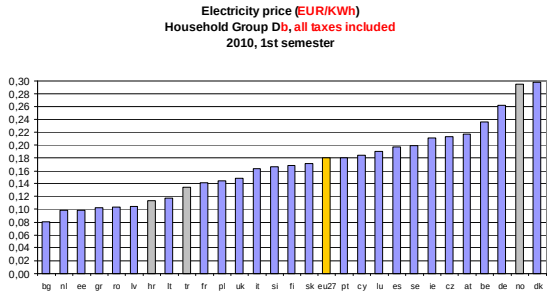


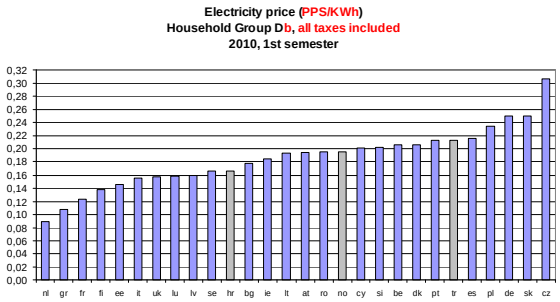
Source : Eurostat
Range for annual consumption of :
Household band Db : [1.000 kWh – 2.500 kWh] ;
Industry band Ib : [20 MWh – 500 MWh]

Note: Data for Austria, Hungary and Malta are not available

A.2.1 Price level

In the first half of 2010 the EU average gross price for electricity stood at 18 €cents/kWh. As in the previous semester, household consumers in Denmark and Germany had to pay the most for electricity, by 30 €cents/kKWh and 26 €cents/kWh respectively. The lowest price on the other hand was reported in Bulgaria, where households had to pay 8 €cents/kWh. The price dispersion was reinforced by the policies of some Member States to keep prices regulated for some industrial and household consumers.





Source : Eurostat
Range for annual consumption of :
Household band Db : [1.000 kWh – 2.500 kWh] ;

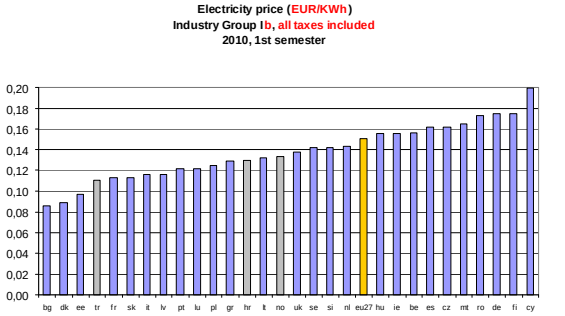
Note: Hungary and Malta are not available

With the exception of Cyprus (19 €cents/kWh) and the Czech Republic (21 €cents/kWh), the new Member States (NMS)[16] still paid less than the EU average in absolute terms. The arithmetic mean for the ten NMS from which data are available amounted to 14 €cents/kWh, which is 4 €cents/kWh less than the weighted EU27 average.

When correcting for purchasing power the picture changes even more. Among the four most expensive Member States measured in PPS[17], three are NMS (the fourth one is Germany). At the lower end of the table, the four countries with the

[16] Member States than joined the EU in 2004 or 2007.
[17] Purchasing power standards

lowest prices in PPS are old Member States (Netherlands, Greece, France and Finland).



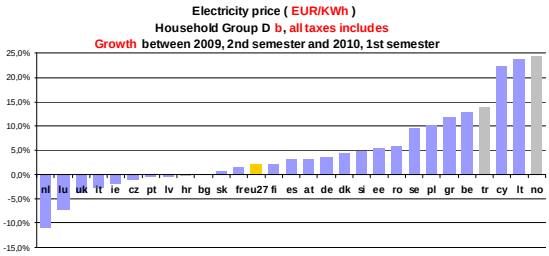
Source : Eurostat
Range for annual consumption of :
Industry band Ib : [20 MWh – 500 MWh]

Note: Data for Austria is not available

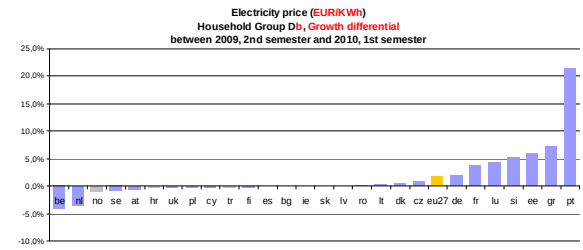
Industrial consumers in the EU27 paid 15 €cents/kWh on average. The most expensive prices were reported in Cyprus 20 €cents/kWh), whilst the lowest ones could be observed in Bulgaria 9 €cents/kWh).

A.2.2 Price dynamics

Electricity prices for household consumers rose on average by a modest 2.1% in the first half of 2010 in the EU-27, compared to the previous semester[18]. However, developments in individual Member states have been quite diverse.



[18] In the remaining part of this chapter, unless otherwise stated, price changes are always compared to the previous semester (2nd semester of 2009)

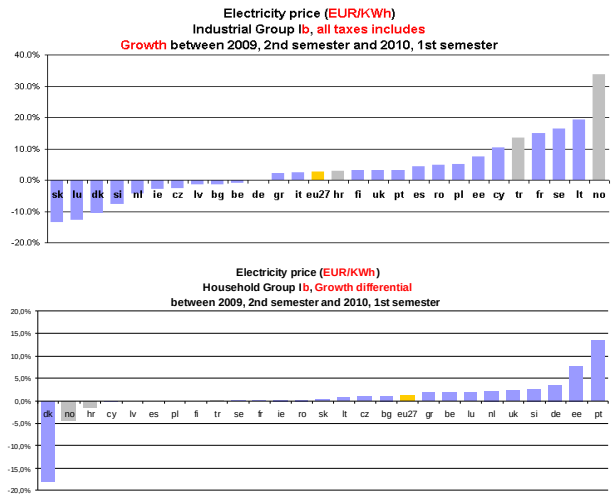


Source : Eurostat
Range for annual consumption of :
Household band Db : [1.000 kWh – 2.500 kWh] ;

Note: Data for Belgium, Hungary and Malta are not available

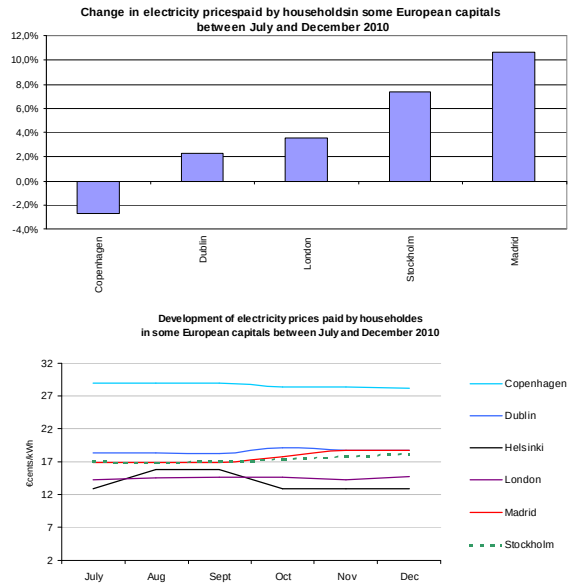
By far the steepest increases among EU Member States could be observed in Lithuania (23.6%) and Cyprus (22.4%). The largest fall in prices on the other hand occurred in the Netherlands (-11.2%).

A large differential between the growth rates of gross and net prices indicates that the level of taxation changed during the period in question. For the majority of countries this growth differential was below one percent, while the weighted EU27 average was 1.7%. In Portugal a major decrease in net prices of 21.8% coincided with a stable gross price (-0.5%), making it the Member State with the largest growth differential.



Source : Eurostat
Range for annual consumption of :
Industry band Ib : [20 MWh – 500 MWh]

Note: Data for Austria, Italy, Hungary and Malta are not available



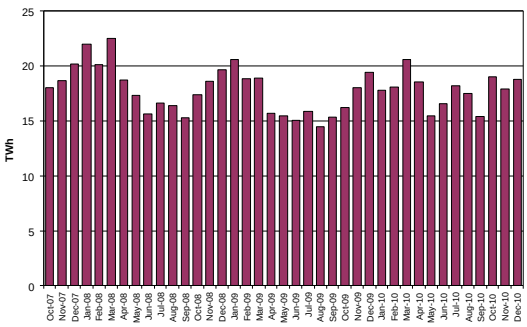
Source: HEPI
The HEPI electricity price index was developed by the Austrian energy market regulator E-control and VaasaEtt Global Energy Think Tank, providing monthly information about the evolution of the final gas consumer prices in some selected capital cities of EU countries.

Industrial consumers across the EU on average experienced a price increase of 2.7 %. Again, the developments in the individual Member States were quite varied. Growth rates of over 10% were reported in Cyprus (10.5%), France (14.9%), Sweden (16.4%) and Lithuania (19.2%). Significant falls in prices on the other hand could be observed in Denmark (-10.3%), Luxembourg (-12.6%) and Slovakia (-13.3%).

Similar to the development of prices for household consumers, Portugal stands out as having the largest positive differential between growth in gross and net prices (13.5%), suggesting that the level of taxation has been increased. An even larger, though negative, differential was present in the case of Denmark (-18.2%). This again indicates a decrease in the level of taxation for this country. This could also explain the decreasing prices in Copenhagen as the HEPI index in the following chart shows.

B. Building the internal market for electricity: cross border flows and trade

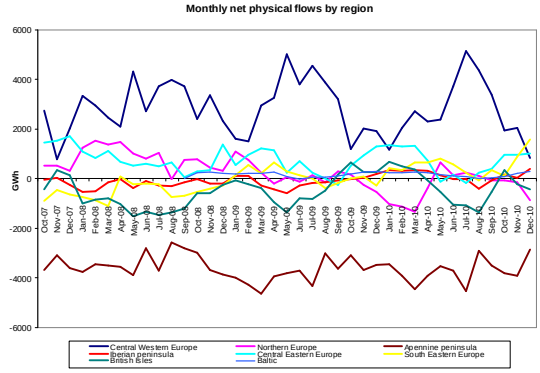
The cross-border monthly physical flows by exporting country reached 55.6 TWh in Q4 2010. This is an increase of 3.7% compared to Q4 2009, but is almost the same volume as in Q4 2008 and 2% lower than in Q4 2007. The highest yearly volumes in the last four years were in 2007 (224 TWh), followed by 2008 (220 TWh), 2010 (214 TWh) and 2009 (204 TWh).



Source : ETSO

Note. Data for MT and CY are missing. Data for EE, LT and LV are available since September 2008, and for IE since July 2010. Data on physical flows from and to LU is incorporated in LU's neighbouring countries : DE, BE, FR. Data for a number of Member States is still partial, particularly for Member States in the South East European Region.

It appears that the economic slowdown affected cross-border flows. Figures show that in line with the economic recovery volumes began increasing in 2010. As some markets began coupling, this could also have stimulated the cross-border electricity trade.



Source : ETSO.

European countries are grouped in the following regions :

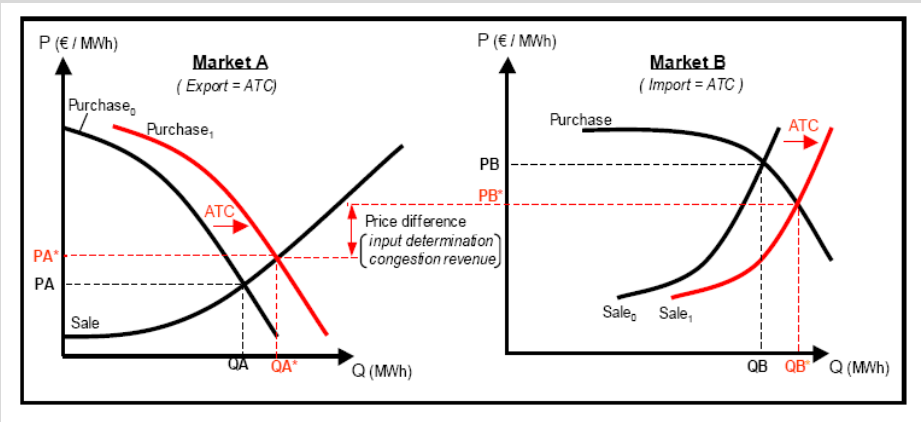
Central Western Europe	*DE, NL, FR, BE, AT, CH*
Nordic	*SE, FI, DK, NO*
Apennine peninsula	*IT*
Iberian peninsula	*ES, PT*
Central Eastern Europe	*PL, CZ, HU, SK*
South Eastern Europe	*SI, GR, BG, RO, HR, AL, FYROM, RS*
British Isles	*UK, IE (from July 2010 on)*
Baltic	*EE, LT, LV*

The chart on net physical flows shows that these flows increased considerably in South Eastern Europe in Q4 2010. Compared to Q3 2010, they were five times higher, resulting mostly from favourable hydro conditions in December 2010.

C. *"Focus on Market Coupling"*

Market coupling refers to the integration of two or more electricity markets from different areas through an implicit cross-border allocation mechanism. Instead of explicitly auctioning the cross-border transmission capacities among the market parties, the capacities are implicitly made available on the power exchanges of the various areas. As such, market coupling allows players to trade directly between markets by benefiting automatically from the cross-border capacities without having explicitly acquired the required transmission capacity across markets.

The purpose of market coupling is to maximise the economic welfare of all players. The mechanism aims to enable the 'free' movement of electricity between the integrated markets. As such, markets with the lowest price can export electricity to markets with the highest price. Ideally, the low cost electricity can fully meet the excess demand in the other market and the price difference between markets is minimised (a price increase in the low price market and a price decrease in the high price market). However, the movement of electricity is limited by the Available Transmission Capacity (ATC) between markets. If sufficient capacity is available prices will equalise across markets, but if congestion occurs a price premium (congestion rent) needs to be paid on the imported electricity. This price premium, which represents the implicit cost of the transmission capacity from one market to the other, is the price difference between the two markets.



Source: Belpex

In the market coupling process, the transmission system operators (TSO) provide information on the transmission capacity available between the different markets and the power exchanges provide market information to a central coupling algorithm. This algorithm then determines both the net flows between the markets and the prices in all the markets areas. This information is then used by the power exchanges in the further bid matching process. Two different kinds of coupling methods can be identified: price coupling and volume coupling. With price coupling, both the determined prices and flows are adapted by the power exchanges, whereas with volume coupling the power exchanges only adapt

the flows and calculate the prices for the different markets separately. Volume coupling can be tight or loose, which refers to the degree of required input (market rules and market data) for the coupling algorithm.

Over the years, the aim of European legislation has been to enhance competition and harmonisation in the European Internal Market for electricity, by which market coupling has been facilitated. Firstly the Regulation on conditions for access to the network for cross-border exchanges in electricity (Regulation (EC) No 1228/2003), which was adopted together with the Electricity Directive of 26 June 2003, laid down basic rules for cross border exchanges in electricity to promote cross-border trade of electricity. The regulation established a compensation mechanism between operators of transmission systems and introduced general principles for cross-border transmission charges and the allocation of available interconnection capacities between national transmission systems.

As barriers to competition continued to disrupt the internal market, a couple of repealing and new regulations were adopted as part of the Third Energy Package on the 25th of June 2009. Regulation No 714/2009 introduced a certification of TSO's and created the European Network for Transmission System Operators for electricity (ENTSO-E). This network is responsible for the electricity transmission system. As such, ENTSO-E must ensure proper network planning and investments to prevent blackouts. Furthermore, it must allow cross border trade and supply of electricity by harmonising grid access. In addition, Regulation No. 713/2009 establishes the Agency for the Cooperation of Energy Regulators (ACER). This agency exercises at Community level the tasks performed by the Member State's regulatory authorities. Concerning cross border infrastructure, the Agency is responsible for taking binding individual decisions on the terms and conditions for access to cross-border infrastructure if the national regulatory authorities have not been able to reach an agreement. ACER has been fully operational since the 3rd of March 2011.

In the last quarter of 2010 a decisive step towards a single European Electricity market was taken. On the 9th of November 2010 two initiatives were simultaneously launched: the CWE price market coupling and the CWE-Nordic region Interim Tight Volume Coupling (ITVC).

The CWE price coupling integrates the markets of Belgium, France, Germany, Luxembourg and the Netherlands. It replaces the Trilateral Market Coupling of Belgium, France and the Netherlands, which was successfully launched in 2006, and additionally includes the electricity markets of Germany and Luxembourg.

The Interim Tight Volume Coupling (ITVC) integrates two regional European markets: the new interconnected Central-West region (France, Belgium, the Netherlands, Luxemburg and Germany) and the Nordic market (Denmark, Sweden, Finland, Estonia and Norway). The ITVC comprises two steps. First of all, the CWE market was coupled on the 9th of November 2010 with the Nordic market. This coupling was based on the existing tight volume coupling model via the interconnectors between Germany and Denmark and Germany and Sweden, which were launched by the European Market Coupling Company (EMCC) on the 9th of November 2009 and 10th of May 2010 respectively. Subsequently, the ITVC between the two regional

markets was finalised on the 12th of January 2011 by the inclusion of NorNed, the submarine interconnector between Norway and the Netherlands. These two projects integrate a day-ahead market of more than 1,800 terawatt hours of power production and cover approximately 60% of electricity consumption in Europe.

At the end of 2010, two other market coupling events occurred. Firstly, the price coupling via the SwePol cable between the Polish market and the Nordic region was launched on the 16th of December 2010. Secondly, in Southern Europe the Italian North-zone was coupled with the Slovenian market by a price coupling mechanism on the 31st of December 2010.