



# Quarterly Report on European Gas Markets

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EUROPEAN COMMISSION  
DIRECTORATE-GENERAL FOR ENERGY

Director-General



Dear readers,

Natural gas consumption in the EU in the first half of 2012 registered a 7% fall, after having already fallen in 2011 relative to 2010. In contrast, the prices of all contracts of natural gas - hub, LNG, long-term piped - increased during the same period.

Along with increasing and high prices, the persisting large disparities in wholesale and retail prices between different Member States show that there is still some way to go for the completion of the internal energy market. It compels us to strive for more flexible and more responsive markets, in which prices effectively act as reliable signals of interaction between supply and demand of natural gas.

Supply also fell with declining gas imports in the EU. Falls in LNG imports were considerable (-34% between the first half of 2012 and the first half of 2011), with signs of increasing LNG deliveries in Asia. The wide availability of relatively low-priced LNG imports in recent times has not only enabled some EU Member States to keep their energy bill down, it has also contributed to relative peace of mind in terms of security of supply.

In contrast, in the same period, the EU increased its consumption and imports of coal, especially from the US and Columbia.

These are the signs of a developing global energy market, whereby trade flows of energy commodities are being directed to where the asking price is highest, and for LNG currently it is Asia, for US and Columbian coal, it appears to be the EU.

Philip Lowe

## HIGHLIGHTS

- The EU's natural gas consumption for the first half of 2012 represented the EU's lowest first half year consumption of the last ten years. It was 7% less than H1 2011 and 14% less than H1 2010.
- In contrast, the prices of all contracts of natural gas - hub, LNG, long-term piped – increased during the same period. The highest increases between the first half of 2011 and the first half of 2012 were in the estimated prices for long-term piped gas contracts (examples: Algerian gas to Spain: +33%, Dutch gas to Italy: +43%, Norwegian gas to Italy: +34%, Russian gas to Bulgaria: +50%, Russian gas to Czech Republic: +38%).
- Imports of natural gas into the EU in the first half of 2012 fell faster than consumption (-12%, as against -7% for the latter), with LNG imports falling by 34% during the same period.
- Qatar, which represented half of all LNG imports in H1 2012, exported 34% less LNG to the EU in the second half of 2012, relative to the same period in 2011, while Nigeria, third biggest exporter in that period, exported 44% less LNG than the first half of 2011.
- Japan and Korea, which continue to pay high prices for their LNG imports (17.2 \$/MMBtu and 16.6 \$/MMBtu, respectively, in June 2012, compared to 9.8 \$/MMBtu for the EU average) represent strong competition for EU spot LNG imports. Such high prices explain the significant falls in imports of LNG currently being observed in the EU in excess of falling consumption. Thus, the extra cost of freight for exports to Asia currently represents the key element of arbitrage for spot cargoes export decisions.
- This means that there is no guarantee that with recovering demand for natural gas in the EU, relatively cheap LNG, which rose to represent 20% of total EU gas imports in 2011, will continue to be as easily or cheaply available as in recent years.
- Looking more closely at LNG prices paid in the EU, it can be observed that in the UK LNG imports continue to be attractively priced relative to hub traded gas. At the other end of the spectrum, France and Italy pay more for their LNG than the natural gas available on their respective hubs.
- It has been widely reported in the press in the last few months that some EU gas importers have managed to get Gazprom to agree to discounts of up to 10% for many of their contracts. According to our estimations on the basis of most recently available data (first quarter of 2012) German imports of Russian gas seemed to be benefitting from a much larger discount (19%, a price of 27.7 €/MWh), when compared to a theoretical pure oil-indexed price for the same period (of 34.3 €/MWh).
- In stark contrast, estimations based on trade data for other European Member States, a number of which are wholly or mainly reliant on Russian gas imports for their consumption, reveal huge disparities in prices: Bulgaria paid an average of 42.2 €/MWh, the Czech Republic 37.4 €/MWh, Estonia 33.1 €/MWh, Latvia 31.7 €/MWh, Lithuania 38.7 €/MWh and Slovakia 31 €/MWh for Russian gas in that period.



- A great disparity in prices paid for Russian gas, and a continued rise in prices in the midst of an economic downturn, has been the prevailing environment which has fuelled a number of actions in recent months against Russian gas exporters.
- In the "Focus On" section we examine in more detail the evolution of demand and imports of coal in the EU, as an additional explanation for the fall in demand for natural gas - demand for coal in the EU has been growing as prices for the commodity have been falling while, inversely, demand for natural gas has been falling as prices have been rising.
- We find that imports of both US and Columbian coal have increased significantly. Specifically with regard to US coal imports, in the first half of 2012, Germany, Italy and the Netherlands respectively imported 37%, 83% and 86% more hard coal from the US than in the first half of 2011. And while 2012 data is not available for the UK, the country imported 79% more hard coal from the US in the second half of 2011 compared to the second half of 2010.
- Widely available and increasingly imported, coal has become the power generation fuel of choice in parts of the EU, at the expense of natural gas, with coal-fuelled generation being more lucrative than gas-fuelled generation, and in some instances (Germany), the latter has even become a loss-making activity in recent months.

**Disclaimer**

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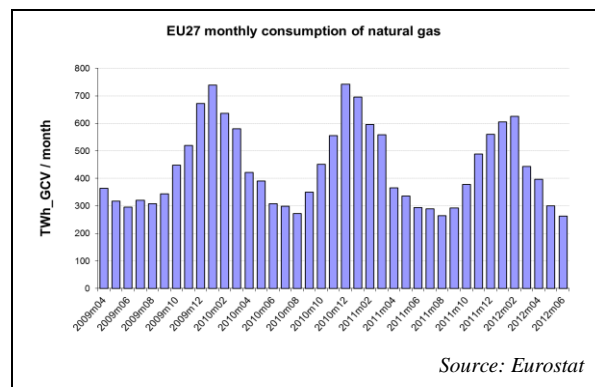
## QUARTERLY REPORT ON EUROPEAN GAS MARKETS

### A. Recent developments in the gas markets across Europe

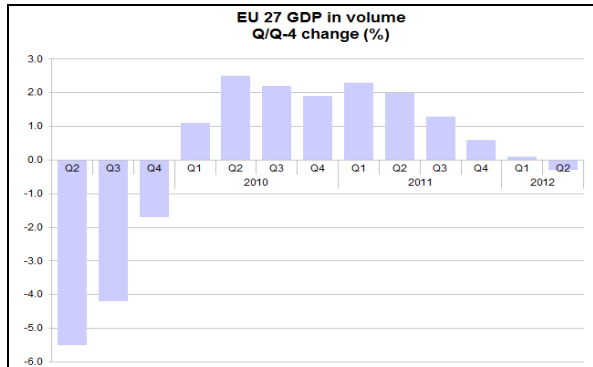
#### A.1 Gas consumption, production and imports

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- At 2,631 TWh, the EU's natural gas consumption for the first half of 2012 represented the lowest half-year consumption recorded for the EU 27. It was 7% less than H1 2011 and 14% less than H1 2010.



- This historical low in consumption was registered along with a return to negative economic growth for the EU economy in the second quarter of 2012, the first time since the 4<sup>th</sup> quarter of 2009.
- It however occurred in spite of extremely cold weather experienced in February 2012, which led to a particularly high number of heating degree days in that month, as reported in the last issue.



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.

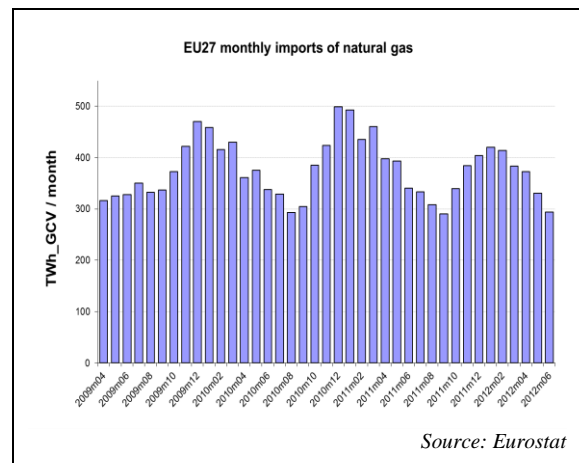
- Temperatures for the second quarter in the EU as a whole expressed in **heating degree days**<sup>1</sup> did not show significant deviations from the long term average values (see table below), even if, in many European regions the first two weeks of April 2012 were colder than usual, prompting additional demand for heating.

EU 27 Heating Degree Days in Q2			
Values for 2010, 2011, 2012 and 1980 – 2004 average			
	April	May	June
2010	248.26	153.20	58.24
2011	220.34	148.69	60.49
2012	308.29	156.56	86.78
LT avg.	289.25	154.04	66.55

Source : Eurostat /JRC

<sup>1</sup> A description of all terms marked in bold, italic and underlines can be found in the Glossary section at the end of this report.

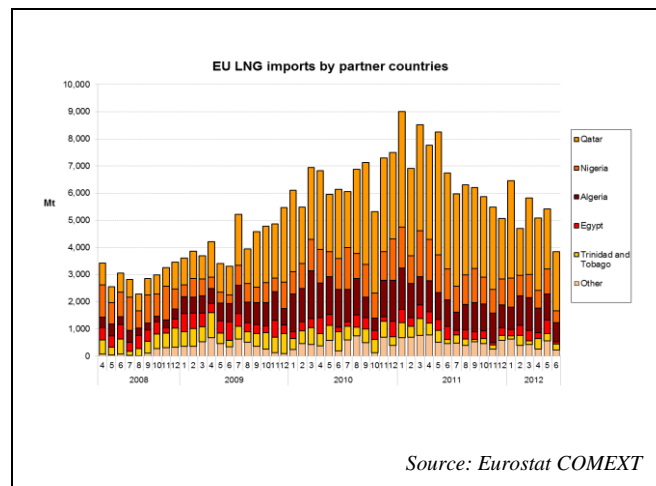
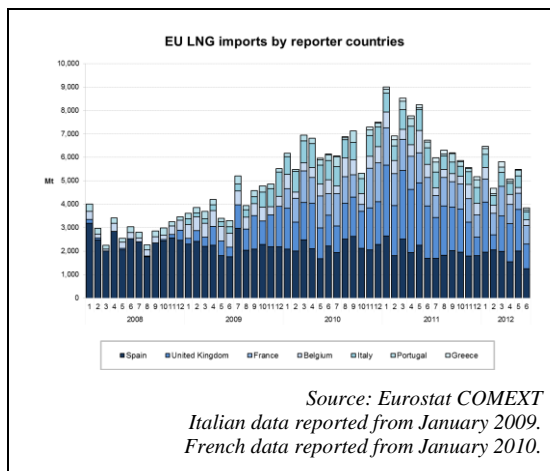
- Continuing the trend already observed in the two previous quarters, second quarter imports of natural gas into the EU also fell, relative to the same period of the two previous years. This contributed to a level of imports for the first half of 2012 (of 2,215 TWh) which was also much below the levels recorded for the first half of the two previous years.
- While H1 2012 imports fell on a yearly basis faster than consumption (-12%, as against -7% for the latter), the level of imports was still higher than that recorded in the first half of 2009, the worst year of the economic crisis.



Source: Eurostat

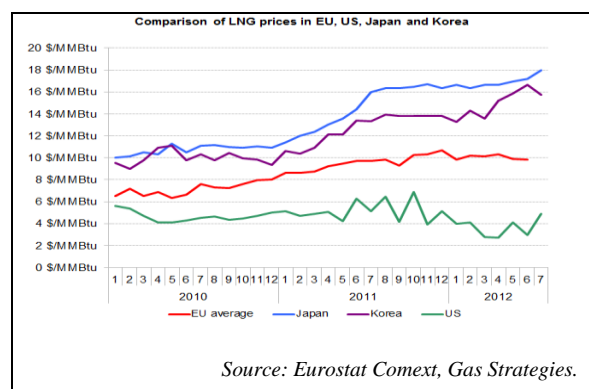
- In the previous issue, we reported that after quasi uninterrupted and continuous growth in LNG imports on a quarterly basis since the beginning of 2009, LNG imports began falling in the second quarter of 2011, after which they fell further each successive quarter of 2011. First quarter 2012 levels were however the same as the previous quarter, though less than Q1 2011 levels.
- The trend of falling LNG imports continued in the second quarter of 2012, contributing to a first half of 2012 level

of imports which was 10% less than the previous quarter and as much as 34% less than the level recorded in the first half of 2011.



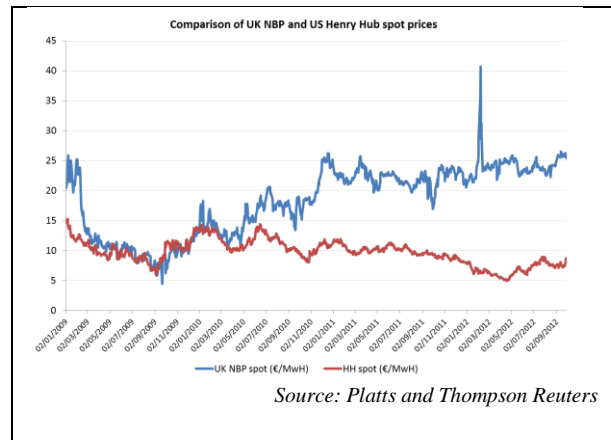
- Looking at EU LNG imports by partner countries (graph below), it could be observed that not all exporters of LNG reduced their exports to the EU in 2012 relative to 2011. Both Egypt (+25%) and Algeria (+2%) shipped off more LNG to the EU in H1 2012 than H2 2011. Egypt and Algeria were, respectively, the fourth and second largest exporters of LNG to the EU in H1 2012.
- However Qatar, which represented half of all LNG imports in H1 2012, exported 34% less LNG to the EU in the second half of 2012, relative to the same period in 2011, and 15% less than the second half of 2011. And Nigeria, third biggest exporter in that period, exported 44% less LNG than the first half of 2011, and 25% less than the previous quarter.

- If we turn to the graph below, showing a comparison of LNG prices in competing markets of the US, EU, Korea and Japan, it can be seen that the latter remained particularly attractive markets to LNG exporters in the second half of 2012, on account of a persistent large premium relative to EU LNG contracts (of 69% for the price paid for LNG in Korea and 75% in Japan, on average, in June 2012, given that prices were 17.2 \$/MMBtu for Japan, 16.6 \$/MMBtu for Korea, 9.8 \$/MMBtu for the EU average).





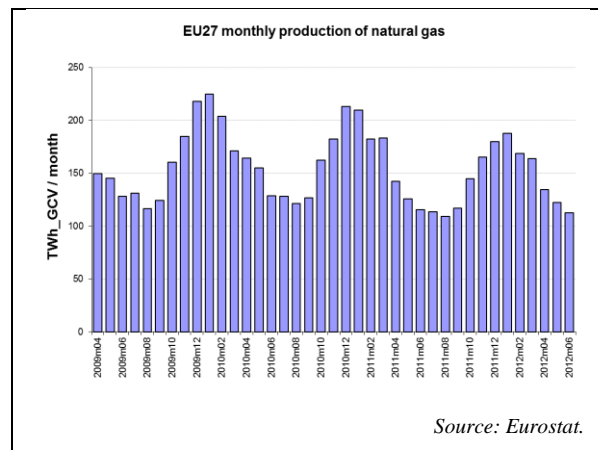
- In sharp contrast, and as can also be seen on the graph above, the unconventional gas revolution in the US, which largely contributed to easily available and relatively cheap LNG for the EU, has led to such an abundant supply of domestically produced natural gas that LNG deliveries to the US were over 200% cheaper than the average EU price in June 2012 (3 \$/MMBtu, as against 9.8 \$/MMBtu).



- Selling LNG in Europe at between \$9 or \$10/MMBtu would offer an Atlantic seller the same return as selling to Asia for \$13 to \$14/MMBtu including freight costs. For the moment, therefore, it makes economic sense to ship off spot cargoes of LNG to Asia rather than the EU.

- Very much in contrast to the US, EU production of natural gas continues its long term decline, amounting to 890 TWh in the first half of 2012, compared to 959 TWh recorded in H1 of 2011 and upwards of 1,000 TWh in the same period of the preceding three years.

- This serves to recall that there are other captive markets in competition with the EU for spot LNG imports, and as long as these markets continue to offer such premiums, there is no guarantee that with recovering demand for natural gas in the EU, relatively cheap LNG, which rose to represent 20% of total EU gas imports in 2011, will continue to be as easily or cheaply available as in recent years (thanks to unconventional gas production developments in the US). The significant falls in imports of LNG currently being observed in the EU (in excess of falling consumption) could be a first warning sign.

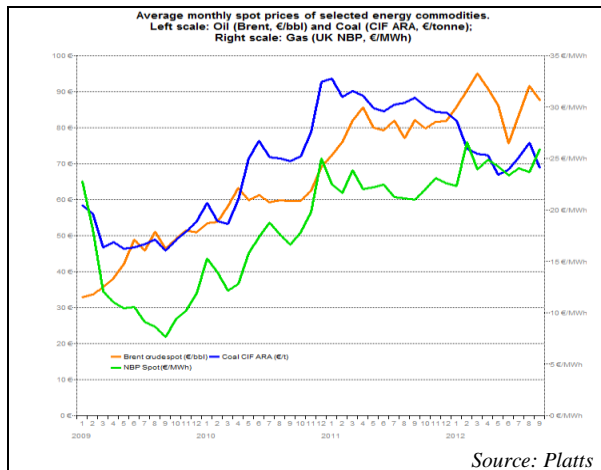


- The growing variance between the EU and US prices for natural gas is also illustrated in the graph further below, which shows a comparison between the benchmark UK NBP and the US Henry Hub spot prices.



## A.2 Wholesale markets

### A.2.1 Overview and summary



- In the last issue, we broke down the evolution of energy commodity prices since the beginning of the crisis in 2008 into what could be called three stages:
- Stage 1 occurred during the second half of 2008/first half of 2009. This was a period of significant correction experienced by all energy commodity prices. Stage 2, occurring between the second half of 2009 and the last quarter of 2010/first quarter of 2011, was a period of renewed growth for all energy commodity prices. Stage 3, from the beginning of 2011, was a period of clear decoupling between coal prices on the one hand and oil and gas prices on the other, with the former following a slight downward trend throughout 2011 and the first quarter of 2012, while the price of Brent stabilised at the end of 2011 but then grew again in the first quarter of 2012, until it reached a new record daily level of 97.7 €/bbl by mid March 2012.
- Similarly, the price of the NBP day-ahead for gas remained more or less

stable in the second half of 2011, but grew again in the first quarter of 2012 to attain a price level of 25.2 €/MWh by the end of March 2012. Not counting the exceptional but temporary February levels (due to the short-lived cold snap), this was the highest price attained by the NBP day-ahead since the first quarter of 2011.

- Since the first quarter of 2012, the price of coal continued decreasing in the second quarter, but then increased again a little in the third quarter of 2012. Relative to the average price for 2011 of 87 €/t for the coal CIF ARA, an average price for the first three quarters of 2012 of 73 €/t however constitutes a continued downward trend for the price of European coal in 2012.
- In contrast, the monthly average NBP price of gas has oscillated between 22 and 26 €/MWh since the beginning of 2012, but on the basis of a comparison of average prices, it can be said that the trend has been a slight upward one in 2012 (24.3 €/MWh) relative to 2011 (22.1 €/MWh). And the same can be said for the price of Brent: the trend since 2011 for the period covering the first three quarters of 2012 has been an upward one (from an average of 80 to 87 €/bbl between 2011 and 2012).
- As can be seen in the graph however, the volatility in the price of Brent has been high since the first quarter of 2012. After reaching the record daily high of 97.7 €/bbl in March, it followed a generally downward trend, falling by 28% to reach a 17 month record low of 70.4 €/bbl on the 21<sup>st</sup> of June 2012. Since then, and until the end of September 2012, it recovered much of

that loss to reach a daily price of 85.9 €/bbl by the 28<sup>th</sup> of September 2012.

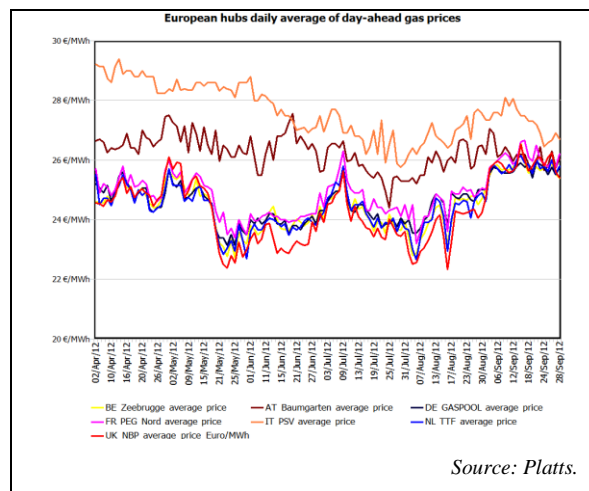
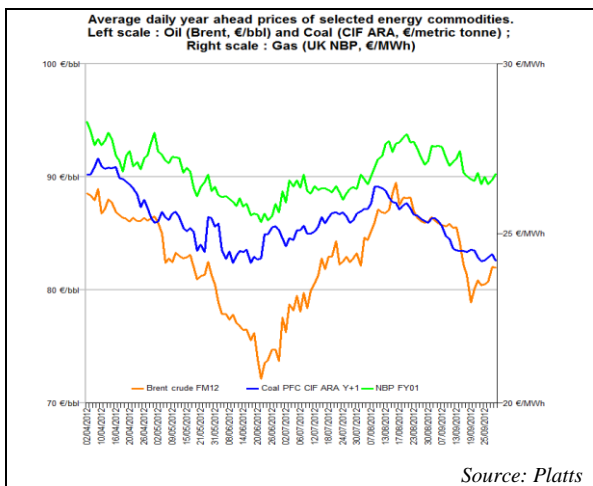
- This volatility is explicable by the succession of a number of oil price impacting events. A principle factor which caused the surge in the oil price in the first quarter of 2012 was the rising tension between the west and Iran (one of the world's important suppliers of crude).
- Much of the subsequent fall could then be attributed to Saudi Arabia increasing supplies of crude oil to a 30 year high. These efforts to lessen the price of crude were however ineffectual in the face of continued tension in the Middle East (including risks of an attack of Iran by Israel and escalating civil conflict in Syria) North Sea oil supply shortages, and a subsequent EU ban on imports of Iran crude.
- The continued downward trend in the price of coal has largely been explicable due to the availability of large amounts of coal from the US to the EU, which we highlighted in the last issue. The growth in EU imports of US coal is documented in the "Focus On" section of this report.
- The different price dynamics between the various commodities is important as it has been defining demand. Demand for coal in the EU has been growing as prices for the commodity have been falling while, inversely, demand for natural gas has been falling as prices have been rising (again, see the "Focus On" section for more details).
- At the root of the coal/gas price dynamics has been the shale gas

revolution in the US. What we first saw occurring with LNG is now happening with coal. A relatively immediate effect of large amounts of unconventional gas production in the US has been the availability of increasing amounts of LNG to the EU, at competitive prices. However, high LNG prices in the Far East and a high demand, post Fukushima, has subsequently likely contributed to increasing LNG prices and a return to global competition in LNG markets (after the loss of much of the US market).

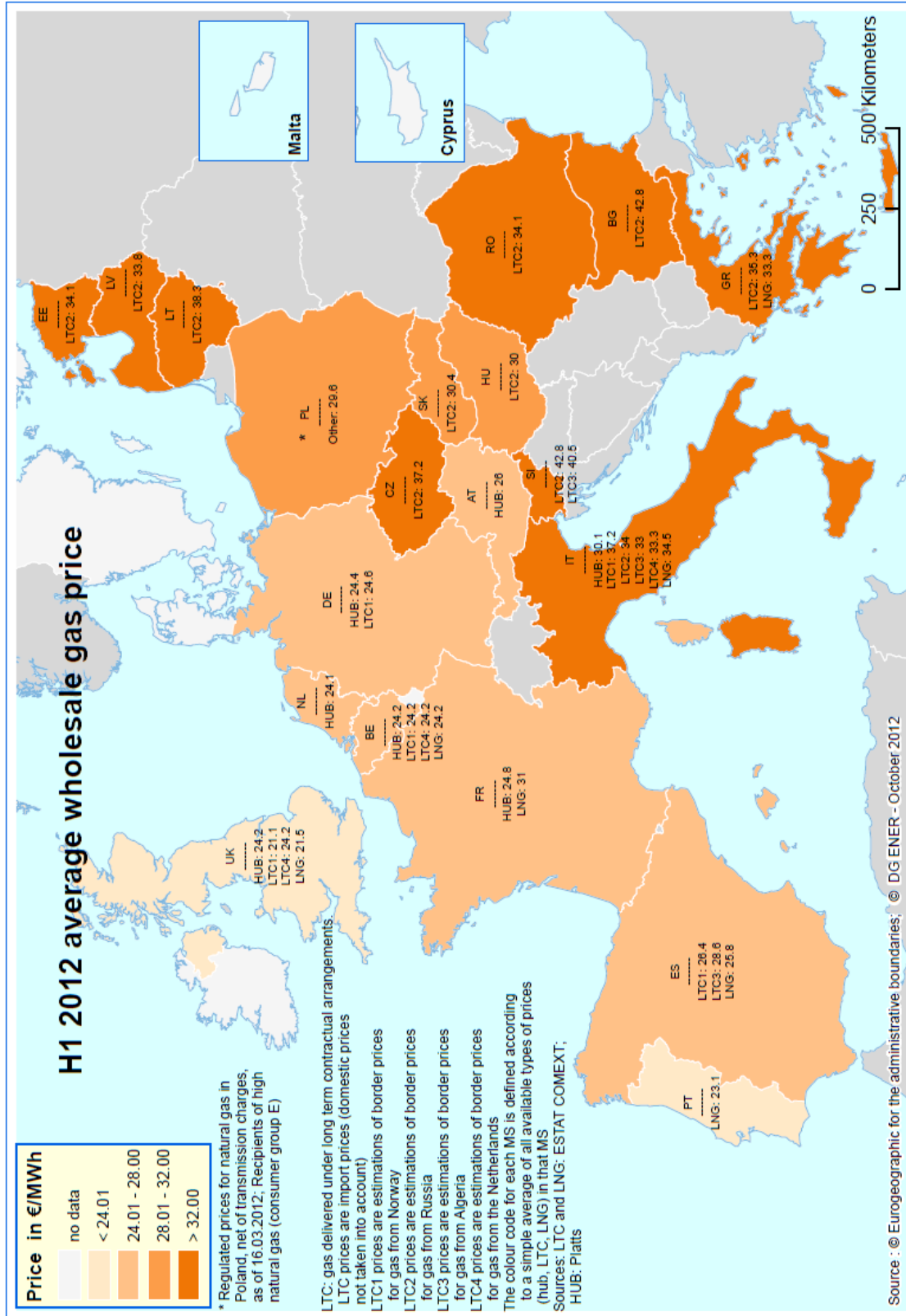
- A secondary, less immediate, effect of large increases in US unconventional gas production, has been the fall in US demand for coal for power generation, in favour of natural gas. Increasing supplies of coal on world markets at a time of slowing growth in the emerging economies, has led to falling prices in the commodity. The end result has been significant: coal has become the commodity of choice in the EU for power generation. This has also been helped by the low level of carbon prices due in part to a crisis-induced general fall in EU demand.
- Turning now to year ahead prices of coal, oil and gas contracts, displayed in the graph below. Throughout the period which includes the second and third quarter of 2012, expectations of one year forward prices have been for rather large increases in coal prices (on average, by 15 €/ton), slight decreases in the value of Brent (by on average 3.5 €/bbl) and slight increases in the value of gas (2.5 €/MWh). While it is perhaps unsurprising, knowing how prices have evolved recently, that expectations are for increasing coal prices (emerging

countries are expected to get back to normal growth, and the EU ETS price is expected to increase again) and slightly falling crude prices, what is perhaps more surprising is that the market expected that natural gas prices will rise slightly. This is likely predicated on some sort of recovery in natural gas demand in the EU, possibly helped by increasing carbon prices.

rise again in the second part of the third quarter: the price evolution over that period thus resembled a 'W'. By the end of the third quarter, NWE prices had risen to levels (around 26 €/MWh) slightly exceeding those at the beginning of the second quarter around 25 €/MWh).

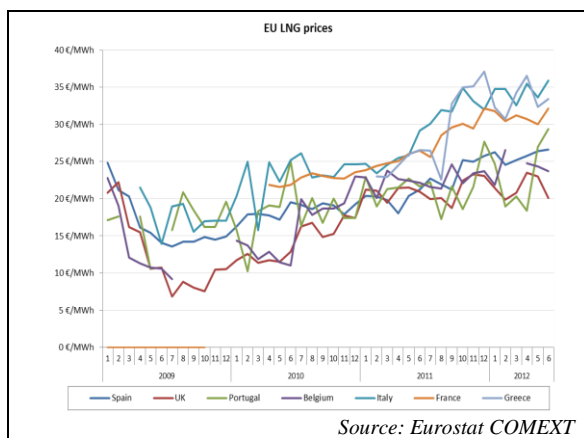


- Looking now in more detail at the evolution of European hub day-ahead natural gas prices in the second and third quarters of 2012 (see graph below). Typically, prices of North West European (NWE) hubs evolve tightly together, while Italian and Austrian hub prices generally follow their own trajectories, at a premium to NWE hubs.
- As we saw earlier for the NBP, there has not really been a clearly discernable trend so far in 2012, although on the basis of a comparison of average prices, it can be said that prices have increased slightly in 2012 relative to 2011.
- Prices followed a downward trend at the beginning of the second quarter, then rose for a while, until they fell again, to



### A.2.2 Gas contracts and pricing mechanisms

- Estimated monthly average spot LNG prices in the EU<sup>2</sup> in the second quarter of 2012 traded within a price range of between 22 and 35.7 €/MWh for the seven countries for which data is available.



- Relative to previous quarters, LNG prices increased in the second quarter, by an average of around 1 €/MWh. Between the two previous quarters, prices had remained fairly stable.
- Thus LNG prices have continued to increase, following a generally upward trend which began in mid-2009, as can clearly be seen in the graph above.
- In comparison, over the same period hub prices have also risen by a similar amount. It should be recalled that in 2011, a continuously rising trend of LNG prices as against one of relatively stable hub day-ahead prices has meant that the gap between the two has been reducing.

- But as was highlighted in the last issue, the EU's LNG importers can be split into two price groups. One group benefits from levels which are close to or at a discount to hub prices. This group contains the UK and Belgium, which by June 2012 paid relatively low amounts for LNG deliveries (respectively 20 and 23.8 €/MWh) compared to other LNG importers, which paid between 26.6 and 35.9 €/MWh.

- As is typically the case Belgium paid a price for LNG deliveries in June 2012 which was in line with its hub price (23.8 €/MWh compared to 23.9 €/MWh), while in the UK, LNG imports offered a large discount to the hub price (20 €/MWh, compared to 23.4 €/MWh). Note that this discount of 3 €/MWh was high relative to the two preceding months but in recent times, discounts as high as 6.7 €/MWh have occurred (February 2012). In the UK, therefore, LNG imports continue to be attractively priced relative to hub traded gas.

- Spain and Portugal also benefit from relatively attractive LNG prices, which from month to month can vary from being in line with prices paid in the UK and Belgium, or slightly higher. By June 2012, prices for LNG deliveries had risen to 26.6 and 29.9 €/MWh in Spain and Portugal respectively.

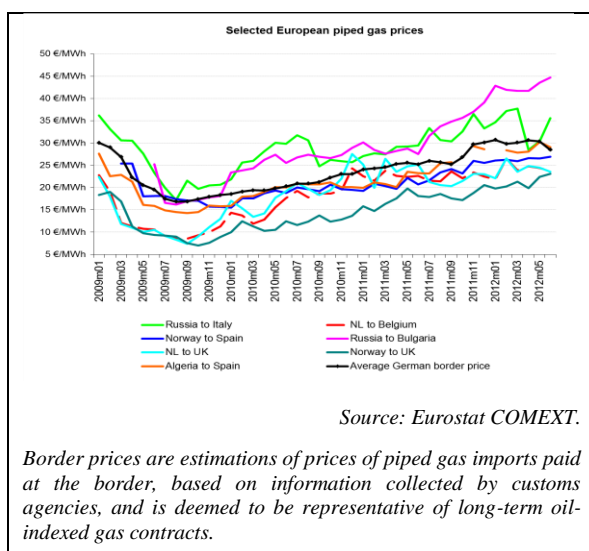
- Other LNG importers which also have hubs tend to pay rather more for their LNG deliveries. This includes Italy and France, which so far in 2012 have paid a premium averaging 6 €/MWh on the monthly average hub price. France and Italy have also been consistently paying over 30 €/MWh for LNG since the

<sup>2</sup> Based on Eurostat external trade data.



second half of 2011. Such levels of prices for LNG, which Greece also pays, are closer to the prices for oil-indexed Long Term Contracts (LTC) for gas, thus suggesting that LNG contracts in these countries are indeed of that type.

- Turning now to looking at a selection of estimated Long Term Contract (LTC) oil-indexed border prices for piped gas in Europe, shown in the graph below, reveals an average price of 28.8 €/MWh for the second quarter of 2012, compared to averages of 29 €/MWh and 27 €/MWh for the two previous quarters. Unlike LNG prices, the trend for LTC prices as represented by this selection of estimated border prices, is showing stability over the last two quarters. But it can clearly be seen in the graph below that the trend for LTC prices has been a continuously rising one since the second half of 2009.



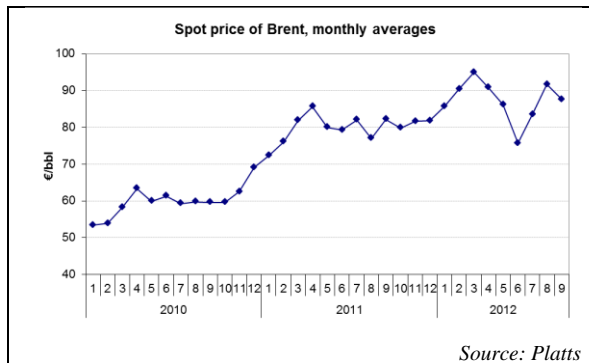
- The range of border prices in the EU however continues to be extremely wide. And LTC prices for gas imports from Russia continue to be among the

highest prices for gas in the EU. From our selection illustrated above, Bulgaria paid an average of 43.3 €/MWh in the second quarter of 2012 for Russian gas. But prices for gas from the same destination can also vary a lot: Italy paid only an average of 31.5 €/MWh for Russian imported gas in that same period.

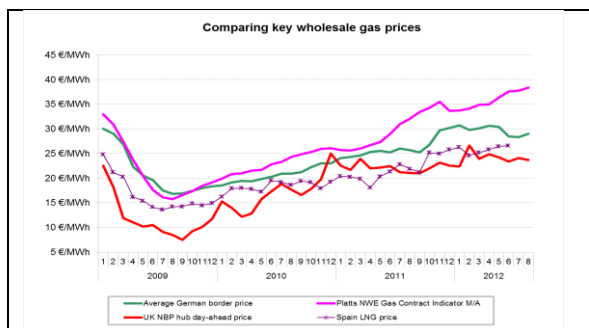
- Overall, in Q2 2012, the EU Member States importing gas from Russia for which we were able to make estimations paid on average well in excess of 30 €/MWh, and typically close to or above 35 €/MWh.
- In contrast, average estimated LTC prices of gas from Norway to Belgium, Spain and the UK were much less than 30 €/MWh over the second quarter of 2012, and in the case of the UK, it was only 21.8 €/MWh, which was much less than the hub price average of 24.5 €/MWh. Gas imports from Norway to Italy however continued to be priced at more than 30 €/MWh, averaging at more than 37 €/MWh over the second quarter.
- Prices of estimated LTC gas for the second quarter of 2012 from the Netherlands and Algeria also varied quite considerably, depending on the destination, from 29 €/MWh in Spain, to 39.5 €/MWh in Slovenia for gas from Algeria; and from 24.3 €/MWh in Belgium, to 34.7 €/MWh in Italy for gas from the Netherlands.

- On the basis of a 6 to 9 month time lag, the relevant oil price references for LTC gas prices in Q2 2012 were oil prices between July and October 2011, or the beginning of the 3<sup>rd</sup> to the beginning of

the fourth quarter of 2011, when the Brent price was relatively stable (see graph below). This would explain the stability in LTC prices between the 1<sup>st</sup> and 2<sup>nd</sup> quarter of 2012.



- The graph below shows a selection of different wholesale price contracts for natural gas in the EU for a closer comparison.



Sources: Eurostat COMEXT, Platts, German Federal Office of Economics and Export Control (BAFA)

*Border prices are estimations of prices of piped gas imports paid at the border, based on information collected by customs agencies, and is deemed to be representative of long-term oil-indexed gas contracts.*

- The graph shows the UK NBP price for traded gas, which is the European hub benchmark, as well as the price of LNG delivered to Spain, the main importer of LNG in Europe, contributing some two thirds of Spanish gas supply.
- The pink line shows the Platts North Western Europe gas contract indicator, which is a theoretical price calculated

using a traditional “pure oil-link” formula, while the green line shows the price of actual gas imports at the German border, as published by the German Federal Office of Economics and Export Control (BAFA). This price has also traditionally been taken as an indicator showing the price of oil-linked gas into Europe.

- Comparing these two lines, it can be seen that the German border price, which had increasingly been dropping away from the Platts NWE GCI oil-indexed price indicator towards the spot gas price, and which then reconverged with the price indicator in the first quarter of 2012, has again been diverging from the German border price. Comparing an average price level in the third quarter of 2012 for the GCI indicator of 38 €/MWh and the latest available monthly average German border price of 29 €/MWh (August 2012), it can be concluded that the two are diverging enough to signal the likely incorporation either of a discount in some or all German imports of LTC gas, or a change in the indexation towards more spot indexation.

- Unfortunately, it is not possible for us to see with any clarity which imports of gas into Germany appear to have modified their terms given that all the Eurostat trade data for Germany which allowed us to make these price estimations has been erased from the Eurostat database, at the request of the Member State. We however know from looking at the historical data which we had previously downloaded from the database that Germany had already benefited from advantageous prices of gas deliveries from Russia in 2011 and



early 2012. The latest available data allowed us to estimate that in the first quarter of 2012 Germany paid on average only 27.7 €/MWh. This compares to a Platts NWE GCI oil-indexed average price for the same period of 34.3 €/MWh.

- It has been widely reported in the press in the last few months that some EU gas importers have managed to get Gazprom to agree to discounts of up to 10% for many of its contracts. A 10% discount on the average Q3 2012 Platts NWE GCI oil-indexed price of 38 €/MWh would lead to a price of 34.2 €/MWh. Relative to an average Q3 2012 NBP spot price of 24.2 €/MWh, or to an average for NWE hubs for the same quarter of 24.8 €/MWh, it is difficult to imagine that EU importers of Russian gas could be content with such a discount.
- On the other hand, the price we quoted above for German imports of Russian gas – of 27.7 €/MWh – represents a discount of 19% compared to 34.3 €/MWh Platts GCI pure oil-indexed price in Q1 2012.
- This German price for Russian gas needs to be put into a context of estimations based on trade data for other European Member States, a number of which are wholly or mainly reliant on Russian gas imports for their consumption, which are as follows: keeping to first quarter 2012 data to make it comparable, Bulgaria paid an average of 42.2 €/MWh, the Czech Republic 37.4 €/MWh, Estonia 33.1 €/MWh, Latvia 31.7 €/MWh, Lithuania 38.7 €/MWh, Hungary 30.1 €/MWh and

Slovakia 31 €/MWh for Russian gas in that period.

- It also needs to be put in the context of the recent long term contract deal struck by British utility Centrica in September 2012 with Gazprom, which included price indexation based on the NBP's day-ahead, rather than based on oil and petroleum prices (see more details in UK chapter).
- A great disparity in prices paid for Russian gas, and a continued rise in prices in the midst of an economic downturn, has been the prevailing environment which has fuelled a number of actions in recent months against Russian gas exporters, and in particular Gazprom.
- In September, the European Commission decided to begin an investigation into whether sales of Russian gas by Gazprom in eastern Europe were anti-competitive. The countries affected include all the countries mentioned above.
- Individual actions have also been carried out. In early October, it was announced that Gazprom is facing a series of billion-euro lawsuits on alleged distortion of gas prices in Lithuania between 2004 and 2012.
- More recently, on the 24<sup>th</sup> of October, RWE Transgas, the Czech unit of Germany's RWE, won a dispute with Gazprom over gas contracts, after a court ruled for the first time that a company did not have to pay fines under a "take-or-pay" clause. Typically, contracts for gas imports from Russia include a take-or-pay clause, under

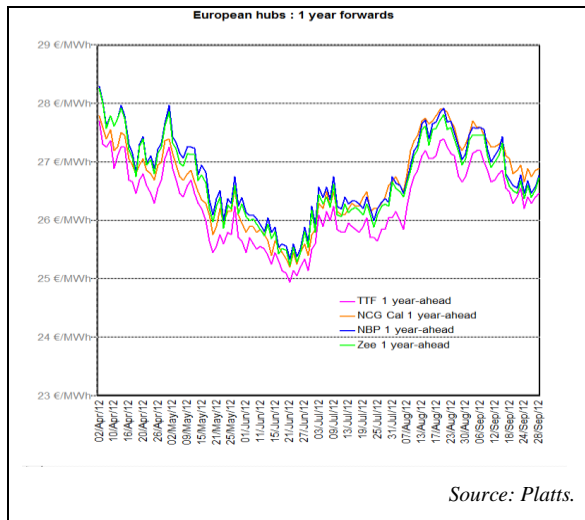
which the importer must buy a minimum amount of gas or pay fines. Gazprom had taken RWE Transgas to court for failing to adhere to take-or-pay commitments between 2008 and 2011.

- To conclude on our price analysis, it is also interesting to compare how prices for gas in the EU have evolved recently in comparison to the evolution of demand for gas. As we noted previously, the EU's natural gas consumption for the first half of 2012 represented the lowest half-year consumption recorded for the EU 27. It was 7% less than H1 2011 and 14% less than H1 2010.
- In contrast, hub prices and LNG prices increased, respectively, between the first half of 2012 and the first half of 2011 by, on average: +9%, +20% while increases in prices of LTC contracts were typically higher than 20%, with some EU Member States experiencing significant increases (examples: Algerian gas to Spain: +33%, Dutch gas to Italy: +43%, Norwegian gas to Italy: +34%, Russian gas to Bulgaria: +50%, Russian gas to Czech Republic: +38%).
- No wonder, then, that natural gas consumption is trending downwards. What this also reveals however is that gas prices in the EU are simply not responsive to demand, and clearly, LTC prices less so than others.

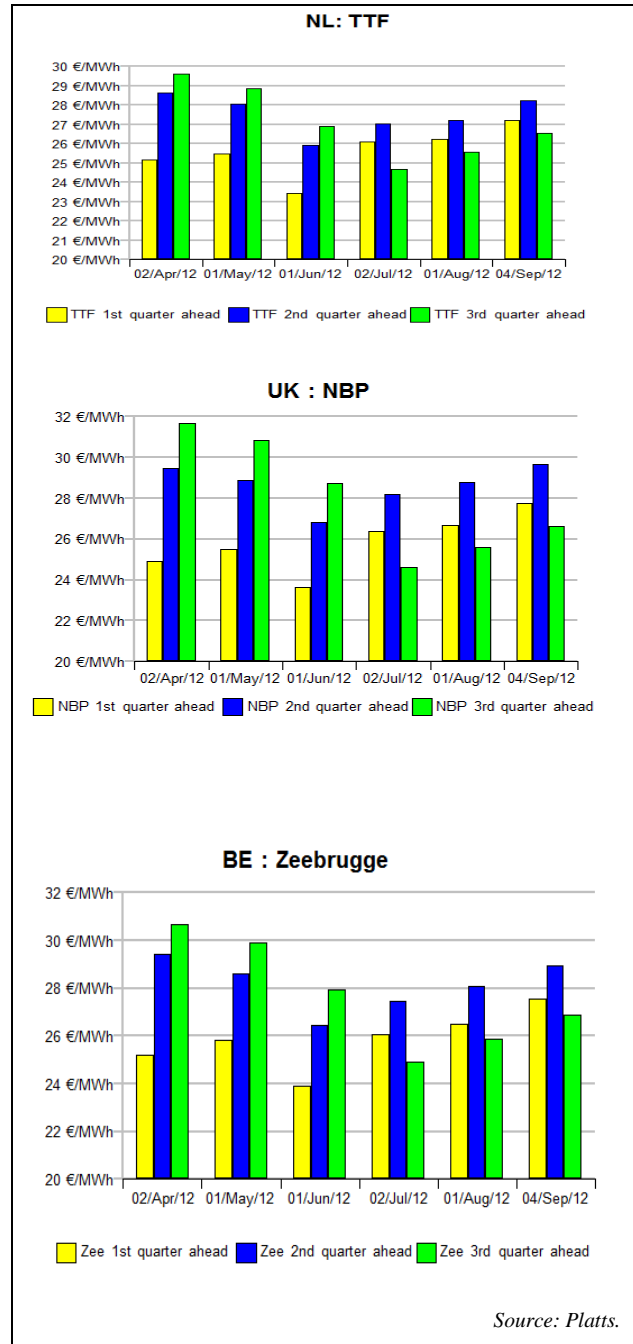
### **A.2.3 Regional markets**

#### **North and South Western Europe**

- Though there was some volatility in day-ahead prices throughout the second and third quarters of 2012 in North-West European (NWE) markets, there were no major events affecting spot hub prices, which on the whole increased only slightly throughout the period.
- As was the case in the two previous quarters, physical throughputs on the Belgian and UK hubs both fell in 2012 compared to 2011 (for the first nine months). In contrast, the Dutch, German and French hubs continued recording impressive growth in physical deliveries and/or trade volumes for the same period, relative to 2011, even if for the German and French hubs, volumes traded are still extremely small relative to the three other hubs.
- With regard to one year forward prices on the NWE hubs, these started the second quarter with a downward trend which then reversed by the end of the quarter. The third quarter was a reverse mirror image of the second quarter. By the end of the period, the average NWE hub one year forward traded at less than 27 €/MWh, equivalent to a less than 1 €/MWh premium to the average September NWE hub price level.

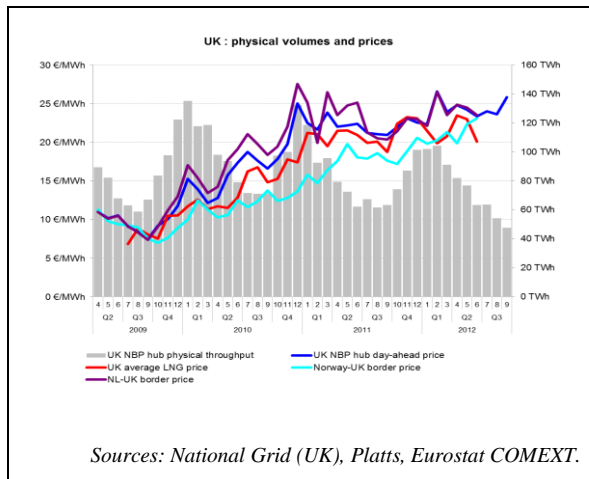


- Unsurprisingly, the near-forward gas curve also followed a similar trend: although near term gas prices in the second quarter were initially in **contango**, expectations were for gradually lower forward prices. In the third quarter, some **backwardation** was observable between the second and third quarter ahead, even if expectations, from one month to the next, were for slightly higher prices.
- In short, given that day-ahead prices have stayed at close to historically high levels in spite of falling demand for natural gas since the last year and continued economic difficulties, there has gradually been little expectations of further upside in prices going forward.



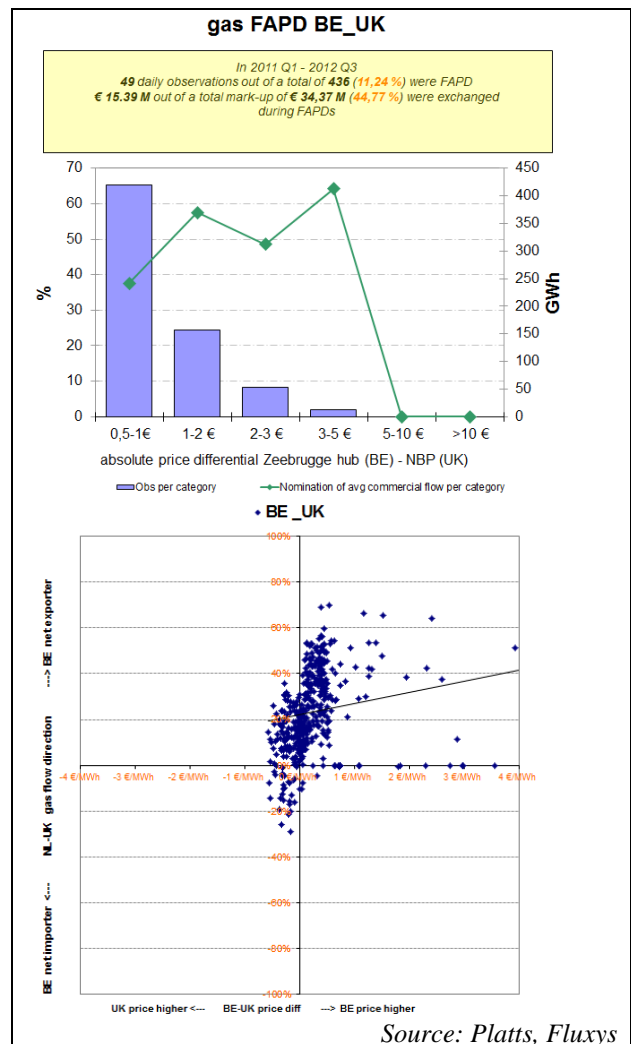
## United Kingdom

- Looking at the chart below showing estimates of LTC UK border prices for piped gas, it can be seen that prices paid for both Norwegian and Dutch piped gas in the UK continue to compare rather favourably to other prices, whereas typically recent prices of LTC purchased gas have tended to exceed hub and LNG prices in other parts of the EU.



- Whereas the cheapest gas consumed in the UK since the second quarter of 2010 had been gas imported from Norway, this changed in the first quarter, with the price of LNG deliveries to the UK offering the best deal. On the basis of averages for the second quarter however, Norwegian gas continued to be attractive, at 21.8 €/MWh, compared to 22.2 €/MWh for LNG and 24.3 €/MWh for Dutch imports, in line with the hub price (of 24.2 €/MWh).
- Gas deliveries in the region of the hub were subdued, with volumes for the first three quarters of the year down by 4% relative to the same period in 2011 and by as much as 20% compared to 2010.

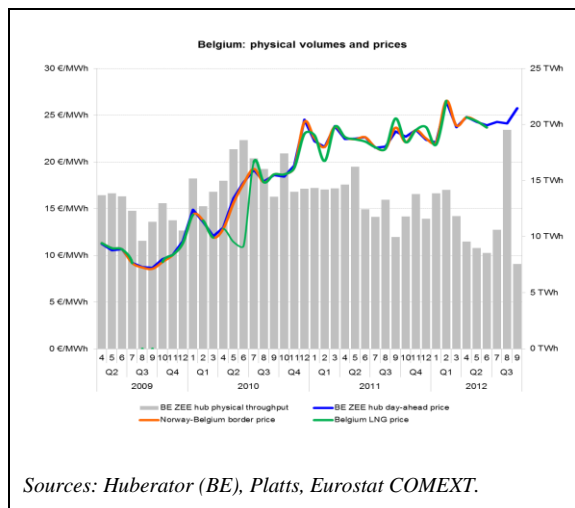
- In September, British utility Centrica signed a 2.4 billion cubic metre, three-year gas supply deal with the UK arm of Russian export monopoly Gazprom. A key part of the deal is that the gas is to be entirely priced against the UK's NBP day-ahead price.
- An analysis of adverse flows shows that there were relatively few occurrences of **FAPD events** on the UK – Belgium interconnector, mainly concentrated in the low price differential range.



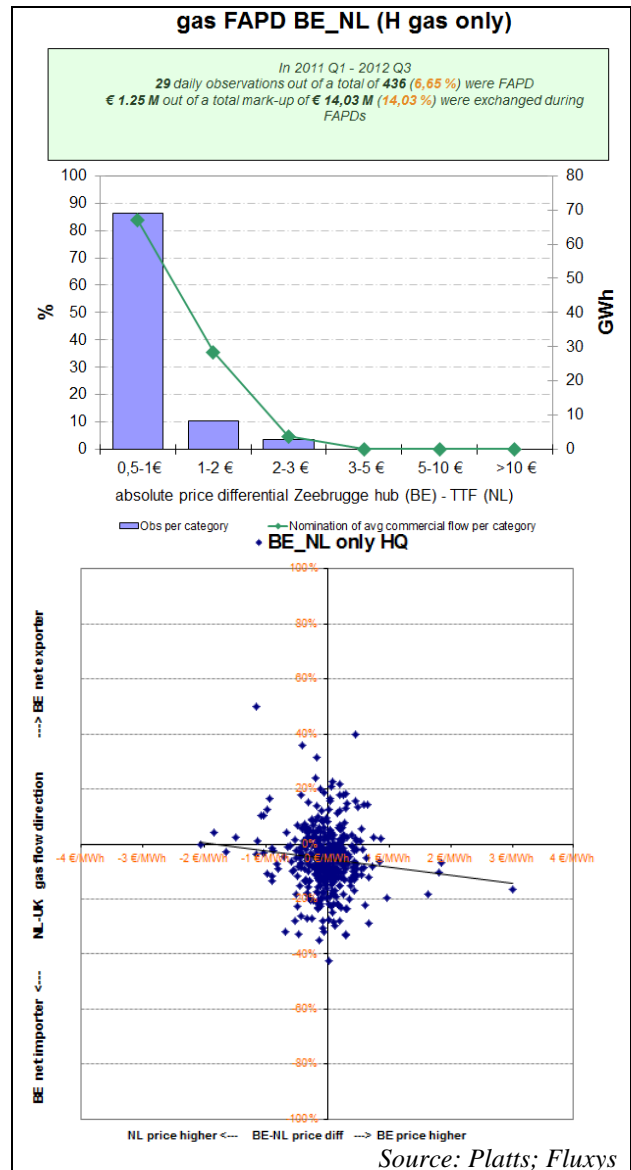
- During the second and third quarter of 2012 just 13 such events were reported, most of them occurring in periods of consecutive days when the Interconnector was shut down in the direction from UK to BE.

## Belgium

- The graph below shows that there is very little difference between the price of Belgian imported gas from Norway and the ZEE-day ahead price, which is itself also highly correlated with the LNG price.
- Such developments implies that gas delivered under long term contracts from Norway are cleared more and more often against spot prices and not under some form of oil indexation.



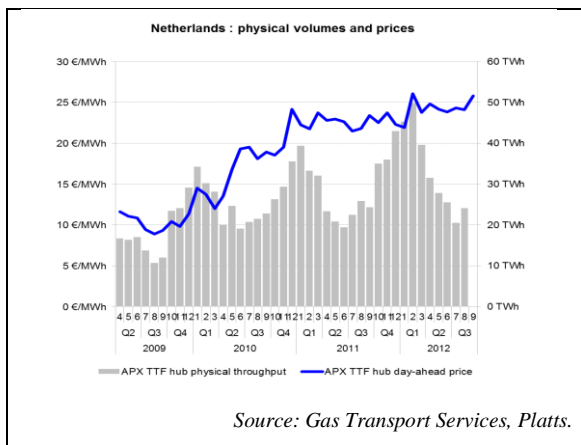
- As for the UK hub, physically developed volumes in 2012 up to and including the third quarter were below 2011 levels (-3%), although slightly above 2010 levels.



- Adverse flow (FAPD) events on the Dutch – Belgium border remained rare and mainly concentrated on the low price differential range as market participants were consistently shipping gas from the low to the high price area.
- In Q2 and Q3 of 2012 just three such events were reported.

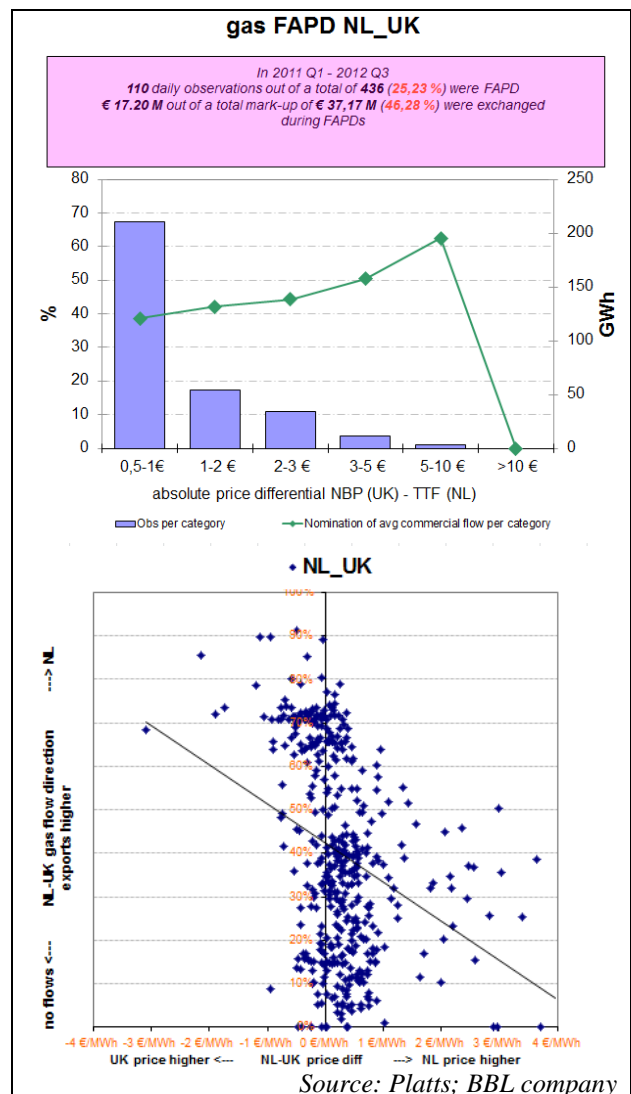
## Netherlands

- Unlike the UK and Belgian hubs, the Netherlands TTF hub has continued registering positive growth in physical deliveries. Year on year growth in throughputs for the three quarters of 2012 increased by 22% relative to the same period in 2011.



- FAPD events seemed more frequent on the Dutch – UK interconnection. From April 2012 to September 2012, gas flow from the high price area to the low price area in 26 days out of 121 for which observations are available in that period.
- It should however be noted that this number might actually be misleading. The next charts report on day-ahead data which is not combined with day ahead nomination (as is usual for the FAPD approach) but with physical flows reported by the BBL company. The time gap between day-ahead price discovery and the moment of actual flows is big enough to suppose that market participants can react to new market conditions and modify their nomination schedules accordingly.

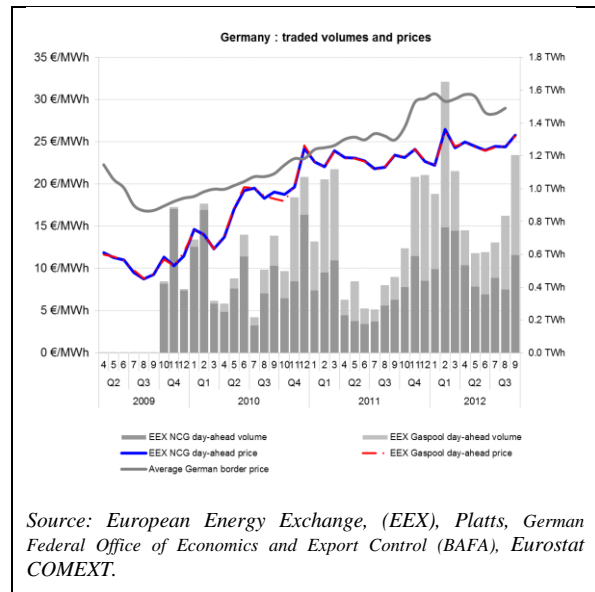
- Another factor that could explain the relatively high proportion of FAPD events as illustrated in the next charts is the absence of physical reverse flow possibility for half of the observed period (Q1 2011 – Q3 2012). In addition, a large part of the nominated capacity on the BBL is attributed to gas deliveries under long term contractual arrangements. The relative share of the mark-up in the total trade on gas contracts is much smaller on the BBL as the day-ahead trade may be just a fraction of the total transacted volume.





## Germany

- In addition to hub prices and volumes, the graph below displays the evolution of the price of gas imports at the German border, as published by the German Federal Office of Economics and Export Control (BAFA). As we have already pointed out in this report, in the last issue we published price data for a number of gas importing countries into Germany, but we are no longer able to do so as these data have been removed from the Eurostat database which they came from.

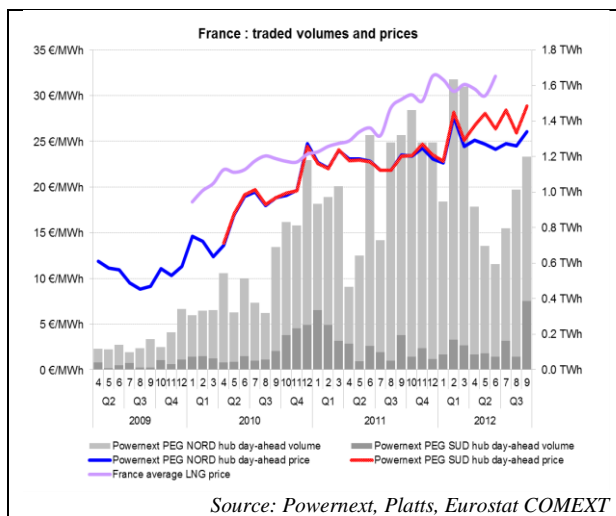


- Comparing the prices of the German NCG and Gaspool hubs to the average German border price, it can be seen in the graph below that in 2009 and parts of 2010, the average German border price exceeded the German hub prices by a considerable amount. Then, in the second half of 2010 and in 2011 up to the third quarter, the gap between the two was substantially reduced. Since the fourth quarter of 2011 however, the gap between the two has grown again. On average in 2012, the German border price was 5 €/MWh higher than either of the two German hub prices.
- As we have commented already in this report, while the gap between hub and LTC German gas prices has been on the increase again of late, Germany however benefits from favourable terms relative to a number of its Central and Eastern European neighbours. LTC prices paid in UK and Belgium, which are very closely correlated to hub prices traded there, are however even more favourable than Germany.
- For Germany we are not able to publish physical volumes, so we publish traded volumes instead. Even if 2012 traded volumes have increased significantly relative to the previous year (67%), at 8 TWh for the first 9 months of 2012, these remain very small compared to the UK, Belgian or Dutch hubs.
- In July, the German utility E.ON signed a deal with Gazprom on the price of long term sales of gas from Russia. It has been reported that the deal includes a price discount of between 7-9% and will boost E.ON's half year results by 1 billion Euros due to retroactive application to Q4 2010.

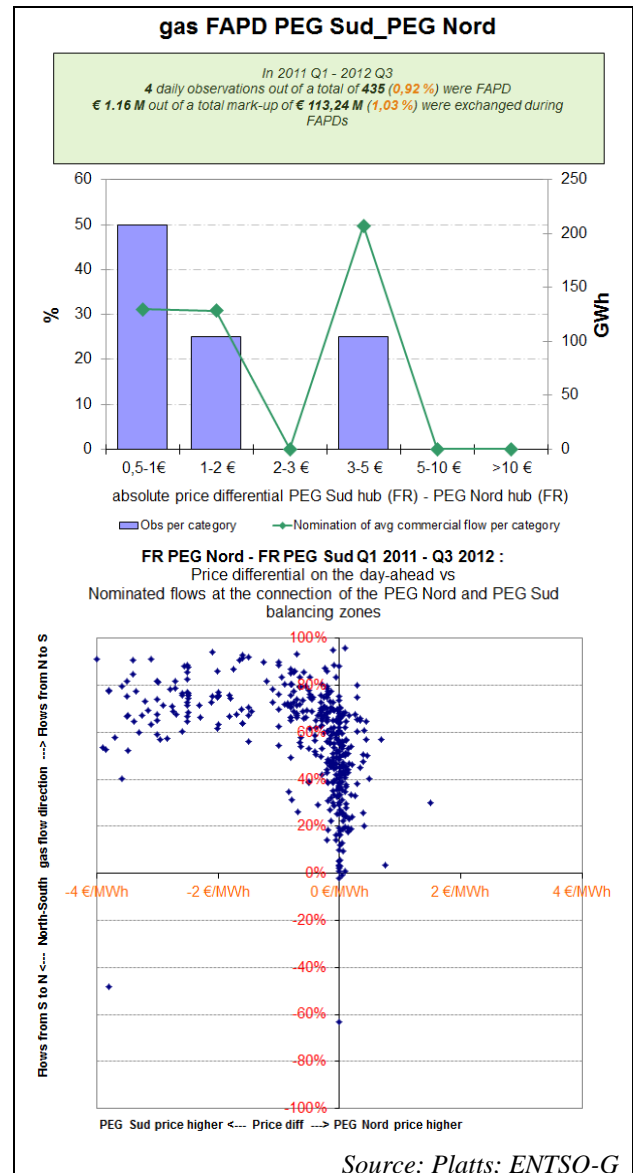


## France

- At an average price of 30.9 €/MWh for the second quarter of 2012, the price of LNG imports paid in France continued to exceed that of the UK, Spain, Belgium and Portugal, but was less than that paid by Italy and Greece. As we have already highlighted in this report, unlike other LNG importing countries such as the UK and Belgium, the price of LNG delivered to France is quite significantly higher than the price of piped gas traded on the hubs. This is also true in Italy.



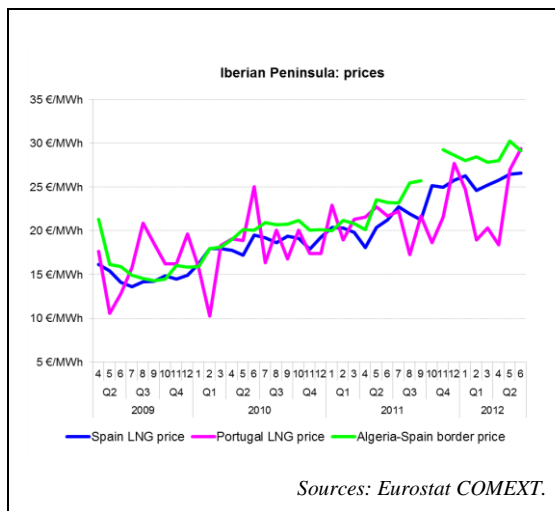
- It is interesting to note that since the end of the first quarter of 2012, there has been a divergence between the prices traded on the two French hubs. This is being investigated by the French regulator.
- According to Platts, traders have said that reasons for high PEG Sud prices could include limited LNG flows into Europe, with LNG deliveries into the Mediterranean Fos terminals making up a key part of PEG Sud supply.



- There were virtually no adverse flow events observed between the two price areas of the French PEG hub in 2011 and 2012.
- Only 1 FAPD event was reported between April and September 2012, indicating that market participants were reacting rationally to price signals to send gas to the high price area.

## Iberian Peninsula

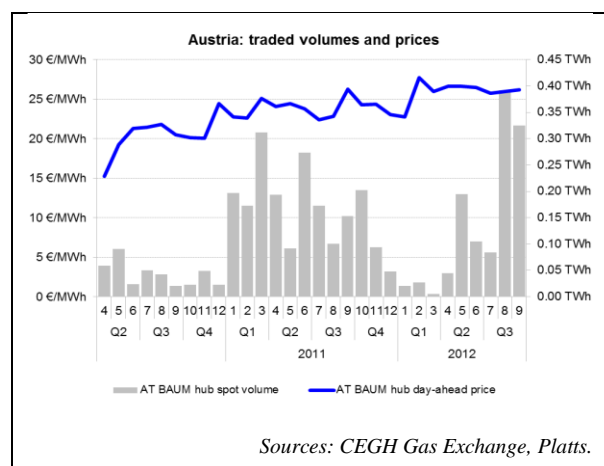
- Some two thirds of natural gas supplies to Spain and Portugal comes in the form of LNG. The price paid for LNG in the Iberian Peninsula is therefore a key determinant of the cost of imports of natural gas in that region of the EU.
- This continues to represent an advantage given the continued relative cheapness of LNG, especially compared to pipe gas delivered under LTC. This being said, Spain also benefits from relatively cheap supplies of LTC piped gas from Algeria.



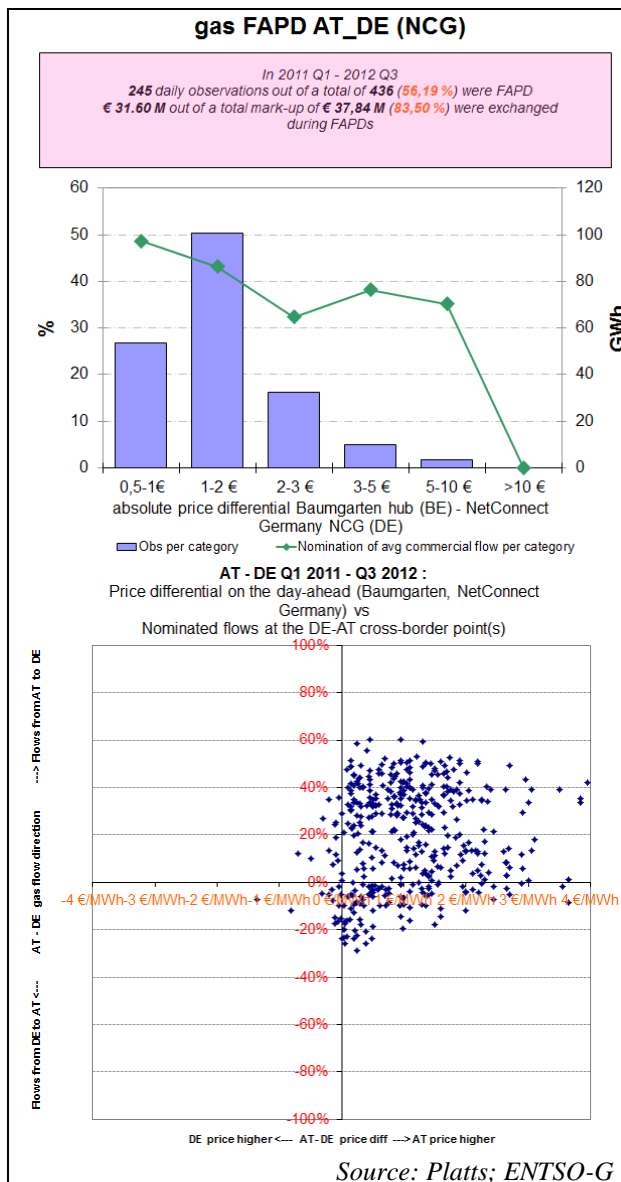
## Central and Eastern Europe

### Austria

- After a considerable increase in traded volumes on the Austrian Baumgarten at the end of 2011, volumes recorded for the first quarter of 2012 had been significantly lower than volumes traded a year earlier during the same period.
- Overall, 2012 data covering the first three quarters of the year reveal that traded volumes fell in 2012 relative to the same period in 2011 by some 18%.
- As regards prices on the Austrian hub, while those had traded close to NWE hub levels in the fourth quarter of 2011 and first quarter of 2012, there was a continued divergence in the second and third quarters of 2012, as is usual for this time of year, with the spot price on the Austrian hub trading at a premium of between 1 and 2 €/MWh.

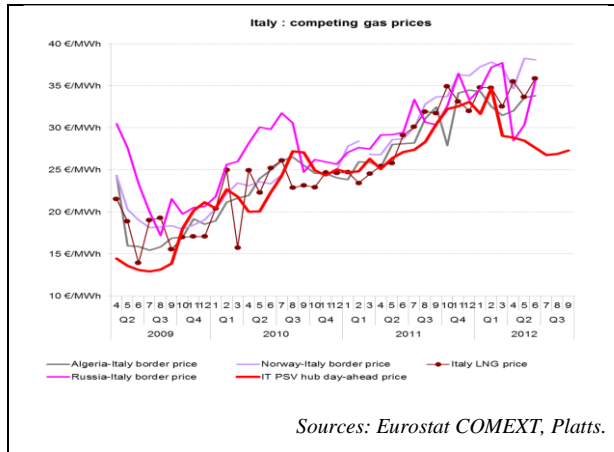


- Traded volumes on the CEGH hub remain very modest. This could perhaps explain the results on FAPD events on the German – Austrian border. As illustrated on the next chart and scatter plot, more than half of the observations appear in adverse mode, implying gas flew from the high price to the low price area more often than not.
- The high share of FAPD events can also be explained by the fact that market participants are relying on other pricing mechanisms such as OTC prices or prices based on long term contracts. Additional measures may be needed to improve liquidity and the quality of the pricing signal on the Baumgarten hub.

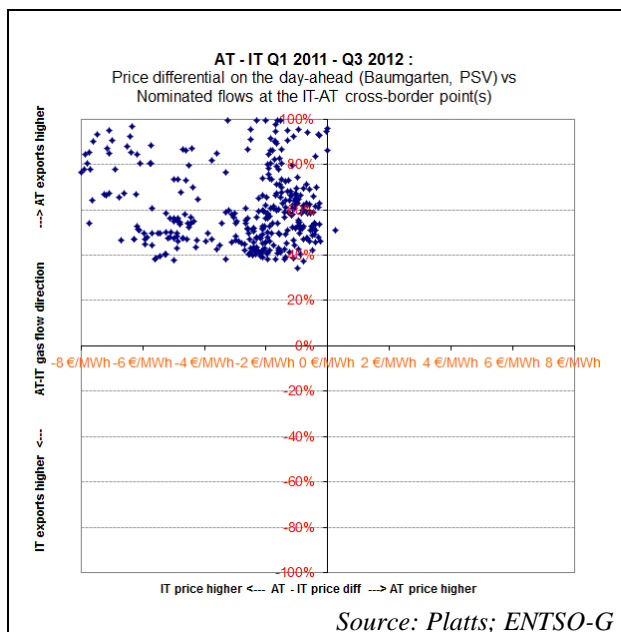


### Italy

- Day-ahead contracts on Italy's PSV hub continued to trade at levels exceeding other European hubs, with an average price over the 2<sup>nd</sup> and 3<sup>rd</sup> quarter of 2012 of only 27.6 €/MWh, compared to a NWE average of around 25 €/MWh. This in fact constitutes a much narrower difference than is usual. For instance, the premium in the first quarter of 2012 was in excess of 5 €/MWh.
- Prices of other gas contracts paid in Italy were quite a bit higher than the hub price over the course of the second quarter, all averaging upwards of 30 €/MWh relative to the PSV hub's 28.3 €/MWh average over the quarter.
- On the whole, Italy continues to pay very high prices for its LNG as well as long term gas contracts, relative to other EU markets with gas hubs.

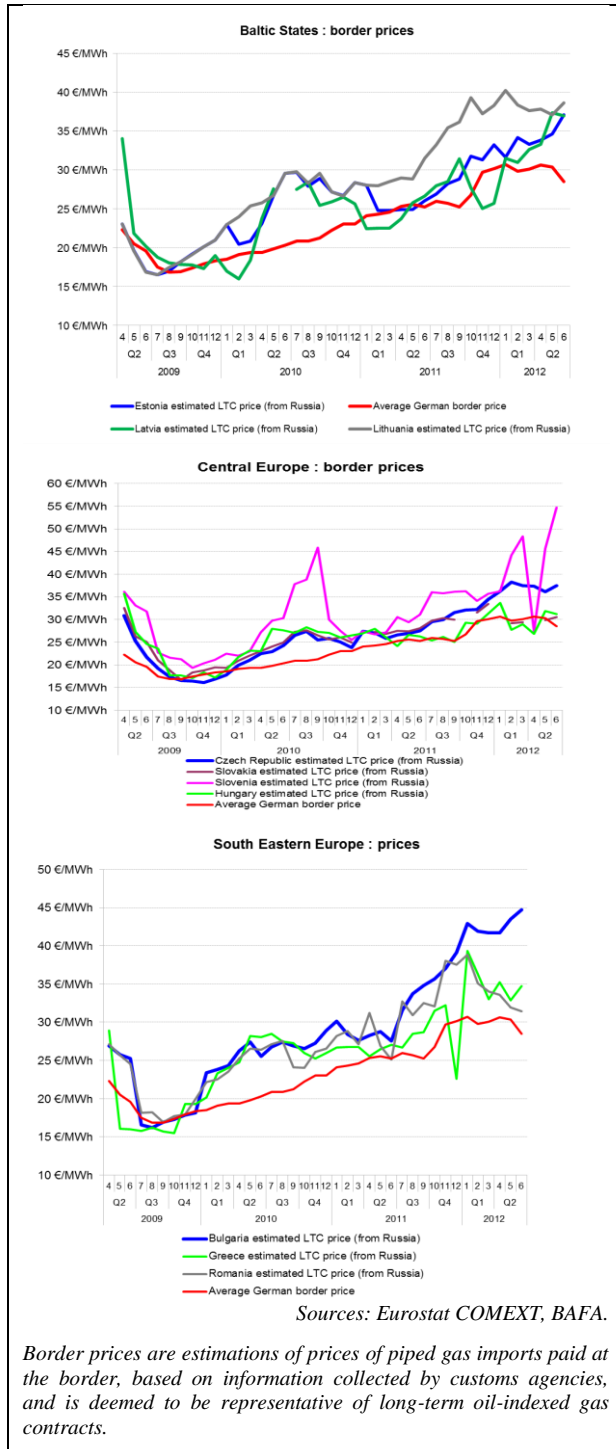


- There were no FAPD events observed on the border with Austria as the Italian prices were systematically higher, which also corresponds to the normal flow direction on this interconnection point.



### Baltic States, other Central and South-Eastern Member States

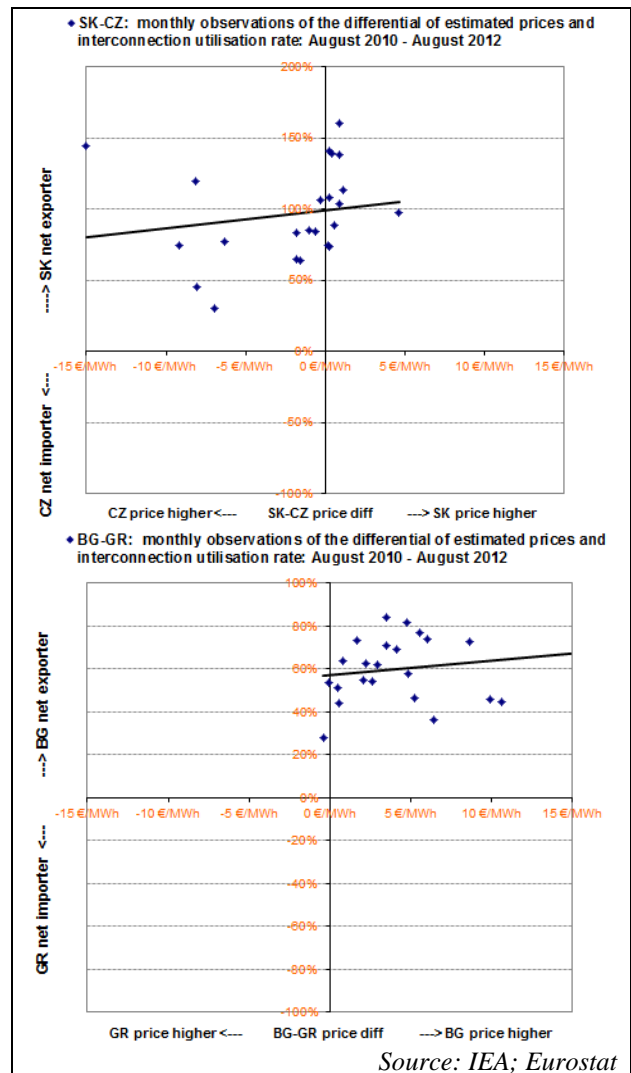
- The next 3 charts illustrate the fact that countries from Eastern and Southern part of the continent continue to pay some of the most expensive gas prices in Europe. As a rule, for the majority of those Member States the estimated gas prices under long term contracts were priced at a considerable premium to the German border price. A combination of two factors could explain such price development.
  - On the one hand, the Baltic states and the countries in Central and Southern Europe do not have a diversified portfolio of gas supply sources and in a lot of cases they do not have a choice on the gas supply route. This was already felt in 2009 during the gas dispute between Ukraine and the Russian Federation.
  - In addition, these countries have not yet developed active hub trading and are paying for their gas deliveries prices which are indexed against crude and refined products. As seen in previous sections of the current report, this pricing mechanism has been consistently more expensive than the hub based gas-on-gas competition prices for a number of years.
- The next scatter plots combine the price estimations with the monthly flow data from the IEA to illustrate the adverse flow concept, this time applied on a monthly frequency. The data covers 23 monthly observations from August 2010 to July 2012, which is the latest available period.



- For the case of the Czech – Slovak border it appears that flows were going predominantly in the direction of the high price area (which was the Czech

Republic). This development contrasts sharply with the situation on the Bulgarian – Greek border: throughout the observed period Bulgaria was systematically the high price area; still it shipped gas to Greece, where it was taken off at a lower price.

- The existence of physical reverse flow capacity and the number of potential gas sources that are available in each market are among the factors that could explain these two contrasting examples.



### A.3 Retail markets

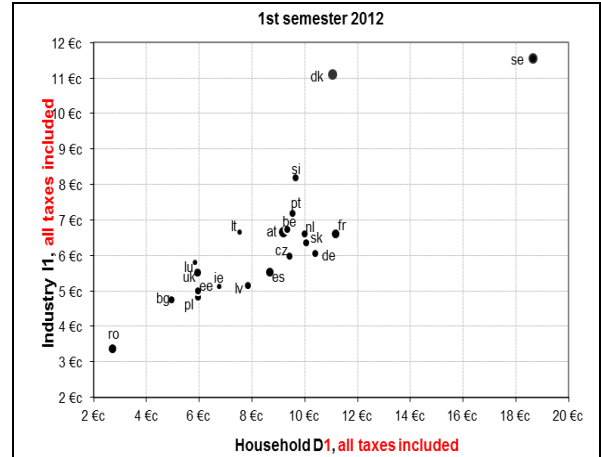
#### A.3.1 Price levels

The first two charts below show prices of natural gas paid by households and industrial customers in the Member States of the EU, with annual consumption up to 20 GJ in the case of households (consumption band D1) and up to 1000 GJ in the case of industrial consumers (consumption band I1) in the first half of 2012.

The first chart shows prices including all taxes (gross prices). The second chart shows gas prices without taxes (net prices).

In the first half of 2012 the ratio between the highest and the lowest gross household natural gas price among the EU Member States was 6.9 (for category D1) – an increase from 6.5 in the second half of 2011. In the case of industrial natural gas prices, the ratio remained unchanged at 3.4 between the second half of 2011 and the first half of 2012, sustaining the decrease from 4.11 in the first half of 2011. The Member States at both end of the range were in both cases Sweden and Romania.

In absolute terms the range between the lowest and the highest pre-tax price remained relatively stable at 10.5 €cent/kWh for household consumers and 4.4 €cent/kWh for industrial consumers in the respective ranges.



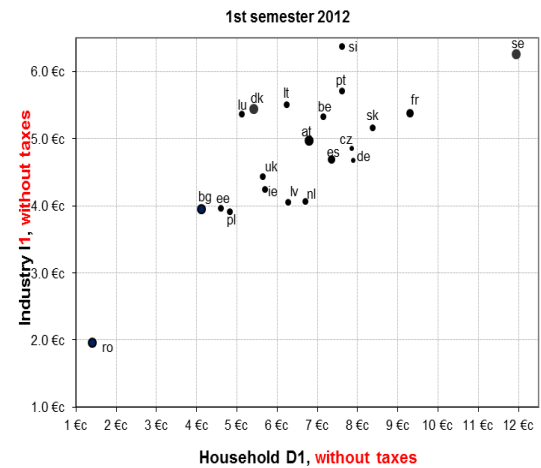
Source: Eurostat, as of October 2012

Range for annual consumption :

Household group D1 : up to 20 GJ ;

Industry group I1 : up to 1000 GJ;

Note: Preliminary data for Austria and the Netherlands. No data for Hungary and Italy.



Source: Eurostat, as of October 2012

Range for annual consumption :

Household group D1 : up to 20 GJ ;

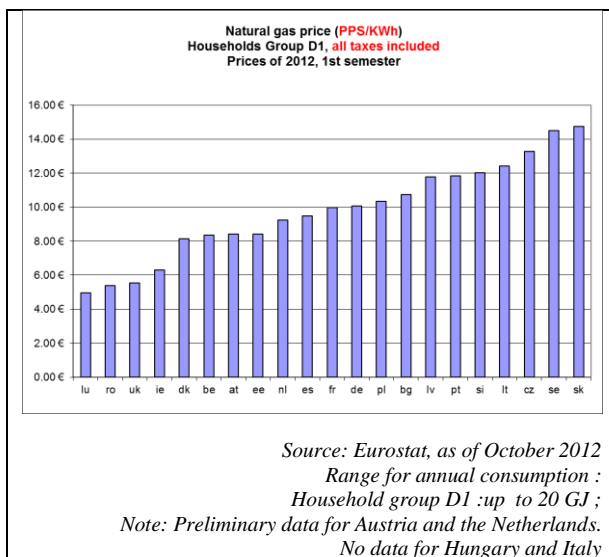
Industry group I1 : up to 1000 GJ;

Note: Preliminary data for Austria and the Netherlands. No data for Hungary and Italy.



Sweden, France and Denmark were the EU Member States where household consumers paid the highest prices in the first half of 2012, respectively 18.7 €cent/kWh, 11.2 €cent/kWh and 11.1 €cent/kWh in consumption band D1. Households in Romania paid the lowest price: 2.7 €cent/kWh in the same consumption band.

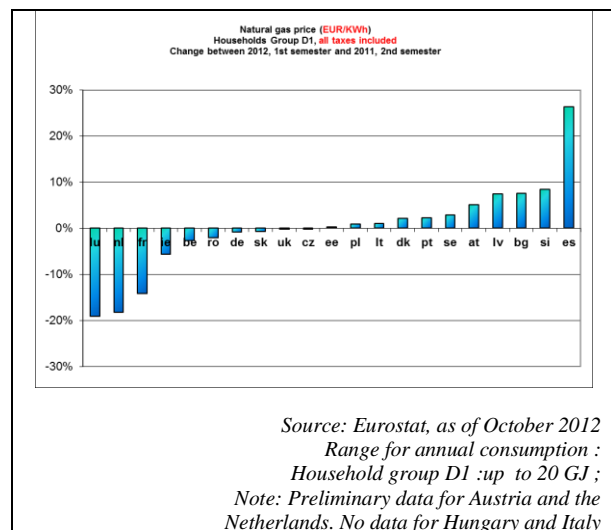
When correcting for purchasing power parity (PPS) the picture changes with the Slovak Republic, the Czech Republic, Lithuania and Slovenia being among the five countries where household consumers in band D1 paid the highest prices, along with Sweden.



### A.3.2 Price dynamics

Changes in natural gas prices for household consumers with annual consumption of up to 20 GJ evolved in different ways between the second half of 2011 and the first half of 2012. Overall, most Member States either experienced price falls or price increases within a range of +/-5%.

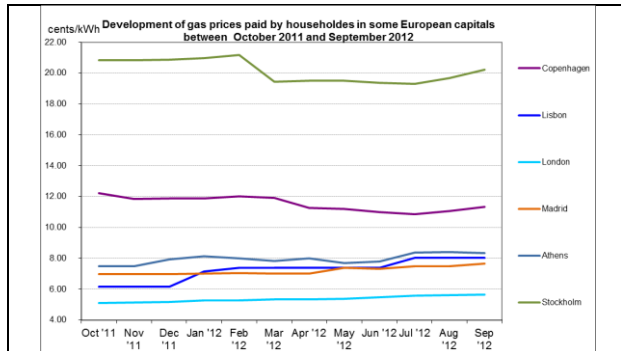
A very substantial gross consumer price increase was observed in Spain (+26%), which the Observatory will further investigate and report on in the next issue. In contrast, prices decreased significantly in Luxembourg, as well as in the Netherlands and France.



The next chart shows the evolution of final retail gas prices paid by households in some European capitals between October 2011 and September 2012. Over this period prices rose in the majority of European capitals. The highest increase was in Lisbon (+31%), followed by London (+11%) and Athens (+11%). Prices went down by 7% in Copenhagen and by 3% in Stockholm, but these two cities continue to have the highest consumer prices for natural gas among the 15 European capitals surveyed in the framework of the Household Energy Price Index (HEPI).

In the period between October 2011 and September 2012 consumer prices went up by an average of 8% in the 15 European capitals surveyed.

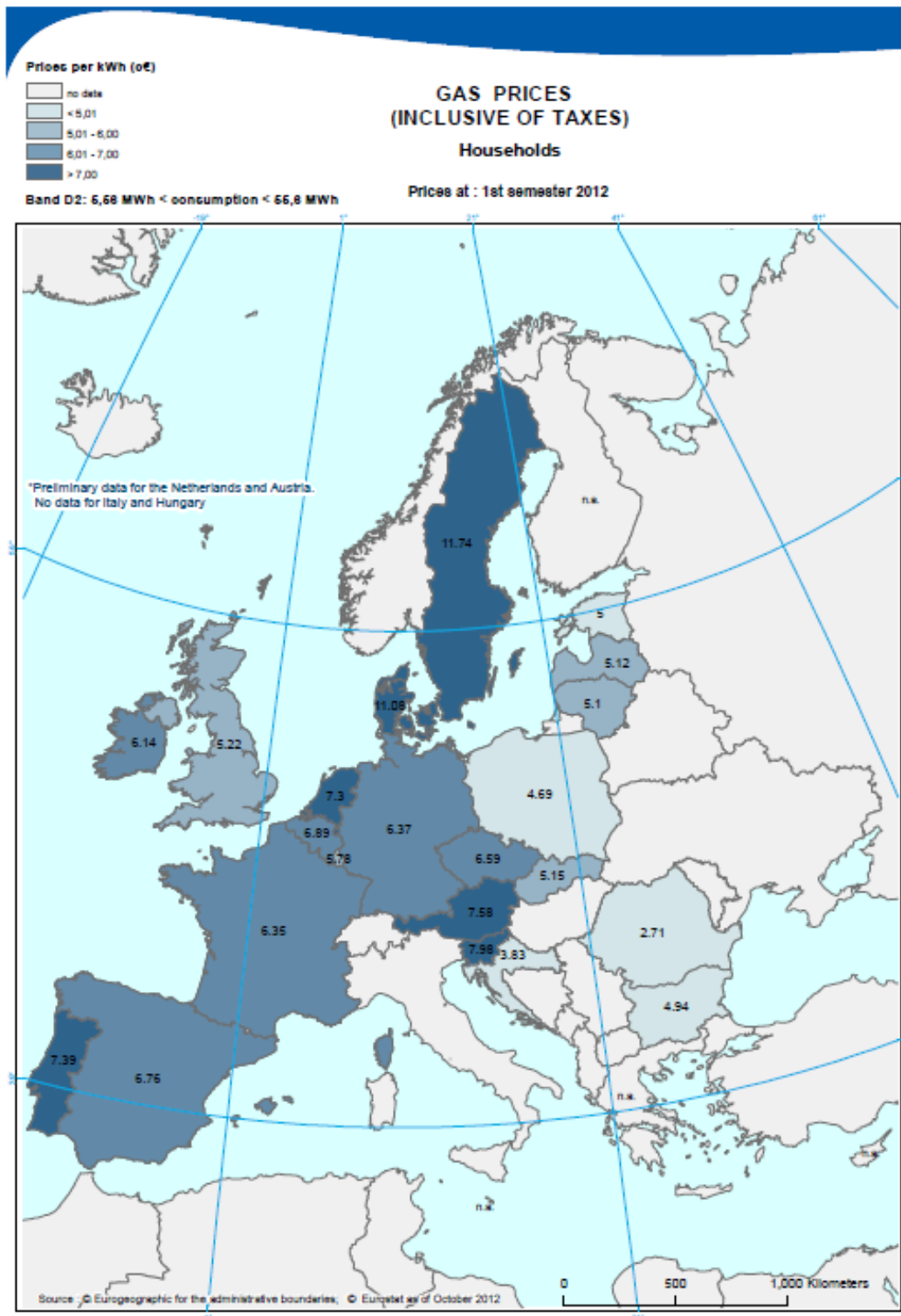


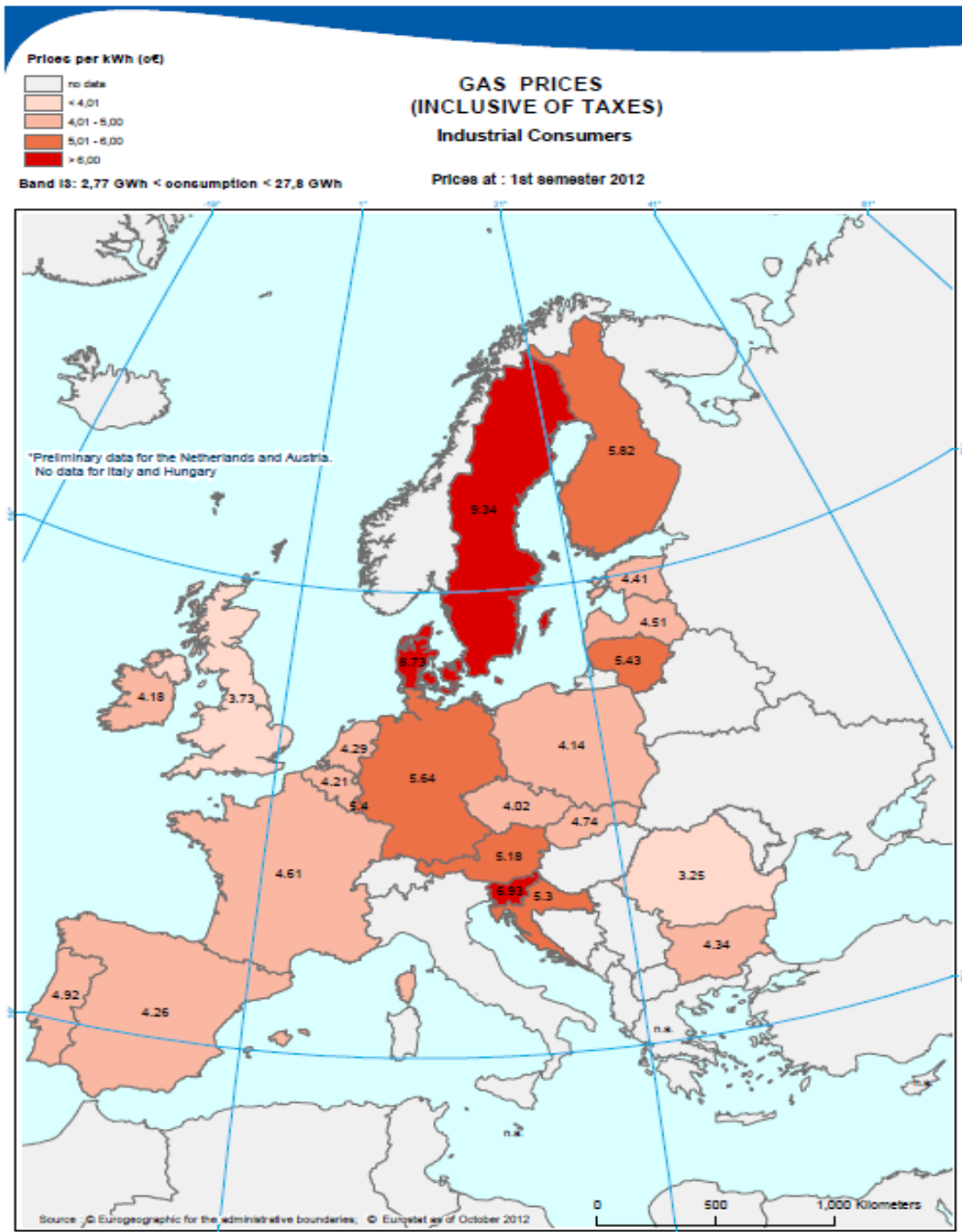


Source: HEPI

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

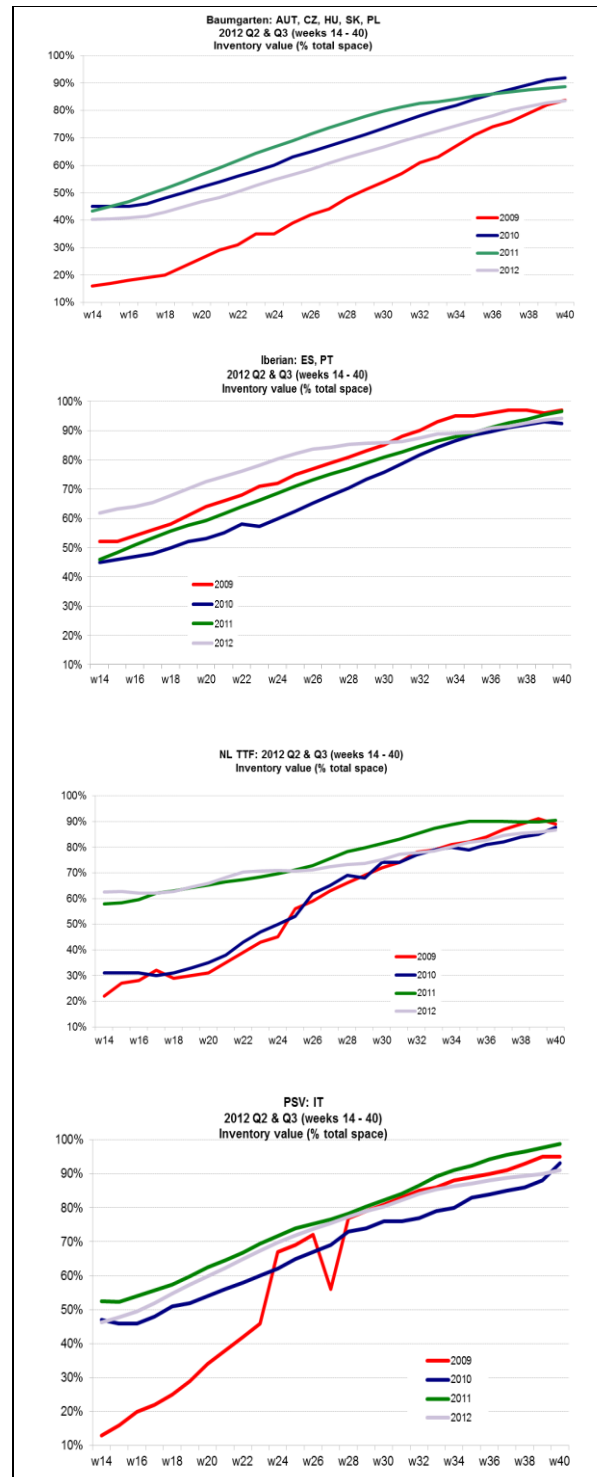
In the next page, two maps illustrate the level of retail prices throughout the EU countries during the first semester of 2012 in consumption bands D2 (households with annual consumption between 5.56 MWh and 55.6 MWh) and I3 (industry with annual consumption between 2.77 GWh and 27.8 GWh).





## B. Storage

- As we noted in the last issue, gas storage levels before the unexpected cold snap in early February were generally higher than usual, thanks to a clement fourth quarter of 2011, which led to a reduced need to complement supplies with storage withdrawals. This allowed significant withdrawals of gas from storage during the cold snap. On average, storage levels across Europe fell by around 30% between week 5 and week 11, when storage levels hit their lowest levels across Europe.
- By the start of the second quarter, in week 14, storage levels in the UK and the Netherlands had already increased quite considerably relative to week 11 levels, but this was not the case in other regions. However, given that in most regions, storage levels in the first quarter did not fall to abnormally low levels, (thanks to abundant supplies, pre cold snap), judging from storage levels recorded in previous years, by the start of the second quarter, levels were for the most part equivalent to or even exceeding previous years.
- Cold weather in the beginning of April (weeks 14 and 15) had no significant impact on storage levels, and for the remainder of the second quarter and the duration of the third quarter, storage levels followed a normal trend, with gradually increasing levels as more injections than withdrawals were occurring during the warmest months of the year, as per usual.





### C. Focus on EU imports of US hard coal

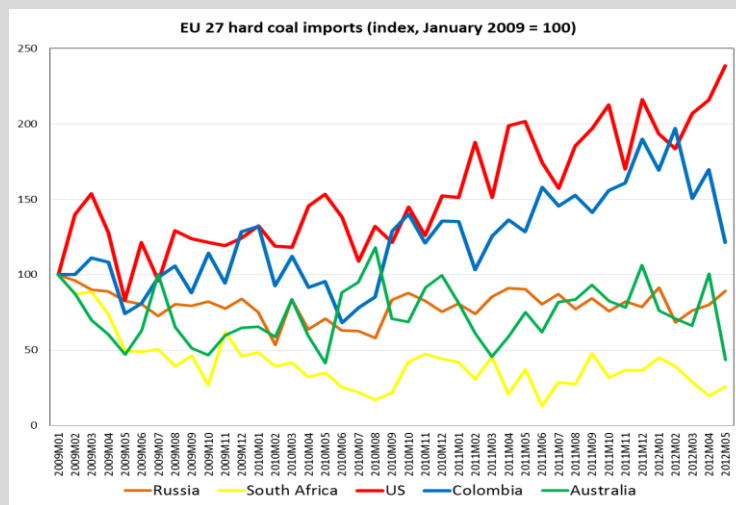
We have already commented in some detail previously in this report on the evolution of EU coal and gas prices, having highlighted that while the trend in the price of the former between 2011 and 2012 has been a downward one, that of the latter has been an upward one. In short, then, coal has been getting cheaper in the EU while at the same time gas has been getting more expensive.

We have also already noted that gas consumption has been falling. To recall, the EU's natural gas consumption for the first half of 2012 represented the lowest half-year consumption recorded for the EU 27. It was 7% less than H1 2011 and 14% less than H1 2010. In the previous report, we highlighted that 2011 EU natural gas consumption reached the lowest level recorded since 2000.

It would be reasonable to assume that the increase in the price of gas has negatively impacted demand for the commodity. If we look at the evolution of the prices of gas on European hubs since the beginning of 2011 until September 2012, they have increased on average by 16%. And if we look at the evolution of border prices for piped gas, we observe that from the beginning of 2011 until June 2012, they have typically increased by an even more considerable amount (examples: Algerian gas to Spain: +46%, Russian gas to Bulgaria: +48%, Norwegian gas to the UK: +48%, average German border price: +18%).

These are indeed considerable increases which, along with subdued economic growth and relatively mild winters in the last two years, would adequately explain falling EU gas consumption.

There is however an additional explanatory factor for falling EU natural gas demand which we have already highlighted in the last issue of this report but which we had not analysed in any detail. It is the growing availability of US-produced coal in the EU which has been driving EU coal prices down.



Source: Eurostat

If we look at the evolution of imports from the top five exporters of hard coal to the EU, it can indeed be seen that there has been growing imports of hard coal from the US since the first half of 2011. In the second half of 2010, the EU imported 12.4 million tonnes of hard coal from the US. By the first half of 2011, this had increased to 16.9 million tonnes, while in the second half of 2011, this reached 20.8 million tonnes, equivalent to a year on year increase of 68%. And US hard coal imports increased by 38% between 2010 and 2011. In 2012, although data is available only for the first five months of the year, for that period it had already reached close to what has been recorded for the first half of 2011 (exactly 16.4 million tonnes), such that 20% year on year growth can be expected for the first half of 2012.

In comparison, coal consumption in the EU grew by only 5% between 2010 and 2011, and by only 2% between the second half of 2011 and the equivalent period in 2010. Thus, imports of US hard coal have grown much faster than EU consumption. Indeed, in 2011, 17% of all imports of hard coal originated from the US. This compares to 13% in 2010 and 12% in the two previous years. Note however that imports from Columbia have also risen significantly: from representing only 11% in 2008, to fully 22% of all imports of hard coal by 2011. Of the five top exporters of hard coal to the EU, imports from the US have grown faster in the last two years than all apart from Columbia. Since the beginning of 2012 however, monthly imports from the US have grown faster than Columbia.

Looking more closely at where exactly in the EU US hard coal has been imported, the graph below provides some clarification. Relative to 2010, Germany, the UK, Italy, France and the Netherlands combined imported 37% more hard coal from the US in 2011. Looking at the first half of 2012, Germany, Italy and the Netherlands respectively imported 37%, 83% and 86% more hard coal from the US than in the first half of 2011. And while 2012 data is not available for the UK, the country imported 79% more hard coal from the US in the second half of 2011 compared to the second half of 2010.

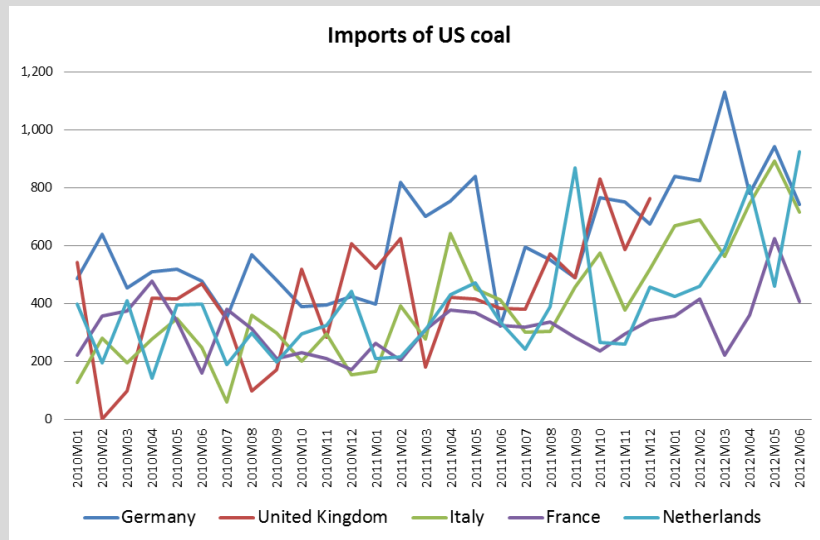
The following charts, which show comparisons of **coal and gas spreads** in Germany and the UK, provide some explanation (in addition to falling coal prices) for why so much cheap US coal has been imported into the EU.

What these charts show is that thanks to low coal and low carbon prices, coal-fuelled power generators have been making upwards of 10 €/MWh since the second half of 2011 to the third quarter of 2012, while for the same period, gas generators have been making losses (in Germany), or in any event much less than coal generators (in the UK).

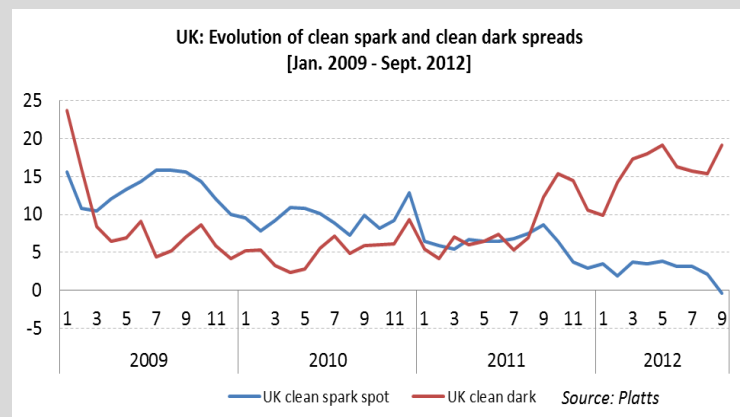
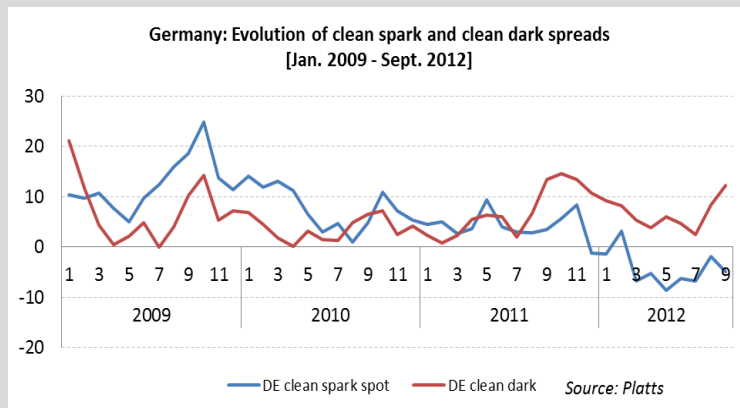
Coal-fuelled power generation has therefore become the power generation of choice for now in the EU, at the expense of gas-



fuelled power generation, thanks in no small part to the abundant availability of coal from the US (and Columbia), at decreasing prices. This represents another explanation for falling natural gas consumption in the EU, some 30% of which is used in power generation (2010 figures, assuming 50% efficiency of gas powered generators).



Source: Eurostat



## **D. Glossary**

**Backwardation** occurs when the closer-to-maturity contract is priced higher than the contract which matures at a later stage.

**Clean dark spreads** are defined as the average difference between the price of coal and carbon emission, and the equivalent price of electricity. **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 spark spreads** are defined as the average difference between the cost of gas and emissions, and the equivalent price of electricity. **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.

**Contango:** A situation of contango arises in the when the closer to maturity contract has a lower price than the contract which is longer to maturity on the forward curve.

**Flow against price differentials (FAPDs):** By combining daily price and flow data, Flow Against Price Differentials (FAPDs) are designed to give a measure of the consistency of economic decisions of market participants in the context of close to real time operation of natural gas systems.

With the closure of the day-ahead markets (D-1), the price for delivering gas in a given hub on day D is known by market participants. Based on price information for adjacent areas, market participants can establish price differentials. Later in D-1, market participants also nominate commercial schedules for day D.

An event labelled as an FAPD occurs when commercial nominations for cross border capacities are such that gas is set to flow from a higher price area to a lower price area. The FAPD event is defined by the minimum threshold of price difference under which no FAPD is recorded. The minimum threshold for gas is set at 0.5 €/MWh.

After the day ahead market closes, market participants still have the opportunity to level off their positions on the balancing market. That is why a high level of FAPD does not necessarily equate to irrational behaviour. In addition, it should be noted that close-to real time transactions represent only a fractional amount of the total trade on gas contracts.

The FAPD chart provides detailed information on adverse flows. It has two panels:

The first panel estimates the ratio of the number of days with adverse flows to the total number of trading days in a given period. It also estimates the monetary value of energy exchanged under adverse flow conditions (mark-up) compared to the total value of energy exchanged across the border. The mark-up is also referred to as "welfare loss". A colour code

informs about the relative size of FAPD events in the observed sample, going from green if less than 10% of traded days in a given period are FAPDs to red if more than 50% of the days are FAPDs.

The second panel gives the split of FAPDs by sub-category of pre-established intervals of price differentials. It represents the average exchanged energy and relative importance of each sub-category on two vertical axes.

**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. These quantitative indices are designed to reflect the demand for energy needed to heat a building.



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