



European
Commission

Quarterly Report

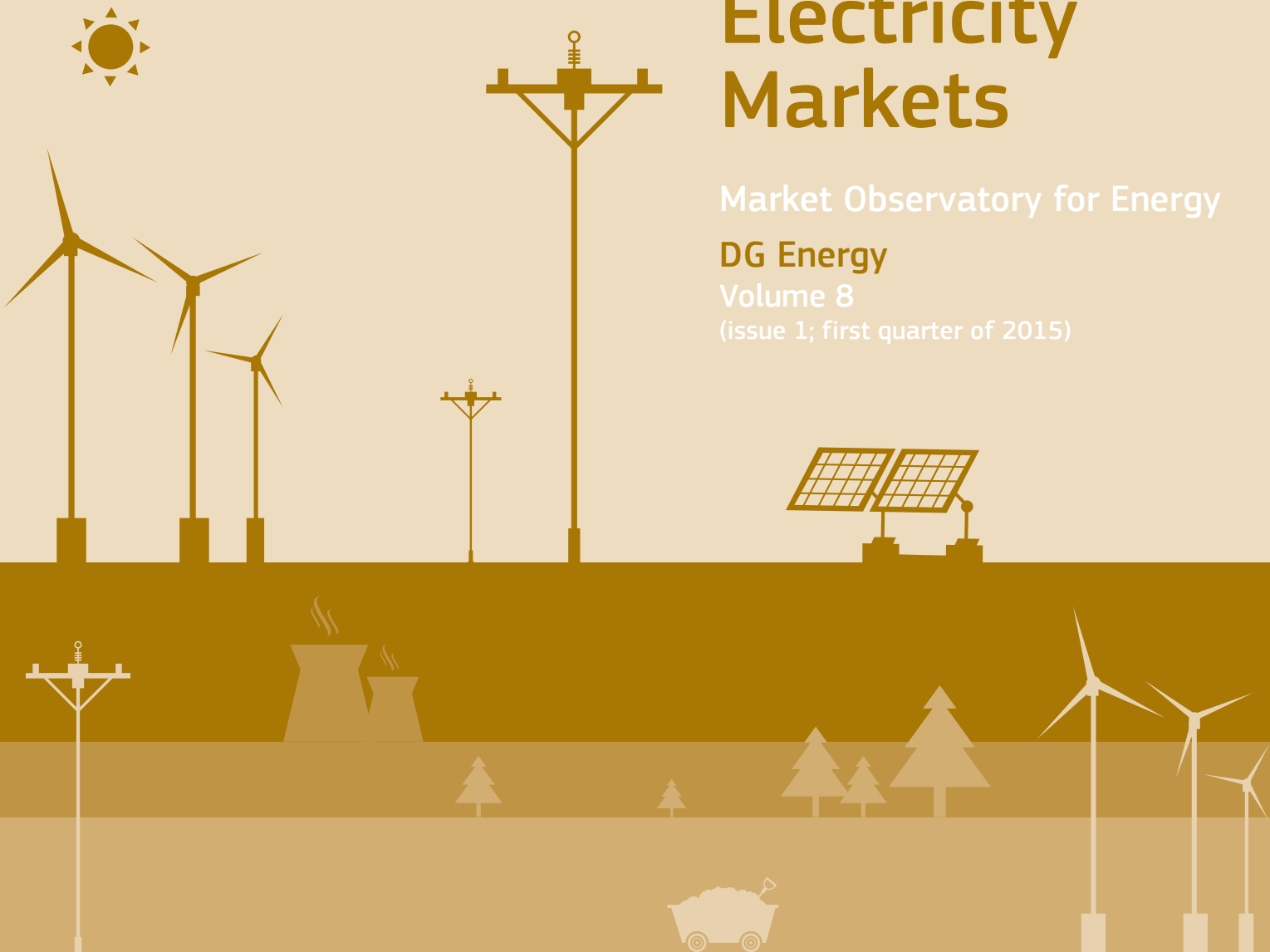
on European Electricity Markets

Market Observatory for Energy

DG Energy

Volume 8

(issue 1; first quarter of 2015)



Energy

DISCLAIMER: This report prepared by the Market Observatory for Energy of the European Commission aims at enhancing public access to information about prices of electricity in the Members States of the European Union. Our goal is to keep this information timely and accurate. If errors are brought to our attention, we will try to correct them. However the Commission accepts no responsibility or liability whatsoever with regard to the information contained in this publication.

Copyright notice: Reproduction is authorised provided the source is acknowledged. © European Commission, Directorate-General for Energy, Market Observatory for Energy, 2015

Commission européenne, B-1049 Bruxelles / Europese Commissie, B-1049 Brussel – Belgium
E-mail: ENER-MARKET-OBSERVATORY-QUARTERLY-REPORTS@ec.europa.eu

Content

Highlights of the report.....	2
Executive summary	3
1. Electricity demand drivers	4
2. Evolution of commodity and power prices	6
2.1. Evolution of power prices, and the main factors affecting power generation costs	6
2.2. Comparisons of monthly electricity baseload prices on electricity markets	10
3. Traded volumes and cross border trade of electricity	6
3.1. Comparison of wholesale market trading platforms and the over-the-counter (OTC) markets	6
3.2. Cross border trade of electricity.....	
4. Regional wholesale electricity markets	14
4.1. Central Western Europe (Austria, Belgium, France, Germany, the Netherlands, Switzerland).....	14
4.2. British Isles (UK, Ireland)	16
4.3. Northern Europe (Denmark, Estonia, Finland, Latvia, Lithuania, Norway, Sweden)	17
4.4. Apennine Peninsula (Italy)	18
4.5. Iberian Peninsula (Spain and Portugal)	19
4.6. Central Eastern Europe (Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia)	20
4.7. South Eastern Europe (Greece)	22
5. International outlook – comparing EU power prices with international peers	24
6. Retail electricity prices in the EU	30
7. Glossary	36

Highlights of the report

- Wholesale electricity prices remained relatively stable in the first quarter of 2015 in most of the EU markets, due to abundant renewable power supply and moderate demand.
- In many European markets wind power generation has an increasing role, assuring lower wholesale electricity prices and less dependence on fossil fuel generation.
- A new electricity interconnector between Spain and France has been inaugurated in February, and the Italian electricity market has been coupled with its neighbours in the same month.
- The solar eclipse that took place on the 20 March and was visible in most of the EU countries did not result in technical problems in the EU power grid.
- In the case of industrial retail electricity prices a gradual convergence across Europe could be observed over the last few years. Network costs and taxes can be decisive in final household electricity prices, having similar importance as energy supply costs in some Member States.

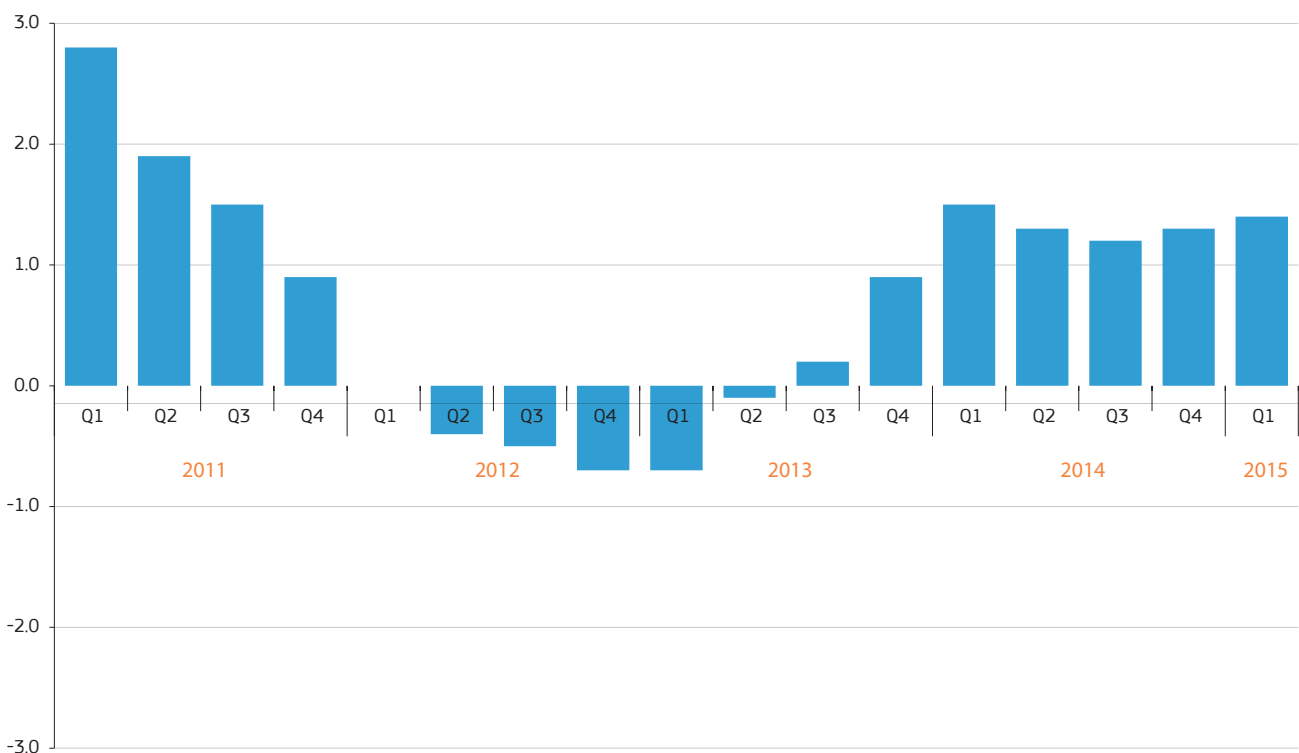
Executive summary

- **Electricity consumption in the EU grew by 0.6%** in December 2014 - February 2015 compared to the same period of the previous year.
- **The Platts' European Power Index (PEP)**, expressing the average evolution of the wholesale power prices in the European markets, remained relatively stable in the first quarter of 2015; amid slightly decreasing natural gas prices, increasing coal prices and increasing share of renewable generation in the EU power mix. Relatively mild weather also contributed to moderate demand for power.
- In many European markets the importance of wind power generation is increasing; the share of wind in the EU power generation mix reached 11% in January 2015, being the highest since ever. Increasing share of renewable energy sources can contribute to mitigating fossil fuel import needs and to lower wholesale market prices. **Renewables can increasingly influence the competition between coal and gas**, and as coal still remained competitive compared to gas, increasing renewable power generation tends to squeeze out natural gas of the European power mix.
- Despite most of the European electricity markets are coupled with one or more of their neighbours, **there were still significant differences in wholesale electricity prices in the first quarter of 2015 in the EU, ranging from 28-29 €/MWh in Denmark and Sweden to 58 €/MWh in Greece**. Over the past few years price convergence could be observed between European markets, however, several factors, such as local generation mixes or the availability of interconnection capacities with neighbouring markets can result in persistent price differentials between national or regional markets in the EU.
- **On the 24 February 2015 the Italian day-ahead wholesale electricity market was coupled with the French, Austrian and Slovenian markets**. However, due to lack of sufficient level of physical interconnection capacities between Italy and its neighbours, the Italian price premium to these markets did not decrease significantly, and flows against price differentials, showing an uneconomic functioning of the cross-border power trade, did not disappear either. **On 20 February 2015 a new electricity interconnector has been inaugurated between Spain and France**, practically doubling the cross-border capacities between the two countries. However, further developments in the infrastructure is needed to achieve a full integration of Spain into the North West European market coupled area.
- **On 20 March 2015 a partial solar eclipse, which could be observed in most of North-Western and Central Europe, significantly impacted solar power generation for a period of two hours**. This drop in actual generation capacities did not really impact day-ahead hourly prices, as the event was anticipated by market participants. However, on the intraday power market significant increases could be observed in the prices of reserving supplementary generation capacities. Due to cloudy weather in many countries, the reserve activation rates remained lower than expected and the European power grid did not experience technical problems.
- Over the last few years **industrial retail electricity prices showed signs of gradual convergence across the EU**, while in the case of household retail prices differences between the cheapest and the most expensive countries remained practically the same. Besides regulated prices in the household segment, non-energy elements, such as network costs and energy taxes and levies might have also contributed to permanent differentials in household retail prices. **In different Member States network costs and taxes can have a decisive role in final retail prices as our data show**.

1. Electricity demand drivers

- As Figure 1 shows, the economic recovery in the EU-28 continued in the first quarter of 2015, and GDP grew by 1.4%, in year-on-year comparison, after similar growth rates in the previous quarters in 2014.
- Electricity consumption in the EU-28 grew modestly, (by 0.6%, or by 5.4 TWh) in December 2014 – February 2015 compared to the same period of the previous year. Increase in electricity consumption in this period was less than the GDP growth, implying that energy efficiency of the EU economy has been improving. However, it must be noted that decentralised forms of electricity generation do not appear in statistics provided by electricity transmission system operators, serving as the basis for electricity consumption statistics, thus the actual electricity consumption might be underestimated.

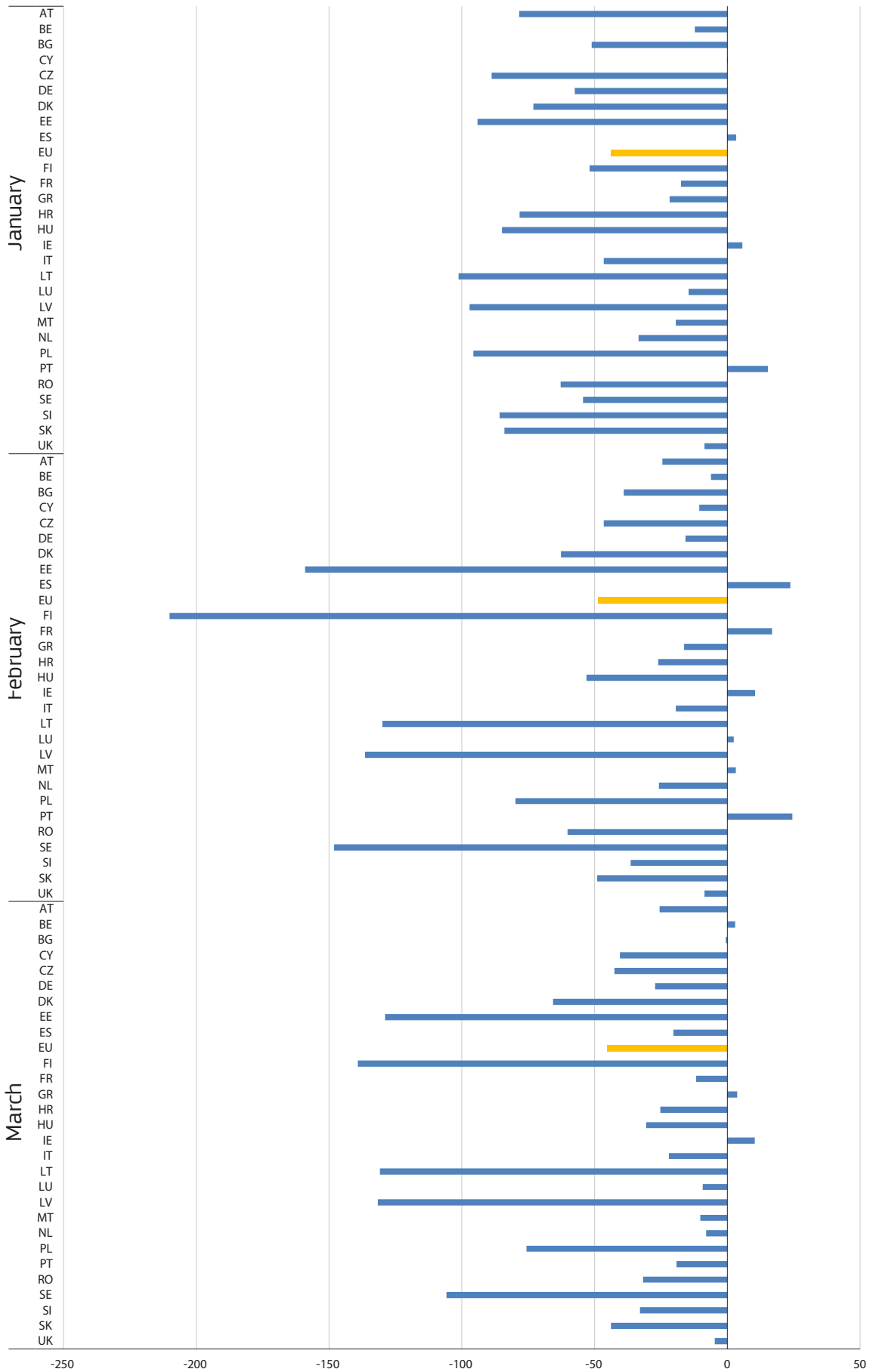
FIGURE 1 - EU 28 GDP Q/Q-4 CHANGE (%)



Source: Eurostat

- Figure 2 shows the monthly deviation of actual Heating Degree Days (HDDs) from the long term average in the twenty-eight member states of the EU in January, February and March 2015.
- In most of the member states actual HDDs were lower than the long term average during these three months, implying that temperatures were higher than the seasonal averages, and the weather was milder than usual in this period of the year. Although in winter periods demand for electricity follows a seasonal increase (higher demand for lighting and heating needs), mild winter weather in most of the EU has contributed to putting a lid on the increase in heating related residential power demand.

FIGURE 2 - DEVIATION OF ACTUAL HEATING DEGREE DAYS (CDDs) FROM THE LONG TERM AVERAGE, JANUARY – MARCH 2015



Source: Eurostat/JRC.

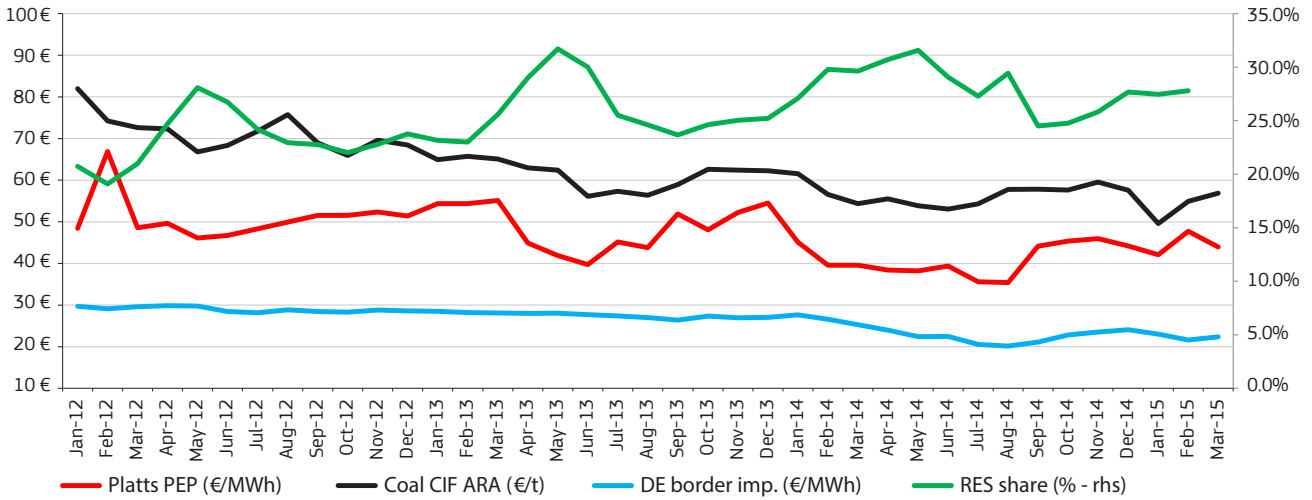
The colder is the weather, the higher is the number of HDDs.

2. Evolution of commodity and power prices

2.1 Evolution of power prices, and the main factors affecting power generation costs

- Coal prices (as represented by CIF ARA contracts, an import price benchmark widely used in North-Western Europe), which were above 80 €/Mt at the beginning of 2012, fell below 50 €/Mt in January 2015, reaching the lowest level since October 2009. Abundant global coal production and decreasing steam coal demand in power generation in many regions of the world contributed to the decreasing price trend.
- Natural gas prices (measured as import prices on the German border) decreased gradually since the beginning of 2012. After temporarily picking up in mid-2014, they decreased again in the last few months, partially in the consequence of lower crude oil prices filtering in the prices of oil-indexed gas supply contracts.
- The share of renewable generation sources (wind, solar, biomass, including hydro) amounted 28% in February 2015, being the highest since August 2014. Without hydro generation renewables accounted for one sixth of the EU power generation mix, which was the highest share since the beginning of available time series.
- The factors described above impacted electricity generation costs and generally the wholesale electricity price level in most of the EU markets, as the red curve in Figure 3 shows, representing the Platts Pan-European Power Index (PEP) used as an electricity price benchmark in Europe. Since the beginning of 2012 the PEP index was following a decreasing trend, however, since autumn 2014, it stabilised around 45 €/MWh.

FIGURE 3 - EVOLUTION OF EUROPEAN AVERAGE WHOLESALE POWER PRICES COMPARED WITH COAL AND GAS PRICES AND THE SHARE OF RENEWABLES IN POWER GENERATION



Source: Source: Platts, BAFA, ENSTO-E

Platts PEP: Pan European Power Index (in €/MWh)

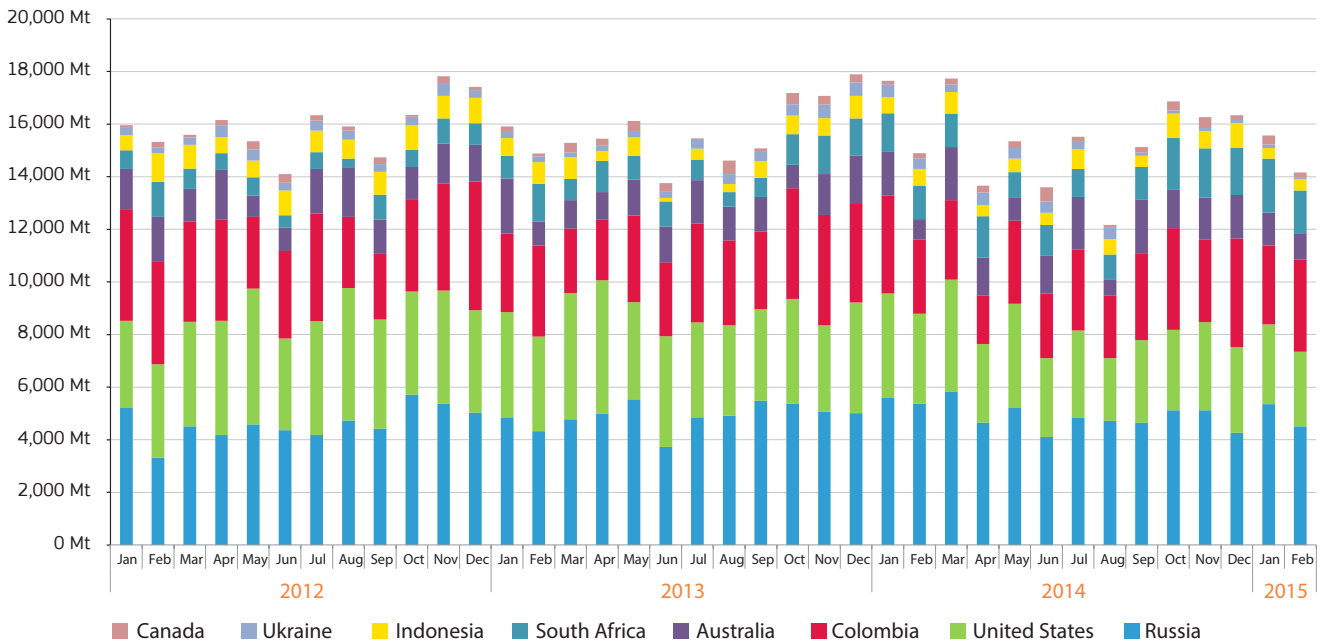
Coal CIF ARA: Principal coal import price benchmark in North Western Europe (in €/Mt)

DE border imp. stands for long term contract based import natural gas price on the German border (in €/MWh)

RES (renewables) includes hydro, wind, solar and biomass; RES share in the total power generation estimation for the EU-28 as a whole (right hand scale)

- In January-February 2015 five countries assured 95% of the EU's hard coal imports, namely Russia (33% of the total imports), Colombia (22%), the United States (20%), South Africa (12%) and Australia (8%), as Figure 4 shows.
- The amount of imported coal in the EU decreased by 8.7% in the first two months of 2015 compared to the same period of the previous year. Imports from the United States, Russia, Australia and Colombia respectively decreased by 21%, 10%, 8% and 1%. Only imports from South Africa increased in this period (by an impressive rate of 34%). Imports from Ukraine, being almost insignificant even in 2014, dropped by three quarters, in the consequence of ongoing political tensions hindering exports from coal producing regions in the country.

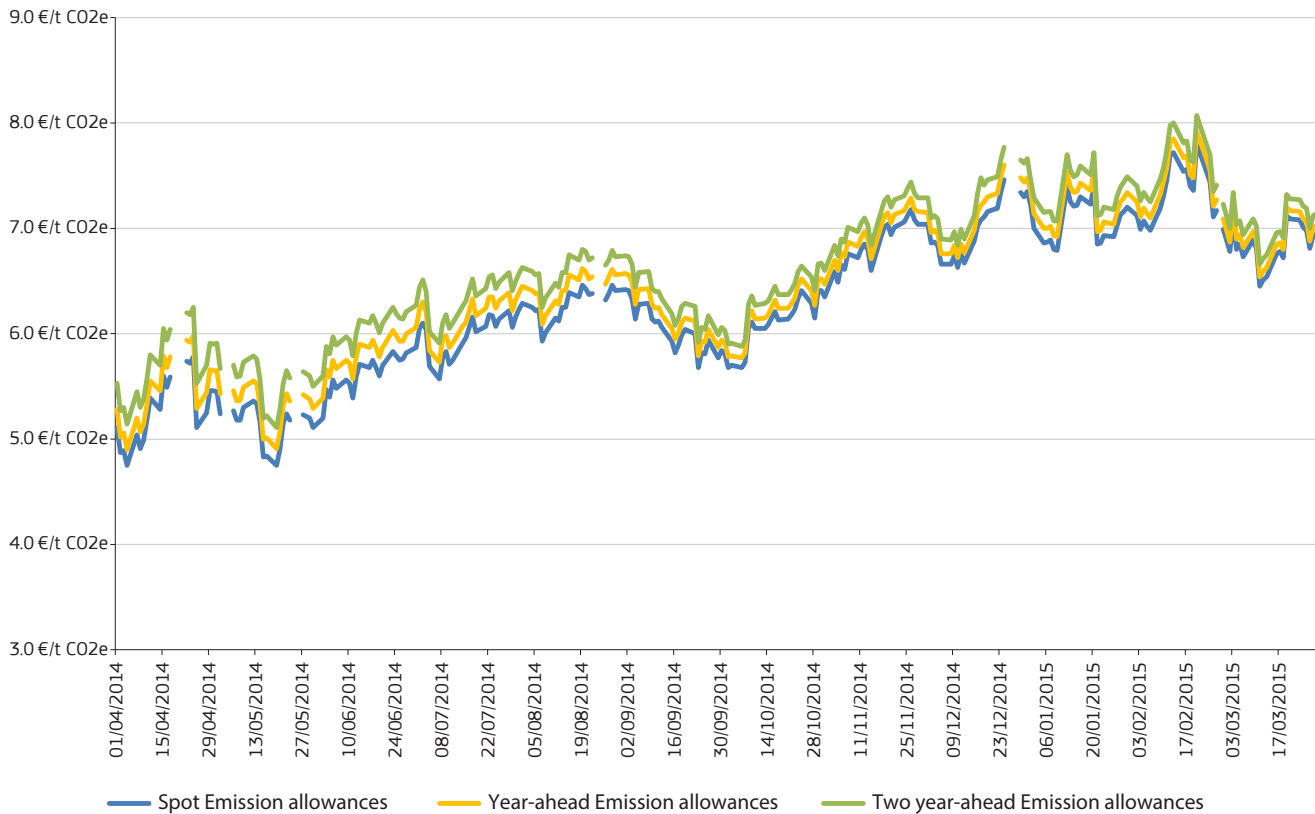
FIGURE 4 - EXTRA-EU STEAM COAL IMPORT SOURCES AND MONTHLY IMPORTED QUANTITIES IN THE EU-28



Source: Eurostat, COMEXT database

European emission allowance prices followed an upward trend in the twelve-month period presented on Figure 5. Policy developments on tackling the market oversupply by withdrawing a given amount of emission allowances from the market had an upward impact on carbon prices, however, decreasing greenhouse gas emissions, improving energy efficiency of the economy and increasing share of renewables in the EU limited the demand for emission allowances.

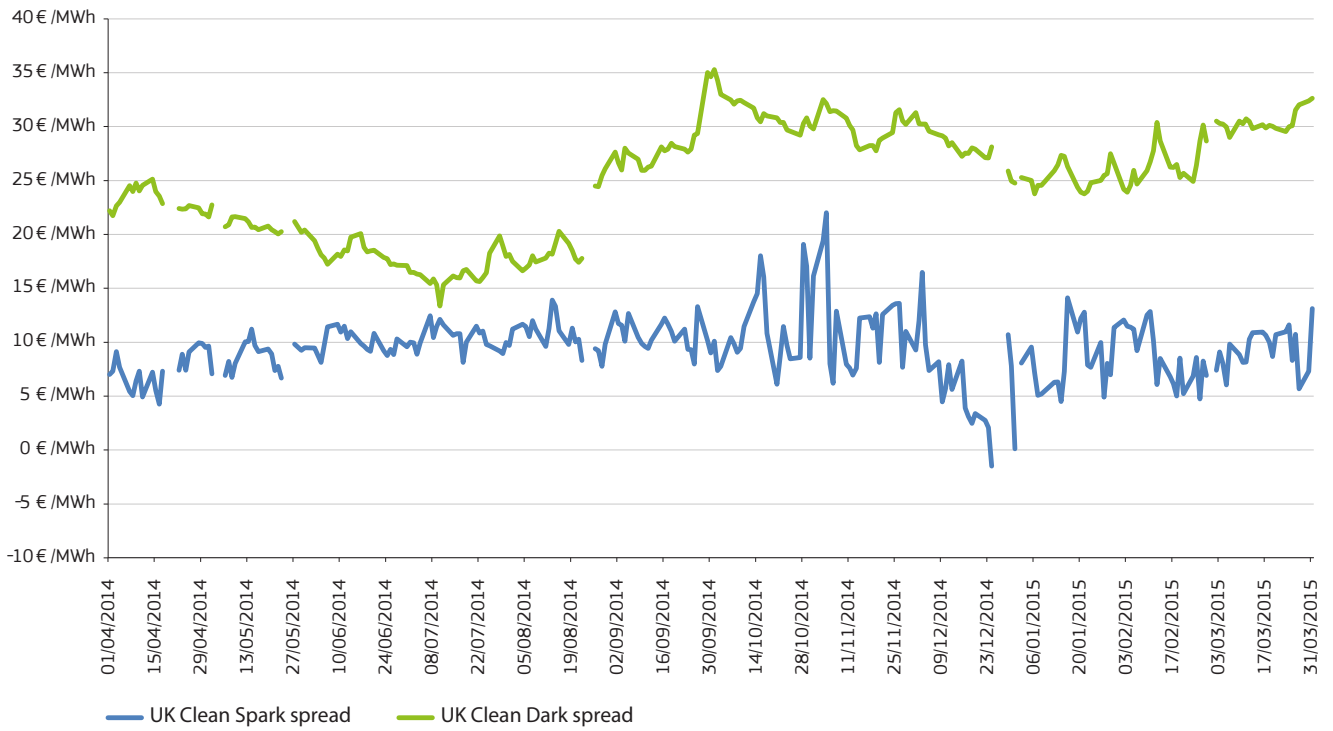
FIGURE 5 – EVOLUTION OF ETS EMISSION ALLOWANCE PRICES



Source: Platts

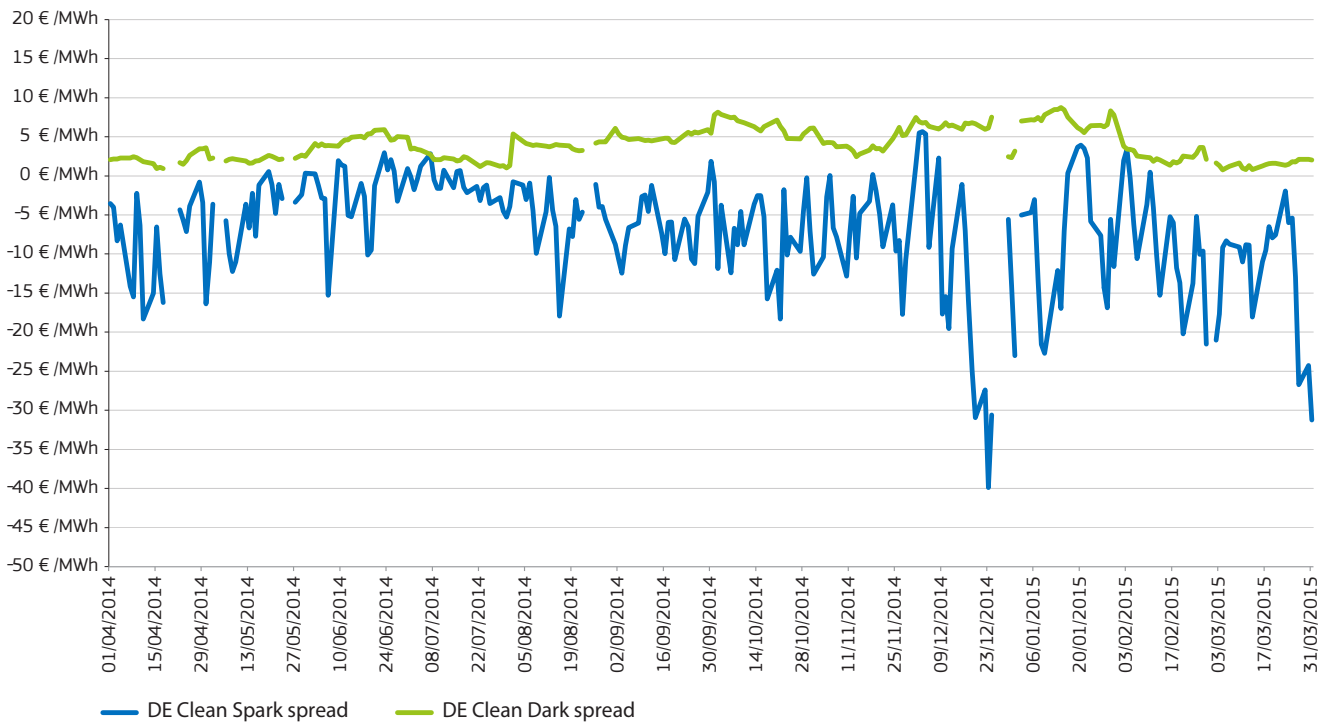
- As Figure 6 and Figure 7 show, clean spark spreads, measuring the profitability of gas-fired power generation, remained positive in the United Kingdom, and fluctuated in a range of 5-15 €/MWh in most of the first quarter of 2015. In Germany there could hardly be found any trading day in Q1 2015 when the clean spark spread was above zero, pointing to the highly unprofitable nature of gas-fired generation.
- Clean dark spreads, measuring the profitability of coal-fired generation, followed an increasing trend in the range of 25-35 €/MWh in the UK in the first quarter of 2015, implying a significant profitability of coal-fired power generation. In contrast, the profitability of coal-fired generation in Germany fell to almost zero by the end of Q1 2015, due to decreasing wholesale electricity prices and slightly rebounding coal prices from the lows measured in January 2015.

FIGURE 6 – EVOLUTION OF CLEAN DARK AND CLEAN SPARK SPREADS IN THE UK



Source: Platts

FIGURE 7 – EVOLUTION OF CLEAN DARK AND CLEAN SPARK SPREADS IN GERMANY

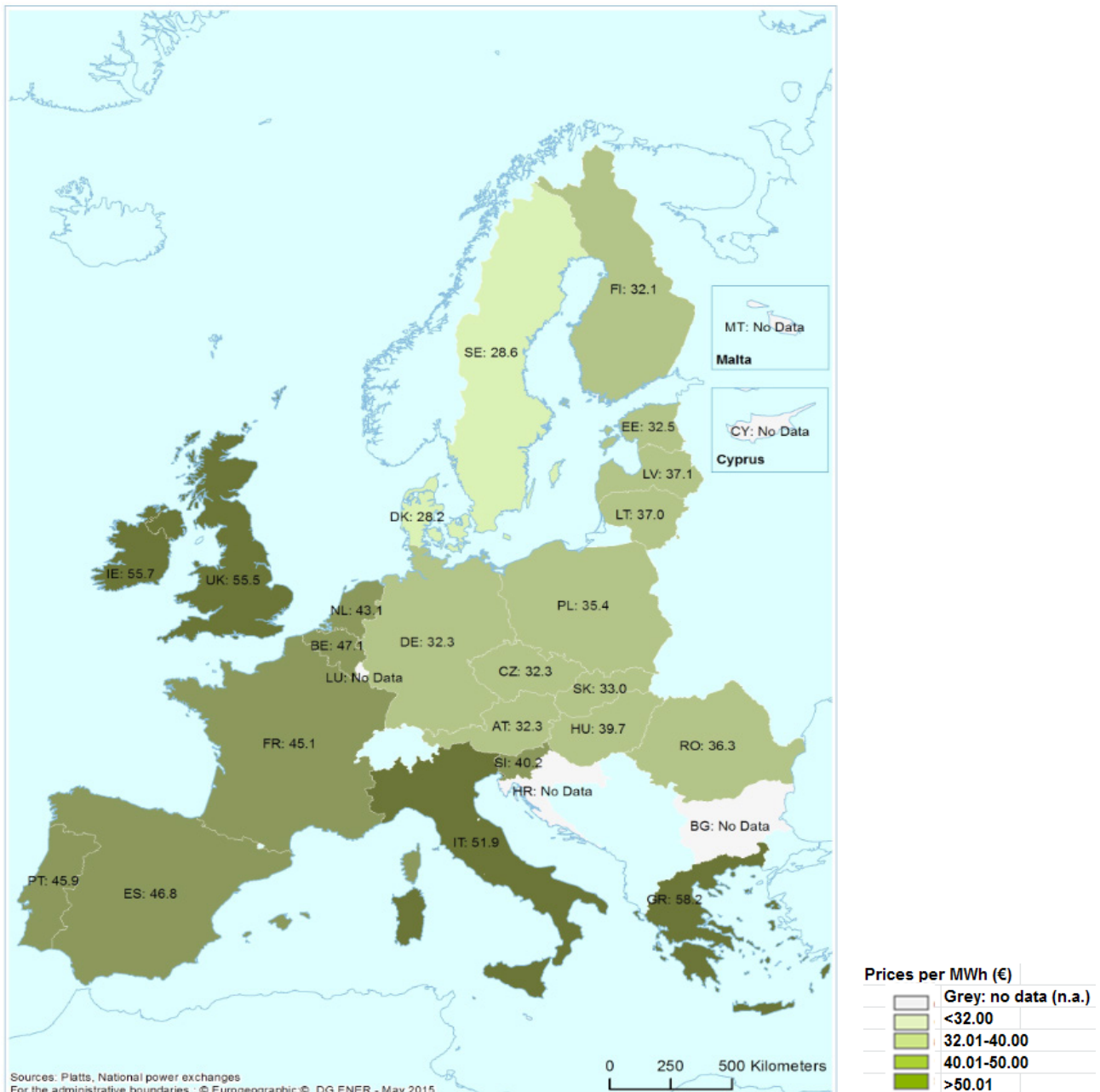


Source: Platts

2.2 Comparisons of monthly electricity baseload prices on electricity markets

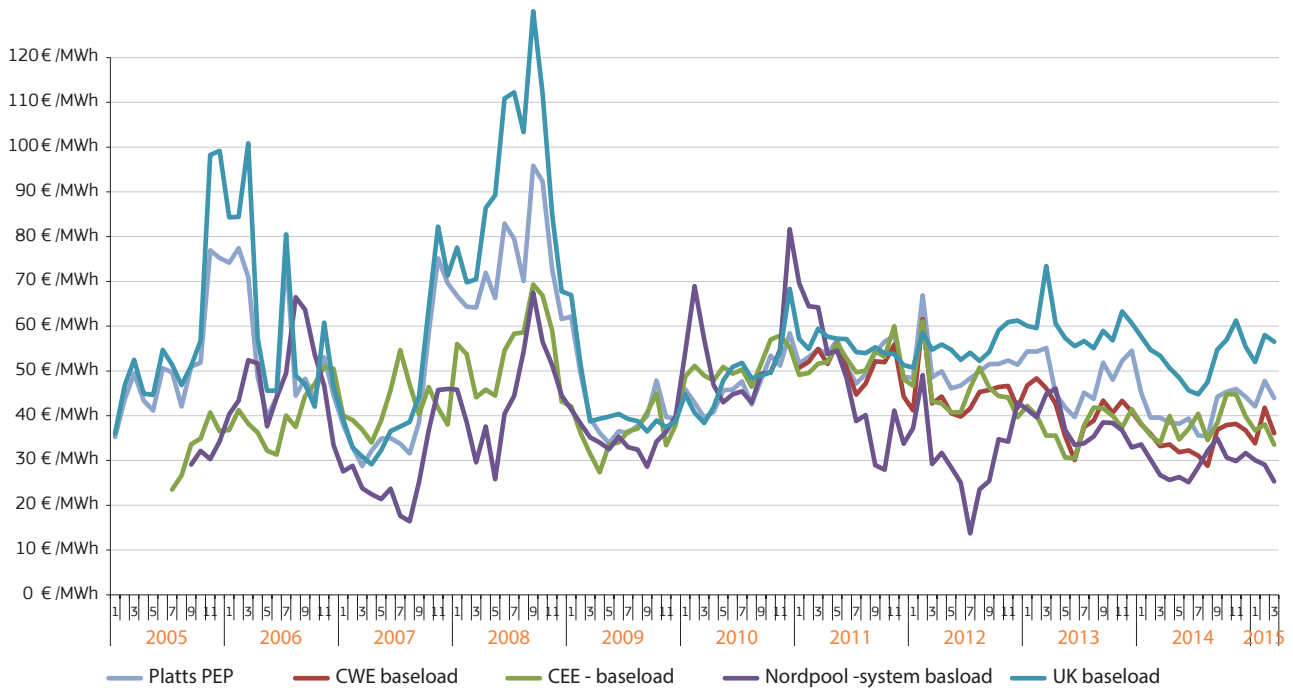
- As the next map (Figure 8) shows, there were significant price differences in the wholesale electricity prices across the EU in the first quarter of 2015, ranging from 28-29 €/MWh in Denmark and Sweden to 58 €/MWh in Greece. Compared to the fourth quarter of 2014 wholesale electricity prices decreased significantly in Poland and in the Baltic States, while they went up by more than 10% in France. Compared to the first quarter of 2014 the average wholesale price level in Q1 2015 showed a double digit per cent decrease in Ireland, Latvia, Lithuania and Poland, while it increased significantly from very low levels in Spain and Portugal.
- Local market prices may significantly differ from each other even in a coupled region, as the Central Western Europe (CWE) region gave a good example for this in Q1 2015. Due to high wind power generation in Germany local prices were lower than in France, Belgium and the Netherlands, where local particularities of the fuel mixes (the availability of nuclear generation and gas-fired plants) significantly impacted the wholesale prices. Besides domestic generation mixes, sufficient level of inter-connection capacities also exerted significant influence on the local price level.

FIGURE 8 – COMPARISON OF AVERAGE WHOLESALE BASELOAD ELECTRICITY PRICES, FIRST QUARTER OF 2015



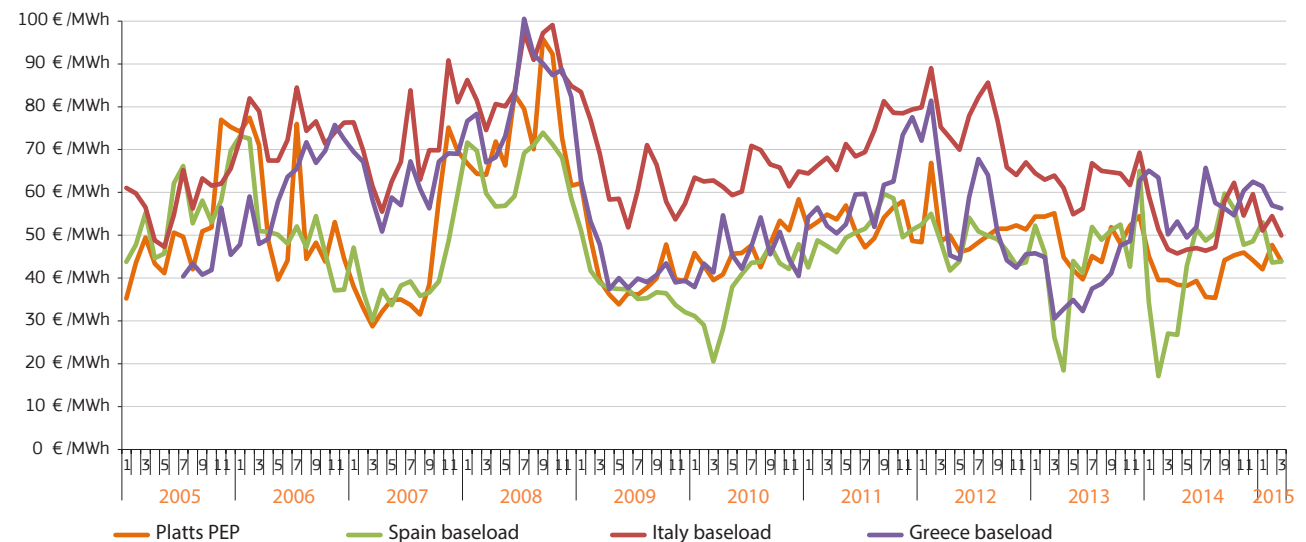
- Figure 9 and Figure 10 show the evolution of the monthly average baseload wholesale electricity prices in the main power regions of the EU; in parallel with the Platts European Power Index (PEP) since January 2005. As Figure 9 shows, the average monthly wholesale electricity price in the Central Western and Central Eastern European regions were by most of the time closely aligned with the PEP benchmark, while the Nordic market and UK prices were more volatile, the former being affected by hydro availability in the Nordic region, while the latter primarily by the volatility of natural gas prices.
- Price premium of the Italian market to the PEP benchmark index was decreasing during the last few years, as costly fossil fuel generation has been partly replaced by renewables in the country's power mix. However, as the country heavily relies on power imports, the wholesale electricity price is among the highest in the EU. The Spanish market is substantially influenced by domestic hydro availability and the permanent bottlenecks in the interconnection with France, while in Greece the high share of fossil fuels and reliance on power imports make the domestic wholesale electricity price higher than the PEP. However, increasing share of renewable power generation (mainly wind and solar) in many European markets can significantly change the picture by changing the power mix that affects generation costs and wholesale prices.

FIGURE 9 – COMPARISONS OF THE PLATTS PEP AND MONTHLY ELECTRICITY BASELOAD PRICES IN REGIONAL ELECTRICITY MARKETS (CWE, CEE, NORDPOOL AND THE UK)



Source: Platts, European power exchanges

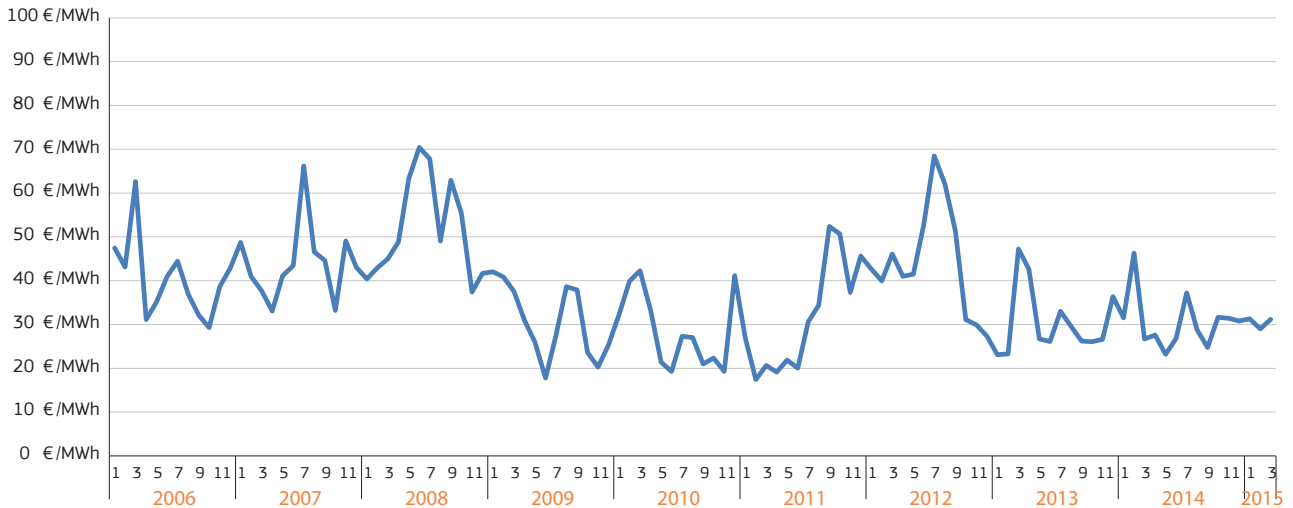
FIGURE 10 – COMPARISONS OF THE PLATTS PEP AND MONTHLY ELECTRICITY BASELOAD PRICES IN REGIONAL ELECTRICITY MARKETS (SPAIN, ITALY AND GREECE)



Source: Platts, European power exchanges

- As it can be followed on Figure 11, wholesale electricity prices showed signs of convergence during the last few years, as the difference between the cheapest and most expensive wholesale electricity market decreased in the EU. However, differences between the price levels still exist and temporary price divergences may occur in the future, in the consequence of sudden shifts in local power demand and supply conditions, owing to changes in electricity mixes in different markets or availability of infrastructure and interconnection capacities.

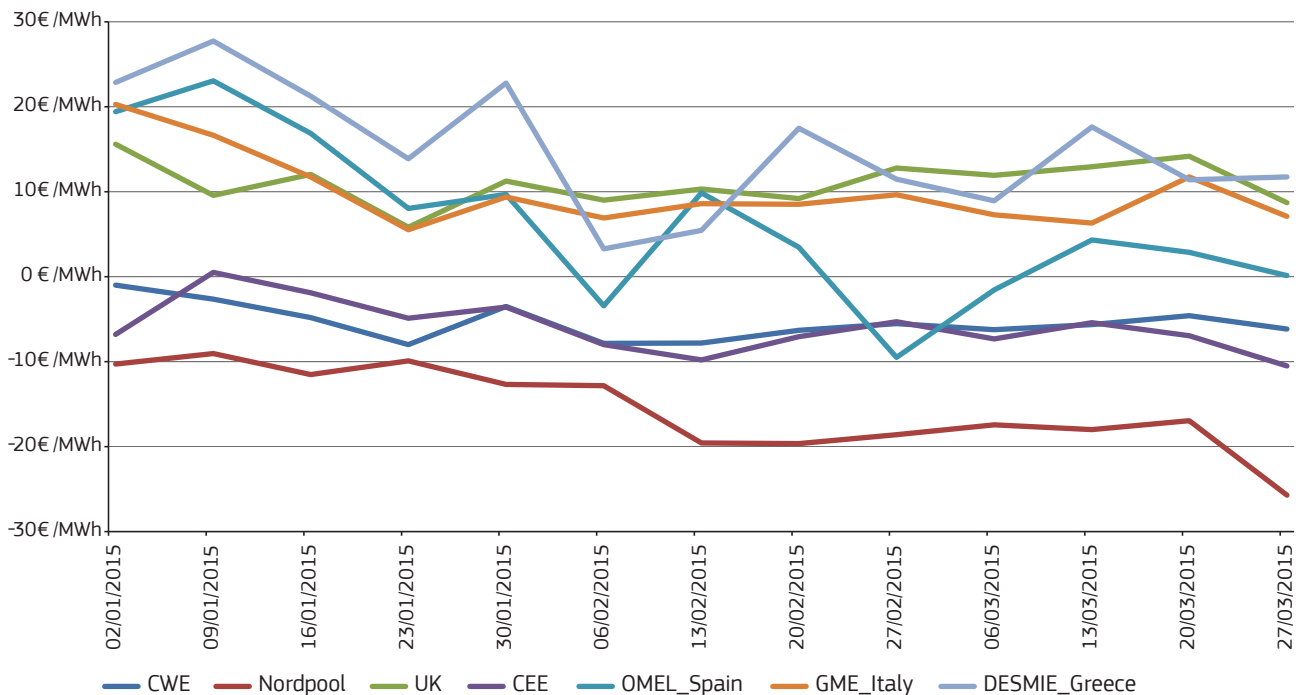
FIGURE 11 – DIFFERENCE BETWEEN THE HIGHEST AND THE LOWEST REGIONAL WHOLESALE ELECTRICITY PRICE



Source: European power exchanges, own computations

- As Figure 12 shows, in the first quarter of 2015 weekly average wholesale electricity prices had a premium to the PEP index in Greece, the UK and in Italy, however, the differential to the PEP benchmark decreased by the end of the quarter. In the Central Western and Central Eastern European regions the wholesale electricity price was generally lower in Q1 2015 than the PEP index. In the Nordic markets the price discount to the PEP became greater throughout the quarter, due to improving hydro availability in the region.

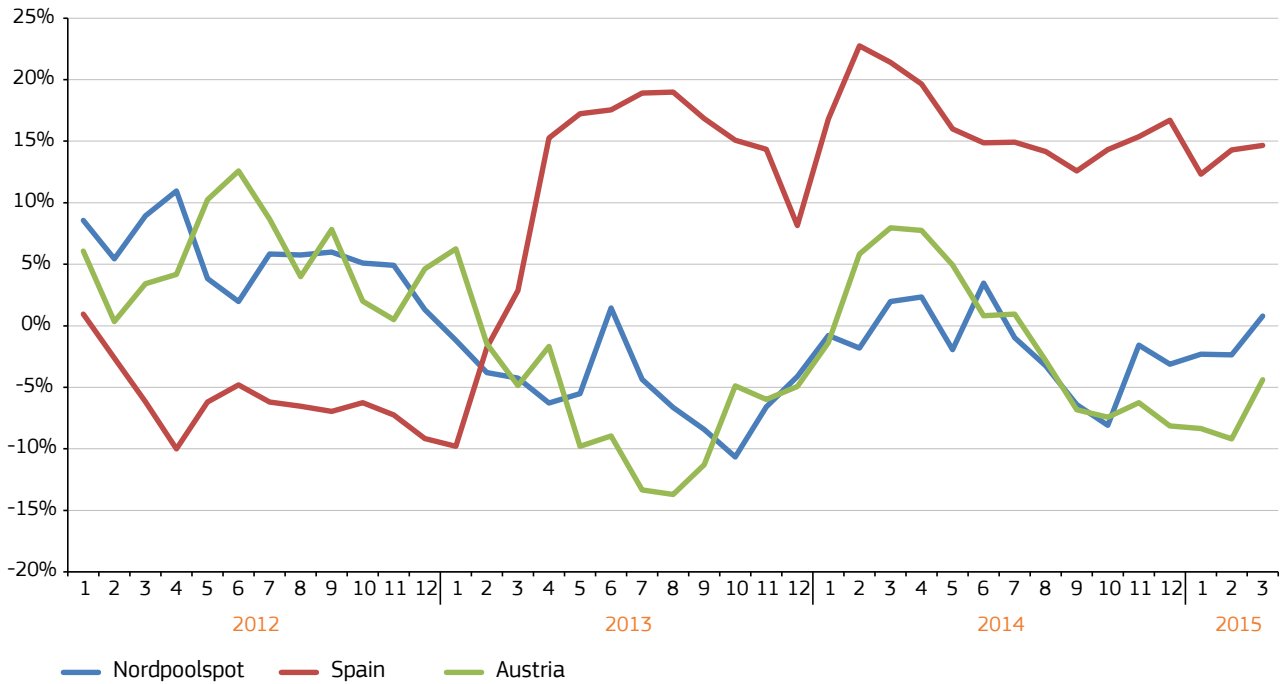
FIGURE 12 – DIFFERENCE BETWEEN THE PEP INDEX AND THE WEEKLY REGIONAL WHOLESALE ELECTRICITY PRICES



Source: Platts, European power exchanges, own computations

- Figure 13 shows the deviation of actual hydro reserve levels from the local long term seasonal averages. In Spain the level of hydro reserves were still well above the long term average in Q1 2015. In Austria hydro reserves were increasing and got closer to the seasonal average by the end of the quarter. In the Nordic market hydro reserves were also increasing and reached the seasonal long term average by the end of Q1 2015, for the first time since Q2 2014.

FIGURE 13 – DEVIATION OF HYDRO RESERVE LEVELS FROM THE LONG TERM LOCAL TREND IN THE NORDPOOL AREA, SPAIN AND AUSTRIA (IN PERCENTAGE POINTS)



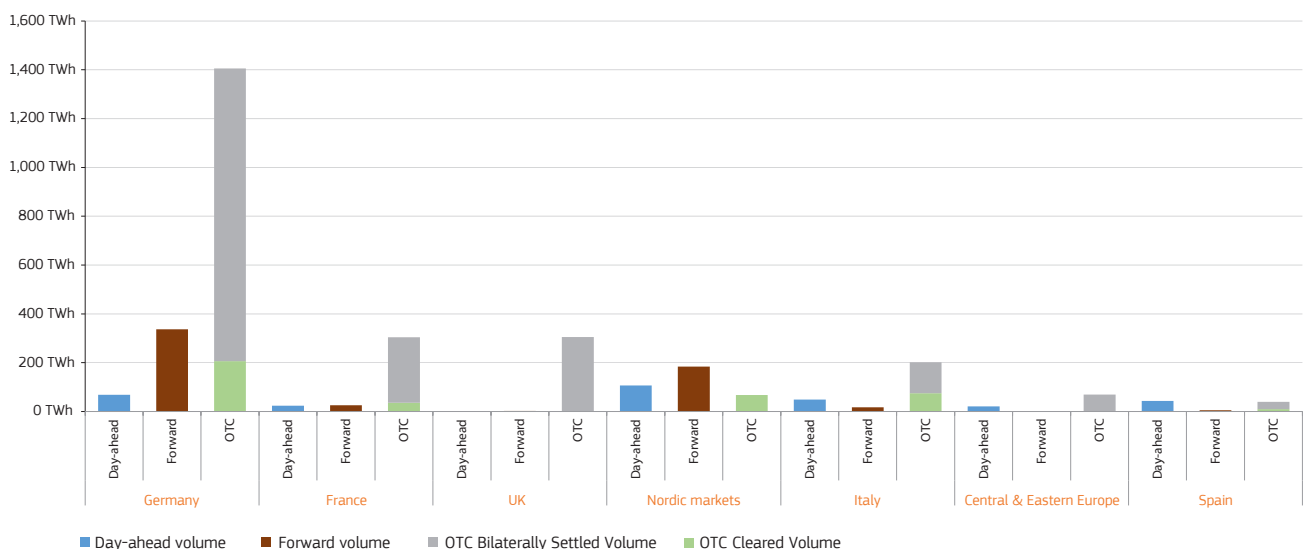
Source: Nordpool, OMEL, E-Control

3. Traded volumes and cross border trade of electricity

3.1 Comparison of wholesale market trading platforms and the over-the-counter (OTC) markets

- In Chapter 4 of this report on regional wholesale electricity markets detailed analysis has been provided on the day-ahead wholesale prices and traded volumes. However, for the full analysis of the wholesale electricity trade it is indispensable to look at the whole forward curve and the traded volumes on the so-called over-the-counter (OTC) markets, providing information on bilateral trade contracts as well.
- As Figure 14 shows, volumes of the day-ahead contracts cover only a minor part of the whole trade in many wholesale electricity markets in Europe. Both in Germany and the Nordic markets the volume of forward contracts was higher than the day-ahead traded volumes in the first quarter of 2015. In almost all markets the volume of the OTC trade was by several magnitudes higher than the trade carried out on the organised trading platforms.
- In order to assess the liquidity of different wholesale electricity markets it is therefore essential to take into account the whole dimension of power trading. In the last few years in Germany and the Nordic markets the so-called churn rate, showing the ratio of all traded volume of power and the electricity consumed in a given period, was particularly high, implying that total volume of traded power exceeded the annual electricity consumption by a factor of 5 to 7. The amount of traded power also exceeded the annual electricity consumption in the UK. In the other markets presented on the chart below the role of the OTC market was of lesser importance.

FIGURE 14 – COMPARISON OF ELECTRICITY TRADED VOLUMES IN SOME IMPORTANT DAY-AHEAD, FORWARD AND OTC MARKETS, FIRST QUARTER OF 2015

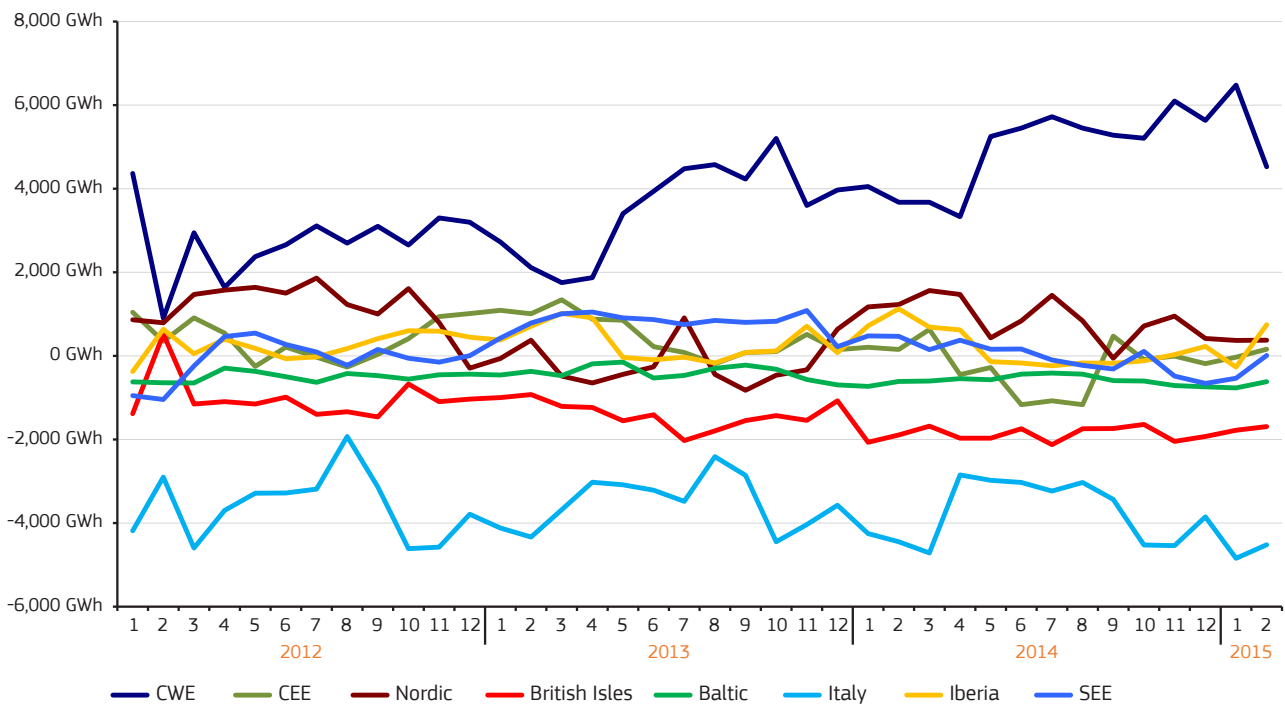


Source: Platts, wholesale power markets, Trayport and London Energy Brokers Association (LEBA)

3.2 Cross border trade of electricity

- As Figure 15 shows, the Central Western Europe (CWE) power region continued to be the most significant net electricity exporter among the European power areas, mainly exporting its power surplus to Italy, United Kingdom and to the Iberian-peninsula.
- The Central Eastern Europe (CEE) region, which used to be net power exporter for a long time, was in an equilibrium position regarding the electricity inflows and outflows. The region could mainly import from the CWE region and could export to South Eastern Europe.
- The British Isles and Italy were still in a strong net importer position, importing their electricity need from countries in the CWE region. The Nordic region was still net electricity exporter, though as price differential with CWE region was less significant than in earlier periods; the Nordic net power flow position was close to zero. The Baltic region was still in a slight net importer position in Q1 2015, importing its power need from the Nordic markets and from Russia and Belarus.
- Figure 16 shows the map of commercial power flows between neighbouring markets in most of the countries of the European continent, providing information on cross-border power flows and the net electricity exporter or importer position of each country in December 2014 - February of 2015.
- Preliminary calculations on regional flows against price differentials (R-FAPDs) for 2014 as a whole show that within the Central West European region there were a number of adverse flows on the Swiss border (with France and Germany), while adverse flows also existed between the countries of the CWE region and Italy.

FIGURE 15 – EU CROSS BORDER MONTHLY PHYSICAL FLOWS BY REGION



Source: ENTSO-E

European countries are grouped in the following regions:

Central Western Europe DE, NL, FR, LU, BE, AT, CH

Central Eastern Europe PL, CZ, HU, SK, HR, SI

Iberian-Peninsula ES, PT

South Eastern Europe RO, BG, GR, RS, BA, ME, FYROM, AL

Nordic

British Isles

Apennine Peninsula

Baltic

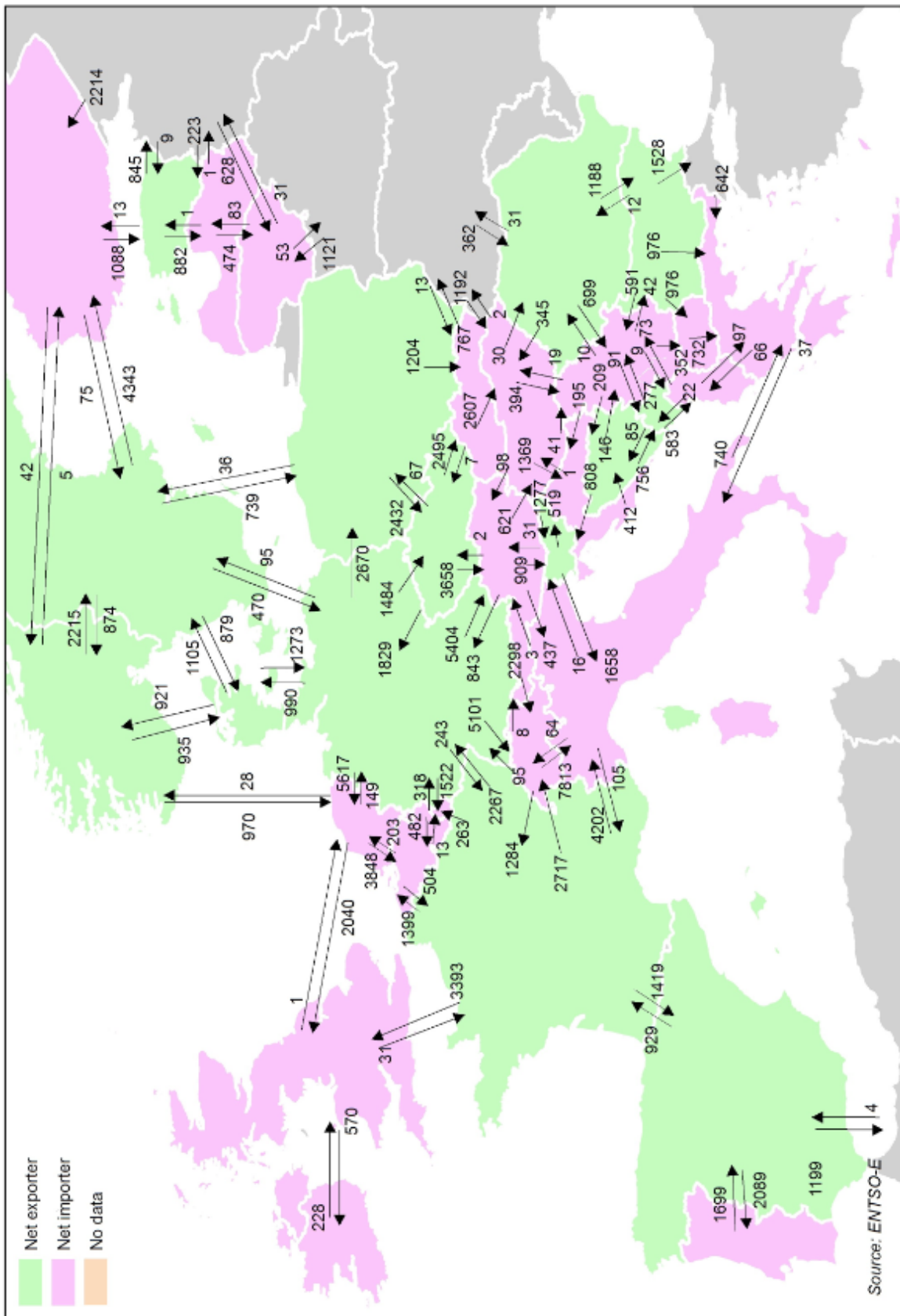
SE, FI, DK, NO

UK, IE

IT

EE, LT, LV

FIGURE 16 – COMMERCIAL ELECTRICITY FLOWS IN GWH IN DECEMBER 2014 – FEBRUARY 2015 (FINAL SCHEDULE)



Data for some countries are not available (see the legend). Due to presentation constraints the Northern European countries and Cyprus cannot be included on the map completely. There is no data available on Kosovo under UNSCR 12/4499. Data on flows between Germany and Austria are estimates. For the majority of the reported borders, commercial flow data is netted on hourly frequency. In the case of the Czech-Slovak border, gross commercial values are given.

4. Regional wholesale electricity markets

4.1 Central Western Europe (Austria, Belgium, France, Germany, the Netherlands, Switzerland)

- As Figure 17 shows, the monthly average baseload day-ahead power price in the CWE region fluctuated in a narrow range in the first quarter of 2015. With the exception of February, when the monthly average baseload price rose to 42 €/MWh and the monthly peakload reached 47 €/MWh, the monthly average baseload varied between 33 €/MWh and 36 €/MWh, while the monthly peakload was around 39-40 €/MWh in Q1 2015.
- On the demand side of the wholesale electricity market weather conditions, being milder than the seasonal average, limited heating-related demand for electricity, in spite of some short-lived cold spells in the quarter. On the supply side mainly two major factors affected the market: the variation in wind and solar based power generation, especially in Germany, and nuclear generation in France. However, some other factors, such as natural gas, coal and emission allowance prices also had measurable impact.
- In Germany wind generation reached all-time high in January 2015, assuring 19% of the generation mix in the country, and exceeding by more than 50% the amount of power generated from wind that in January 2014. In the same month in France nuclear power generation rose to a four-year high, and on 19 January 2015 it reached a historic daily peak output of 61.5 GW, with all except one nuclear reactors in operation. As wind power generation in Germany and nuclear generation in France receded in February 2015, wholesale electricity prices started to increase.
- In March 2015 however, wind generation picked up again in Germany, and this, in parallel with low coal prices, helped in lowering wholesale electricity prices in the whole CWE region. Some nuclear plants have already been taken offline in March as the planned maintenance season started. However, in Germany a new coal fired generation plant with 800 MW capacity has become fully operational, contributing to healthy baseload power supply and putting a lid on wholesale electricity prices, despite occasional cold spells.
- In the Netherlands the evolution of natural gas prices fundamentally influenced the wholesale electricity price contracts. As in February Dutch gas hub prices increased due to supply concerns related to the tensions between Russia and Ukraine and to dwindling production in domestic gas fields, wholesale electricity prices started to rise. In March however, as both gas and coal prices receded, wholesale electricity prices also went down.
- In Belgium news on nuclear availability were the key factor behind wholesale electricity price movements. As Figure 18 shows, the Belgian price level was the highest in the region in almost all Q1 2015. In February, prices were up on news on ongoing technical problems (hydrogen flaking in reactor pressure vessels) in the two reactors being permanently offline (Doel-3, Tihange-2). On 24 March the average daily price jumped to € 106/MWh on news on potential maintenance works on a third reactor (Tihange-3).
- On 20 March 2015 a partial solar eclipse, which could be observed in most of North-Western and Central Europe, significantly impacted solar power generation for a period of two hours. Alone in Germany solar power generation capacities dropped by 60% (by 10 GW). This drop in actual generation capacities did not really impact day-ahead hourly prices (as the event was anticipated by market participants). However, the price of the so-called positive and negative capacity activations, (the cost of reserve allocations during the sudden decrease in solar capacities at the beginning of the event and then the sudden increase phase at the end of the eclipse), was ten times higher as on normal trading days. Due to cloudy weather in many countries, the reserve activation rates remained lower than expected and the European power grid did not experience technical problems.

FIGURE 17 – MONTHLY TRADED VOLUMES AND PRICES IN CENTRAL WESTERN EUROPE

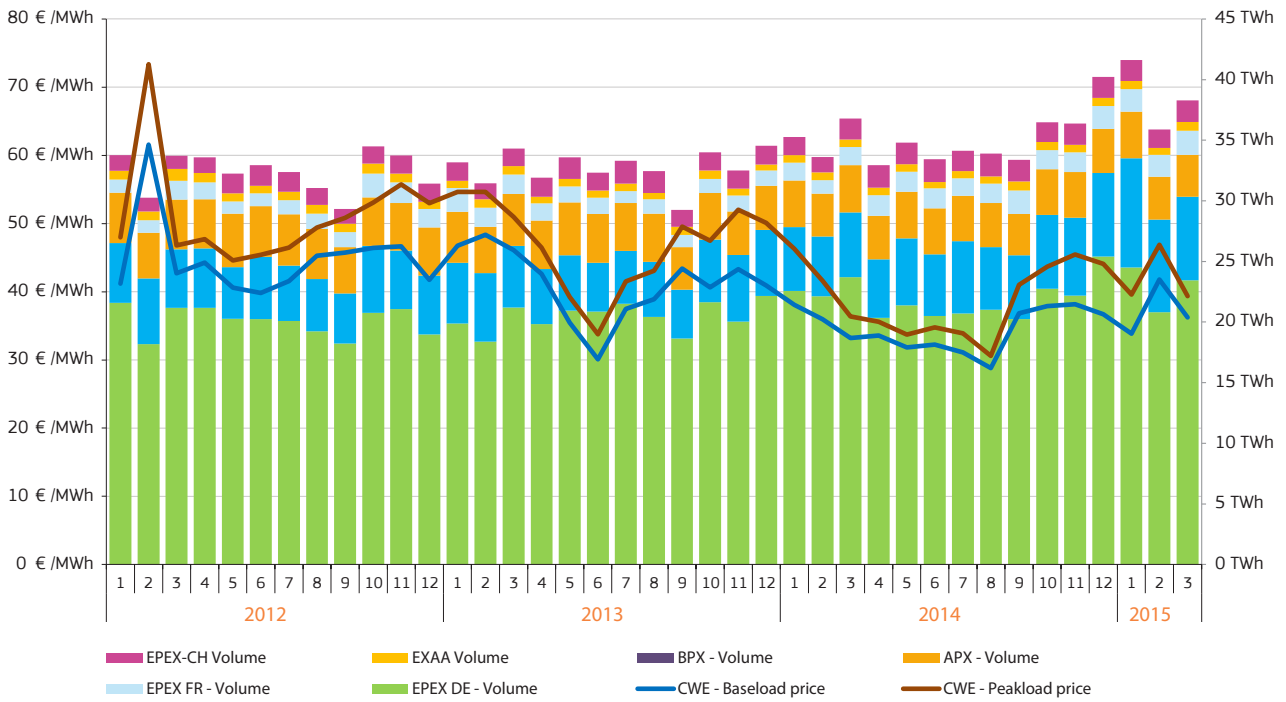
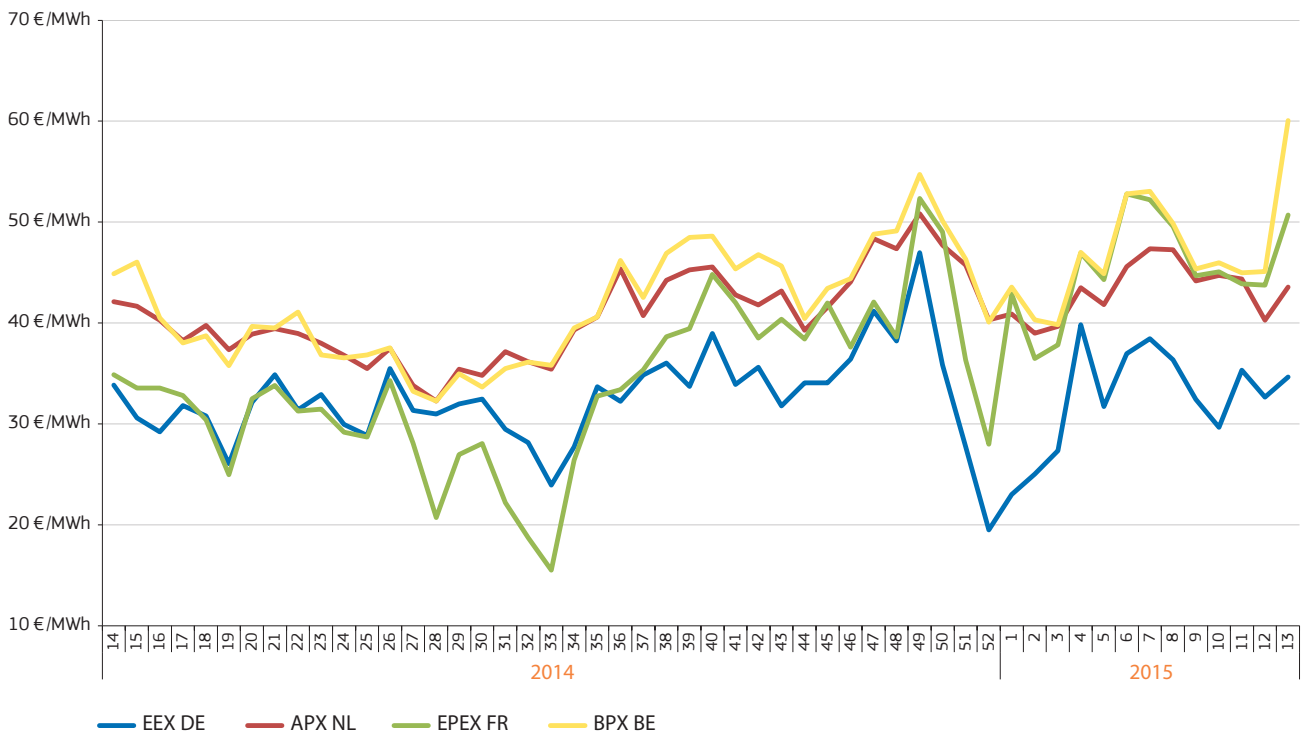


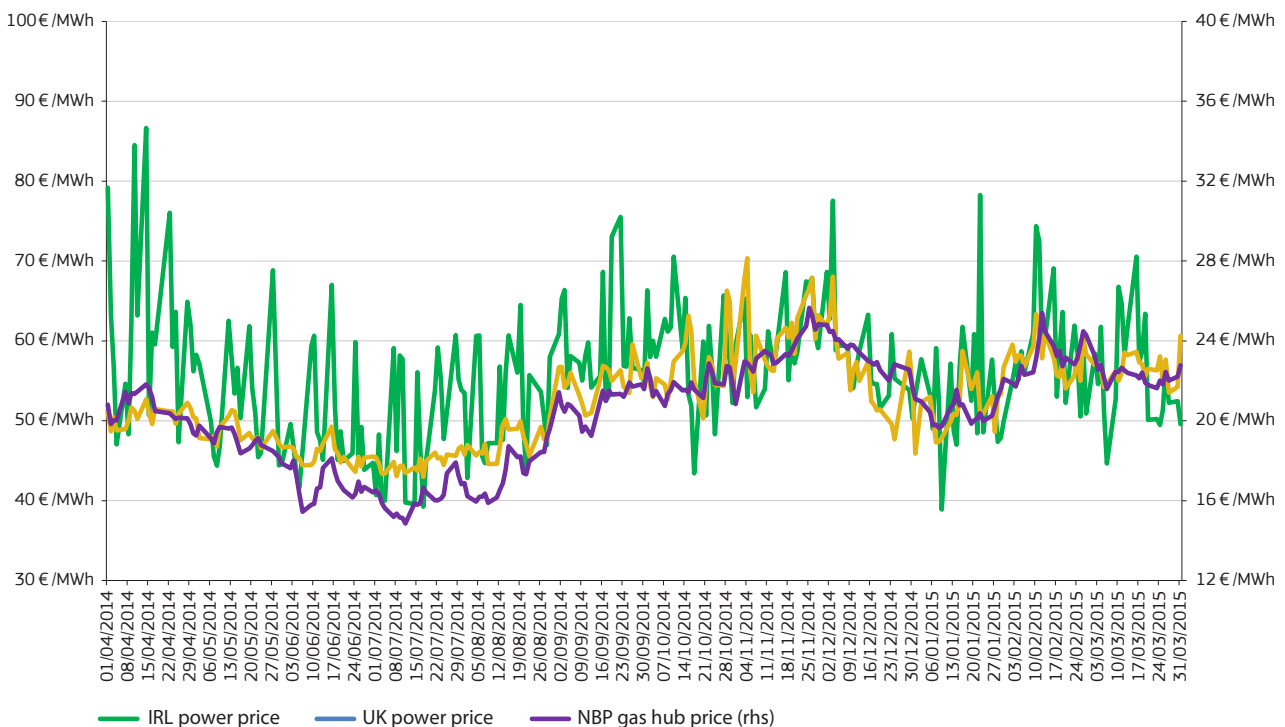
FIGURE 18 – WEEKLY AVERAGE WHOLESALE POWER PRICES IN THE CWE REGION



4.2 British Isles (UK, Ireland)

- As Figure 19 shows, baseload power prices in the UK and Ireland were low at the beginning of 2015, due to competitive gas prices on the NBP hub, abundant wind power generation in the consequence of windy weather and relatively mild temperatures compared to seasonal averages. In January 2015 the average wholesale baseload power price was € 52-53/MWh in the UK and Ireland, rising to 58 €/MWh in February and slightly falling back to 55-56 €/MWh in March.
- Wind power generation has become increasingly important in both the UK and Ireland. In both countries the contribution of wind to power generation reached record highs in January 2015 (9% and 32%, respectively). However, as Figure 19 shows, natural gas still remained the main generation cost setting fuel in both countries. As in February 2015 wind power generation receded from record highs measured in January, costlier gas fired generation stepped in and this resulted in higher electricity prices.
- Coal-fired generation remained highly profitable during the whole Q1 2015 in the UK. Gas-fired generation was also profitable, contrarily to many markets in the continental Europe. This was mainly due to higher wholesale electricity prices in the UK than in most of Central and Northern European markets. Increasing share of renewables raise a challenge for conventional fossil fuel based power generation, as lower wholesale electricity market prices will erode their profitability.
- Although day-ahead baseload contracts showed a decreasing price trend in March 2015, the increase in carbon tax in the UK (from 9.55 GBP/Mt to 18.08 GBP/Mt as of 1 April 2015) has already filtered in the pricing of near-term UK forward price contracts. The carbon tax has to be paid on the top of EU Emission Trading System (ETS) carbon allowances.
- Wholesale electricity prices in the Irish market remained closely aligned to their UK peers, as due to increasing domestic wind generation in Ireland the country had to less intensively rely on power imports from the UK, being able to keep domestic electricity prices at lower level.

FIGURE 19 – DAILY AVERAGE POWER PRICES IN THE UK AND IRELAND, IMPACTED BY GAS PRICES

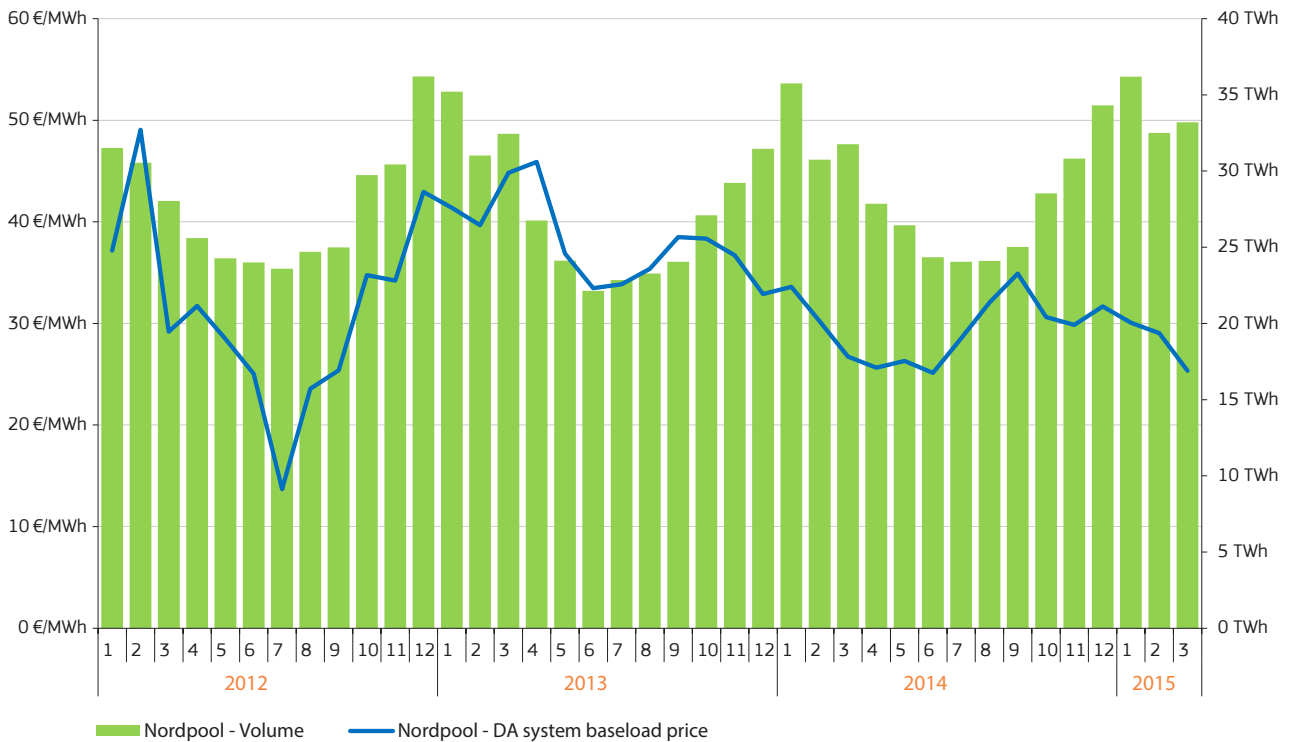


Source: Platts, SEMO

4.3 Northern Europe (Denmark, Estonia, Finland, Latvia, Lithuania, Norway, Sweden)

- The monthly average wholesale system price in the Nordpoolspot market showed a decreasing trend in the first quarter of 2015, as Figure 20 shows. While in December 2014 the regional average baseload wholesale price was 32 €/MWh, in March 2015 it went down to 25 €/MWh, being the lowest since June 2014. Following the seasonal pattern, traded volume of day-ahead power contracts showed an increase compared to the previous quarter in the Nordpoolspot market. However, increasing demand for power did not impacted the generally decreasing wholesale price trend, as generally mild weather over the whole Q1 2015 mitigated heating related electricity demand.
- Hydro levels in the Nordic region were increasing during the first quarter of 2015 and by the end of March they were above the long term seasonal values, providing for a healthy hydro power supply in the whole Nordic region.
- In Sweden and Finland, where nuclear power generation has always played an important role, the increasing share of wind and biomass resulted in decreasing contribution of nuclear sources in the power mixes. In February 2015 the share of wind in Sweden rose to 11% and the share of biomass in Finland rose to 19%, both being the highest since the beginning of the available time series.
- In Q1 2015, similarly to the previous quarters, the cheapest area in the Nordic region was Norway, with an average price of 27.5 €/MWh, though in Denmark and Sweden the price level was nearly the same (28-29 €/MWh on quarterly average). In Finland and in the Baltic States the average price level was higher, due to limited access to cheap import sources from the aforementioned three countries of the region.

FIGURE 20 – MONTHLY TRADED VOLUMES AND PRICES IN NORTHERN EUROPE

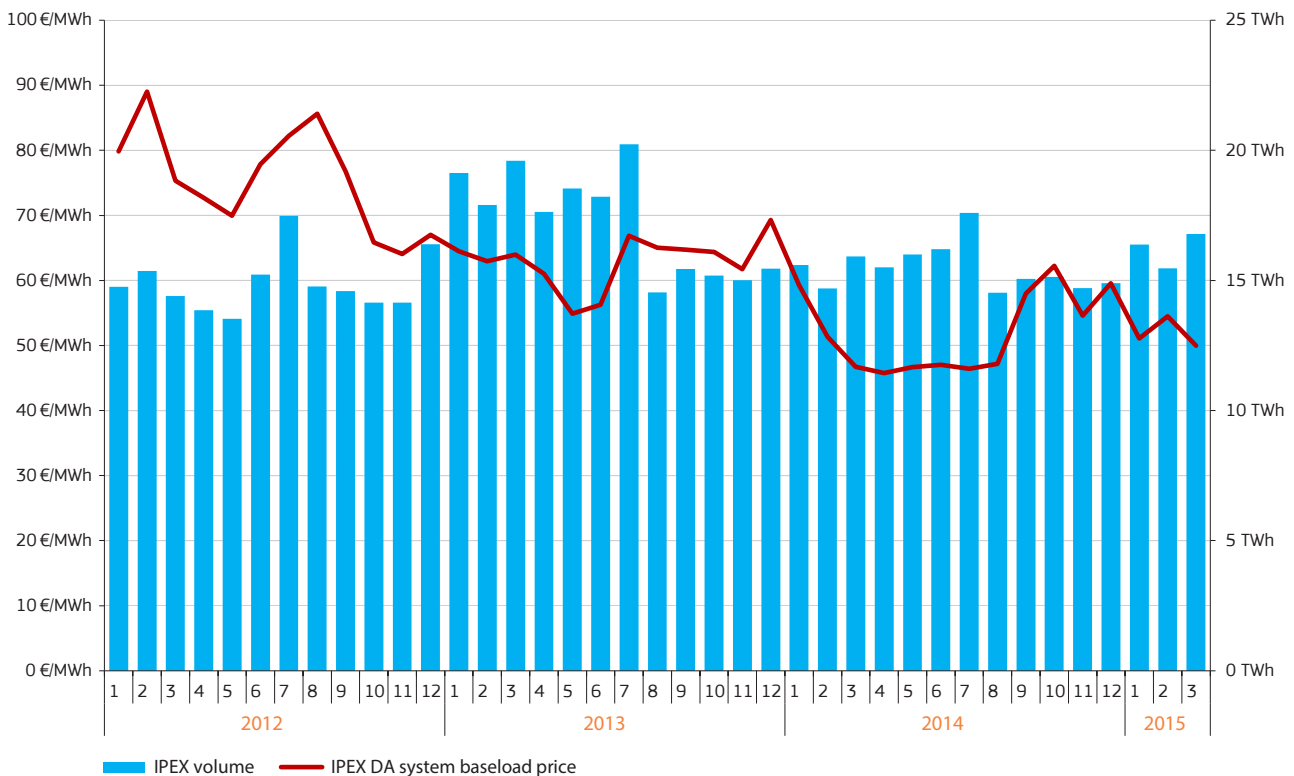


Source: Nordpool spot market

4.4 Apennine Peninsula (Italy)

- Between January and March 2015 the Italian monthly average day-ahead baseload electricity price continued its gradual decrease that began in October 2014, and in March it fell below 50 €/MWh, which was the lowest since August 2014. This decreasing price trend was supported by the subdued demand for power, both from industry and residential consumption.
- The share of renewables (wind, solar and biomass) assured around one fifth of the Italian power generation in the first quarter of 2015, while in March alone their share amounted to 22%, being the highest in the last five years. Although the share of hydro generation showed a decreasing trend in Q1 2015, and natural gas prices on the PSV hub were higher than in December 2014, abundant renewable generation could exert a downward impact on power generation costs and hence wholesale electricity prices in Italy.
- On 24 February 2015 the Italian wholesale electricity market entered in a price coupling mechanism with three of the countries' neighbours, namely France, Austria and Slovenia. However, as the level of physical electricity interconnections continues to be insufficient between Italy and these neighbouring markets, a significant price convergence of Italian day-ahead prices to the regional peers could not be observed and the number flow against price differentials (FAPDs) did not decrease either after the coupling had taken place. This example shows that market coupling does not necessarily lead to price convergence between neighbouring markets, if the physical interconnection is not sufficient.

FIGURE 21 – MONTHLY TRADED VOLUMES AND PRICES IN ITALY

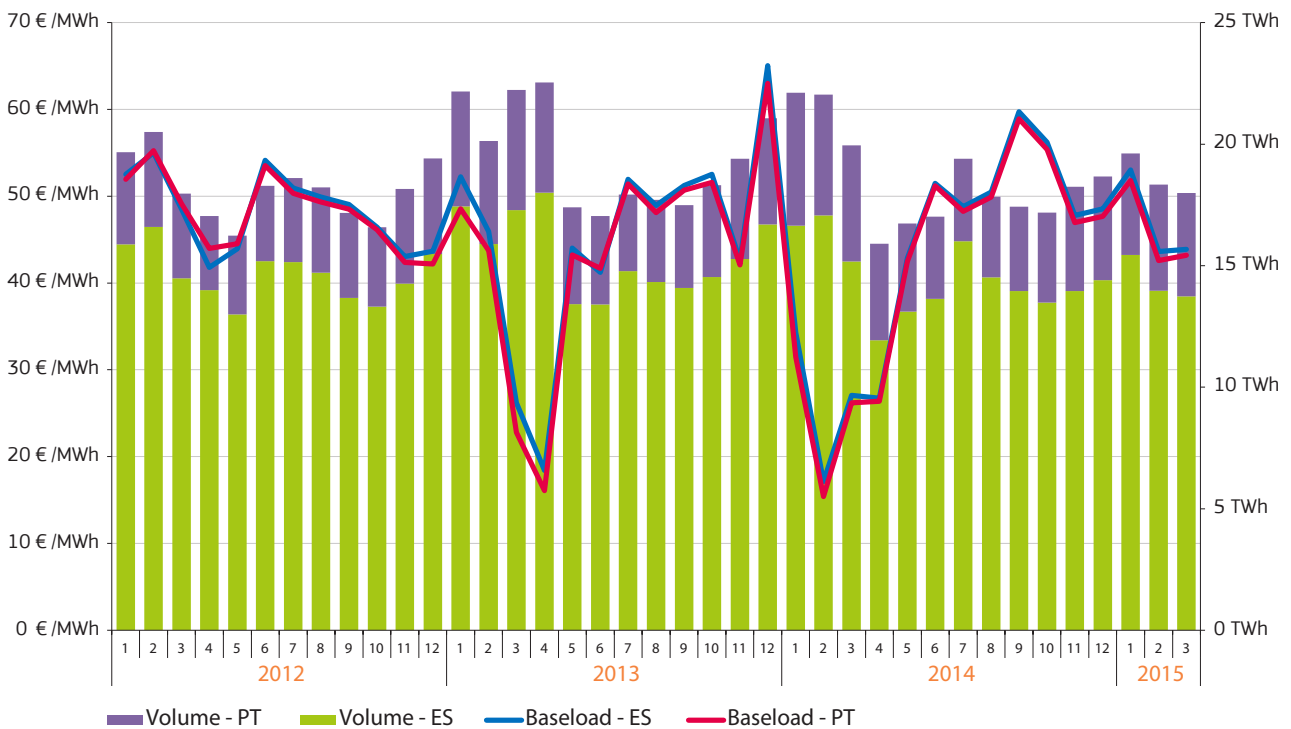


Source: GME (IPEX)

4.5 Iberian Peninsula (Spain and Portugal)

- Spanish and the Portuguese wholesale electricity markets witnessed a gradual decrease in monthly average baseload prices in the first quarter of 2015. While in January 2015 the average price was 53 €/MWh in Spain and 52 €/MWh in Portugal, in March these numbers were 44 €/MWh and 43 €/MWh, respectively, being the lowest since the second quarter of 2014.
- However, the January monthly price was above the December 2014 average in both countries, as the share of hydro and renewable generation sources decreased in the power mix. In February and March 2015, as the share of renewables and hydro started to rebound, wholesale electricity prices began to decrease both in Spain and Portugal.
- On 20 February 2015 a new electricity interconnector has been inaugurated between Spain and France, (between Baixas in southeast France and Santa Llogaia in northeast Spain, with a length of 65 km being the longest subterranean electricity interconnector in the world) increasing the interconnection capacities from 1,400 MW to 2,800 MW. This development is a definitive contribution to the implementation of internal electricity market in the South West European region; however, in spite of increasing interconnection capacity further investments in infrastructure are needed to achieve a full integration of the region to the North West European coupling area¹.
- Although the absolute price differential between France and Spain was less than 1 €/MWh in March 2015 on monthly average, falling to several years' low, which might be related to the reinforced interconnection capacity between the two countries, the impact of the new interconnector can only be fully analysed by looking at the data of the next months.

FIGURE 22 – MONTHLY TRADED VOLUMES AND PRICES IN THE IBERIAN PENINSULA



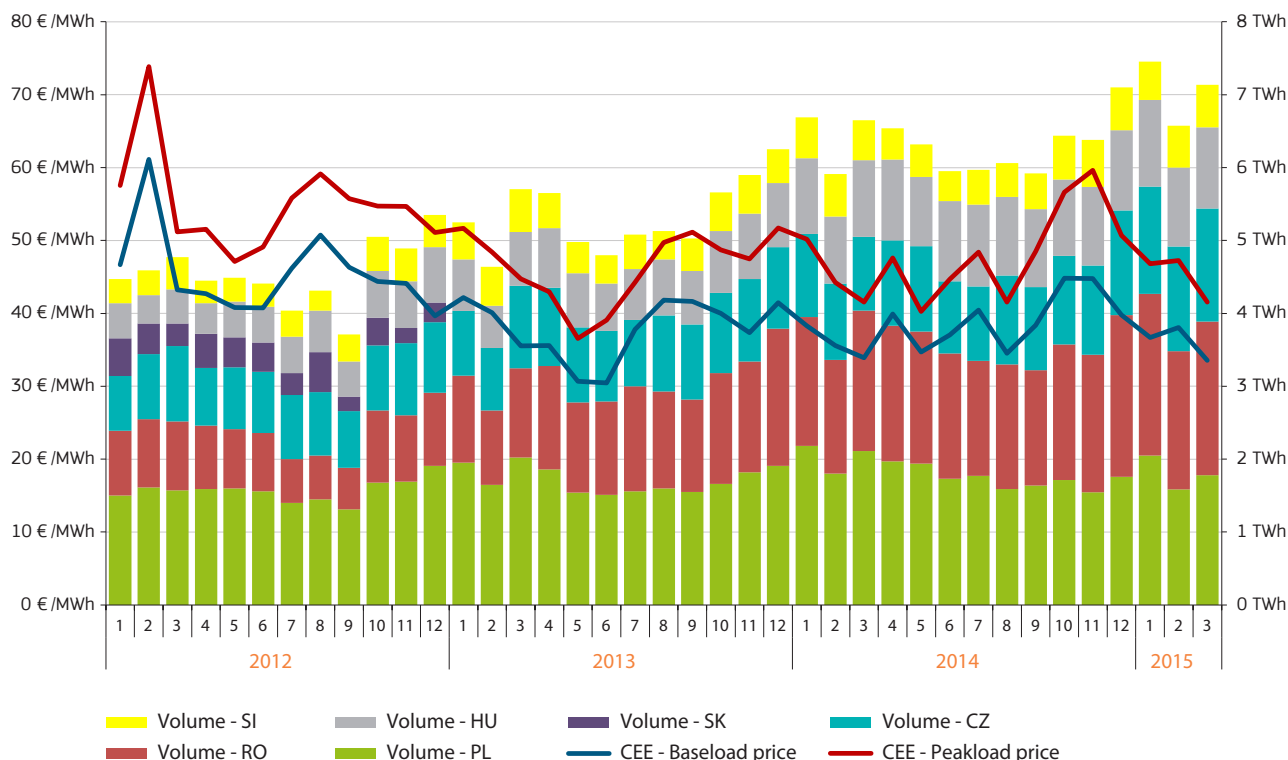
Source: Platts, OMEL

1. A new High Level Group between the European Commission, France, Spain and Portugal has recently been set up in order to drive forward key energy infrastructure projects in South-West Europe such as building missing cross-border links between the Iberian Peninsula and the rest of the EU energy market: <http://ec.europa.eu/energy/en/news/high-level-group-energy-infrastructure-south-west-europe-created>

4.6 Central Eastern Europe (Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia)

- As Figure 23 shows, the combined traded volume of day-ahead baseload power contracts in the CEE region continued to increase at the beginning of the year and reached 7.1 TWh on monthly average in the first quarter of 2015, being 10% higher than in the first quarter of the previous year. The monthly average regional baseload wholesale price continued its downward trend began in October 2014 and in March 2015 it fell to € 33/MWh, being the lowest since June 2013. The monthly average peakload contract fell to twelve-month low of € 42/MWh.

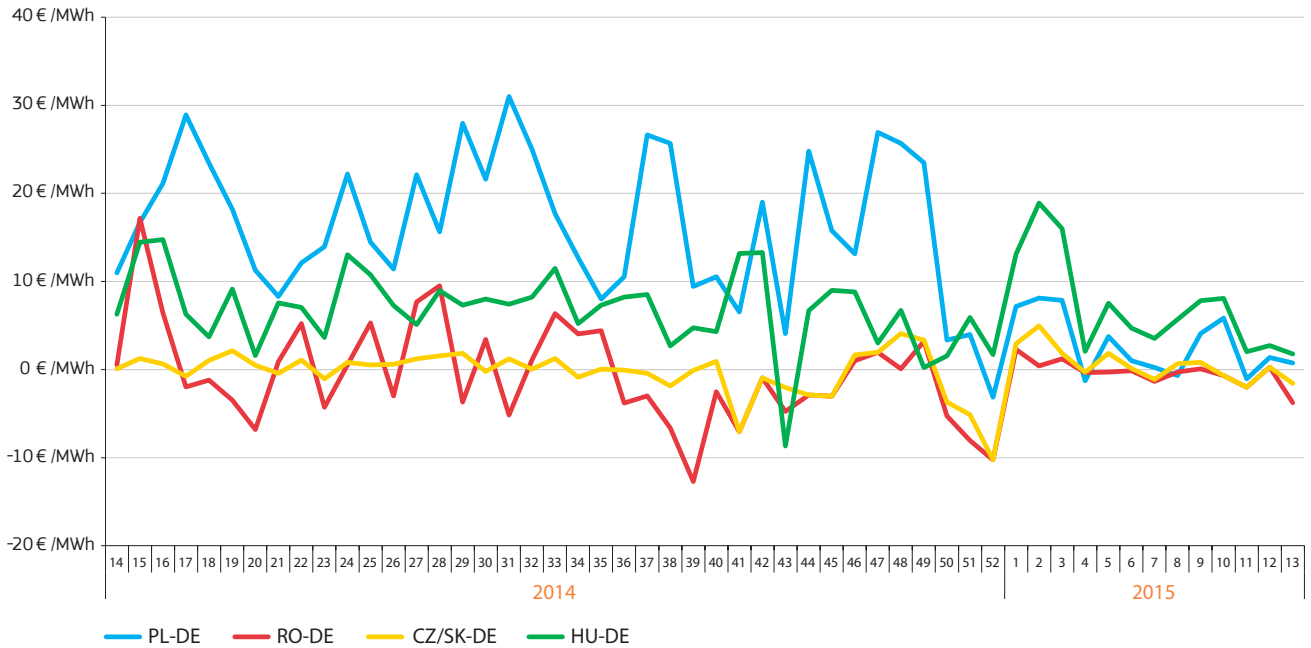
FIGURE 23 – MONTHLY TRADED VOLUMES AND PRICES IN CENTRAL EASTERN EUROPE



Source: Regional power exchanges, Central and Eastern Europe (CEE)

- As Figure 24 shows, wholesale electricity prices in the region started to re-converge to the German peers in the first quarter of 2015, after significant differentials observed in previous two-three quarters. Polish wholesale electricity prices, being one of the most expensive ones in the EU in the second half of 2014, decreased significantly at the turn of 2014/2015, and the price premium to Germany almost completely disappeared by the end of Q1 2015. Wind power generation started to increasingly play a role in Poland (in January-February 2015 its share in the country's power mix rose to record high, 11-12%), contributing to easing supply margins that had put pressure on the balancing market in the previous quarters, resulting in high day-ahead prices.
- In Hungary the price premium to Germany rose significantly in the first two weeks of 2015, in the consequence of cross border capacity curtailments on the Austrian-Hungarian and Slovakian-Hungarian interconnectors. In later periods of Q1 2015 some minor power flow restrictions continued to influence the Hungarian wholesale electricity market, resulting in a price premium of 5-10 €/MWh to Germany during most of Q1 2015. On quarterly average Hungarian and Slovenian day-ahead baseload price contracts were the most expensive ones in regional comparison.
- Czech, Slovak and Romanian wholesale electricity prices were closely aligned with the German peers during most of the time in Q1 2015. Similarly to Poland, the importance of wind power generation is increasing in Romania, reaching a share of 13-16% in Q1 2015. Besides this development the country generated half of its electricity from hydro and nuclear, assuring competitive wholesale prices and a generation surplus that could be exported to Bulgaria, Hungary and Serbia. In the Czech Republic and Slovakia strong generation levels assured cheap source of electricity amid increasing renewable penetration at regional level.

FIGURE 24 – REGIONAL WEEKLY BASELOAD PRICE PREMIUMS OR DISCOUNTS TO THE GERMAN MARKET

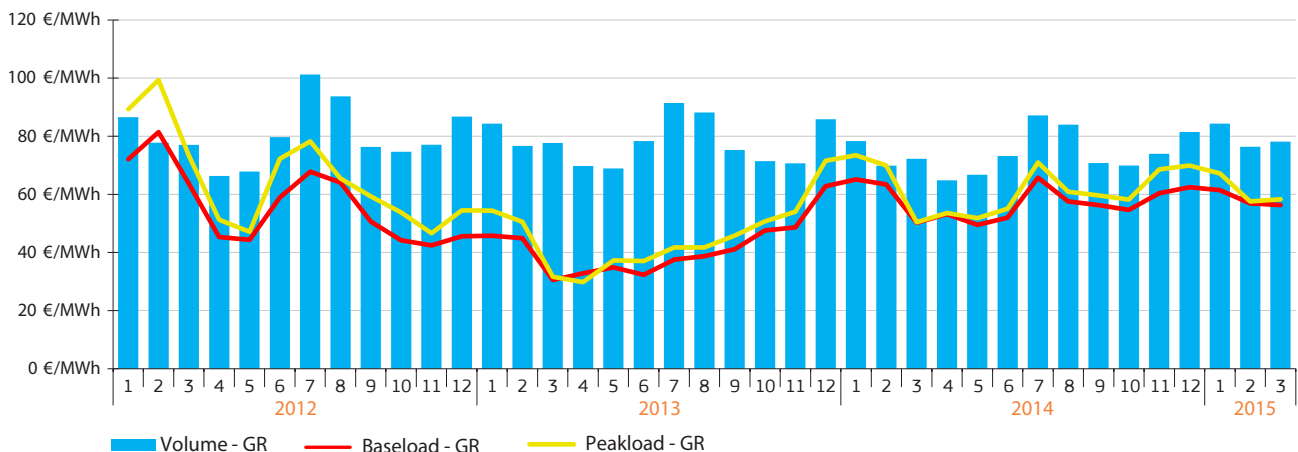


Source: Platts (EPEX), CEE Regional power exchanges

4.7 South Eastern Europe (Greece)

- Between January and March 2015 Greek day-ahead baseload and peakload monthly average wholesale power prices showed a decreasing trend. The baseload monthly average decreased from 62 €/MWh to 56 €/MWh between December 2014 and March 2015, while in the same period the monthly peakload average went down from 70 €/MWh to 58 €/MWh. However, in the first quarter of 2015 Greece continued to be the highest priced wholesale electricity market in the EU.
- The amount of generated power from hydro source rose to two-year high in February 2015 and assured 29% of the domestic generation mix in Greece. In the same month renewables accounted for 20% of the generated power, while the share of wind energy rose to 11%, which was the highest in the last five years. At the same time the share of lignite and natural gas substantially decreased in the Greek power generation in Q1 2015.
- Increasing share of renewables and hydro in the domestic power mix resulted in decreasing generation costs and hence lower wholesale electricity prices. However, Greece had to import in Q1 2015 more than 20% of its power need (mainly from Bulgaria, Italy, Turkey and the Former Yugoslav Republic of Macedonia). On the longer term broader deployment of renewables might help in mitigating power import needs of Greece and could reduce its exposure to lignite fired power generation.

FIGURE 25 – MONTHLY TRADED VOLUMES AND PRICES IN GREECE



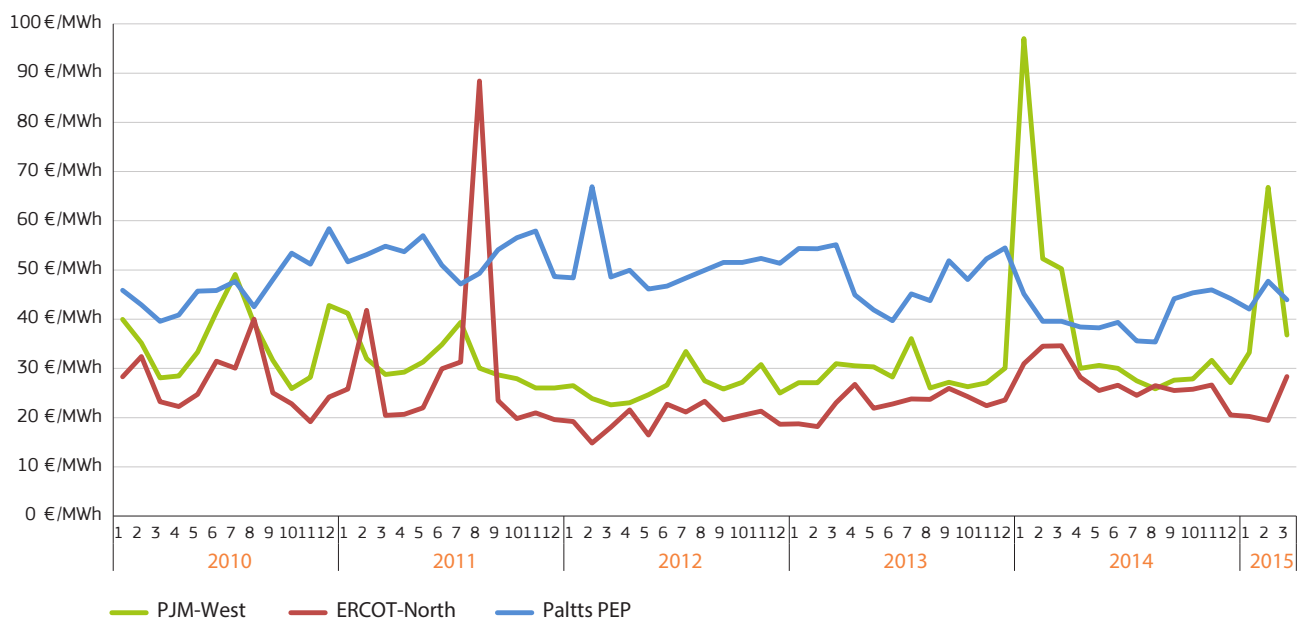
Source: DESMIE

5. International outlook

comparing EU power prices with international peers

- As the next chart (Figure 26) shows, regional wholesale electricity prices in the US were generally below the European power benchmark, the PEP index. However, US power prices are more volatile than their peers in Europe, primarily owing to dependence on gas-fired generation, as gas prices are sensitive to changes in weather conditions.
- In Q1 2015 EU wholesale electricity prices were around 43% above the average of US regional wholesale electricity prices. Permanent wholesale electricity price differentials between the US and the EU result in a competitiveness advantage for energy intensive industries, manufacturing in the US.

FIGURE 26 – COMPARISON OF THE MAJOR US WHOLESALE ELECTRICITY HUB PRICES WITH THE EUROPEAN AVERAGE (PEP)



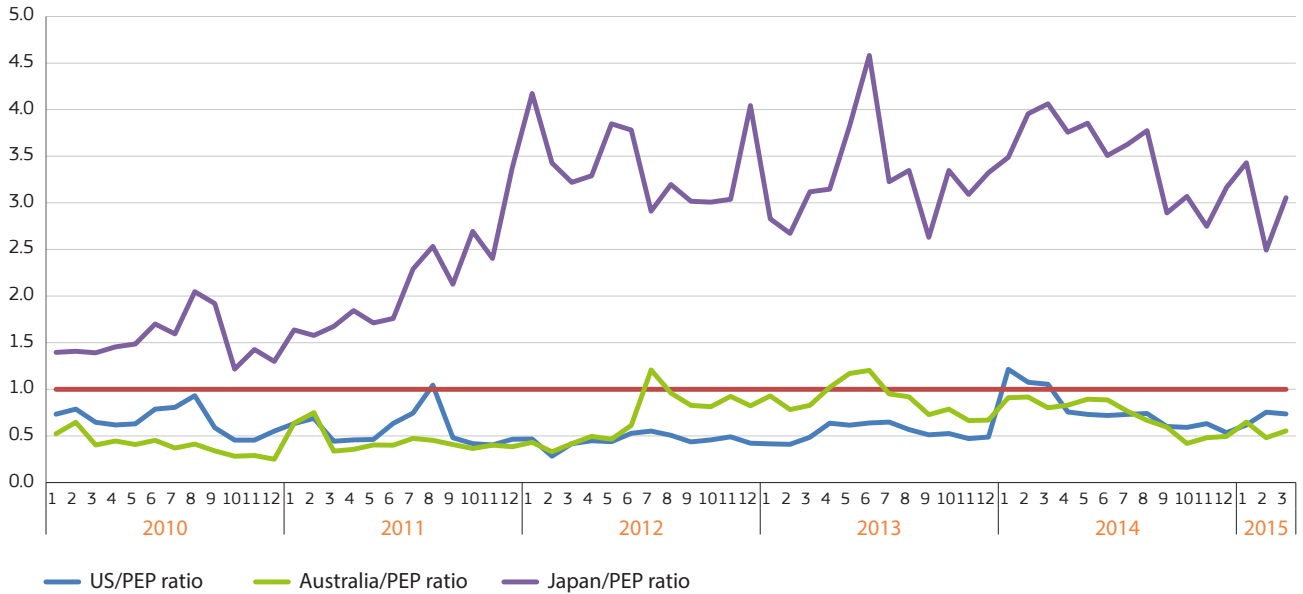
Source: Platts, US electricity hubs

PJM West: Pennsylvania-Jersey-Massachusetts hub (Western part); ERCOT: Texas hub; Platts PEP: Pan-European Power index

- Looking at Japan, over the last few years, wholesale electricity prices have consistently been higher than in the EU. Price differential to the EU has become even greater in the consequence of the Fukushima nuclear power plant incident, as nuclear generation has been replaced by gas-fired plants. However, during the last few months as LNG import prices became lower, power generation costs also decreased and it had beneficial impact on wholesale electricity prices in Japan.
- In Australia the average wholesale electricity price level used to be lower by a magnitude of two-to-three compared to the EU average; in the first quarter of 2015 the average Australian price level was 44% below the PEP index in the EU.

- Putting all these together, Figure 27 shows that wholesale electricity prices in the US and Australia are of comparable magnitude, and during most of the time between 2010 and 2015 they were both well below the level of European wholesale electricity prices. In contrast, prices in Japan are extremely high compared to the other three regions (EU, US, Australia). However, prices in Japan recently began to decrease in parallel with cheaper LNG prices in Asia.

FIGURE 27 – THE RATIO OF THE US, JAPANESE AND AUSTRALIAN WHOLESALE ELECTRICITY PRICE CONTRACTS AND THE EUROPEAN AVERAGE (PEP)

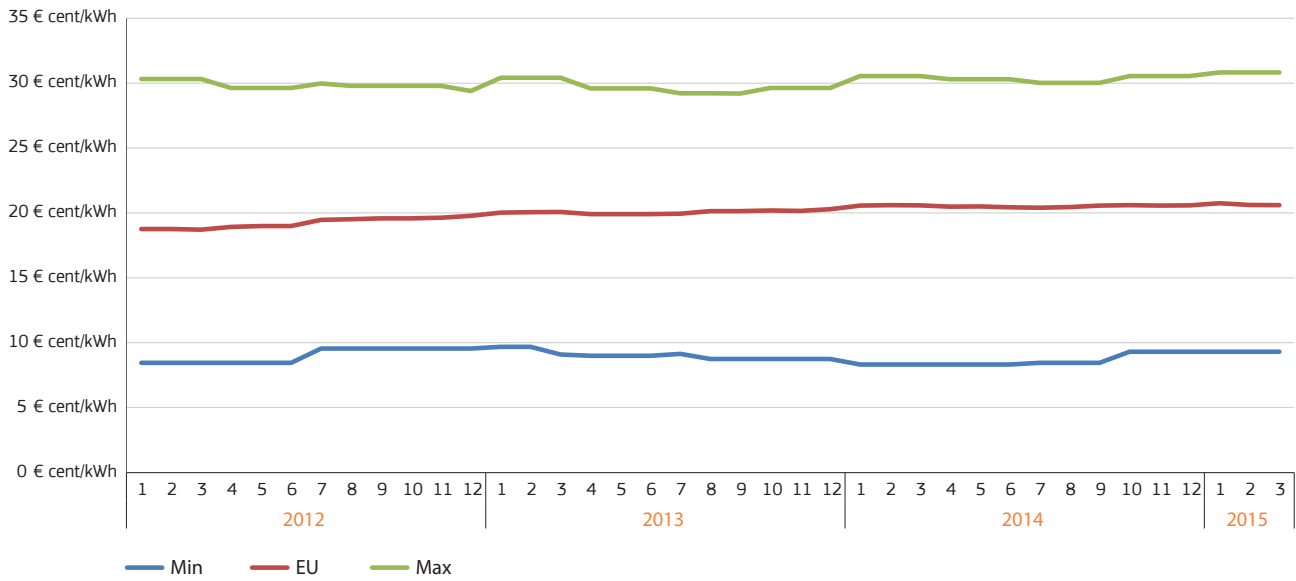


Source: Platts

6. Retail electricity prices in the EU

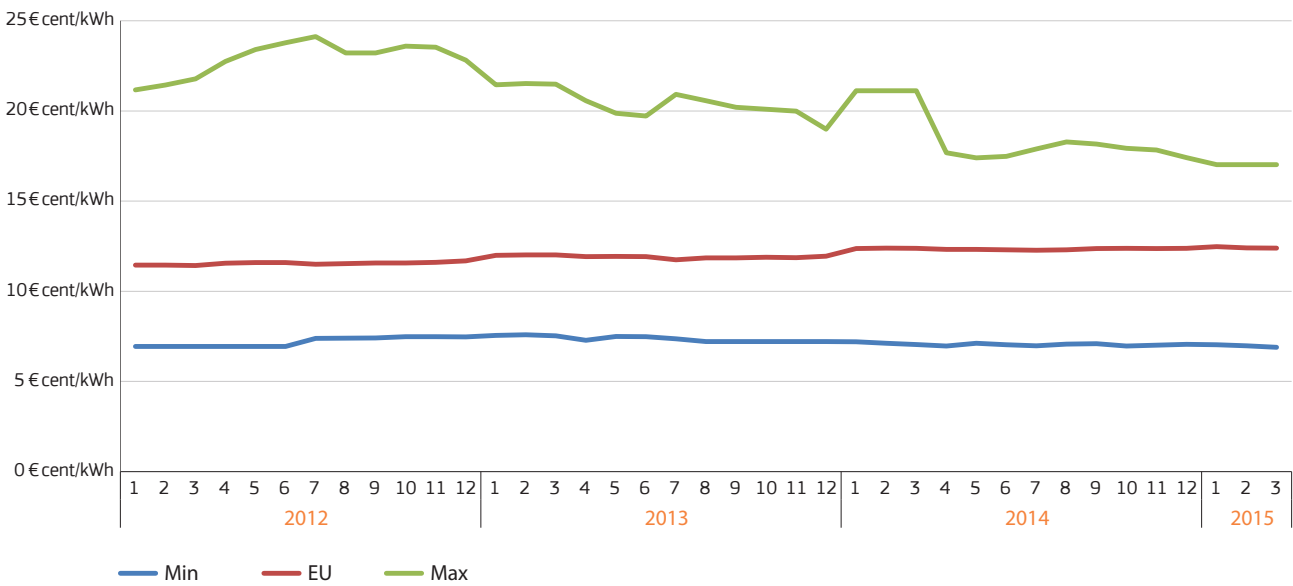
- Figure 28, Figure 29 and Figure 30 on the next pages show the retail electricity price ranges for household and industrial consumers in the last three years for different consumption bands.
- In the case of household consumers retail prices for medium level of annual electricity consumption (between 2,500 kWh and 5,000 kWh - Band Dc) are presented, while for industrial consumer both prices for medium level consumption (between 500 MWh and 2 000 MWh - Band Ic) and for large consumption (between 70 000 MWh and 150 000 MWh - Band IF) are shown. These annual consumption bands correspond to the retail price reporting system of Eurostat.
- Retail prices paid by households include all taxes, while retail prices paid by industrial customers are prices without VAT and recoverable taxes and levies. Monthly retail electricity prices are estimated by using the Harmonised Consumer Price Indices (HICP) for the household prices and the Producer Price Indices (PPI) for the industrial consumers, based on the time series of half-yearly retail energy price data from Eurostat.
- In March 2015 the lowest estimated household retail electricity prices could be observed in Bulgaria (9.3 Eurocent/kWh) and the highest prices could be found in Denmark (30.8 Eurocent/kWh) implying a price differential ratio of 3.3 between the cheapest and the most expensive country in the EU.
- In the case of industrial consumers having medium level annual consumption the price ratio of the cheapest country (Sweden, with a price of 6.9 Eurocent/kWh) and the most expensive country (Italy, with a price of 17 Eurocent/kWh) was 2.5 in March 2015. At the same time the cheapest country was again Sweden (4.8 Eurocent/kWh) and the most expensive one was Malta (12.6 Eurocent/kWh) in the case of large industrial consumers, giving a price differential ratio of 2.6 for the highest and the lowest priced country in the EU.
- Figure 31 shows the electricity component of the so-called Household Energy Price Index (HEPI), calculated with a methodology developed by Vaasaett on the basis of monthly electricity invoice collecting in capital cities in the EU. According to these data households in Copenhagen had to pay the highest electricity prices in the EU (30.7 Eurocent/kWh), while households in Sofia paid the lowest prices (10.6 Eurocent/kWh) in March 2015. The greatest increase in household electricity prices between March 2014 and March 2015 could be observed in Paris (12.6%) and Prague (9.5%), while in Brussels retail electricity prices decreased by 18.5% in this period.
- Figure 32 shows the cost components (energy costs, transmission and distribution costs, energy taxes and VAT) of the final electricity prices in European capital cities in March 2015. Different cost items have substantially different importance in affecting the final price across the EU capital cities. For example the energy cost component had the highest share in the final consumer price in Valetta, while in Madrid the transmission and distribution cost item had the highest share in the final price, primarily owing to the fixed element linked to capacities. In Copenhagen the energy taxes had the highest share in the final price among EU capital cities.
- The maps (Figure 33 and Figure 34) on the following two pages show the estimated retail electricity prices paid by households and industrial consumers having medium level of annual electricity consumption in the first quarter of 2015. In most of the EU countries national average retail prices for household consumers with a medium level annual consumption, as provided by Eurostat, correspond well with data of Vaasaett for the capital cities in the same country.

FIGURE 28 – RANGES OF NOMINAL ELECTRICITY PRICES PAID BY HOUSEHOLD (ALL TAXES INCLUDED) CONSUMERS IN ANNUAL CONSUMPTION BAND DC (2 500 KWH < CONSUMPTION < 5 000 KWH) IN EU MEMBER STATES



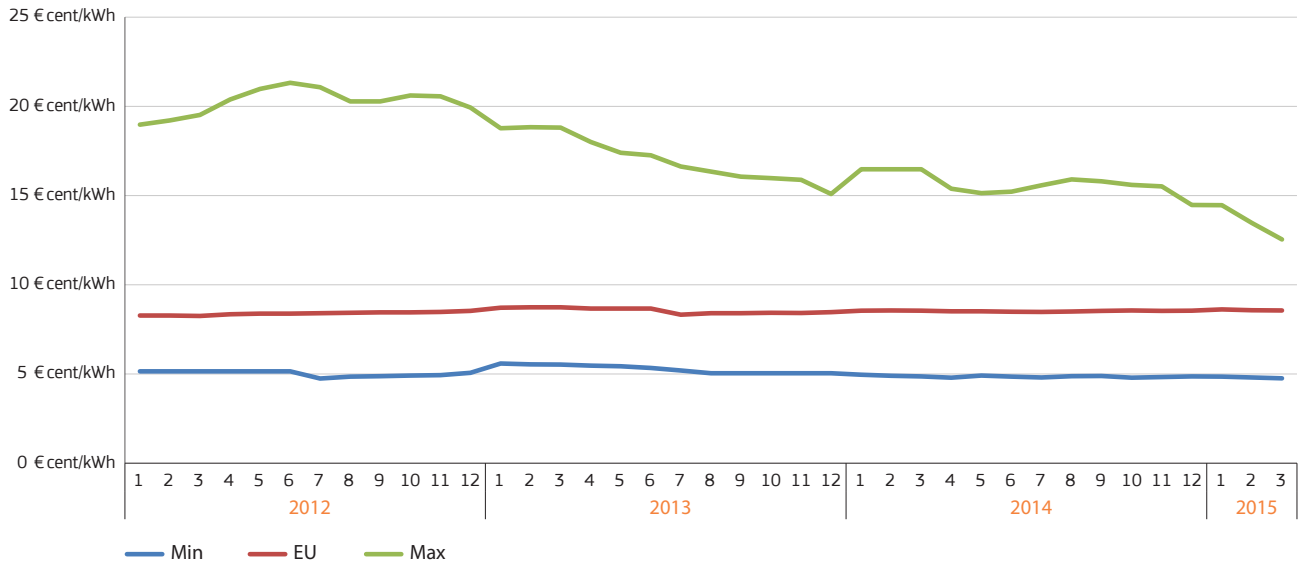
Source: Eurostat

FIGURE 29 – RANGES OF NOMINAL ELECTRICITY PRICES PAID BY INDUSTRIAL (WITHOUT VAT) CONSUMERS IN CONSUMPTION BAND IC : 500 MWH < CONSUMPTION < 2 000 MWH IN EU MEMBER STATES



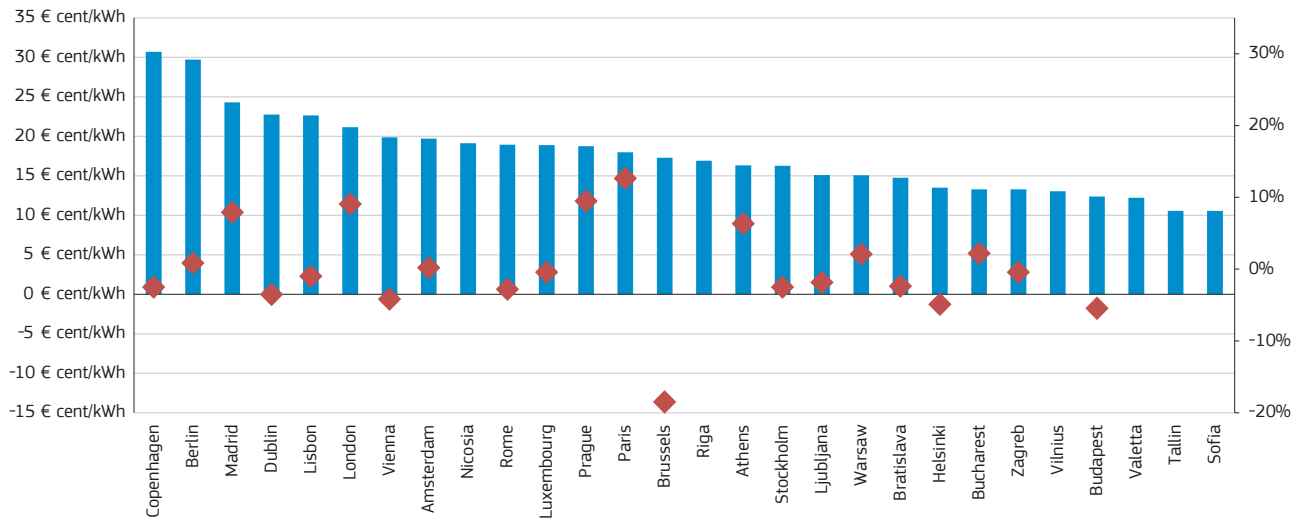
Source: Eurostat

FIGURE 30 – RANGES OF NOMINAL ELECTRICITY PRICES PAID BY INDUSTRIAL (WITHOUT VAT) CONSUMERS IN CONSUMPTION BAND IC : 500 MWh < CONSUMPTION < 2 000 MWh IN EU MEMBER STATES



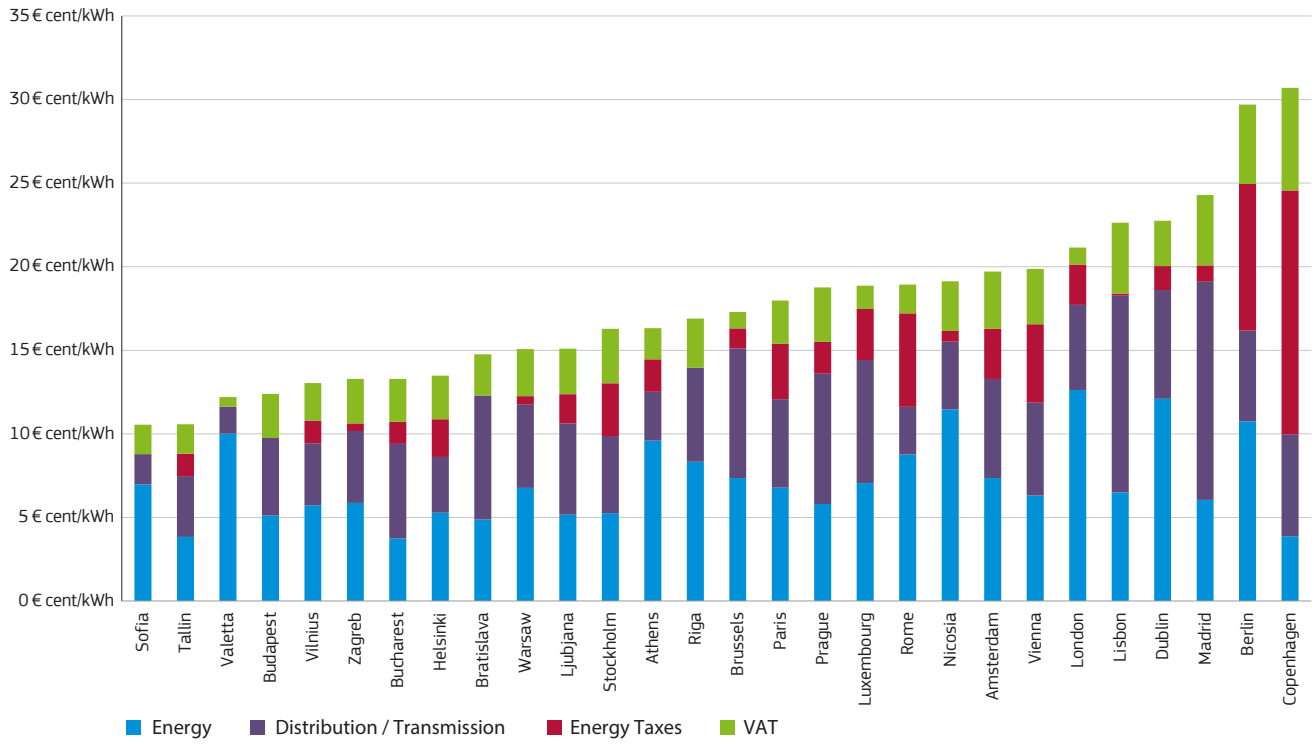
Source: Eurostat

FIGURE 31 – THE HOUSEHOLD ENERGY PRICE INDEX (HEPI) IN EUROPEAN CAPITAL CITIES - ELECTRICITY PRICES IN MARCH 2015, AND CHANGES IN HOUSEHOLD ELECTRICITY PRICES COMPARED TO MARCH 2014



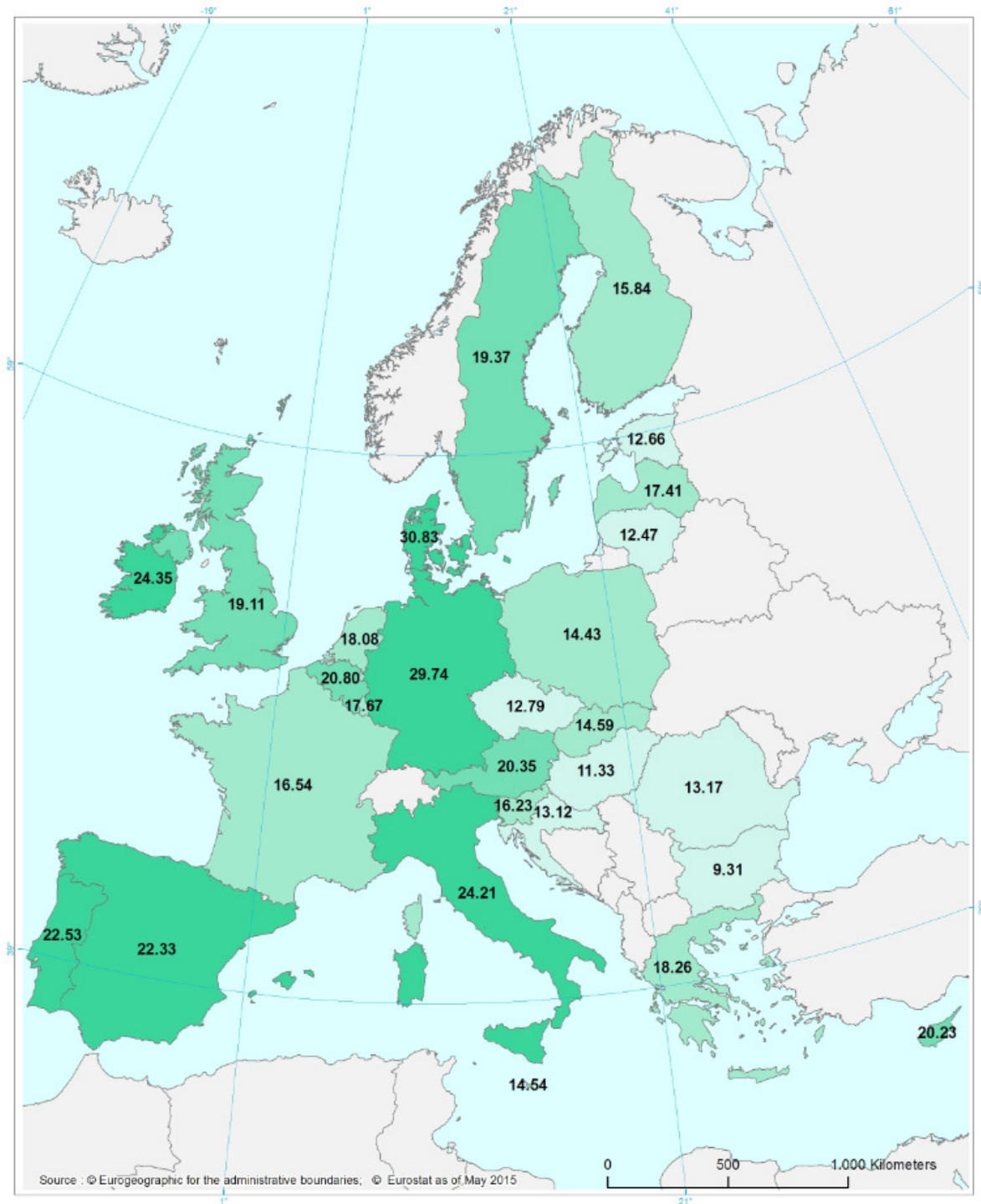
Source: Vaasaett. No price data for March 2014 available for Tallin, Riga, Vilnius, Valetta, Sofia and Nicosia

FIGURE 32 – HEPI ELECTRICITY PRICES AND THEIR COST COMPONENTS IN EUROPEAN CAPITAL CITIES, MARCH 2015



Source: Vaasaett

FIGURE 33 – ELECTRICITY PRICES (INCLUSIVE OF TAXES) – HOUSEHOLDS – ESTIMATED PRICES: 1ST QUARTER OF 2015

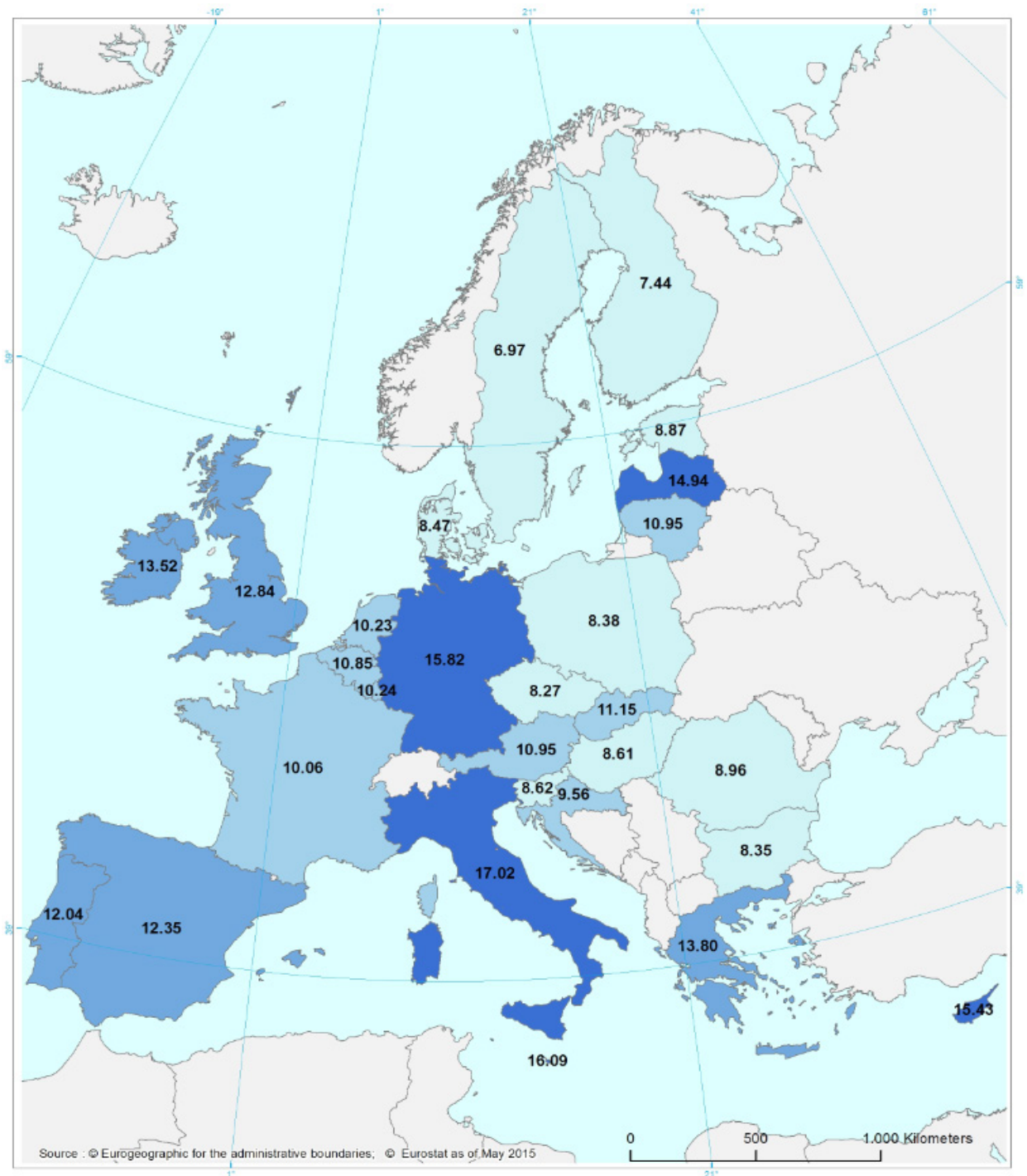


Source: data computed from Eurostat half-yearly retail electricity prices and consumer price indices

Band DC : 2 500 kWh < Consumption < 5 000 kWh
Prices per kWh (c€)

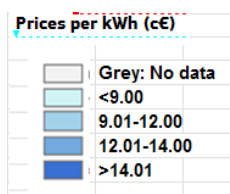
Prices per kWh (c€)	
Grey	no data
Light Green	< 14.00
Medium Green	14.01-19.00
Dark Green	19.01-22.00
Very Dark Green	>22.01

FIGURE 34 – ELECTRICITY PRICES (WITHOUT VAT AND NON-RECOVERABLE TAXES) – INDUSTRIAL CONSUMERS – ESTIMATED PRICES: 1ST QUARTER OF 2015



Source: data computed from Eurostat half-yearly retail electricity prices and consumer price indices

Band IC : 500 MWh < Consumption < 2 000 MWh
Prices per kWh (c€)



7. 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. If the level of dark spreads is above 0, coal power plant operators are competitive in the observed period. *See dark spreads.*

Clean spark spreads are defined as the average difference between the cost of gas and emissions, and the equivalent price of electricity. If the level of spark spreads is above 0, gas power plant operators are competitive in the observed period. *See spark spreads.*

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.

Cooling degree days (CDDs) are defined in a similar manner as Heating Degree Days (HDDs); the higher the outdoor temperature is, the higher is the number of CDDs. On those days, when the daily average outdoor temperature is higher than 21°C, CDD values are in the range of positive numbers, otherwise CDD equals zero.

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 in this publication for UK and Germany, with the coal and power reference price as reported by *Platts*.

Flow against price differentials (FAPDs): By combining hourly price and flow data, 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 electrical systems.

With the closure of the day-ahead markets (D-1), the prices for each hourly slot of day D are known by market participants. Based on the information from the power exchanges of two neighbouring areas, market participants can establish hourly price differentials. Later in D-1, market participants also nominate commercial schedules for day D. 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 in this quarterly report provides detailed information on adverse flows, presenting the ratio of the number of hours with adverse flows to the number of total trading hours in a quarter.

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.

Spark spreads are reported as indicative prices giving the average difference between the cost of natural gas delivered ex-ship and the power price. As such, they do not include operation, maintenance or transport costs. Spreads are defined for a gas-fired plant with 50 % efficiency. Spark spreads are given for UK and Germany in this publication, with the gas and power reference price as reported by *Platts*.

Tariff deficit expresses the difference between the price (called a tariff) that a *regulated utility*, such as an electricity producer is allowed to charge and its generation cost per unit.

