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Corrigendum
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COMMISSION STAFF WORKING DOCUMENT

Energy prices and costs report

Accompanying the document

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Energy prices and costs in Europe

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Table of Contents

Introduction

Europe's energy sector is in the midst of a major transformation. Its gas and electricity sectors are moving from public monopolies into competitive private companies in liberalised markets and electricity generation is being decarbonised, with strong growth of wind and solar power in particular. At the same time, alternative gas supplies are being developed and diversified and the transport sector is becoming more fuel efficient and starting to use cleaner, alternative fuels.

There are different expectations and understanding of how all these changes affect each other. The liberalisation of the market is expected to deliver more competitive and therefore efficient and cheaper energy; environment and climate policy and decarbonisation is meant to ensure a sustainable energy sector for the long run, with acknowledged short term costs. Governments expect such changes to deliver short term benefits to consumers as well as longer term sustainability objectives. And the energy industry itself has to adapt to very different environmental, commercial, regulatory and technological regimes.

These efforts of Member State governments to create a more competitive and sustainable energy sector coincide with a major economic downturn in Europe's economic activity. Such economic hardship often triggers reluctance to change, and this is becoming visible in the energy sector: measures to protect jobs and enhance the competitiveness of national industry are impacting market liberalisation; the affordability of the short term costs of achieving sustainability is questioned; reliance on existing market players, structures and technologies grows heavier.

In light of such questions of the high costs to consumers and reduced European competitiveness, it is important to scrutinise and analyse the details of what is happening in the energy sector. There is a need to ensure that the changes and transformation underway are not undermining Europe's competitiveness, and that competitive and cost effective solutions are sought out to minimise negative impacts. This is why the conclusions of the 2013 May European Council announced a forthcoming analysis from the Commission on "*the composition and drivers of energy prices and costs in Member States (...), with a particular focus on the impact on households, SMEs and energy intensive industries, and looking more widely at the EU's competitiveness vis-à-vis its global economic counterparts*"

This report has been produced to support such scrutiny. Chapter 1 starts with a review of recent trends in energy prices and breaks down energy prices to explore the trends in separate price drivers (the electricity or gas costs, network and taxation elements of retail prices). The relationship between wholesale and retail prices is examined for gas and electricity markets and the consequences of regulating household and industrial consumer prices is examined. Chapter 2 looks at the impact and the evolution of energy costs, comparing household and industry costs across time, different industry sectors and Member States, with aggregated data and with case studies[1]. Chapter 3 provides international comparisons of energy prices and costs, looking at disaggregated prices and comparisons of taxation in particular, and explores the global nature of some hydrocarbon markets compared with the regional markets of natural gas and electricity. Chapter 4 examines the possible macroeconomic and sectoral consequences of *ongoing* European cost increases.

[1] Including seven energy intensive industries: bricks and roof tiles, wall and floor tiles, float glass, ammonia, chlorine, primary aluminium and steel

1. Energy prices in the EU

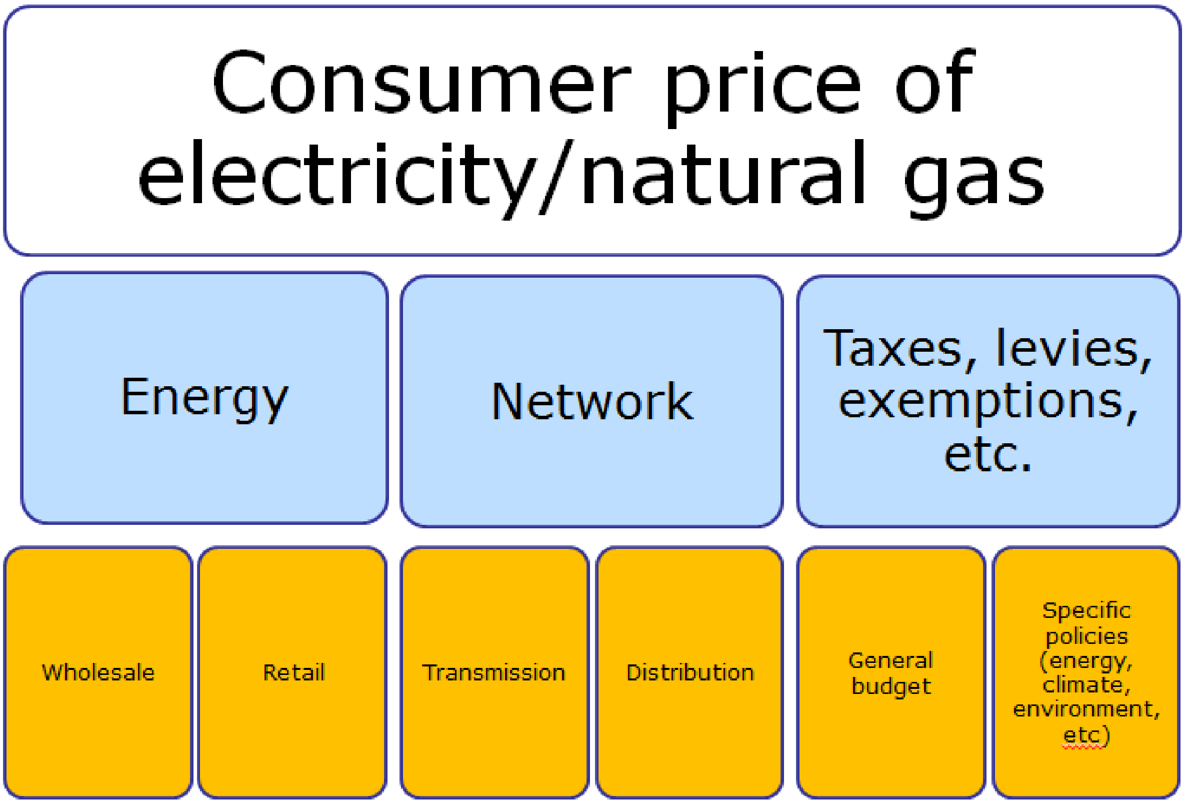
Key global energy commodity prices have increased in recent years, including oil and coal. However in the global markets for oil and coal, prices move in step and energy consumers across the globe pay broadly the same price. So price differentials - that can raise costs to consumers and generate competitive advantages or disadvantages – are not a concern. That is why these two fuels and the transport sector are not covered extensively in the report.

However in gas and electricity markets, despite a degree of global tradability of fuels and equipment (such as wind turbines), there are at best regional prices, and more often national or sub national prices, which change retail costs and prices for consumers and can generate inefficiencies or competitive disadvantages in what should be the single market.

The figure below presents a diagram of the basic elements of the final electricity and natural gas bills. All components and subcomponents listed below contain many elements that cover costs incurred by economic agents along the value chain on the one hand and financial charges and exemptions imposed upon taxpayers by the legislative authority of Member States on the other.

To a certain extent, the electricity and natural gas sectors operate under comparable industrial structures as both are fairly capital intensive, deliver energy products which are often used as inputs by other businesses, and rely upon a complex grid structure to ship the product from generators / extractors to final consumers (thus both are referred to as "network industries"). The similar industrial features explain to a large extent the similarity of the first and second tier elements of the end consumer bill. Yet, looking into more detail, differences start to emerge.

Figure 1. Schematic break-down of an end consumer bill for electricity and natural gas



The wholesale element covers the costs incurred by companies to deliver the energy product on the grid.

In the case of natural gas, it covers the costs of production and processing of domestic hydrocarbon resources or the costs of acquisition of imported gas which contain those elements plus costs related to shipping to a delivery point on the high pressure system.

In the case of electricity this element covers direct costs related to the construction, operation and decommissioning of electricity generating units which can further be broken down to capital expenditures, (CAPEX) - which includes for instance overnight costs[2], capital costs, liability insurance and decommissioning - and operating expenses, (OPEX) which includes for instance costs of operation, maintenance, refurbishment, fuel and carbon as well as costs related to the operation of wholesale trading activities.

A robust competitive market, as foreseen by the IEM legislative packages[3], ensures that the optimal available mix of assets and suppliers is used to deliver the energy needed by end consumers in the most cost efficient manner.

The retail element covers costs related to the sale of energy products to final consumers, including (but not limited to) portfolio management (size and structure of client base), personnel, IT, overheads, insurance for imbalance, etc.

The transmission and distribution elements can be similarly broken down into CAPEX- and OPEX- related components which include infrastructure costs (maintenance and grid expansion), system services (costs by use or by availability), network losses and other charges such as (but not limited to) stranded costs, public service obligations, policy support to certain technologies, etc.

Finally, the elements related to taxation policy can be grouped along several criteria to two or more sub-categories.

From the perspective of the taxpayer, the tax-related elements can be broken down into recoverable, partially recoverable and non-recoverable parts. Recoverable taxes or levies include full or partial recovery of taxes paid on purchases, either as a payment or as an offset against taxes owed to the tax authorities. VAT is an example of a recoverable tax but there may be more such taxes and levies which may be imposed on different administrative levels (local authorities, regions, states, federal authorities etc.). Partially recoverable taxes include a combination of taxable and exempted levels of consumption. In the case of non-recoverable taxes or levies, the full amount of collected proceeds is transferred to the tax authorities. This distinction is important when it comes to retail prices for different types of final consumers of electricity and natural gas. For example, the tax-related elements for households would most often be non-recoverable whereas at least some part of the taxes and levies companies that are paid by companies would be recoverable and companies may further benefit for some special exemption regime.

When it comes to the destination of the proceeds collected, the third part of the consumer bill can be broken down by taxes, which are unrequited payments to finance the general public budget, and charges/levies, which are ear-marked to different energy or other policy measures.

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[2] Overnight cost is the cost of a construction project if no interest was incurred during construction, as if the project was completed "overnight". It is the value of the investment project to be paid upfront as a lump sum that would cover the construction costs (including pre-construction costs and Engineering, Procurement and Construction (EPC) costs) and any additional contingency costs.

[3] Communication from the Commission on delivering the internal electricity market and making the most of public intervention http://ec.europa.eu/energy/gas_electricity/doc/com_2013_public_intervention_en.pdf

Different taxes, levies, non-tax levies, fees and fiscal charges include value added tax (VAT), concession fees, environmental taxes or levies, other taxes or levies linked with the energy sector (such as public service obligations/charges, levies to financing energy regulatory authorities, etc.), other taxes or levies not linked with the energy sector (national, local or regional fiscal taxes on energy consumed, taxes on gas distribution, etc.). As specified in Directive 2008/92/EC, taxes on income, property-related taxes, oil for motor cars, road taxes, taxes on licences for telecom, radio, advertising, fees for licences, taxes on waste, etc. are excluded from the taxation element and included in energy and supply because they are part of the operators' costs and apply also to other industries or activities.

It should also be noted that the break-down in Figure 1 is schematic and that in reality policy support measures may appear in different parts of the electricity or natural gas bill, including the energy, network and taxation parts. One example of such measure that will be looked at in greater detail is the policy support measures that were put in place by Member States to reach the 2020 targets on climate change and energy sustainability.

Methodological issues

Most of the analysis of Chapter 1 concentrates on the evolution of the different components of the end consumer bill from a **top-down perspective**, based on harmonized collection methodologies over broad segments of the economy which were identified by the level of energy consumption rather than by industrial sectors or specific groups of household consumers.

Special attention is given to prices for household consumer bands DC (electricity) and D2 (natural gas) as these are the median bands with the highest number of electricity and gas consumers in the majority of Member States[4]. For the industrial sector[5], the focus is on the medium price data for bands IC and I3 as those groups typically represent medium size enterprises. As such, DC and IC (electricity) and D2 and I3 (natural gas) are the most representative consumer bands.

The prices reported in this and following Chapters cover the period from 2008 to 2012 as these are the first (and respectively the last) full year with complete retail price data for all MS and under the new Eurostat methodology at the time of drafting.

The top-down price developments inform mostly on general developments. The specific, on-the-ground conditions can be quite different from these developments, especially for the energy intensive industries. For example, companies can operate under special regimes, pay or be exempted from extra taxes or levies (ETS), be subject to a special state aid regime etc.

The current legal basis for data collection on retail prices for electricity and natural gas does not allow for a detailed breakdown of costs related to energy, network and taxation[6]. In addition, there is no harmonised methodology specifying under which category – energy, network or taxation - Member States should attribute costs related to specific public policies.

[4] The limiting values for the consumer bands are as follows:
Electricity households DC 2 500 kWh < Consumption < 5 000 kWh. Electricity industrial IC 500 MWh < Consumption < 2 000 MWh. Natural gas households D2 20 GJ < Consumption < 200 GJ equivalent to 5.56 MWh < Consumption < 55.56 MWh. Natural gas industrial I3 10 000 GJ < Consumption < 100 000 GJ equivalent to 2.78 GWh < Consumption < 27.78 GWh

[5] Industrial prices reported in line with Directive 2008/92/EC on industrial electricity and gas price data collection may include other non-residential user. In the case of gas all industrial uses are considered. However, the system excludes consumers who use gas for electricity generation in power plants or in CHP plants, in non-energy uses (e.g. in the chemical industry), above 4,000,000 GJ/y.

[6] For example Directive 2008/92/EC. paragraph (m) of Annex I and II specifies that taxes, levies, non-tax levies, fees and any other fiscal charges not identified in the invoices provided to industrial end-users go under the reported figures for the price level 'Prices excluding taxes and levies'.

The main purpose of a **bottom-up assessment** of the evolution and composition of energy prices and costs at the level of individual industry sectors and plant level is to complement the information already available at a macro level with a fundamental bottom-up perspective on the operating conditions that industry stakeholders need to deal with. **Section 1.1.2** and **section 1.2.2** provide price assessments for electricity and natural gas prices for a select group of European industries based on a methodology which is described in Annex 2.

Retail price trends

Figure 2 presents electricity and natural gas prices for the median household consumer bands expressed in Euro per kWh of energy. The remaining sections of this chapter provide a detailed analysis of the various components of retail prices. Figure 2 illustrates the variation of price conditions across Member States ("price dispersion").

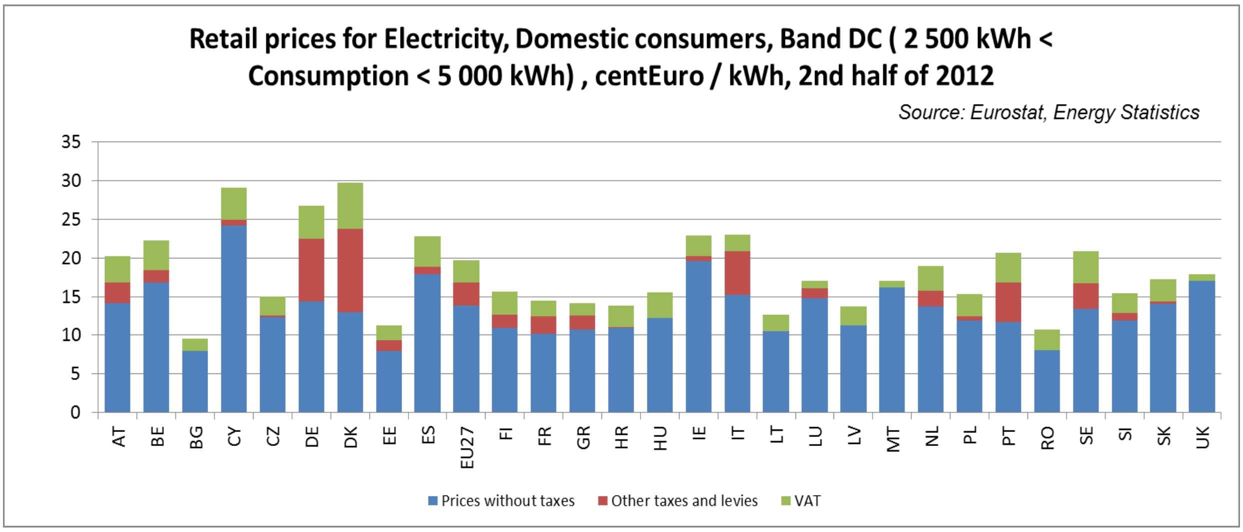
A similar pattern seems to apply: **the ratio of highest to lowest price in the Member States is in the range of 4 – 2.5 to 1.** Similar ratios are observed for all energy products (electricity or gas); consumer types (domestic or industrial), consumer bands (modest, median or big consumers), monetary units (Euro, national currency or purchasing power standards[7]) and periods (2008 - 2012)**.**

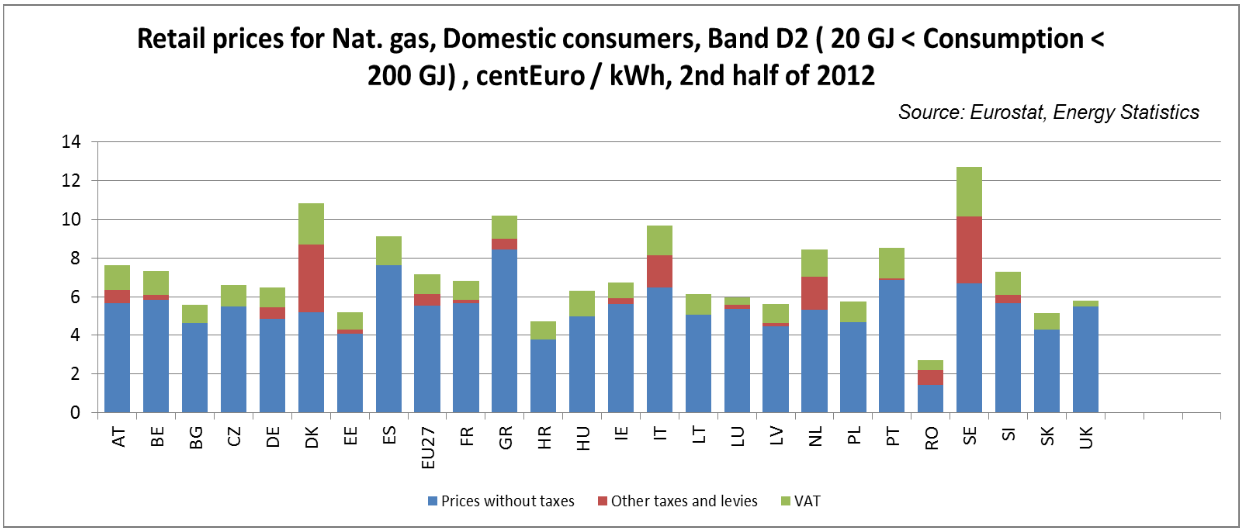
Despite efforts towards the creation a single EU market for energy, **retail price conditions remain persistently different** across borders. This development contrasts sharply with what is observed in the **wholesale markets for electricity and natural gas where the major benchmarks are broadly aligned**. A combination of factors could explain why the introduction of market mechanisms has proved to be more difficult in the retail segment. These are further discussed in Sections 1.1.1.1 and 1.2.1.1.

[7] The purchasing power standard, abbreviated as PPS, is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country. However, price differences across borders mean that different amounts of national currency units are needed for the same goods and services depending on the country. See more at http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Purchasing_power_standard_(PPS). Purchasing power parities, abbreviated as PPPs, are indicators of price level differences across countries ,see more at http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Purchasing_power_parities_(PPPs)

Figure 2. Retail prices for electricity and gas in EUR

** The original version of this report contained a technical mistake in the legend and in the title of Figure 2.*





To indicate the degree of divergence of the prices of electricity and natural gas in the EU, Table 1 provides dispersion metrics of price levels for a variety of markets and illustrates that price dispersion remains high in electricity and natural gas.

In 2012 the dispersion - measured as standard deviation divided by mean - was about 0.30 in the case of retail price of electricity and gas (including taxes in the case of households and excluding VAT and recoverable taxes in the case of industry), while it was below 0.1 in the case of motor fuels (including taxes). The variation coefficient for total labour costs stood much higher, at around 0.6.

While the levels of price variation on the EU retail electricity and natural gas market appear to be on par with what is observed in the market of mobile telephony, these same levels seem almost insignificant when compared to the variation in labour costs across the EU: the ratio of highest to lowest average salary in the EU is more than 3 times larger than what can be observed for electricity or natural gas prices for final consumers. In that sense, the variation of labour-related costs may appear as more important driver impacting competitiveness and investment decisions than energy-related costs; at least for industries that are relatively less energy intensive.

Another report from the Commission[8] finds that price dispersion increases when taxes are included, which confirms the contribution of taxes to the heterogeneity of energy prices. Interestingly, price dispersion is not observed on electricity wholesale markets where spot price has progressively converged over the past years. In well-functioning energy markets, retail prices would be expected to mirror the process of convergence observed upstream (wholesale). Obviously, the relative higher dispersion of retail prices has to do with other factors than wholesale market fragmentation.

Yet, the dispersion of electricity and gas retail prices for households and industry within the EU appears about 3 times larger than in the case of retail prices of motor fuels (gasoline had a variation coefficient of 0.12 in 2008 and 0.10 in 2012, while coefficient for diesel has been stable across the period at 0.09). The market for motor fuels provides a good benchmark for the gas and electricity markets: it is a mature energy product market where the taxation element has a relatively big share of the final price. Still price conditions are in general quite similar across borders, consumers can choose from several competitive offers and price levels (which are not regulated) react relatively quickly to signals from the wholesale market.

Table 1. Dispersion metrics, all taxes included

Market	Year	Max/Min	Variation coefficient[9]
Electricity, households	**2008**	3.38	0.30
	2012	3.11	0.28
Electricity, industrial consumers	**2008**	3.15	0.29
	2012	3.85	0.32
Natural gas, households	**2008**	3.67	0.30
	2012	4.62	0.29
Natural gas, industrial consumers	**2008**	2.60	0.26
	2012	3.02	0.26
Gasoline	**2008**	1.58	0.12
	2012	1.43	0.10
Diesel	**2008**	1.52	0.09
	2012	1.41	0.09
Mobile communications[10]	**2008**		0.21
	2010		0.30
Labour market, Industry, consumption, service	**2008**	14.54	0.54
	2012s	13.42	0.56

Source: European Commission (Eurostat, DG ENER, DG ECFIN)

[8] European Commission, DG ECFIN, Market functioning in network industries, Occasional Paper 129, February 2013.
[9] The variation coefficient is a normalized measure of dispersion. It is defined as the ratio of the standard deviation to the mean. The higher the ratio, the more dispersed the data.
[10] The dispersion reported for 2010 refers to the average revenue per minute of mobile communications, whose definition is slightly modified with respect to the former: nevertheless, its commonality among Member States should not justify significant changes in the dispersion thereof. More information available in Annex 1 of the report mentioned in the footnote above.

A Commission consumer market study on the functioning of the vehicle fuels market[11] confirms that major components of the final consumer prices are due to fuel taxes and VAT rates, which differ among Member States. Differences in pre-tax prices are much less than those of post-tax prices, which shows that national tax policies explain much of the observed differences in prices experienced by consumers. This is true for both average gasoline and diesel prices. The highest price components are generally found in EU15 Member States, with absolute highest levels for petrol seen in the Netherlands, Italy, the UK, Greece and Sweden and for diesel prices in the UK, Italy, Sweden and Ireland in 2012.

1.1. Developments in the retail markets for electricity

<u>Retail electricity prices expressed in Euros</u>

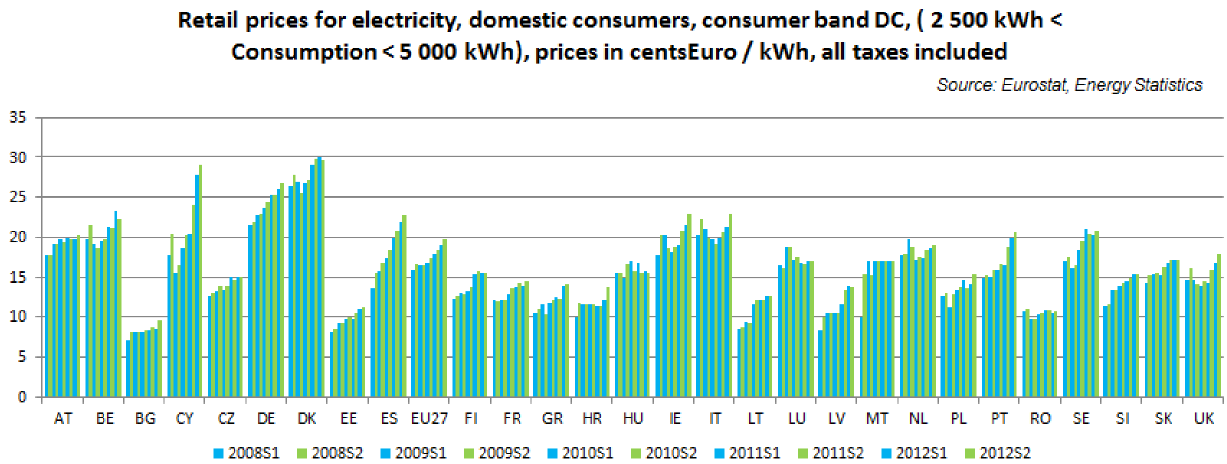
Looking at the period between 2008 and 2012, nearly every EU Member State has seen an increase in household electricity prices. **On average, the EU household electricity prices increased by more than 4% a year between 2008 and 2012**[12]. Whilst Romanian electricity prices have actually declined since 2008, others have experienced average annual increases of 9-10% (Latvia, Spain, Cyprus).

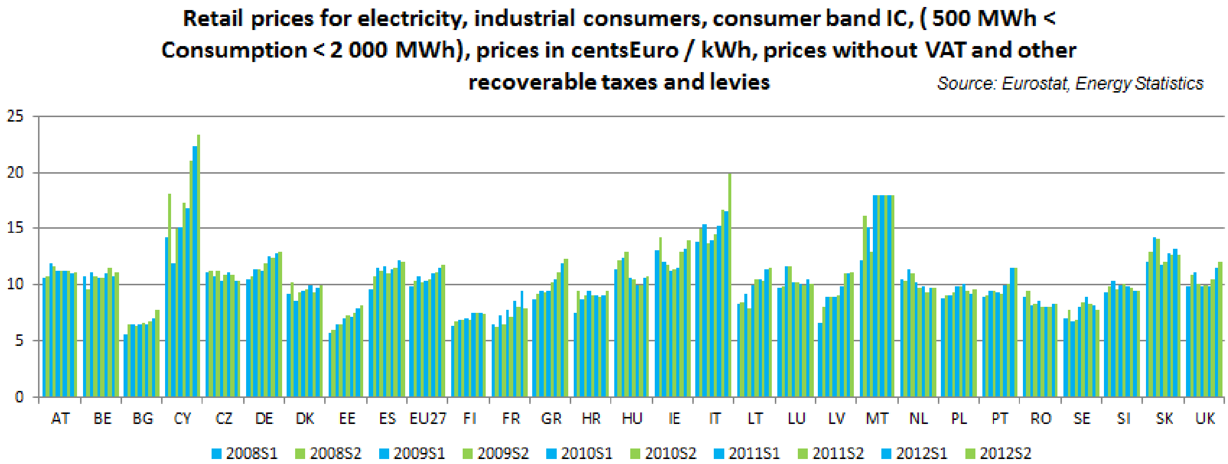
In the same period **industrial electricity prices (excluding VAT and recoverable taxes) have gone up by about 3.5% per year**. In some countries retail industrial prices have actually decreased over the period in question (Czech republic, Denmark, Croatia, Hungary, Ireland, the Netherlands, Romania, Slovenia and Slovakia), while industrial users in countries such as Estonia, Lithuania and Latvia have experienced annual growth of more than 8%.

[11] To be published by DG Health and Consumers during the first semester of 2014

[12] Median household consumer band with annual consumption between 2 500 and 5 000 kWh per year. Prices measured in cents EUR / kWh.

Figure 3. Evolution of retail prices, electricity, domestic and industrial consumers, centsEuro / kWh



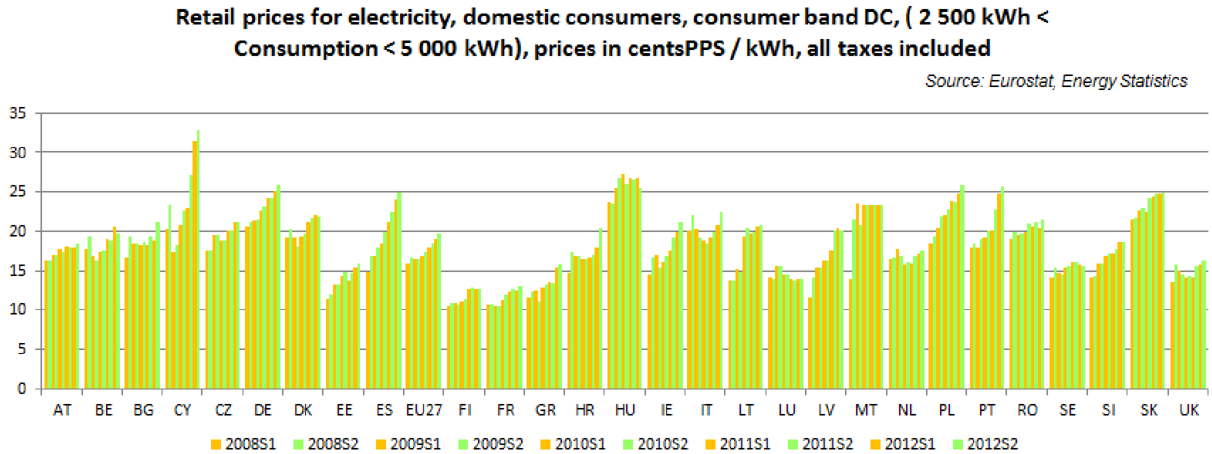


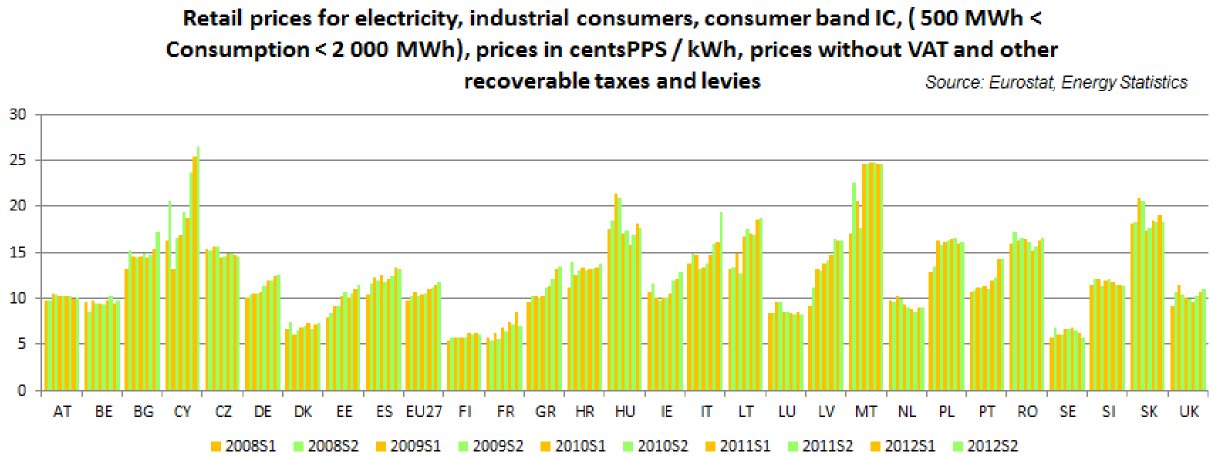
Retail electricity prices expressed in purchasing power standards

Taking into account purchasing power effects does not change the picture above in terms of **price trends** but **it does change substantially the relative position of the Member State**. The most pronounced increases are those observed in new Member States. As a group these countries register price increases in terms of PPS, indicating that the median household and industrial consumers from new Member States spend a relatively larger portion of their budgets to the purchase of the same amount of electrical energy.

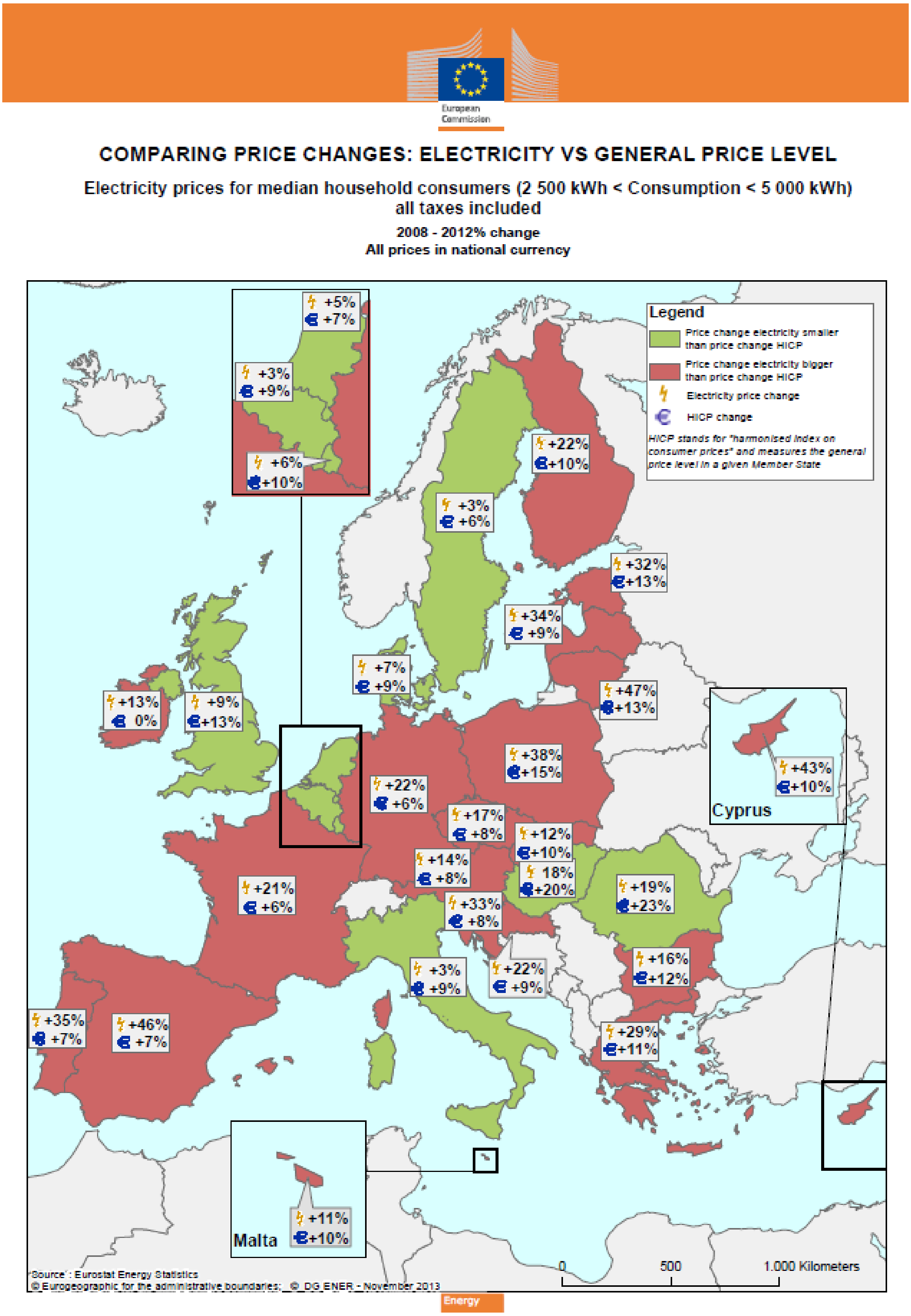
Taking into account the relatively higher levels of energy intensity of new Member States suggests that those economies might be more vulnerable to price risks related to the different components of the electricity and natural gas bill.

Figure 4. Evolution of retail prices, electricity, domestic and industrial consumers, cents PPS / kWh

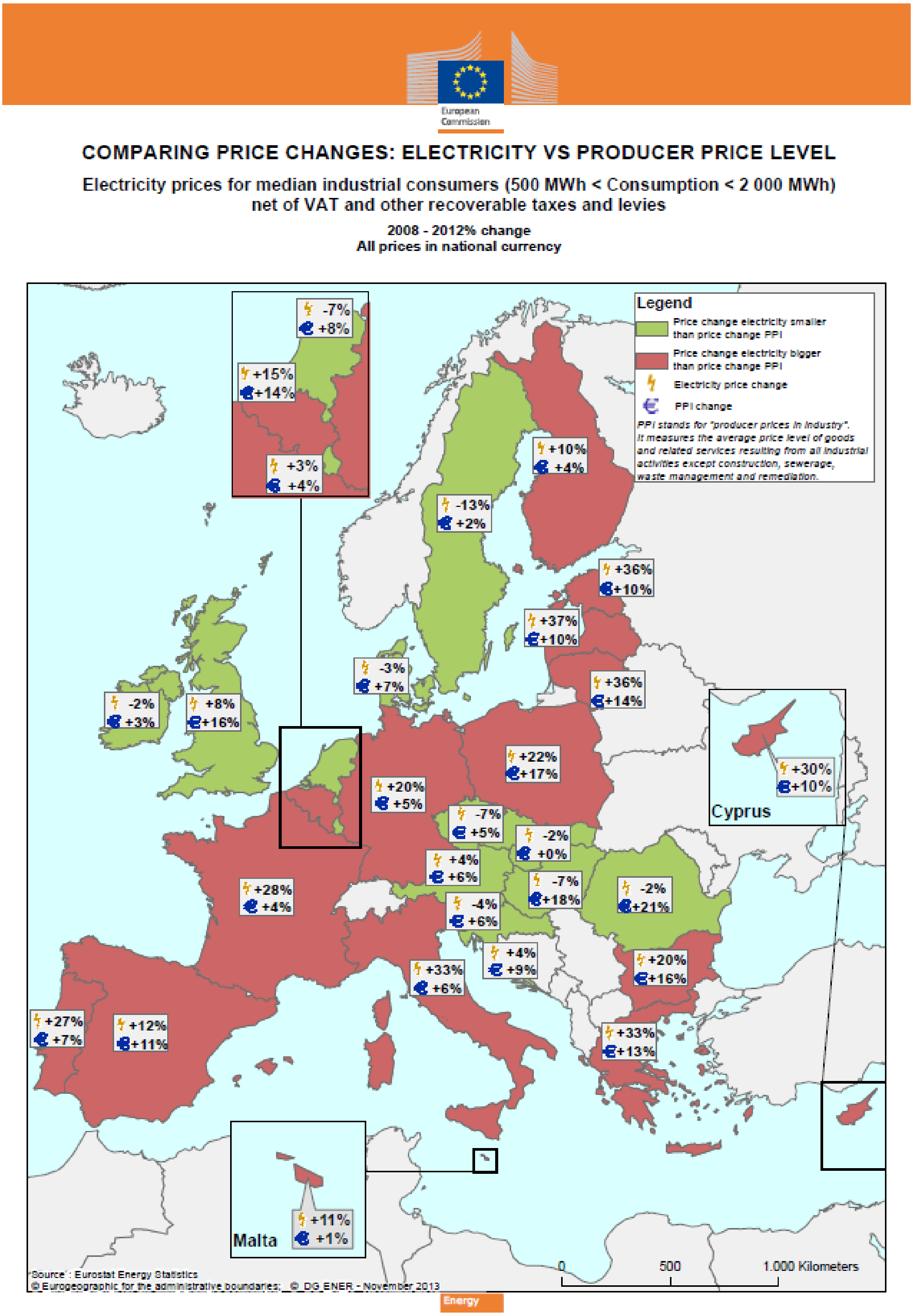




Map 1 Household electricity prices vs. inflation (HICP)



Map 2. Industrial electricity prices vs. inflation (PPI)



Comparing electricity price changes to inflation levels

The maps compare the increase in electricity prices against the increase of the general price level in each Member State.

As indicated by **Map 1**, in 19 out of 28 Member States the median household consumer bands experienced a price increase in electricity which was higher than the increase in the general price level[13] as measured by the harmonized index of consumer prices (HICP). Belgium, Denmark, Italy, Luxembourg, Hungary, the Netherlands, Romania, Sweden and the UK were the exceptions to that rule.

The combination of actual changes in electricity and general price levels between 2008 and 2012 was unique for each Member State and the map colours illustrate only the relative position of those changes. In Estonia, Spain, Cyprus, Latvia, Lithuania and Portugal electricity prices, inclusive of all taxes, increased by more than 30% between 2008 and 2012. For the same period, inflation increased by 10% or more in Bulgaria, Estonia, Greece, Cyprus, Lithuania, Luxembourg, Hungary, Malta, Poland, Romania, Slovakia, Finland and the UK.

Turning to industrial consumers and comparing the price rise in electricity (excluding VAT and other recoverable taxes and levies) and the general industrial price level, as measured by the Producer Price Index (**Map 2**), Member States were split by half. As a rule, electricity price changes were smaller than those for domestic consumers and in several countries (the Czech Republic, Denmark, Ireland, Hungary, the Netherlands, Romania, Slovenia, Slovakia and Sweden) electricity prices actually decreased.

Comparing electricity price changes to exchange rate variations

During the 2008 – 2012 period, the Romanian, Polish and Hungarian currencies depreciated by 21%, 19% and 15% respectively. Thus, while median retail prices for Romanian households were registering a modest decrease when measured in Euro cents per kWh (- 2.45%), those same prices increased by 20% when measured in Lei per kWh. Similar trends were observed for the other countries with notable currency depreciation.

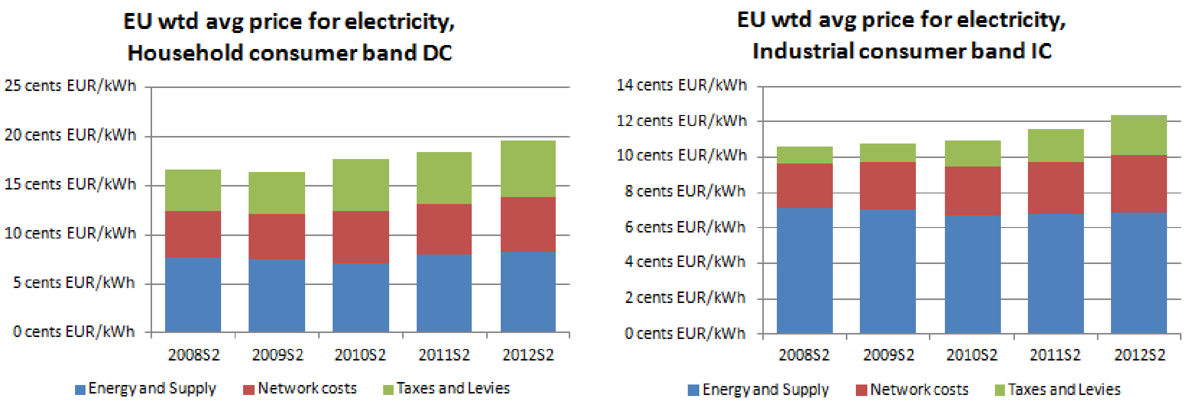
Sweden was the only Member State that witnessed the opposite evolution as the Krona appreciated by 10% in 4 years relative to the Euro. As a result, whereas electricity prices for domestic consumers registered moderate increases when measured in the national currency, more pronounced changes were recorded in Euros. In the case of median industrial consumers, a decrease in price measured in Kronor actually translated into an increase when converted into Euros.

[13] Second round effects in the interaction of retail electricity prices and inflation (the electricity price being a component of the HICP) are not discussed in this report.

1.1.1. Electricity retail price developments by components

Figure 5 illustrates the aggregate EU numbers weighted by electricity consumption respectively for households and industrial users.

Figure 5. Evolution of EU28 electricity retail price by components: levels, selected household and industrial bands



Source: Eurostat Energy Statistics

Note: Prices include all taxes in the case of households. Prices exclude VAT and other recoverable taxes in the case of industry, as well as industry exemptions (data not available).

Based on available data from the most recent 5-year period, the European retail prices (nominal) for electricity increased on average by 3 Euro cents per kWh. Whereas the energy component remained the most important element in the end consumer bill, its relative share registered significant decreases (more than 10 % for industrial consumers and about half as much for households). As the relative share of network costs remained relatively stable, representing about a third of the bill, it was the taxation component that filled the gap left by the supply of energy component.

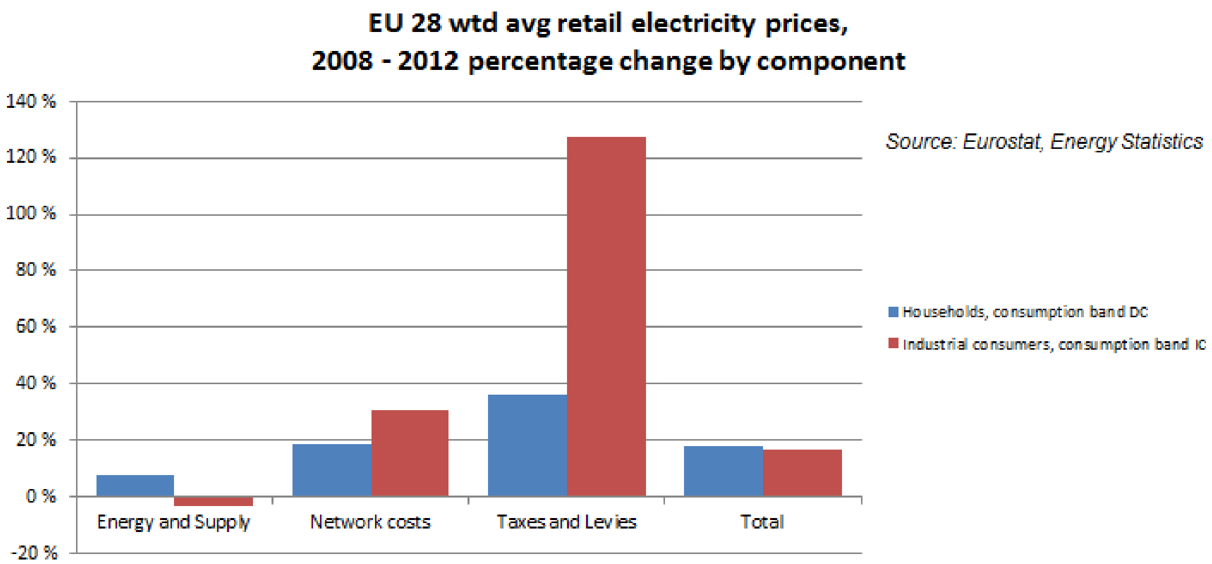
The next chart illustrates these evolutions. Taxes and levies went up by the most, especially for industry. In the case of the EU weighted average price it increased by 127%. The chart includes only non-recoverable taxes for industry (e.g. excluding VAT and other recoverable taxes) and exemptions are not reported. For the large majority of Member States the share of taxes and levies is still below 10% of ex-VAT prices, even though for Germany, Italy and Austria it exceeds 20%[14]

In the case of households, the taxes and levies component of the EU weighted average price went up by 36.5% and its share accounts on average for 30% of the final price (up from 26% in 2008).

Network costs went up by 30% for industrial consumers and by 18.5% for households. While this increase is smaller than in the case of taxes and levies, network charges constitute a much more important element of final prices, reaching 50% in the case of households (CZ) and 56% in the case of industrial consumers (LT).

[14] These countries may give exemptions that are not uniform and hence report certain levies as non-recoverable, whereas they are indeed recoverable for certain categories of consumers.

Figure 6. Evolution of EU28 electricity retail price by components: percentage change, selected household and industrial bands



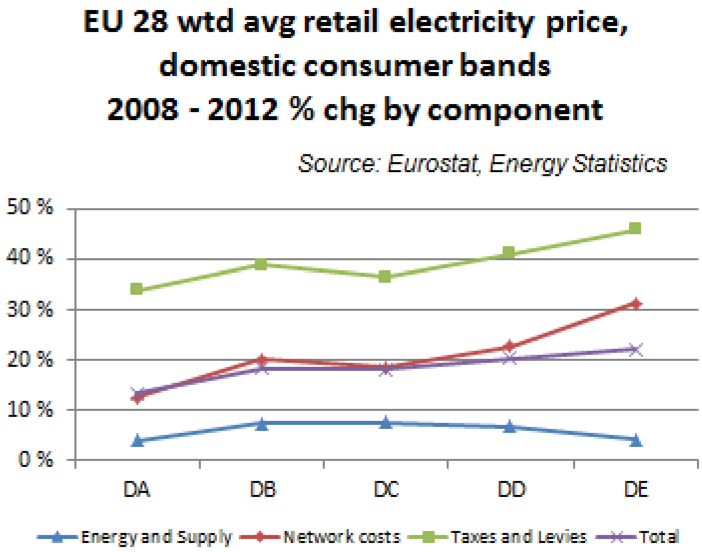
Note: Prices include all taxes in the case of households. Prices exclude VAT and other recoverable taxes in the case of industry, as well as industry exemptions (data not available).

The energy element went up only slightly in the case of households and indeed went down in the case of industrial consumers.

With these general findings it is important to point out that part of the increase in the taxes and levies includes financing for energy supply costs and that "network" costs can include other charging elements (e.g. for RES or other financing needs). Member State reporting is inconsistent in this regard and needs to be improved.

The next two charts illustrate that the developments observed for the median consumers were quite representative for the remaining consumer bands as well. As a rule, the taxation element registered the highest increases across all bands, followed by increases in the network components of half that magnitude, whereas the costs related to the supply of energy remained stable.

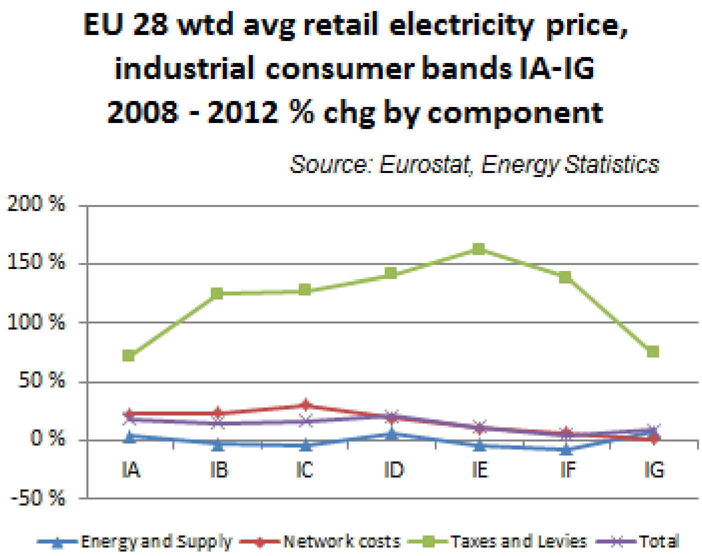
Figure 7. Evolution of EU 28 electricity retail price by components, all household consumer bands



DA	Consumption < 1 000 kWh
DB	1 000 kWh < Consumption < 2 500 kWh
DC	2 500 kWh < Consumption < 5 000 kWh
DD	5 000 kWh < Consumption < 15 000 kWh
DE	Consumption > 15 000 kWh

The increase in the non-recoverable taxation element was significantly higher for industrial consumers. The network and energy elements were stable, even slightly negative for the larger consumer bands. As the relative share of non-recoverable taxes currently represents a small portion of the final bill, network costs were among the most likely price drivers.

Figure 8. Evolution of EU 28 electricity retail price by components, all industrial consumer bands

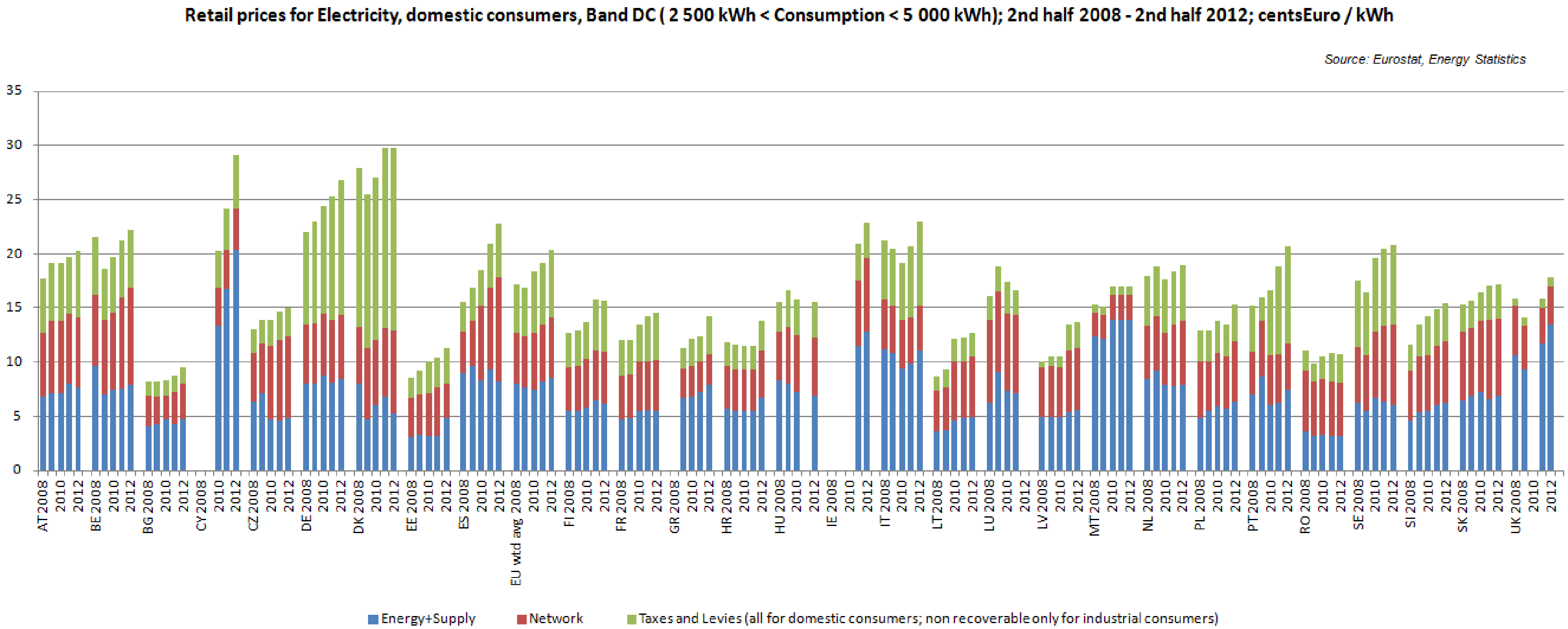


DA	Consumption < 1 000 kWh
DB	1 000 kWh < Consumption < 2 500 kWh
DC	2 500 kWh < Consumption < 5 000 kWh
DD	5 000 kWh < Consumption < 15 000 kWh
DE	Consumption > 15 000 kWh
IA	Consumption < 20 MWh
IB	20 MWh < Consumption < 500 MWh
IC	500 MWh < Consumption < 2 000 MWh
ID	2 000 MWh < Consumption < 20 000 MWh
IE	20 000 MWh < Consumption < 70 000 MWh
IF	70 000 MWh < Consumption < 150 000 MWh
IG	Consumption > 150 000 MWh

Components at national level

The weighted average EU numbers conceal a great deal of variety between Member States. The chart on the next pages illustrates the evolution of the energy, supply, network and taxation components for each Member State and for the median household consumer band in 2008 – 2012.

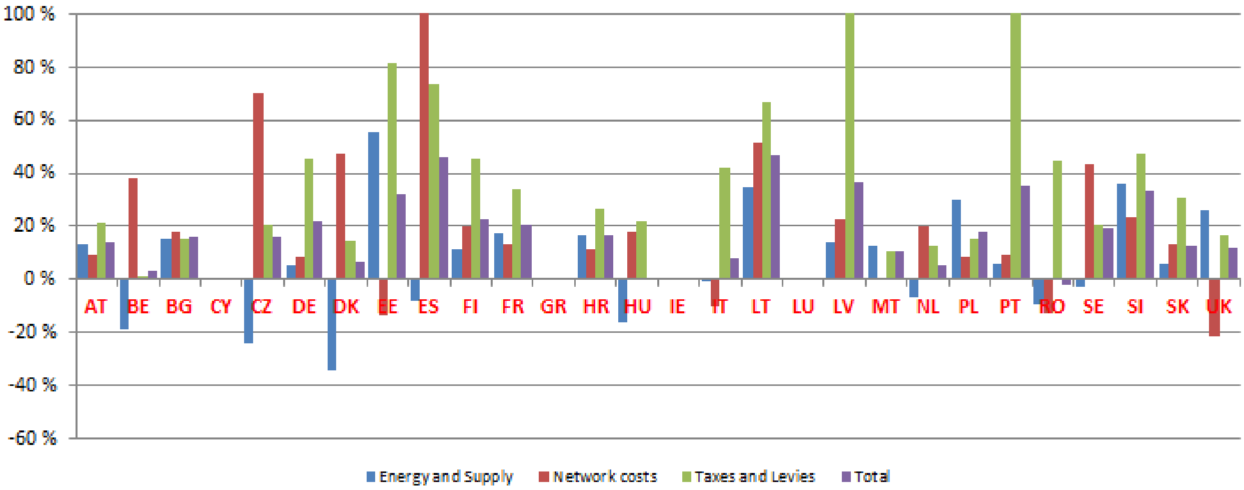
Figure 9. 2008-2012 evolution of the retail price of electricity, median households by component



Note: Prices include all taxes.

The percentage change of the level of the energy component of **household electricity prices** varied in a range of -34% in Denmark and +55% in Estonia over the period 2008-2012. During the same period the network costs of households decreased in the UK (-21%) and more than doubled in Spain (+152%[15]). The largest growth in taxes and levies on electricity prices for households was in Portugal, where the component level went up by more than 100%[16] and in Latvia where it increased by almost 400%[17].

Figure 10. Retail electricity prices, Household consumer band DC; 2008 – 2012 percentage change by component



Source: Eurostat, energy statistics

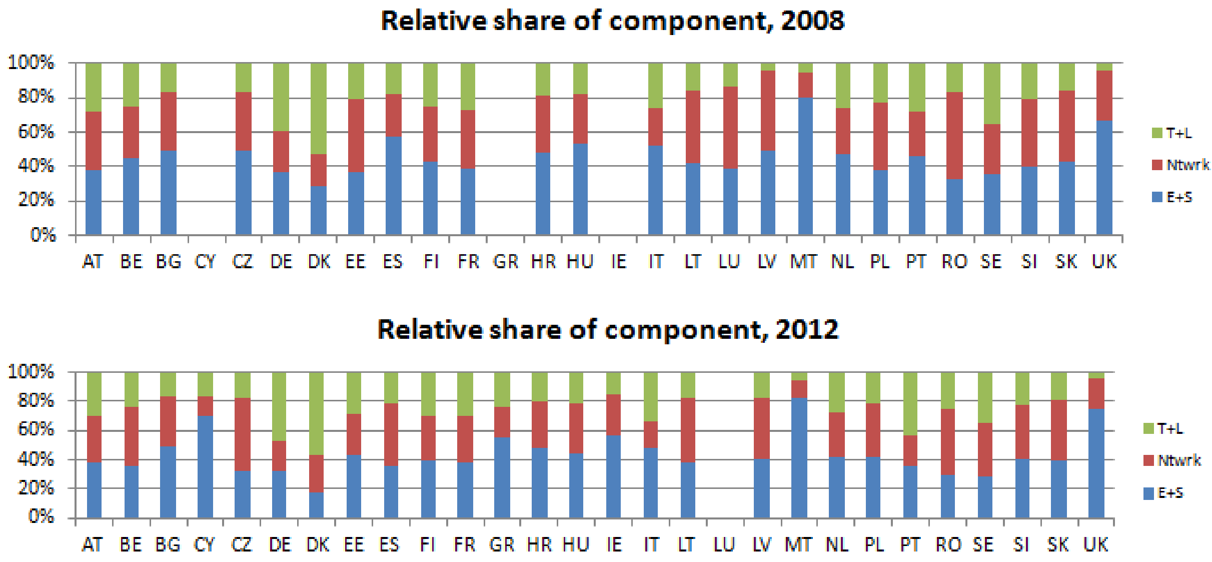
In 2008 taxes and levies represented on average 26% of the bill, being as low as 5% for Malta, the UK and Lithuania and accounting for more than half of the bill in Denmark (52%). In 2012 the relative share of taxes reached 30% on average, ranging from 5% in the UK, to close to 30% in Austria, Estonia, Finland, France, Italy and Sweden and reaching 43%, 46% and 56 % respectively in Portugal, Germany and Denmark. The share of taxes decreased marginally in Belgium, Bulgaria, Malta in Poland while it grew by more than 10% in Latvia and Portugal.

[15] The Spanish data apparently includes significant other charges together with network costs

[16] A combination of an increase in VAT rate, concession fees, stranded costs and other taxes linked to the energy sector and a small decreases on RES and CHP levies and the compensation for isolated islands, according to the MS metadata (see footnote **Error! Bookmark not defined.**)..

[17] The RES tax doubled and the VAT rate increased more than 4 time, according to the MS metadata (see footnote **Error! Bookmark not defined.**).

Figure 11. Relative share of components, households

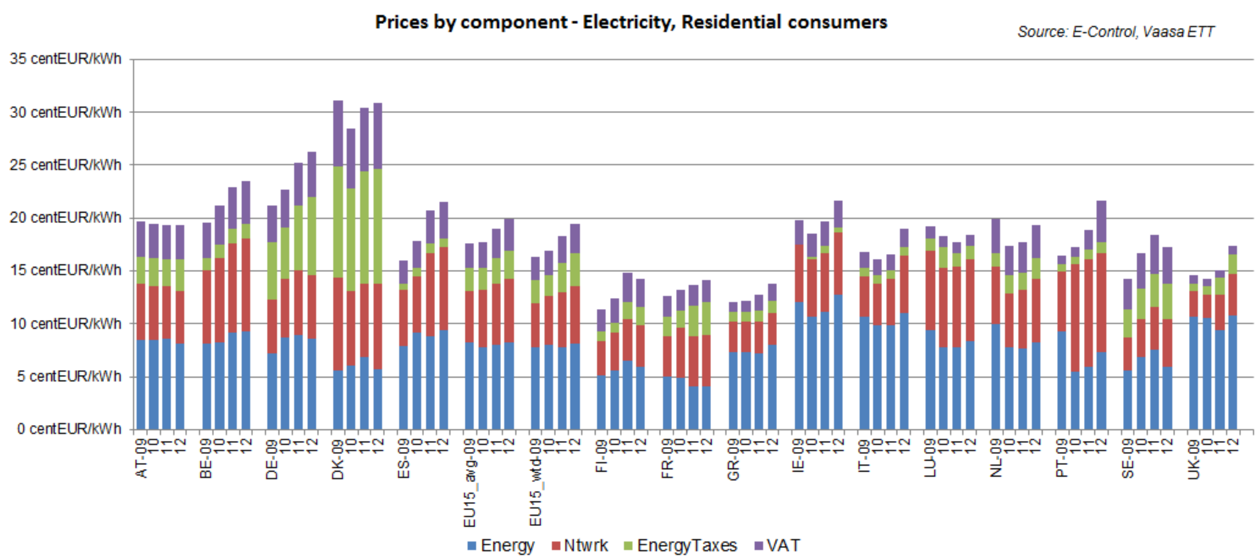


Source: Eurostat, energy statistics

Note: Prices include all taxes

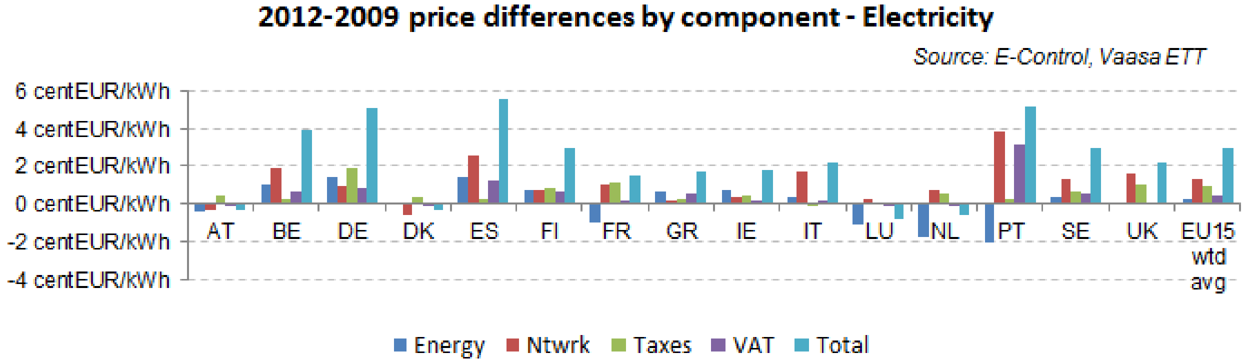
A further look into the different elements of the electricity bill of residential consumers is provided by the Household Energy Price Index (HEPI) from E-Control and VaasaETT[18]. Each month since January 2009, it has been reporting electricity prices paid by residential consumers in 15 capitals of the EU since 2009. It also provides an alternative breakdown of the taxation component into taxes related to energy policies and VAT and other recoverable taxation instruments.

Figure 12. EU15: electricity retail prices – residential consumers in capitals, 2009 – 2012 evolution



[18] http://www.energypriceindex.com/

Figure 13. EU15: electricity retail prices – residential consumers in capitals; 2009-2012 differences and percentage changes by component



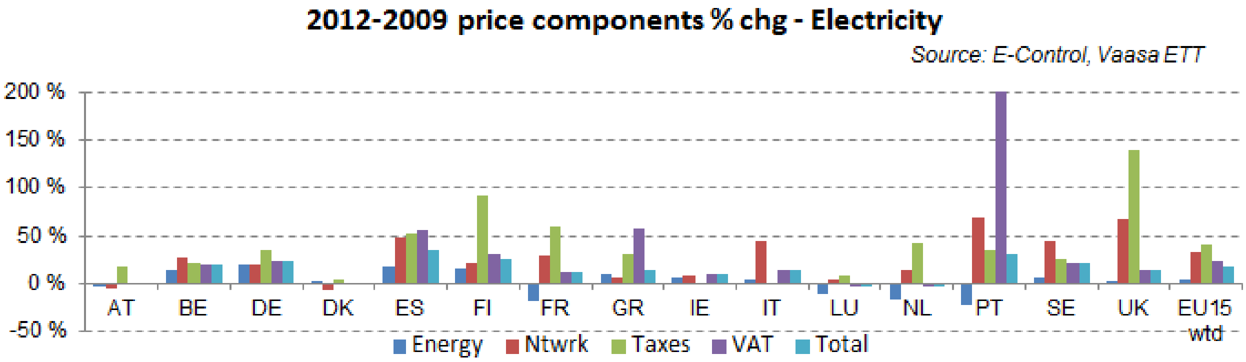
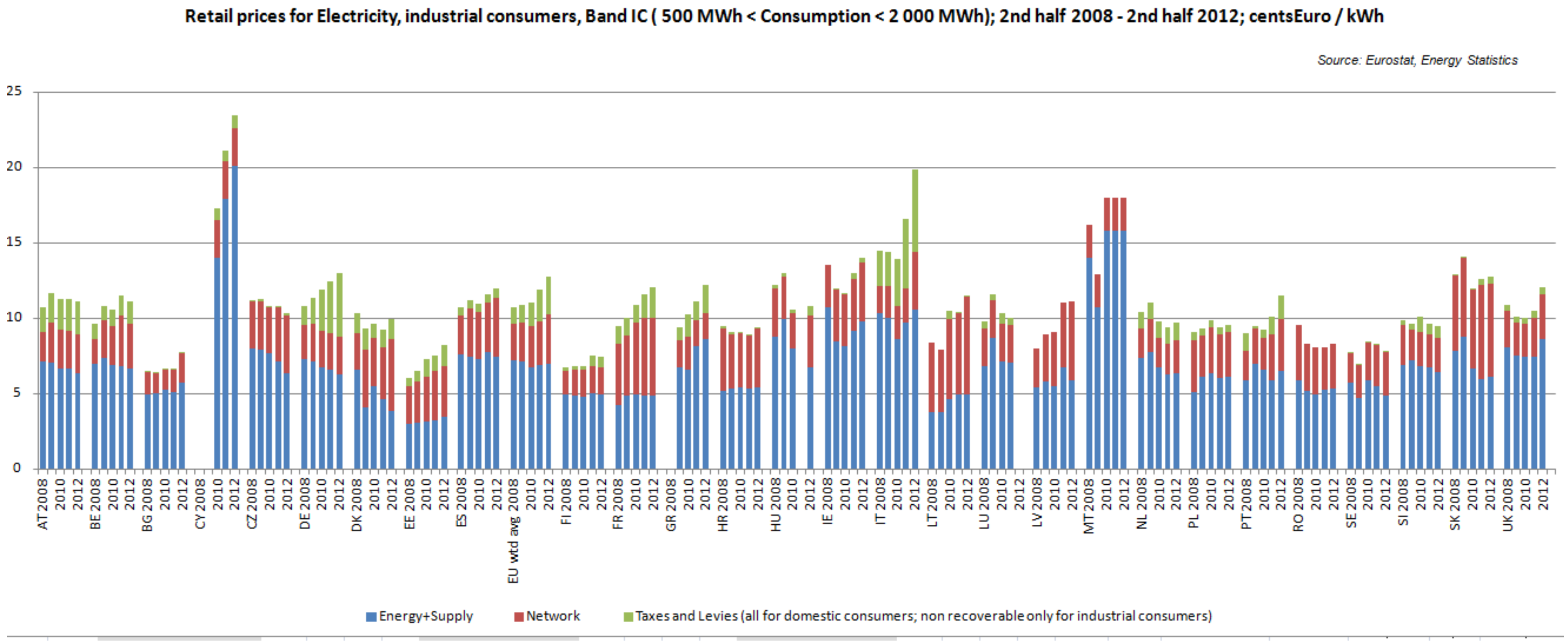


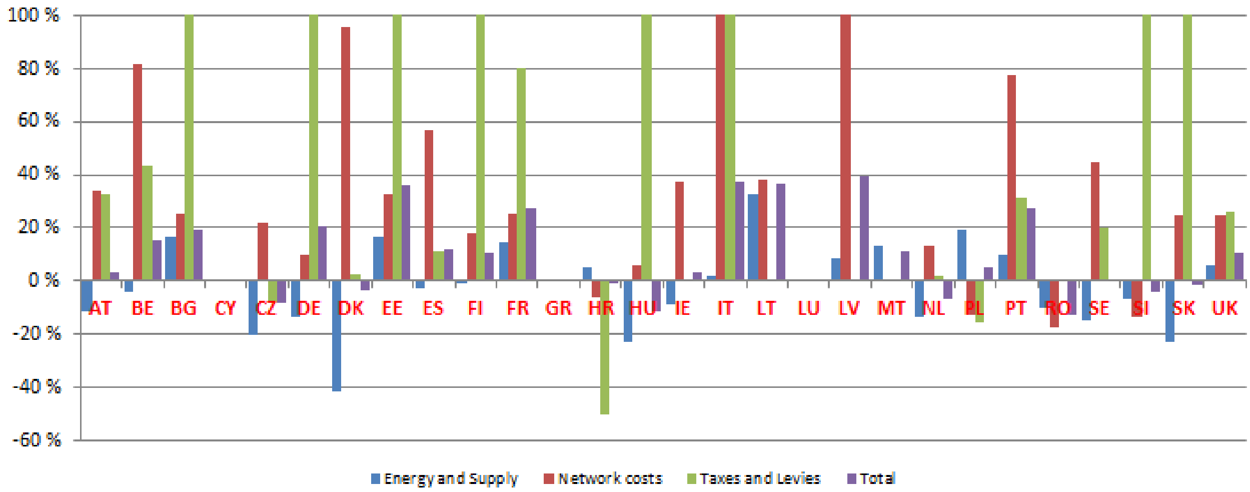
Figure 14. 2008-2012 evolution of the retail price of electricity, industrial consumers by component



Note: Prices exclude VAT and other recoverable taxes in the case of industry, as well as industry exemptions (data not available).

In the case of **industrial electricity prices**[19], between 2008 and 2012 the energy component went up by more than 30% in Lithuania, while it went down by 40% in Denmark. Network costs doubled in Latvia and Italy, but went down by 17% in Romania. Taxation increased many-fold in the following countries: Germany (RES levy and electricity tax), Estonia (RES tax and electricity excise tax), Finland (electricity excise tax), Hungary (increase in support for district heating, partly compensated by decreases in support for retirement schemes for electric industry employees and support for coal industry restructuring), Italy, Slovenia (contribution to provide security of supply by using domestic primary energy sources for electricity production, contribution to support the production of electricity in high efficiency cogeneration and from renewable resources, addition to fuel prices for the improvement of energy efficiency and an increase in excise tax) and Slovakia (increase of the excise tax and introduction of other taxes linked to the energy sector)[20]. The taxation component remains still a fairly minor part of industrial prices in most of these countries, except for Germany and Italy. More Member State specific information is available in **Annex 1**.

Figure 15. Retail electricity prices, Industrial consumer band IC; 2008 – 2012 percentage change by component



Source: Eurostat, energy statistics

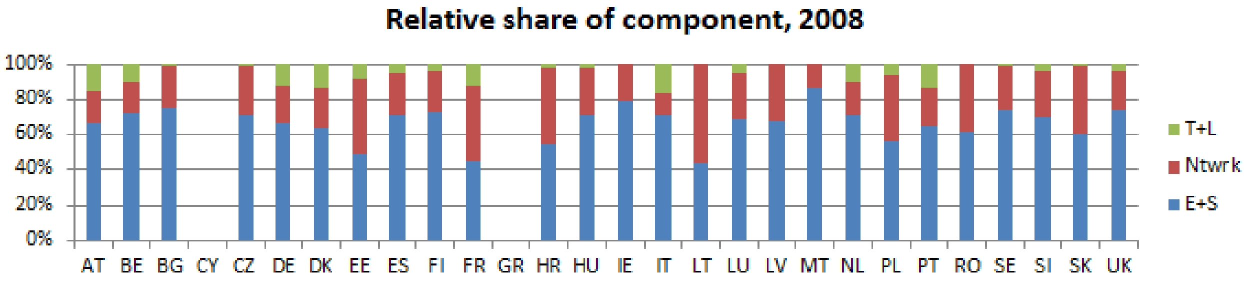
Note: Prices exclude VAT and other recoverable taxes in the case of industry, as well as industry exemptions (data not available).

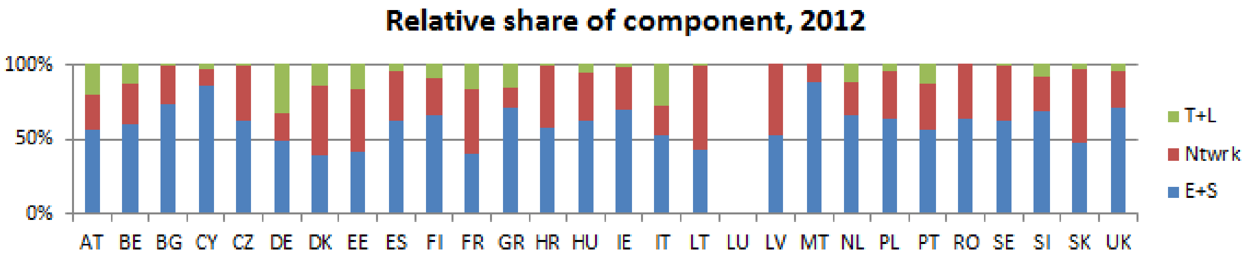
In 2008 taxes and levies represented on average 9% of the bill, being as low as 0.5% for Slovak consumers and reaching 16% in Italy. In 2012 taxes were counting still for less than 2% in Bulgaria, the Czech republic, Croatia, Lithuania and Sweden while they reached 32 in Germany; the average EU level reached 18%, well above the maximum level registered in 2008.

[19] The prices for the industrial consumer bands are net of VAT and other recoverable taxes and levies.

[20] Source: MS metadata (see footnote **Error! Bookmark not defined.**).

Figure 16. Relative share of components, industrial consumers





Source: Eurostat, energy statistics

Note: Prices exclude VAT and other recoverable taxes in the case of industry, as well as industry exemptions (data not available).

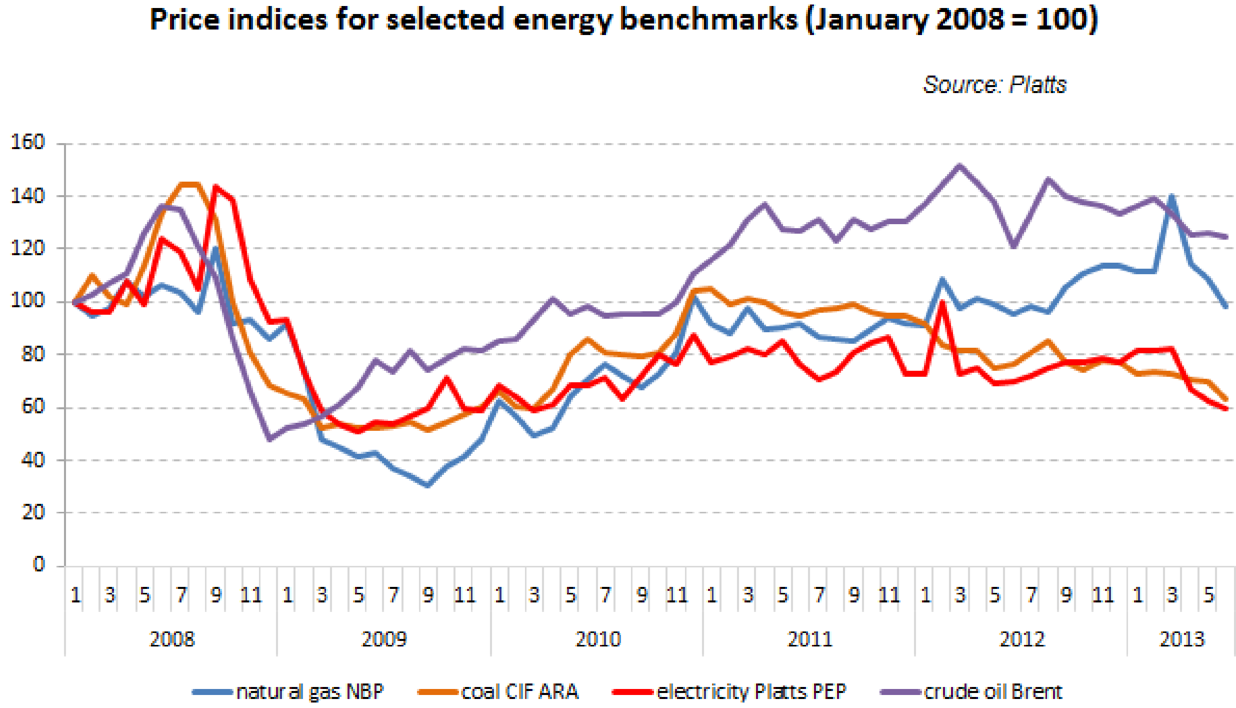
1.1.1.1. Costs related to energy and supply

In the case of **electricity prices paid by households**, in 2012 the energy component was between 3.2 Eurocent/kWh (Romania) and 20.4 Eurocent/kWh (Cyprus) and accounted for between 18% (Denmark) and 82% (Malta) of the household electricity price (see Figure 14 on p. 21). Median **industrial consumers** paid between 3.4 Eurocent/kWh (Estonia) and 20.1 Eurocent/kWh (Cyprus) for the energy component in 2012, its share in the final bill[21] ranging between 39% (Denmark) and 88% (Malta).

The wholesale market developments have influenced the energy – related component of the end consumer bill. As an asset class, energy commodities followed the market turmoil triggered by the financial crisis and the recession fears in most of the world's leading economies throughout the second half of 2008. Prices for crude oil, coal, natural gas and electricity experienced similar price corrections, as illustrated by Figure 17. Since then European electricity prices evolved within a range of EUR 40 / MWh – EUR 60 / MWh, representing 60%-70% of the price levels of January 2008. Fossil fuel prices were more volatile.

[21] Excluding VAT and other recoverable taxes

Figure 17. Evolution of European average wholesale electricity prices vis-à-vis coal and gas prices



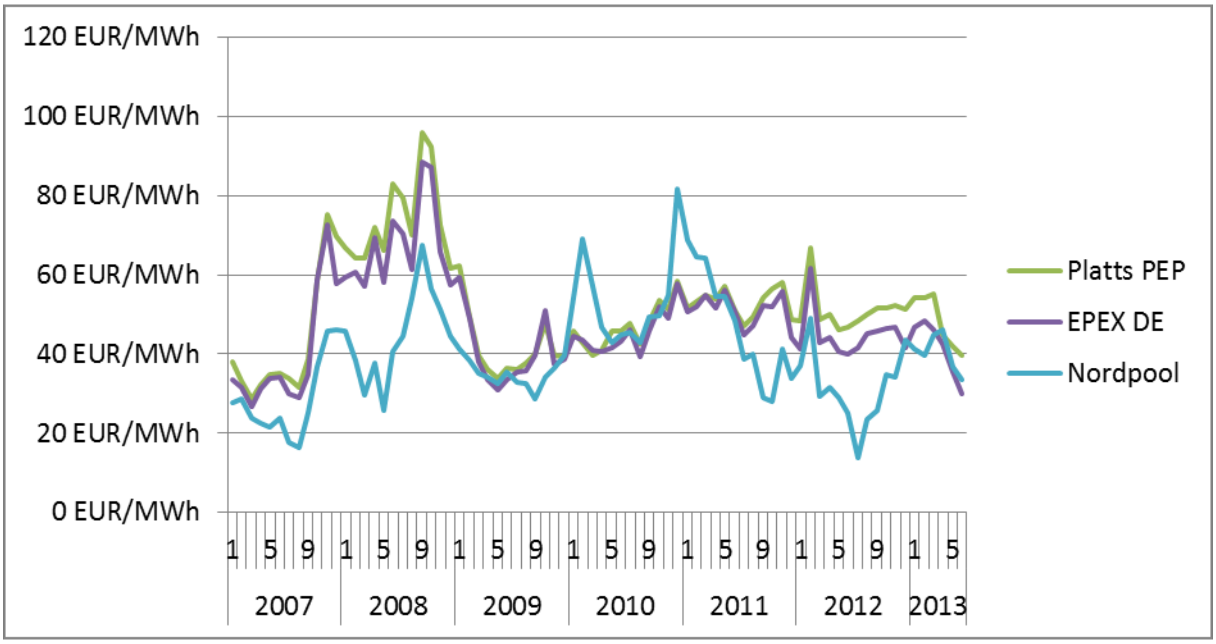
Notes: Platts PEP: Pan European Power Index (in €/MWh), Coal CIF ARA: Principal coal import price benchmark in North Western Europe (in €/Mt), Natural gas NBP: price for natural gas delivered at the national balancing point, a virtual trading location for sale and purchases of gas at the UK gas grid

The EU's main electricity markets have followed a similar trend, reflecting seasonal and regional specificities of the different price areas, as indicated in Figure 18 which illustrates the price evolution for the leading day-ahead indices[22]. In spite of some significant increases experienced over the period examined, subsequent decreases have resulted in wholesale electricity prices by the end of the period (June 2013) reaching levels close to those at the beginning of 2007 and well below peaks in 2008.

During the observed period (H2 2008 – H2 2012) **the prices of the major European wholesale electricity benchmarks decreased by 35 – 45 %** as markets remained well supplied. This is in clear contrast to the trend in retail prices.

[22] These indices are a proxy for the spot price; they are also used to build derivative products on the forward curve. Finally, they serve as a reference point for the over-the-counter trade (cleared and non-cleared).

Figure 18. Selected European benchmarks, wholesale electricity prices



Source: Platts

Prospex Research[23] estimates that the total electricity trading volumes in the mature EU markets, including exchanges and over-the-counter trades (OTC), stood at 8 500 TWh in 2012. This compares to a gross inland consumption for electricity in EU27 in the range of 3 000 – 3 200 TWh. The traded volumes recorded a second consecutive year of decrease, mostly linked to a reduction of trading activity of a number of banks and major utilities such as EDF, E.ON and RWE.

The German and Nordic markets remained the European leaders by a wide margin in terms of both total trading volumes and market development. The churn factors[24] of these markets have been estimated respectively at 7.1 and 5.

With regards of market sectors, OTC remained the favoured choice of trading, representing about 2/3 of total volumes. Yet, compared to previous years, OTC volumes declined significantly. The larger part of OTC is non-cleared on exchanges.

Despite the difficult conditions, the exchange spot trading remained the only segment to register steady increases of volumes. About 1 200 TWh were exchanged in 2012, reaching 14%, which is an increase compared to the year before. Among the factors shaping the evolution described above were the recession and slow economic recovery thereafter that affected energy demand, especially from industry, coupled with new electricity generation assets coming on-stream.

The frequency of occurrence of negative price episodes[25] rose in the last part of the observed period as the costs of ramping up or down of some conventional plants are significant.

Some of the new generation plants (wind, solar) impacted directly the supply curve[26] of the day-ahead market as their low marginal generation costs allowed them to outbid conventional electricity generators. As such, the RES units contributed to keeping the wholesale price in

[23] "European power trading 2013", Prospex Research, www.prospex.co.uk

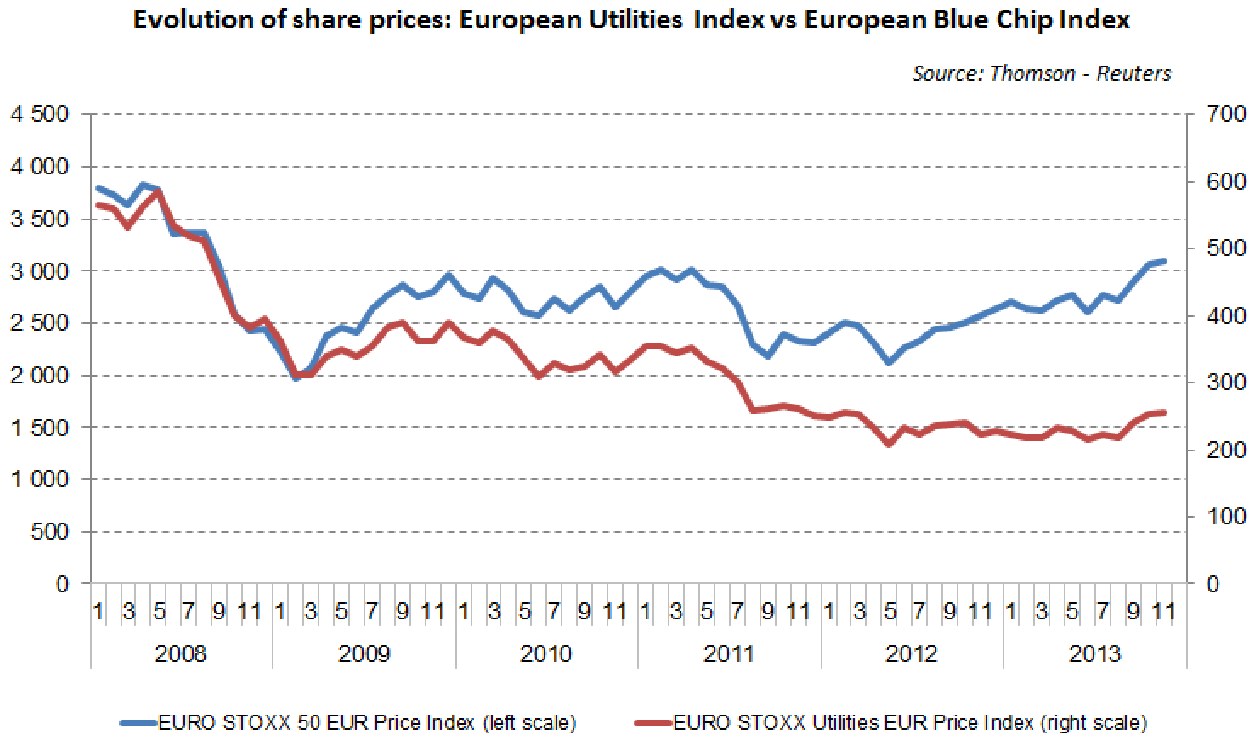
[24] The churn facto is defined as the ratio of traded volume to physical consumption. It informs about the liquidity of the market place and the quality of the pricing signal that is discovered on that market.

[25] Negative prices occur when, with excess supply of electricity, utilities with inflexible generation capacity prefer to pay to sell the generated electricity, rather than ramp down or close their power stations

[26] The ranking of electricity generation assets by their marginal cost of production sets up the supply curve, also known as the merit order.

check through **the merit order effect,** as explained in **Annex 3**. In a normally functioning energy market, the decreased wholesale prices *should* pass through to final consumers in the form of lower cost of the energy supply component.

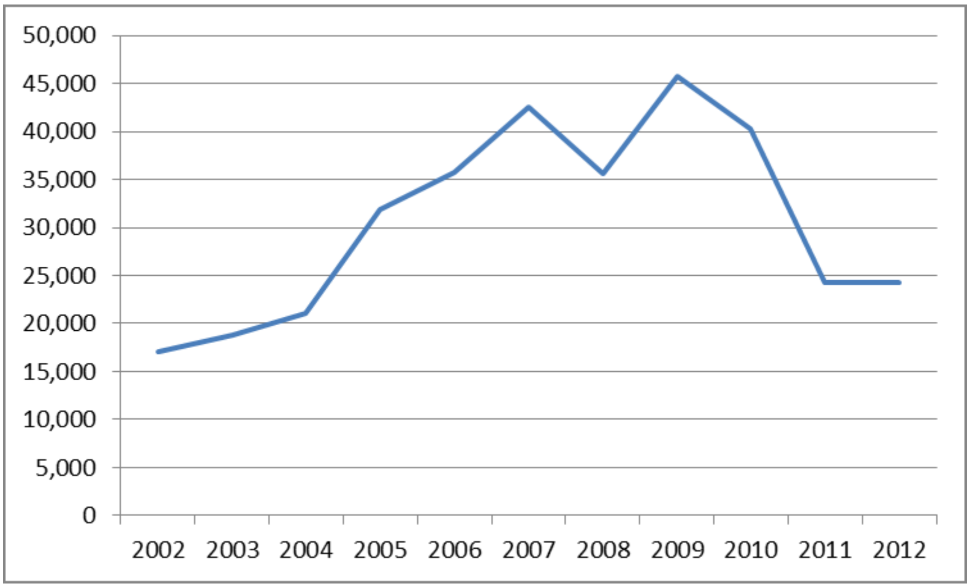
Figure 19 Evolution of share price indices: European Utilities vs. European Blue Chips



At the same time, policy support measures (including renewables and energy efficiency support and other energy subsidies) increase the levy element of retail prices or the transmission charges, while the costs of network development and ancillary services increased the network element. Thus overall, retail prices rose.

The combination of weak demand, stable wholesale electricity prices (when hydrocarbon prices were on the rise) has put pressure on conventional assets (at times resulting in companies adopting faster depreciation rates). In many cases both the profit margins from the generation business and company share prices were negatively affected, (as can be seen from the evolution of the Euro Stoxx Utilities index on Figure 19), and access to finance has been more difficult.

Figure 20 Reported Net Income for the Bloomberg EU Power Generation Top Index in € millions (2002-2012)



Source: Bloomberg

Reported net income for European electricity generation utilities demonstrates this negative trend in profits, as illustrated in Figure 20. Whereas fortunes had been rising throughout the first decade of the millennium, profits rapidly declined after a peak in 2009 before reaching a plateau in 2011. Earnings have not, however, stabilized across Europe, as European utilities are not equally exposed to the new risks facing the industry. Firms with large shares of coal generation have a different short-term outlook than those with large shares of gas generation due to low ETS credit prices and cheap coal prices resulting from increased American exports. Moreover, Central European utilities (E.ON, GDF Suez, RWE, PGE and CEZ) have been particularly hit due to their exposure to electricity prices. However, electricity generation utilities have fared poorly in other regions as well (Endesa, PGE).

As a rule, the EU utilities have tried to adapt to this new business environment by focusing more on downstream services, including decentralized generation and energy efficiency and by gradually divesting their conventional electricity generation assets.

In an open and competitive retail market the energy component of the end consumer price (Figure 1) for electricity would reflect generation costs, as represented by an efficiently functioning wholesale market[27] and the quality of services provided by the energy supplier; the network component would reflect the costs of the efficient operation and balancing of the transmission and distribution grids, including the demand side response, and the taxation component would be set in such a way, so as to achieve taxation and energy policy objectives with the least burden on consumers.

In addition, pricing signals should provide a strong link between the retail and wholesale segments, ensuring a completeness and coherence of the market structure. A strong and relatively quick **pass-through** of any persistent, long term change of the wholesale benchmark to the energy component in the retail price would indicate a good / normal

[27] The part of the consumer bill related to the supply of energy is in fact the only component where suppliers can actually compete.

operation of the IEM. The final consumers would then be able to adapt their economic decisions in line with the supply and demand fundamentals.

These conditions are rarely met in today's retail markets in the EU. The normal operation of the market is often restrained by a variety of factors and barriers that limit competition. Measuring barriers to entry is difficult in the case of electricity and natural gas markets, not least because harmonised methodologies to support data collection of relevant retail market indicators are still missing.

Elements that may slow down the interaction between retail and wholesale sections include but are not limited to: consumers' low ability and propensity to switch behaviour, sticky retail prices and non-market based price regulation.

In a competitive retail market the empowered and price-sensitive energy consumers have a wide range of options when it comes to finding attractive price offers. Switching across offers of the current supplier, or switching the supplier, is just one of those options, yet to be fully used in the case of EU retail electricity and natural gas markets.

Understanding consumer behaviour is in general a complex exercise which is further compounded for the case of electricity and natural gas. As a rule, the price elasticity of these commodities is low, implying that end consumers have to be incentivised by a significant price variation to consider changing behaviour. This may explain in part why switching rates tend to be low.

Figure 21, coming from the latest market monitoring report from ACER and CEER (2012)[28], illustrates this for the case of electricity: it shows that the expected profits from switching (coming in the form of savings on the bill) have to be substantial to incentivise consumer switching. In some cases the prospect of saving more than 10 Euros per month, just by switching to an existing offer in the market, may not be enough to prompt actions from consumers.

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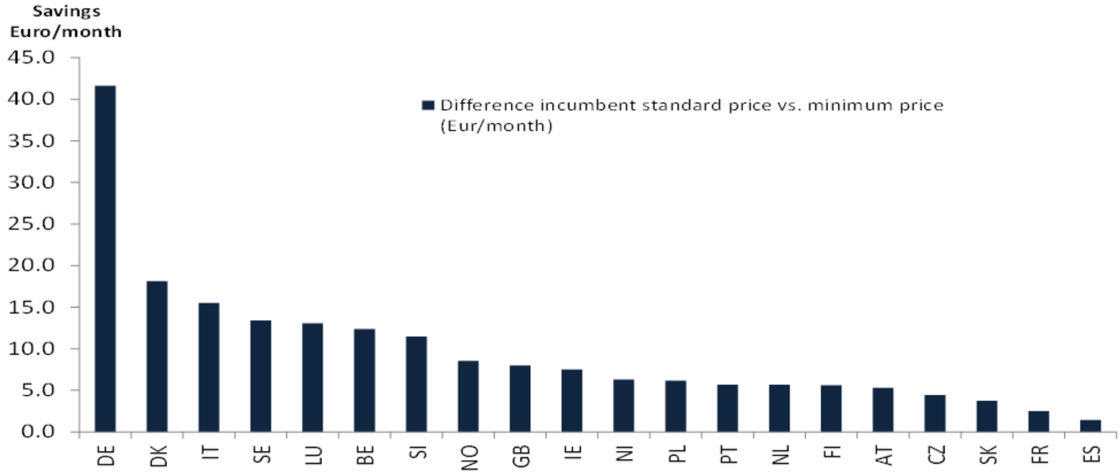
[28] The report is available here: http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Market%20Monitoring%20Report%202013.pdf

Figure 21. Average monthly saving potential (household consumers, 4000 kWh of annual consumption) from switching from the incumbent standard offer to the lowest priced offer in the market – capital city – December 2012 (euro/month)



Source: ACER retail database (December 2013)

Non-market related justifications – such as loyalty to a supplier or a perception of protection by staying under the administered offer – may not be enough to explain such behaviour. The complexity of supply offers, lack of transparency and user-friendly tools for comparing offers, or even ignorance and lack of interest may also be at play.

Commission's 2010 in-depth market study on retail electricity market found that current market conditions (limited transparency and comparability of tariffs and offers, limited access to information as well as complicated switching procedures) make it very difficult for EU consumers to compare the different offers and choose the best deal, or to subsequently switch providers. The study estimated that 62% of consumers could switch to a cheaper tariff, representing a potential average annual saving of EUR 13 billion EU-wide.[29]

For a large group of consumers, the retail prices also tend to be **sticky**: such consumers would sign contracts where prices and consumed amounts are set ex-ante and where metering and ex-post bill settlement takes place on regular intervals (matching real and estimated prices and consumed volumes). Demand-side participation on the wholesale market is thus discouraged and so is the transmission of pricing signals between the retail and wholesale segments.

As indicated by the ACER-CEER report, Member States continue to administer retail prices for electricity over vast portions of household and industrial consumers: "***in 2008, 130 million out of 229 million of household consumers in Europe were supplied under regulated prices, i.e. 57%. This share decreased only to 51% four years later****. Whilst in several MSs regulated and non-regulated prices co-exist, the tendency for household consumers to switch from regulated to non-regulated prices is rather low".*

It should be noted that several Member States have committed themselves to timetables to phase out retail price regulation and other Member States are considering such a phase out. In a few other Member States, isolated wholesale markets would not for the time being allowing competition to keep prices at check in the retail markets. Retail price regulation might in these instances not have a major distortive impact.

[29] *The functioning of retail electricity markets for consumers in the European Union*, Study on behalf of the European Commission, Directorate-General for Health and Consumers, 2010 – http://ec.europa.eu/consumers/consumer_research/market_studies/docs/retail_electricity_full_study_en.pdf.

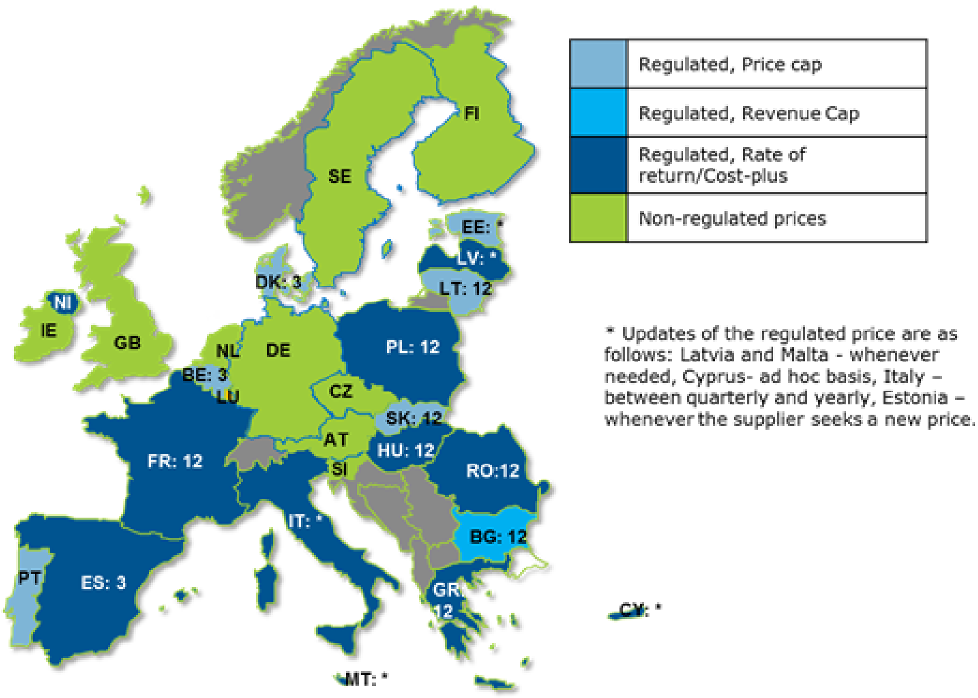
Non-market based regulated prices tend to distort the normal operation of retail markets; service quality and innovation tend to be lower than they would otherwise be. Moreover, the implementation of smart demand response solutions, which allow consumers to take advantage of fluctuating just-in-time prices, depend on flexible pricing formulas, and therefore risk being hampered by retail price regulation.

Moreover, in these cases incentives for energy efficiency are greatly reduced and an additional financial burden is placed on consumers in their capacity of taxpayers in order to finance the non-covered costs

A recent European Commission service report found out that price regulation leads to cross-subsidisation among consumer groups[30]. When prices are set below costs, tariff deficits may accumulate in the balance sheet of companies that are present on the market. Profit margins of companies deteriorate and the related uncertainty might have a negative impact on the cost of capital, which in turn impacts investment decisions. Switching behaviour would be further discouraged as consumers would not see any need to look for competitive offers and new entrants would stay away from the market.

A regulation setting prices above costs can also distort retail markets and act as a deterrent to new entry. It clusters offers around the regulated level and discourages switching; it also creates unnecessary burden for National Regulating Agencies as the definition of the regulation methodology may become a contested topic in the political debate and thus subject to frequent modifications.

Map 3 Method of price regulation (electricity) and update frequency in months in Europe - 2012



Source: The CEER national indicators database and ACER questionnaire on regulated prices (2013)

[30] DG ECFIN. Energy Economic Development in Europe

Whereas the drive to regulate prices may be prompted by legitimate concerns as the protection of certain vulnerable consumer groups, regional policies, secure supplies, etc. these concerns can be better addressed through policies which are less distortive on the retail markets, in particular focussed financial support of vulnerable consumers that enable these customers to source energy at competitive market prices.

Map 3, again from the ACER-CEER report, illustrates that 18 Member States continued to regulate prices in 2012. Price regulation methods for the energy component of the retail price for electricity are specific for each Member State. As mentioned, "*11 out of 18 Member States with regulated electricity prices apply rate of return/ cost plus regulation (i.e. Cyprus, France, Greece, Hungary, Italy, Latvia, Malta, Northern Ireland, Poland, Romania and Spain). Price cap is applied in five out of 18 MSs (i.e. Denmark, Estonia, Lithuania, Portugal and Slovakia). Bulgaria regulates end-user prices by applying the revenue cap regulation for end suppliers and distribution companies*".

The factors slowing down the completion of the retail segment of the internal market are also contributing to the generally negative perception of consumers with regards to the quality of the service provided. As consistently shown by the Commission's Consumer Markets Scoreboards[31], the electricity and natural gas sectors are rather poorly assessed by consumers. In 2013, the electricity market ranked 28th out of 31 services markets, with market performance significantly differing from one country to another and particularly low scores in Southern European countries[32]. The market has particularly poor scores on the choice of suppliers available in the market, comparability of offers and trust in suppliers to respect consumer protection rules (2nd, 4th and 5th lowest among all services markets, respectively). In addition, only 4% of consumers have switched products or services with their existing provider and 7% switched supplier during the past 12 months (4th lowest among the 14 'switching services' markets) and the switching process is perceived as relatively difficult. All this suggests that consumers do not yet have the conditions to make full use of the saving opportunities created by market liberalisation[33].

According to Commission services' empirical estimate on electricity price drivers[34], market opening plays a downward effect on end user prices. Policies, such as unbundling of the electricity activities benefited end users by lowering the retail prices through higher competition among suppliers and more efficient monitoring of network costs. At the same time, fossil fuels are still important drivers and countries that have access to low marginal cost plants, such as nuclear and coal plants, face lower wholesale prices compare to countries that depend on high marginal cost, such as open cycle natural gas and oil plants. Finally, the RES penetration at times contributes to increasing the retail prices through the levy's component, as the cost of the supporting schemes may outweigh the benefit of lower wholesale prices resulting from renewables (see Annex 3. The merit order effect). However in many countries, the cost of RES supporting schemes is increased unevenly among consumer groups (particularly households) due to the government's protection of energy intensive industries. Industries.

[31] The Consumer Markets Scoreboard ranks over 50 consumer markets based on how well they are functioning for consumers in terms of trust, comparability, problems and complaints and overall consumer satisfaction. In addition, for the relevant markets, the Scoreboard also monitors switching suppliers and tariffs and consumer choice of providers. See http://ec.europa.eu/consumers/consumer_research/cms_en.htm.

[32] There is a 33 point difference (on a scale for up to 100 points) between the top ranked country (Germany) and the bottom ranked country (Bulgaria).

[33] Consumer Market Monitoring Survey 2013 commissioned by DG SANCO, to be used in the forthcoming 10th Consumer Markets Scoreboard.

[34] See Energy Economic Development in Europe, DG ECFIN.

As some industries are exempt from RES-related levies, the majority of the costs brought about by investments are to be borne by household consumers in some Member States (e.g. Germany). However in other Member States the situation appears to be different and lessons are to be learned from different national experiences

1.1.1.2. Costs related to networks

In 2012 median households paid in the range of 2.2 Eurocent/kWh (Malta) to 9.6 Eurocent/kWh (Spain) for the network component and its share represented between 13% (Cyprus and Malta) and 50% (Czech Republic) of the total bill. For industry, network costs represented between 11% (Cyprus) and 56% (Lithuania) of the end price and consumers paid between 1.66 Eurocent/kWh (GR) and 6.46 Eurocent/kWh (Lithuania).

The proceeds collected from the network component of the end consumer bill are intended to cover capacity and operating expenses related to the transmission and distribution grids. Both businesses are run as regulated activities and the expenses can be schematically broken down into infrastructure costs (maintenance and grid expansion), system services (costs by use or by availability), network losses and other charges such as (but not limited to) stranded costs, public service obligations, policy support to certain technologies, etc.

Direct comparison of unit tariffs should be done with caution due to differences between countries in areas such as quality of service, market arrangements, main technical characteristics, topological and environmental aspects of the networks, e.g. consumption density, generation location, that influence the level of such charges. On the transmission side these relate to costs of infrastructure, energy losses, ancillary services, system balancing and re-dispatching.

Figure 22 presents a breakdown of the network costs into transmission and distribution components starting from the total network values reported by Eurostat. These values are only indicative as they may include elements which are not directly related to the operation of the transmission and distribution grid. Such is the case for a number of Member States estimated to be on the high end of network costs. More elements are needed to conduct a thorough analysis on the drivers affecting network costs. What emerges is that, barring few exceptions, distribution costs are by far the larger part of this component.

The split of electricity transmission and distribution costs within network costs also varies significantly across Member States – Spain, Denmark, Lithuania, Latvia and Slovakia have rather high distribution costs. Transmission costs are relatively high in Slovakia, Ireland, the Czech Republic, Croatia, Lithuania and Spain.

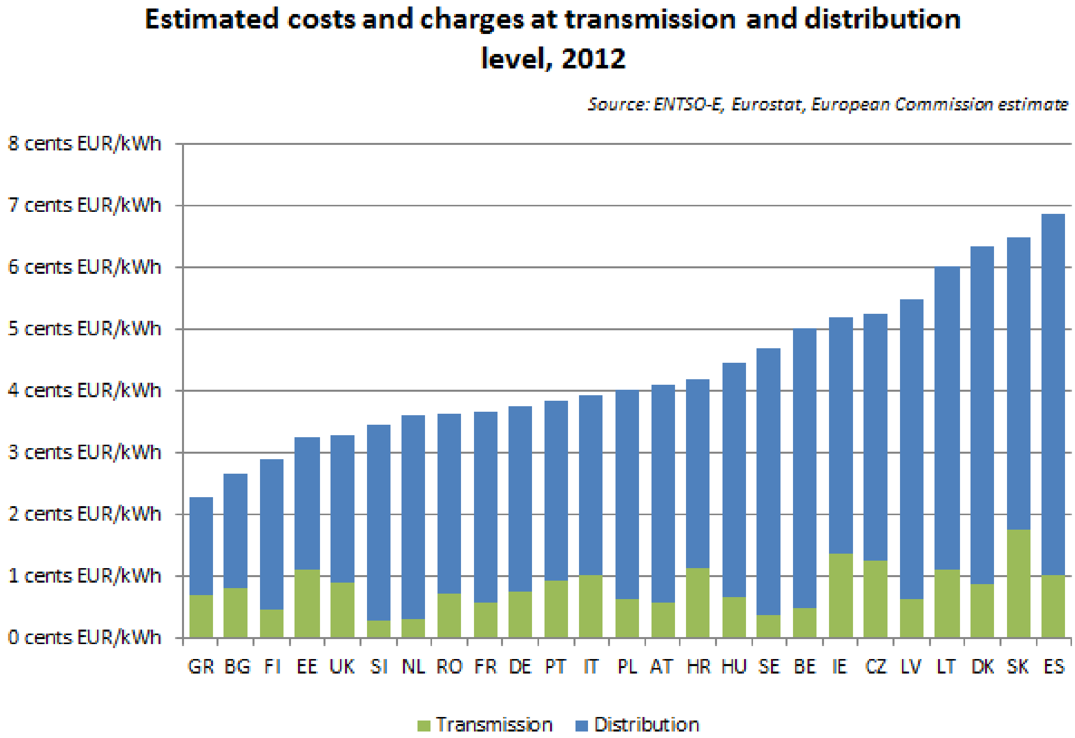
Detailed and harmonized information on the distribution grids of the EU is in general scarce. For the majority of the distribution grids, not much is known even on basic data such as total length and age of operation by component[35]. It is also not clear if national regulators are applying similar accounting rules and methodologies to determine the level of the distribution and, to a lesser extent, the transmission tariff.

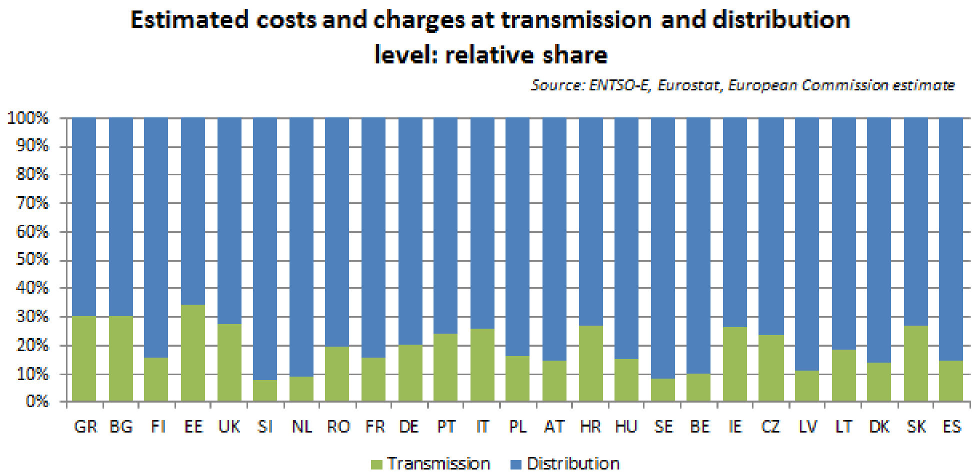
The observed differences in network charges may result not only from differing underlying transmission and distribution costs, but also from different regulatory cost assessment methodologies in use by NRAs at TSO and/or DSO level (asset eligibility, asset valuation and

[35] A first estimation of the total length is provided by Eurelectric, "Power distribution in Europe: facts and figures": http://www.eurelectric.org/media/113155/dso_report-web_final-2013-030-0764-01-e.pdf

asset remuneration for instance). Figure 23 provides data on some basic elements of the transmission grid.

Figure 22. Breakdown of network costs into transmission and distribution (levels + shares)



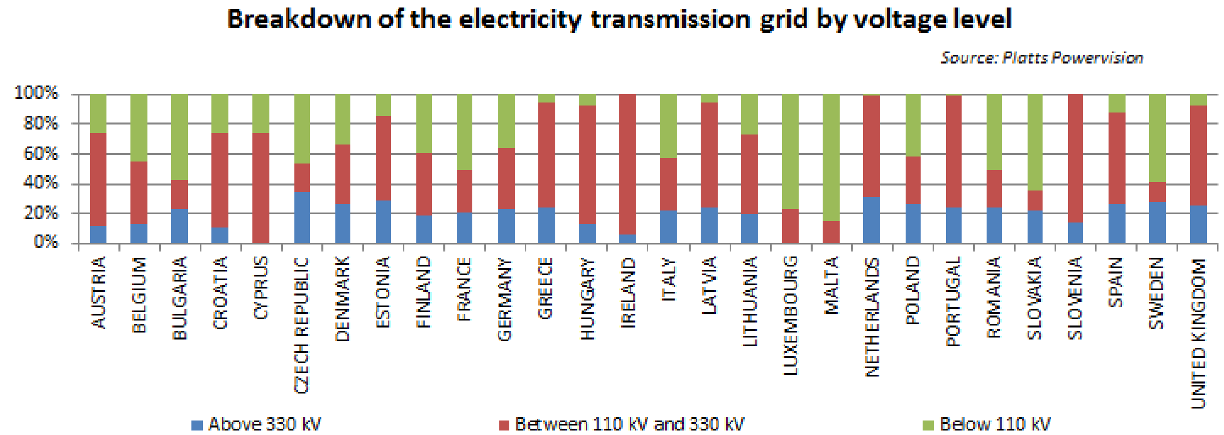


Note: certain Member States add non network costs to network charges, which are not distinguished in the data. For example, Spanish data reported to Eurostat includes capacity payment (*pagos por capacidad*) and premium payments for RES and CHP (*Prima Régimen especial*) under network costs. Similarly, Danish data reported to Eurostat classifies Public Service Obligations under network costs.
The total network costs are calculated as a weighted average of network costs for household and industrial consumers (consumer bands DC and IC), as reported by Eurostat. Transmission costs are those reported by ENTSO-E. Distribution costs are estimated as the difference of total network and transmission costs. Data limitations do not allow splitting network costs in Luxembourg, Cyprus and Malta.
ENTSO-E calculates the unit transmission tariff taking into account the whole of the tariff: adding the invoices applied to the load and to the generation (if applicable), and assuming they produce and consume the energy they had in their programs (without individual deviations). ENTSO-E makes the following assumptions: 5000 h utilization time that includes day hours of working days, typical load considered is eligible and has a maximum power demand of 40 MW when it is connected at EHV and a maximum power demand of 10 MW when it is

connected at HV, for countries with tariff rates that are differentiated by location an average value has been taken.

Figure 23 Length and relative share of Member States electricity transmission grids by voltage level

	< 110 kV (km)	110-330 kV (km)	> 330 kV (km)	Total (km)
AUSTRIA	1808	9199	3929	14936
BELGIUM	1447	4483	4781	10712
BULGARIA	3323	2828	8274	14425
CROATIA	982	5943	2446	9371
CYPRUS	0	968	328	1297
CZECH REPUBLIC	3950	2206	5369	11525
DENMARK	2514	3761	3149	9424
ESTONIA	2118	4131	1077	7325
FINLAND	4282	10061	9193	23536
FRANCE	21562	28605	51186	101353
GERMANY	20057	34824	30354	85234
GREECE	4353	12223	1010	17586
HUNGARY	2612	15535	1419	19566
IRELAND	435	6485	3	6923
ITALY	11986	19103	23581	54670
LATVIA	1378	3929	310	5617
LITHUANIA	1544	4186	2050	7779
LUXEMBOURG	0	167	538	704
MALTA	0	34	190	225
NETHERLANDS	3289	6958	133	10380
POLAND	6348	7625	9835	23808
PORTUGAL	1813	5592	67	7472
ROMANIA	4474	4444	9334	18252
SLOVAKIA	1647	978	4776	7401
SLOVENIA	396	2410	1	2807
SPAIN	16911	37901	7896	62709
SWEDEN	11852	5638	24625	42116
UNITED KINGDOM	12459	33995	3535	49989

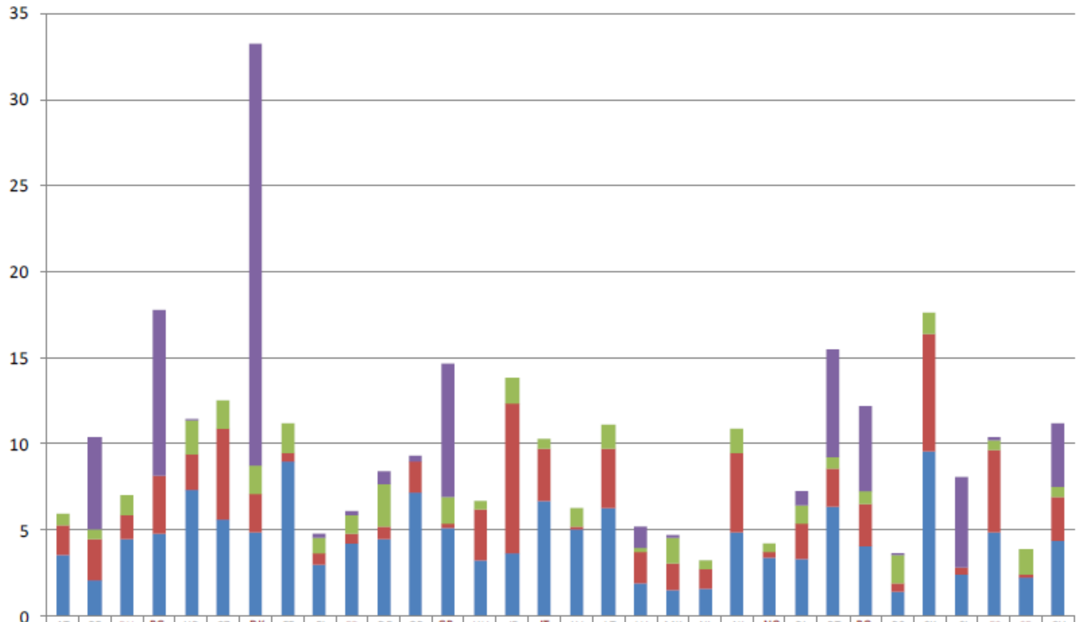


The work of TSOs within ENTSO-E may prove to be a good example to follow in bringing transparency on the operation of distribution networks. As more and more generation assets are connected to the low voltage level the need to reinforce the grid at that level increases. Grid expansion financed only by public investments may be difficult. So ensuring adequate financial framework to attract potential investors, may be necessary.

The next chart presents the components of the transmission tariffs, as represented by the latest ENTSO-E overview[36].

Infrastructure costs are in the 0.2 – 1 Eurocent / kWh range; system services including balancing are more variable with the ratio between the lowest to highest per Member State exceeding 1 to 10. Losses are globally comparable. The other regulatory charges are not directly related to TSO activities and include elements such as: stranded costs, public interest contribution, renewable energy and other. A detailed description by country is provided in Annex 5 of the above-mentioned publication.

Figure 24. Components of transmission tariffs, EUR/MWh



	AT	BE	BH	BG	HR	CZ	DK	EE	FI	FR	DE	GB	GR	HU	IE	IT	LV	LT	LU	MK	NL	NI	NO	PL	PT	RO	RS	SK	SI	ES	SE	CH
Other regulatory charges	0,00	5,33	0,00	9,60	0,01	0,00	24,51	0,00	0,19	0,18	0,75	0,29	7,69	0,00	0,00	0,00	0,00	0,00	1,25	0,21	0,00	0,00	0,00	0,83	6,24	4,91	0,02	0,00	5,28	0,12	0,00	3,73
Losses	0,61	0,60	1,16		2,01	1,58	1,66	1,70	0,90	1,10	2,49	0,00	1,57	0,51	1,45	0,524	1,07	1,38	0,24	1,49	0,53	1,39	0,52	1,06	0,69	0,76	1,59	1,26	0,00	0,57	1,47	0,58
System Services	1,79	2,37	1,39	3,34	1,99	5,26	2,18	0,50	0,71	0,61	0,75	1,85	0,20	2,98	8,78	3,05	0,19	3,44	1,82	1,56	1,11	4,59	0,32	2,04	2,23	2,46	0,50	6,85	0,42	4,77	0,18	2,57
Infrastructure	3,52	2,06	4,44	4,81	7,36	5,63	4,89	9,00	2,95	4,17	4,41	7,14	5,14	3,19	3,60	6,68	5,03	6,28	1,90	1,47	1,58	4,89	3,38	3,32	6,32	4,02	1,42	9,53	2,37	4,87	2,20	4,34

Source: ENTSO-E Overview of transmission tariffs in Europe: Synthesis 2013

[36] https://www.entsoe.eu/fileadmin/user_upload/_library/Market/Transmission_Tariffs/Synthesis_2013_FINAL_04072013.pdf

1.1.1.3. Costs related to taxation

In 2012 median EU households paid between 0.85 Eurocent/kWh (UK) and 16.8 Eurocent/kWh (Denmark) for the taxation component which accounted for between 5% (UK, Malta) and 56% (Denmark) of the total bill.

The share of the taxation component (net of VAT and other recoverable taxes and levies) for industrial consumers varied in the range of 0% (Romania, Lithuania, Latvia, Malta) to 32% (Germany) of industrial electricity prices (excluding recoverable taxes) with levels of up to 5.5 Eurocent/kWh (Italy).

In general, taxes on energy can be divided into broad consumption taxes (such as Value Added Tax, VAT) and specific taxes (such as excise duties, energy and carbon taxes). VAT is a general tax that applies, in principle, to all commercial activities involving the production and distribution of goods and the provision of services. VAT is a consumption tax borne ultimately by the final consumer as a percentage of price. In contrast, excise duties are indirect and specific taxes on the consumption or the use of certain products, which are expressed as a monetary amount per quantity of the product.

Where carbon taxes are in place, they are generally designed to complement rather than overlap with the ETS, and ensure a similar burden share between ETS and non-ETS sectors. This is the case in Denmark and Sweden, for example. The UK has in place a Carbon Price Floor, which acts to "top up" the price of carbon allowances in the ETS.

The overall effect of high energy taxation depends on the use of tax revenues. The IEA points out that while taxes on the sale of energy to industry can affect the sector's international competitiveness, this effect can be offset – to some degree – by government interventions designed to improve industrial competitiveness, such as government measures and programmes aimed at improvements to infrastructure, support for investments.

Tax Rates - VAT and excise duties

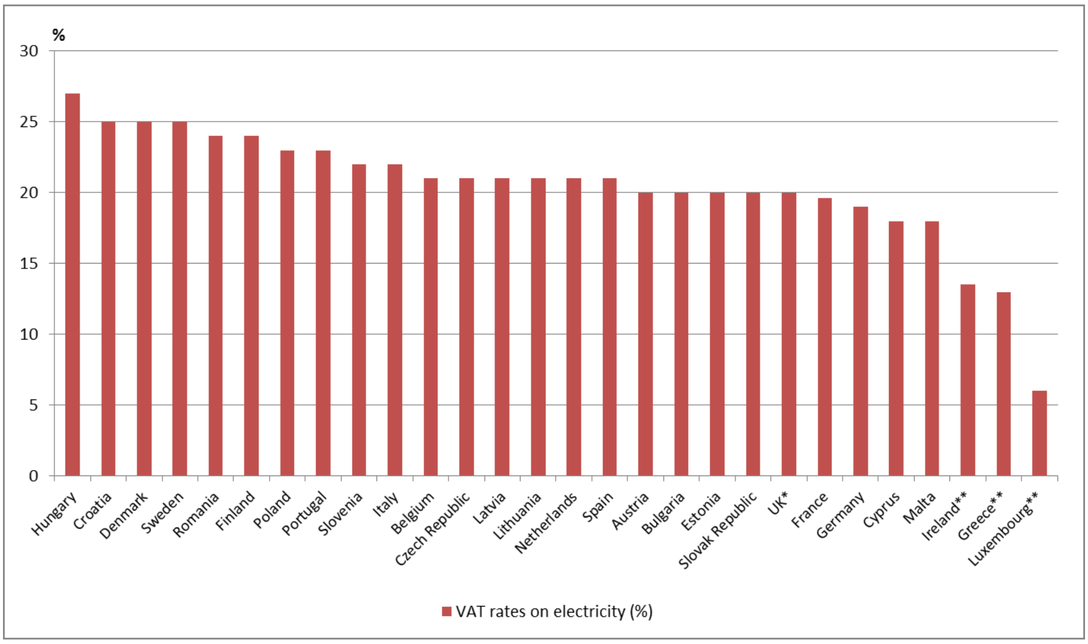
The VAT Directive [37] provides a legal framework for the application of VAT rates, establishing a standard rate of at least 15% and allowing for Member States to apply one or two reduced rates of not less than 5% to goods and services enumerated in a restricted list. In the case of electricity, VAT rates do not differ considerably across Member States. Since 2009, many MSs have raised VAT rates, in general affecting both commercial and non-commercial consumers. Standard VAT levels vary between 15% and 27% across Member States, with a range of 19-21% most commonly observed.

Some Member States apply reduced VAT rates on electricity consumption: for example, the United Kingdom charges a reduced VAT rate of 5% on electricity in the case of households, while Luxembourg, Ireland and Greece charge reduced VAT rates of 6%, 13.5% and 13%, respectively, on electricity consumption for both business and non-business use. VAT rate on electricity in Croatia, Sweden and Denmark is at 25% and in Hungary at 27%.

Reduced VAT-rates on energy products may reduce the incentives for energy efficiency efforts for household consumers.

[37] 2006/112/EC

Figure 25. VAT rates on electricity



Source: European Commission

Note: *Reduced VAT rate of 5% for electricity non-business use in the UK.

**Reduced VAT rates for electricity (business and non-business users) in Ireland, Greece and Luxembourg.

In the EU the general framework for energy taxation is set by the Energy Tax Directive, which set minimum levels of **excise duty** for a wide range of energy sources and fuels, plus electricity, while recognising that "*certain exemptions or reductions … may prove necessary … because of the risks of a loss of international competitiveness or because of social or environmental considerations*". According to the Energy Tax Directive the minimum levels of excise duty for electricity amount to 0.5 Euro/MWh and 1 Euro/MWh for business and non-business use respectively.

The levels of excise duty which Member States charge in addition to the minimum rates set by the Directive vary significantly by country. About half of the Member States enforce rates either at or slightly above the minimum (typically up to 1.5 Euro/MWh). On the other hand, significantly higher rates of taxation are found in Northern European and Nordic Member States. In the case of non-business use, Germany imposes a tax rate of up to 20 Euro/MWh, Sweden of up to 34 Euro/MWh and Denmark of over 109 Euro/MWh[38].

Excise duties are frequently applied unevenly across sectors; many Member States set lower rates for commercial, industrial or domestic use. Member States enforcing lower rates of excise duty for electricity use by business sectors (in comparison with non-business use) include Denmark, Germany, Greece, Finland, Italy, Lithuania, Romania and Sweden. The scale of the disparity between sectors varies by country: in Germany, business versus non-

[38] Includes CO_2 tax in the case of Denmark, as reported for the compilation of the Excise Duty Tables published by the European Commission and available at http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

business rates stand at 15.37 Euro/MWh to 20.57 Euro/MWh; for Finland, this was 7.03 Euro/MWh to 17.03 Euro/MWh; for Romania 0.5-1 Euro/MWh and for Lithuania 0.52 to 1.01 Euro/MWh.

Countries that impose lower effective tax rates on industrial use may be seeking to address competiveness concerns, particularly in relation to energy-intensive industries that are subject to strong international competition. On the other hand, in EU countries, the lower rates may to some extent reflect the fact that many large industrial emitters are subject to the EU emission trading system. Countries that impose lower rates on residential fuel use may place greater weight on affordability and vulnerability concerns.

The precise distribution of exemptions from excise duties also varies by Member State. In Sweden this applies to manufacturing industry as well as agriculture, horticulture, fisheries and forestry. In Finland, the reduced rates apply to industry and greenhouse cultivation. In Greece, the exemptions apply to consumers of high voltage electricity, while other business use is taxed at the normal rate.

In Slovakia, Greece and Bulgaria, domestic electricity consumption is exempt from excise duty. In the UK, the Climate Change Levy, the main tax on electricity and energy use, is paid only on business and public sector consumption.

Table 2. Excise duties levied on electricity, 2013

Electricity, EUR/MWh	Non-business use	Business use
Belgium (1)	1,91	0
Bulgaria	1,00	1,00
Croatia	1,01	0,51
Czech Republic	1,14	1,138
Denmark (2)	109,99	54,42
Germany	20,50	15,37
Estonia	4,47	4,47
Greece	2,20	2,5
Spain	1,00	0,50
France	1,5	0,5
Ireland	1,00	0,50
Italy	22,70	12,50
Cyprus	0	0
Latvia	1,00	1,00
Lithuania	1,01	0,52
Luxembourg	1,00	0,50
Hungary	1,00	1,00
Malta	1,5	1,5
Netherlands (3)	114	114
Austria	15 ,00	15 ,00
Poland	4,56	4,56
Portugal	1,00	1,00
Romania	1	0,5
Slovenia	3,05	3,05
Slovakia (4)		1,32
Finland	17,03	7,03
Sweden	31,66	0,55
UK	0	0

Source: European Commission Excise Duty Tables.
Notes : (1) In Belgium, a federal contribution of EUR 2.98 / MWh is collected; there are number of reductions and exemptions for energy intensive business; (2) Includes CO_2 tax ; (3) Depending on consumption level, the exemptions range from EUR 0.5 / MWh to EUR 116.5 / MWh; (4) Non-business use is exempted;

Other levies

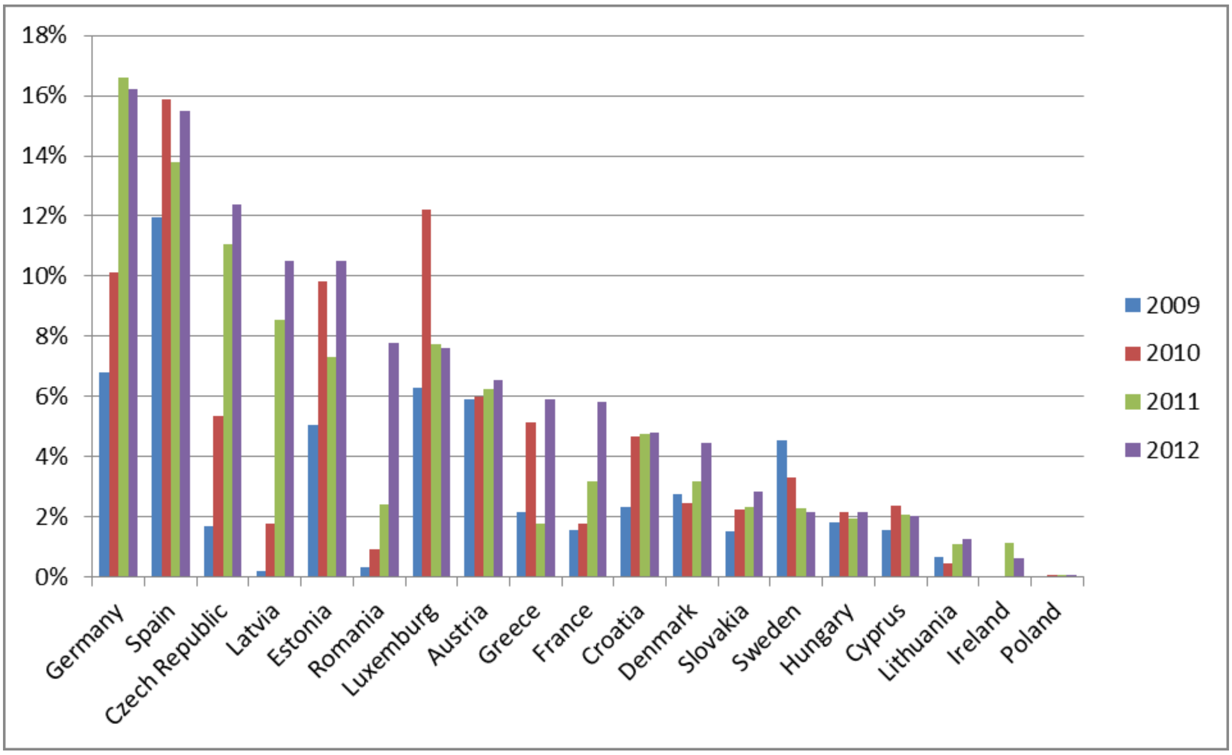
Other government policies may also be financed through additional energy or carbon-related taxes, as well as through levies and charges on energy bills, the composition of which is very different between Member States. Emissions trading schemes, renewable energy policies, energy efficiency policies and investment in infrastructure may all have an impact on electricity bills; in some Member States financing related to these policy priorities is done though taxes or levies, whereas in others they are instead considered as a factor in the production cost of energy or in network costs.

Costs related to the EU ETS are incorporated in the energy component of prices and current state of knowledge is that the impact on electricity prices has been relatively modest, if any. A recent study by DG ECFIN covering data until 2011 did not find any significant impact of ETS carbon prices on electricity retail prices neither for industry, nor for households.

In the period 2009-2012 the share of levies and charges used to support electricity generated from renewable energy sources has increased, rather abruptly in some Member States.

In 5 Member States support for renewable electricity generation in 2012 accounts for more than 10% of household electricity price, excluding VAT. The steep increase in the level and the relative share of renewable electricity charges paid by households in some Member States cannot be disconnected from the fact that large industrial consumers are often exempt from paying these (see discussion below).

Figure 26. Evolution of the share of RES-E levies in the electricity price for households in selected EU countries (2009-2012)

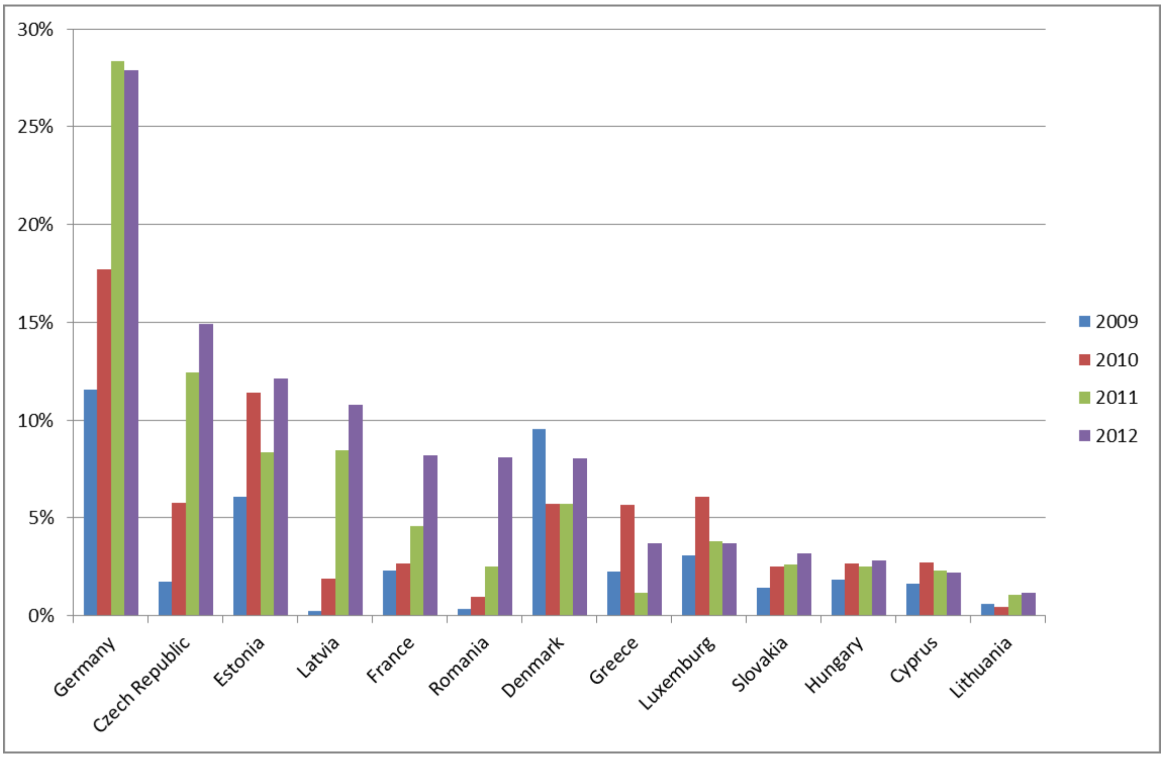


Note: Only states with data for all the years in the period 2009-2012 included. Calculated as % of price for consumers with annual consumption between 2500 and 5000 kWh (Eurostat consumption band DC), excluding VAT.

Source: Commission services calculations based on Eurostat and Member State data

Between 2009 and 2012 industrial consumers in Germany, the Czech Republic, Estonia, Latvia, France and Romania saw a steep increase in the share of RES-E-related levies in final price of electricity (excluding VAT and other recoverable taxes), though from a very low starting level in the cases of the Czech Republic, Latvia, France and Romania.

Figure 27. Evolution of the share of RES-E levies in the electricity price for industrial consumers in selected EU countries (2009-2012)



Note: Only states with data for all the years in the period 2009-2012 included. Calculated as % of price for consumers with annual consumption between 500 and 2000 MWh (Eurostat consumption band IC), excluding VAT and other recoverable taxes.

Source: Commission services calculations based on Eurostat and Member State data

Tax exemptions

The effect of energy taxes upon different industrial sectors is however complicated by reimbursements and exemptions which may be available in some countries to specific sectors. This section provides examples of exemptions provided to certain categories of consumers in some EU countries that generally tend to tax energy consumption more heavily. It is beyond the scope of this review to provide a comprehensive legal and economic analysis of all exemptions and preferential tax treatments in the EU: comprehensive data on re-imbursements and exemptions across all Member States are scarce, meaning it is difficult to build a systematic picture of these exemptions across the EU. It is nevertheless possible to point to specific examples.

A 2011 study carried out by ICF International for the UK government looked at the impact of energy and climate change policies on energy intensive industries[39] in a select group of EU countries[40]. This concluded that in the EU Member States examined "*energy taxes for energy intensive industries… are generally low due to significant re-imbursements that are possible*

[39] The study examined the following sectors: iron and steel; aluminium; cement; chemicals, in particular chlor alkali, fertiliser and industrial gases.
[40] Denmark, France, Germany, Italy and the UK,

... re-imbursements to EIIs appear most significant for Germany, Denmark and Italy, and are also relatively high for France".

In **Germany**, certain energy intensive sectors pay a rate on electricity consumption below the rates for businesses. Similarly for natural gas, heating use by businesses is taxed at a lower rate than by non-businesses (EUR 1.14 per gigajoule compared with EUR 1.53 per gigajoule) and a refund is applied to natural gas used in industry and agriculture[41]. Under the electricity tax law of 1999 (amended in 2011), the majority of EII sectors[42] qualify for a complete reimbursement of energy taxes.

In addition to these discounts, German renewables law protects EIIs from the added costs of electricity owing to preferential grid access for renewables. These costs are distributed among all electric consumers as an additional levy, with the exceptions of EIIs meeting certain conditions with regards to electro-intensity[43]. The case studies in section 1.1.2 confirm that the plants in the German sample paid about 5% of the full RES-levy size (see Table 5).

In the **United Kingdom**, the Climate Change Levy is a tax imposed on consumption by business and the public sector of electricity, natural gas and other fuel sources. Energy intensive industries[44] qualify for a reduction of 80% on this levy, on condition of meeting certain energy-saving targets set out in a Climate Change Agreement. Under this scheme, an energy intensive industrial user would pay GBP 1.018 per MWh, as opposed to GBP 5.09 per MWh paid by a regular industrial consumer.

In **Denmark**, under the Green Tax Package scheme, EIIs are completely exempt from energy taxes, and almost completely exempt from carbon taxes.[45] Processes which participate in Voluntary Agreements, committing them to energy efficiency improvements, are eligible for a rebate of 100% on their energy tax and 97% on their carbon tax.

In **France**, electricity consumed by large industrial consumers is taxed at a reduced rate slightly below that faced by residential users.[46] The tax rate applied to industrial users depends on the user's scale and is lower for larger consumers. The tax rate applied to residential and commercial users is set at an intermediate level between the rates of for the two types of industrial users.

In the **Netherlands**, taxes on natural gas and electricity consumption are based on a bracket system, which sets marginal rates based on the amount of use. The rates decrease with increased use, and different rate schedules apply for industrial, residential and agricultural use. Business use of electricity greater than 10 million KWh pa is exempted if the consumer has agreed to obligations for improving energy efficiency.[47] The average tax rates on electricity consumption for industry (calculated by the OECD) are below those for other sectors (e.g., for electricity, 0.006 Euro/kWh versus 0.113 Euro/kWh for residential use).

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[41] OECD. 2013. Taxing Energy Use: A Graphical Analysis.

[42] The law covers: electrolysis, glass, ceramics, cement, lime, metals, fertilizers and chemical reduction methods. The industrial gas sector qualifies for a reimbursement of 90%.

[43] Exemptions are granted to EIIs meeting the following conditions: (a) the ratio of the electricity costs to gross value added exceeds 15% and electricity demand exceeds 10 GWh/year at a certain delivery point; in which case the added costs to the client cannot exceed €0.05 cents per kilowatt-hour; (b) the ratio of the electricity costs to gross value added is below 20% and the electricity demand is below 100 gigawatt-hours the limitation of the added cost will only apply to 90% of the electricity purchased in the previous year.

[44] Qualifying sectors must meet the following criteria: (a) energy intensity (EI) must be 3% or more (i.e. energy costs must be 3% or more of the production value for the sector); (b) the industry import penetration ratio must be 50% or more - this ratio is calculated for the sector as a whole to determine its exposure to international competition. Sectors that do not meet the international competitiveness criteria must have an EI of 10% or more. Source: https://www.gov.uk/climate-change-agreements

[45] ICF International. 2012. An international comparison of energy and climate change policies impacting energy intensive industries in selected countries.

[46] OECD, ibid

[47] OECD, ibid

In **Belgium**, EIIs with an environmental agreement are entitled to a 100% exemption on the excise tax on fuels they use, as well as on electricity consumption.[48]

[48] OECD ibid

1.1.2. Electricity price developments in selected industries

This section looks into retail electricity price developments for several energy intensive industries, based on samples compiled from a study analysing data at company and plant level[49]. Based on the methodology described in Annex 2, the results of several case studies for selected energy-intensive industries are presented below with regard to electricity prices. The results are not representative of either the entire industrial branches in each Member State or region, or of the EU as a whole.

The purpose of the case studies is to complement the statistical analysis with data from real installations, while acknowledging the limits in terms of interpretation and generalisation of the results and conclusions beyond the sampled plants. Annex 2 provides details on coverage and selection criteria; details on sampling for each industrial sector are provided in the text.

Cross-sectoral analysis
Before introducing the detailed results of the case studies, this section presents and compares the variation of data for each of the seven sectors assessed.

In particular, for each sector and the related EU-wide sample (no split into regions) the average electricity prices paid by the surveyed plants and the standard deviation of price are presented. The applicable consumption ranges are presented using the median and box plots[50].

The number of questionnaires used for each sector and each of the two energy inputs is reported below. The questionnaires that form the basis of this cross-sectoral section come from a total of 21 Member States. The coverage differs by sector. The results may not be necessarily representative of the situation of the respective industrial branches in each Member State or region.

Table 3 Number of questionnaires used in cross-sectoral analysis

(sub)sector	N. of questionnaires Electricity
Bricks and roof tiles	16
Wall and floor tiles	20
Float glass	10
Ammonia	10
Chlorine	9
Steel	15
Aluminium	9
Total	**89**

Note: Based on the number and type of respondents in each sector as well as the respective Member State of origin, the criteria used in the sample definition (see Annex 2) have different weights. This implied that, for some sectors, not all questionnaires received could be fully used.

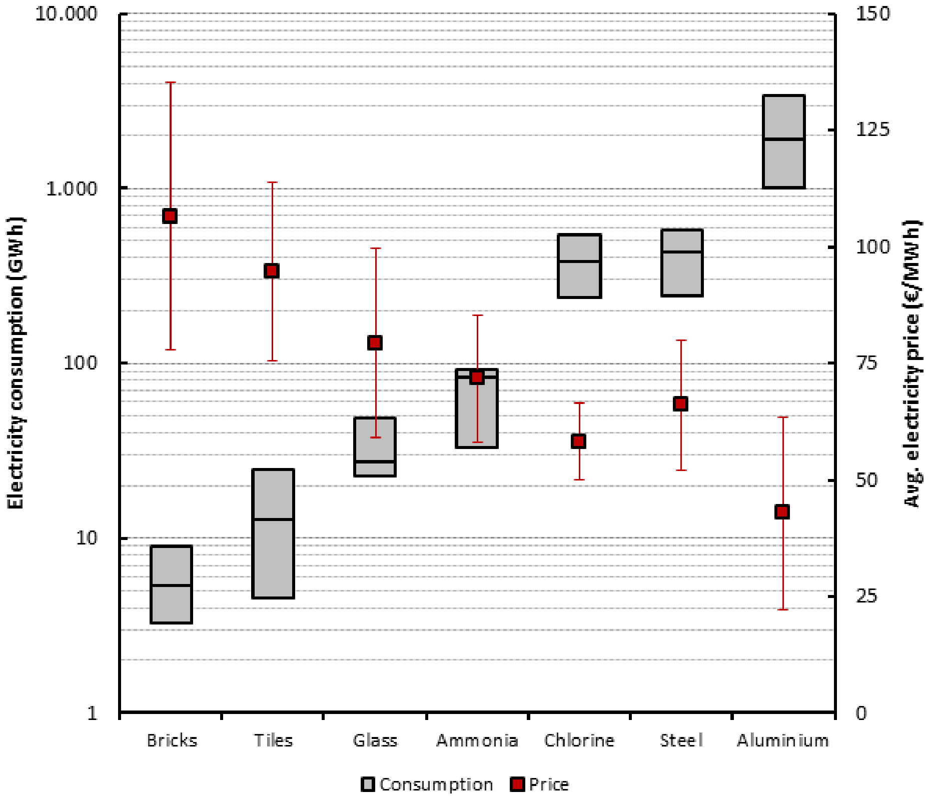
As shown in the following graphs, for the installations sampled, the electricity consumption level increases when moving from the sector of bricks to the sector of aluminium while increasing consumption levels are associated to decreasing electricity prices.

[49] "Composition and drivers of energy prices and costs in energy intensive industries" Specific contract No SI2.6575586 with the Centre for European Policy Studies.
[50] The median refers to the value which splits the sample in half; the box plot indicates the range of values between which 50% of the data sample lay.

The median electricity consumption in the aluminium sector, as seen from the 9 installations sampled, is indeed more than 360 times higher than this in the 16 installations sampled in the bricks sector, whereas an average aluminium producer responding to the questionnaire pays 42.9 €/MWh that is 63.7 €/MWh less than an average bricks producer responding to the questionnaire.

The finding is not surprising as possible explanations for decreasing price levels associated to higher consumption volumes include more favourable supply contracts (including long-term contracts); discounts for large-scale consumers; different levels of levies and taxes (incl. exemptions for large-scale consumers). It is worth noting that these average prices represent the values aggregating the plants surveyed in multiple countries with different price levels and different legislative frameworks.

Figure 28 Electricity consumption range and price variations grouped by sector (89 plants)



Source: CEPS, calculations based on questionnaires

Table 4 Average electricity prices and median consumption in various sectors (89 plants)

	Bricks	Tiles	Glass	Amm.	Chlorine	Steel	Alum.
Average price (€/MWh)	106.5	94.7	79.3	71.7	58.2	66.1	42.9
Median consumption (GWh)	5.3	12.7	27.4	83.2	384.8	436.0	1,915.0

Source: CEPS, calculations based on questionnaires

In addition to EU averages data, a specific assessment has also been conducted for four Member States - Germany, Italy, Poland and Spain – using answers to industry questionnaires collected across all sectors. This assessment builds on case study-based results that cannot be extrapolated to the entire sectors in each of these Member States and are meant to give insight about a sample of plants across the EU. Due to data limitations and the need to ensure the anonymity of plants, the country-specific analysis could be conducted only with regard to electricity prices and price components.

First, data shows a high variation of electricity prices paid by certain operators in the four Member States. It shows a general increase in prices in the 28 plants surveyed in Italy and Spain, a stable price level in Poland and a decrease in Germany.

Amongst the four selected countries and the 28 facilities in the industrial branches sampled, the 5 producers located in Italy face the highest price. Despite the fact that the selected plants in Italy have an average consumption similar to that of plants in Spain (23 vs. 14 GWh/year) Italian producers still paid about 20 €/MWh more than Spanish producers. A major part of this difference is due to higher impact of the energy component in Italy.

In contrast to the other countries analysed, the 10 Spanish electricity consumers in the present sample do not directly pay the costs for RES support through levies[51].

RES levies appear to have an impact also in the plants surveyed in Poland, where they represent about 10% of the final price paid the sampled plants. However, compared to the 15 plants in Italy and Spain, the 5 plants in Poland face lower or considerably lower grid fees. The latter are even lower in Germany, where they account for only about 6% of final electricity price in 2012 for the 8 installations sampled. Among possible explanations of lower grid fees in both Poland and Germany, there is also the possibility that some of the sampled plants are connected to the high-voltage grid.

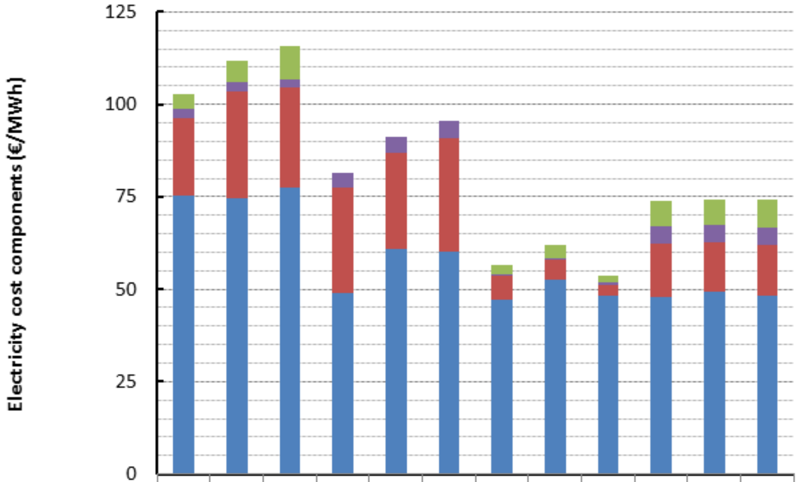
For the 8 German plants surveyed, the average price decreased from 2011 to 2012. This was associated with the decrease of three out of the four components assessed, namely grid fees, RES levies and energy component. However, it is worth noting that a certain share of grid fees is charged in the country in relation to the connection power of the consumer (i.e. euro per watt peak) and is not related to annual consumption. Therefore, increasing the annual consumption would decrease the grid fees when expressed in EUR/MWh, as reported in the graph below. Admittedly, it is still probable that one or more plants in Germany have benefited from lower grid fees starting in 2012. Atypical and energy intensive electricity consumers were exempt from grid fees in the order of 340 million Euro[52]. Decreasing RES levies are associated to new exemptions granted in that year, reversing the previous increasing trend.

[51] The Spanish government sets a so-called access fee ("peaje de acceso") to cover all costs that are not related to (conventional) production and commercialisation. Costs for RES support are therefore supposedly included in the other components but may also partly be covered by the public budget.

[52] See Federal Ministry of Economics and Technology (BMWi), Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU: First monitoring report "Energy of the future", Berlin 2012.

At the same time, the reasons behind the slight decrease in the energy component may be related to the falling wholesale market prices in Germany driven significantly by the strong growth in wind and solar electricity production.

Figure 29 Structure of electricity costs in Italy, Spain, Germany and Poland in absolute terms (28 plants) (€/MWh)

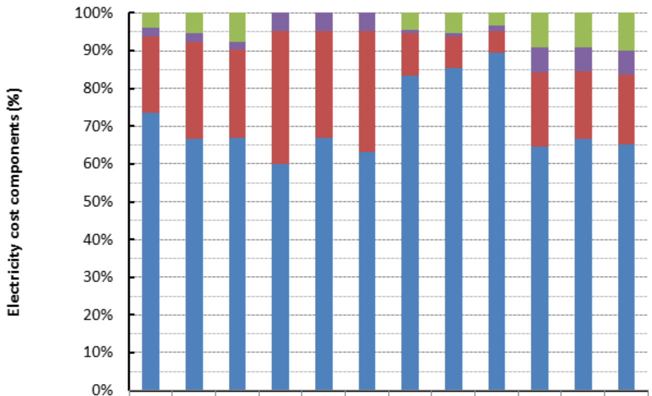


	IT (5 plants)			ES (10 plants)			DE (8 plants)			PL (5 plants)		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
RES levy	3,9	6,1	9,0	0,0	0,0	0,0	2,6	3,3	1,8	6,7	6,7	7,4
Other (excl. VAT)	2,6	2,5	2,2	3,9	4,4	4,5	0,5	0,5	0,8	4,9	4,7	4,7
Grid fees	20,8	28,9	27,0	28,6	25,9	30,6	6,5	5,2	3,1	14,4	13,4	13,8
Energy comp.	75,5	74,5	77,5	49,0	60,9	60,3	47,1	52,8	48,1	47,7	49,3	48,3

Energy comp. Grid fees Other (excl. VAT) RES levy

Source: CEPS, calculations based on questionnaires.

Figure 30 Structure of electricity costs in Italy, Spain, Germany and Poland in relative terms (28 plants) (%)



	IT (5 plants)			ES (10 plants)			DE (8 plants)			PL (5 plants)		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
RES levy	4%	5%	8%	0%	0%	0%	5%	5%	3%	9%	9%	10%
Other (excl. VAT)	3%	2%	2%	5%	5%	5%	1%	1%	1%	7%	6%	6%
Grid fees	20%	26%	23%	35%	28%	32%	11%	8%	6%	20%	18%	19%
Energy comp.	73%	67%	67%	60%	67%	63%	83%	85%	90%	65%	67%	65%

Energy comp. Grid fees Other (excl. VAT) RES levy

Source: CEPS, calculations based on questionnaires.

As indicated above in the methodological section (Annex 2), all prices presented are net of possible exemptions from taxes, levies or transmission costs. In Table 5, the full size of the RES levies are compared with the average values paid by the sampled plants. The figures show that the sampled German plants received – on average – a 93% reduction in the year 2012.

Table 5– RES levies in Germany – regular vs. average values paid by sampled plants (€/MWh)

	2010	2011	2012
RES levy (regular, full size)	20.47	35.30	35.92
RES levy (average sampled plants)	2.6	3.3	1.8

Source: CEPS, calculations based on questionnaires

1.1.2.1. Bricks and roof tiles

The results of the case study for bricks and roof tiles presented below are based on the answers provided by a sample of 13 plants to a questionnaire and to each sections of it, as reported in the table below. The share of the sampled plants in EU production is unknown. Production volumes are reported using different units due to homogeneity of products.

Table 6 – Number of questionnaires used in the case study

Received	Selected in the sample	Energy prices trends	Energy bill components	Energy intensity	International comparison
23	13	13	13	8	6

Average electricity prices for the sample of bricks and roof tiles producers have increased by about 13% between 2010 and 2012, from 90.4 to 102.4 €/MWh. The spread between the lowest and the highest price in the sample has also increased by 40%, going from 91.4 to 128 €/MWh, indicating an increased variability across sampled operators. In particular, the gap has been widening because of the sustained increase of the maximum price recorded (+30%). Very different price dynamics can be observed across regions.

Table 7 Descriptive statistics for electricity prices paid by the 13 sampled brick and roof tile producers in the EU (€/MWh)

Electricity price (€/MWh) €c/kWh	2010	2011	2012	% change 2010-2012
EU average	90,4	93,4	102,4	13,3
EU minimum	52,7	54,1	58,7	11,4
EU maximum	144,1	146,1	186,7	29,6
Northern Europe (average)	89,9	91,3	95,0	5,7
Central Europe (average)	95,4	99,3	103,4	8,4
Southern Europe (average)	87,1	89,2	105,0	20,6

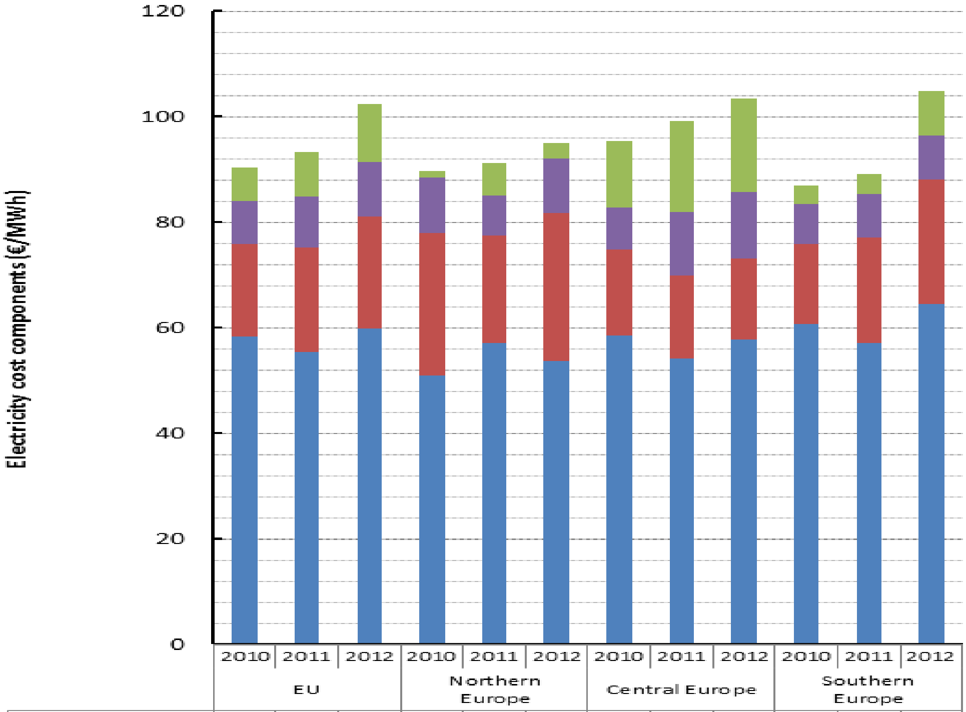
Northern Europe includes 5 plants: IE, UK, BE, LU, NL, DK, SE, NO, LT, LV, FI, EE
Central Europe includes 3 plants: DE, PL, CZ, SK, AT, HU
Southern Europe includes 5 plants: FR, PT, ES, IT, SI, HR, BG, RO, EL, MT, CY
Note that sampled plants do not come from all the Member States in one region. The specific countries cannot be indicated due to confidentiality reasons.
Source: CEPS, calculations based on questionnaires

In 2010 based on the sample of plants surveyed Southern Europe represented the region with lowest average price. Between 2010 and 2012 the 5 plants in Southern Europe saw a sustained increase in electricity prices of more than 20%. As a result of this, in 2012 Southern Europe was the region with the highest average electricity price (105 €/MWh compared to 103.4 and 95 €/MWh for Central and Northern Europe, respectively).

In terms of electricity price components, energy still represents the most significant one in the 13 sampled plants. However, despite a slight increase between 2010 and 2012 - from 58.3 €/MWh to 59.9 €/MWh – its share of the total price has decreased from 65% to 58%. This development is related to the stronger increase in other components.

This is due to the significant increase in all other components, with grid fees going up by 21% in the plants surveyed (from 17.6 to 21.3 €/MWh), other non-recoverable taxes and levies increasing by 28.4% (from 8.1 to 10.4 €/MWh) and RES levy by 73.0% (from 6.3 to 10.9 €/MWh). Between 20120 and 2012, the share of components other than energy in the total average electricity price went up from 35% to 42%.

Figure 31 Components of the electricity bills paid by the 13 sampled bricks and roof tiles producers in Europe (€/MWh)



	EU			Northern Europe			Central Europe			Southern Europe		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
RES levy	6,3	8,4	10,9	1,4	6,1	3,0	12,6	17,2	17,8	3,7	3,9	8,4
Other (excl. VAT)	8,1	9,8	10,4	10,5	7,6	10,2	8,0	12,1	12,6	7,4	8,2	8,4
Grid fees	17,6	19,7	21,3	27,0	20,4	28,0	16,3	15,7	15,2	15,3	20,0	23,6
Energy comp.	58,3	55,5	59,9	51,0	57,2	53,8	58,5	54,3	57,9	60,6	57,1	64,5

Energy comp. Grid fees Other (excl. VAT) RES levy

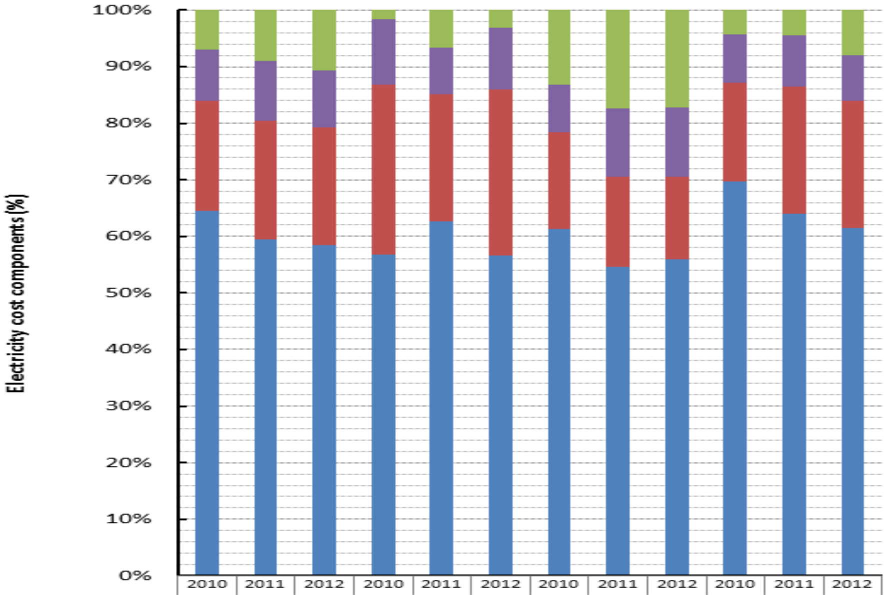
Source: CEPS, calculations based on questionnaires.

Looking at the trend in the plants surveyed in different regions, RES levies registered a much higher increase in the plants surveyed both in Southern and in Northern Europe compared to Central Europe (127%, 114% and 41% respectively). Despite the different dynamics, however, the impact of RES levies on final price remained greater in the Central Europe where they represented 17% of the total.

The non-recoverable tax component increased considerably in the plants surveyed in Central Europe (+57%) while only slightly increasing (+13%) or remaining stable in the plants in Southern and Northern Europe, respectively.

Finally, grid fees went up by 54% in the plants surveyed in Southern Europe compared to slight decrease or increase elsewhere, therefore, pushing up the EU average.

Figure 32 Components of the electricity bills paid by the 13 sampled bricks and roof tiles producers in Europe (€/MWh)



	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			Northern Europe			Central Europe			Southern Europe		
RES levy	7%	9%	11%	2%	7%	3%	13%	17%	17%	4%	4%	8%
Other (excl. VAT)	9%	11%	10%	12%	8%	11%	8%	12%	12%	9%	9%	8%
Grid fees	19%	21%	21%	30%	22%	29%	17%	16%	15%	18%	22%	22%
Energy comp.	65%	59%	58%	57%	63%	57%	61%	55%	56%	70%	64%	61%

Energy comp. Grid fees Other (excl. VAT) RES levy

Source: CEPS, calculations based on questionnaires.

1.1.2.2. Wall and floor tiles

The results of the case study for wall and floor tiles presented below are based on the answers provided by a sample of 12 plants to a questionnaire and to each sections of it, as reported in the table below. The share of the sampled plants in EU production could not be calculated. Production volumes are reported using different units due to homogeneity of products.

Table 8 – Number of questionnaires used in the wall and floor tiles case study

Received	Selected in the sample	Energy prices trends	Energy bill components	Energy intensity	International comparison	Production costs and margins
24	12	12	12	6	6	9

The average electricity price paid by the sample of 12 wall and floor tiles producers has increased by more than 20% between 2010 and 2012, from 80.8 to 97.6 €/MWh. The spread between the lowest and the highest price has also increased by about 37%, going from 63.5 to 86.8 €/MWh, indicating an increased variability across operators.

Table 9 Descriptive statistics for electricity prices paid by the 12 sampled EU wall and floor tile producers (€/MWh)

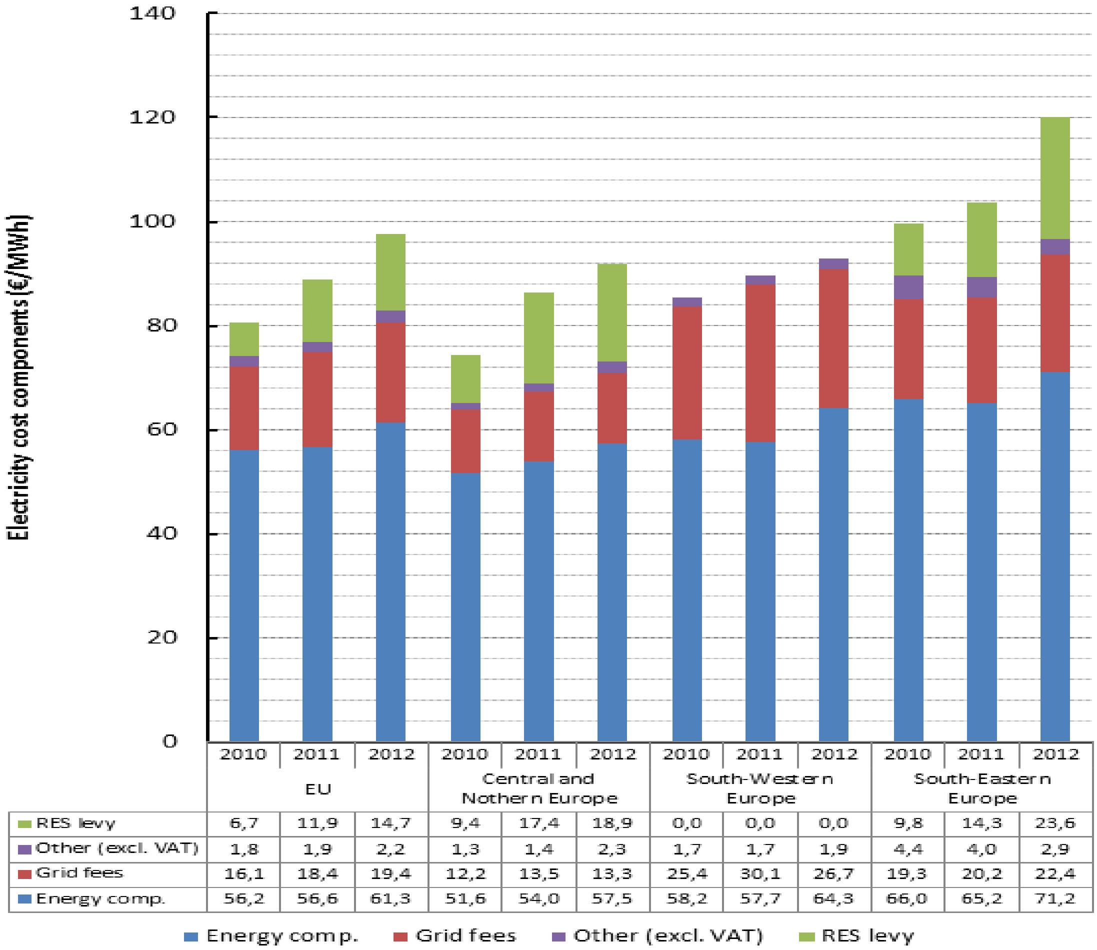
Electricity price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	80,8	88,8	97,6	20,8
EU minimum	64,1	71,4	76,9	20,0
EU maximum	127,6	130,3	163,7	28,3
Central and Northern Europe (average)	74,4	86,3	92,0	23,7
South-Western Europe (average)	85,3	89,5	92,9	8,9
South-Eastern Europe (average)	99,5	103,6	120,1	20,7

Central and Northern Europe includes 3 plants: IE, UK, BE, LU, NL, DK, DE, PL CZ, LV, LT, EE, SE, FI
South-Western Europe includes 5 plants: ES, PT, FR
South-Eastern Europe includes 4 plants: IT, SI, AT, HU, SK, HR, BU, RO, EL, MT, CY
Note that sampled plants do not come from all the MS in one region. The specific countries cannot be indicated due to confidentiality reasons.
Source: CEPS, calculations based on questionnaires

With regard to the regions assessed, the strongest increase in electricity price was registered in the 3 plants based in Central and Northern Europe (23.7%), which led to an average price in 2012 in line with the price paid by 5 plants in South-Western Europe. However, in each of the years observed, the highest price of electricity is paid by operators in South-Eastern Europe, which paid 120 €/MWh in 2012 (up by 21% compared two 2010).

With regard to the electricity price components in the 12 sampled plants, energy still represents the most significant one although, despite an increase in absolute terms of about 9%, its relative weight for the whole sample decreased from 70% in 2010 to 63% two years later. The result is mainly the consequence of the strong increase of the RES levy component, which more than doubled over the period, going from 6.7 €/MWh in 2010 to 14.7 €/MWh in 2012 (+119%). The other components, namely grid fees and other non-recoverable taxes also increased but at a lower pace (about 20%), resulting in a rather stable share over the total price.

Figure 33 Components of the electricity bills paid by the 12 sampled wall and floor tiles producers in Europe (€/MWh)



	EU 2010	EU 2011	EU 2012	Central and Nothern Europe 2010	Central and Nothern Europe 2011	Central and Nothern Europe 2012	South-Western Europe 2010	South-Western Europe 2011	South-Western Europe 2012	South-Eastern Europe 2010	South-Eastern Europe 2011	South-Eastern Europe 2012
RES levy	6,7	11,9	14,7	9,4	17,4	18,9	0,0	0,0	0,0	9,8	14,3	23,6
Other (excl. VAT)	1,8	1,9	2,2	1,3	1,4	2,3	1,7	1,7	1,9	4,4	4,0	2,9
Grid fees	16,1	18,4	19,4	12,2	13,5	13,3	25,4	30,1	26,7	19,3	20,2	22,4
Energy comp.	56,2	56,6	61,3	51,6	54,0	57,5	58,2	57,7	64,3	66,0	65,2	71,2

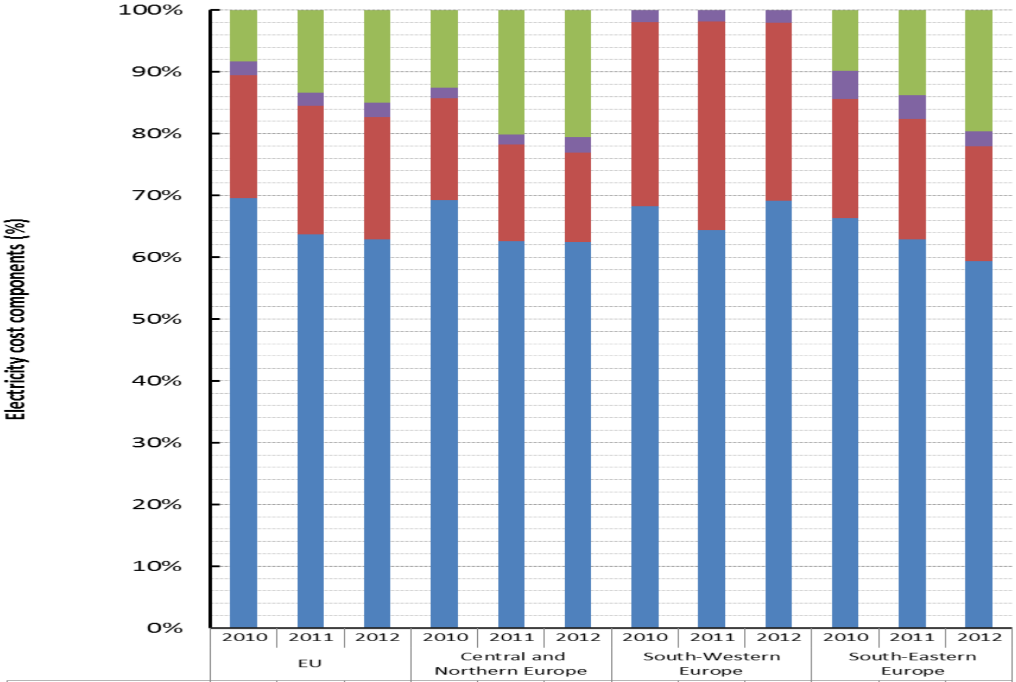
Source: CEPS, calculations based on questionnaires.

Looking at the trend in different regions, RES levies registered a very high increase in the plants surveyed in both Central and Northern Europe and in these based in South-Eastern Europe (101% and 141%, respectively). The relative weight of the RES component in the two regions therefore went up to about 20%.

However, in the sample of plants located in South-Eastern Europe a 34% decrease in other non-recoverable taxes is observed (from 4.4 €/MWh in 2010 to 2.9 €/MWh in 2012) while these increase in Central and Northern Europe and remained fairly stable in South-Western Europe. The size of RES contributions in South-West Europe could not be established based on the invoices provided by respondent plants.

Grid fees increased in all three regions, with the highest increase registered in South-Eastern Europe (about 16%).

Figure 34 Components of the electricity bills paid by the 12 sampled wall and floor tiles producers in Europe (€/MWh)



	EU			Central and Northern Europe			South-Western Europe			South-Eastern Europe		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
RES levy	8%	13%	15%	13%	20%	21%	0%	0%	0%	10%	14%	20%
Other (excl. VAT)	2%	2%	2%	2%	2%	3%	2%	2%	2%	4%	4%	2%
Grid fees	20%	21%	20%	16%	16%	15%	30%	34%	29%	19%	20%	19%
Energy component	70%	64%	63%	69%	63%	62%	68%	64%	69%	66%	63%	59%

Source: CEPS, calculations based on questionnaires.

1.1.2.3. Float glass

The results of the case study for float glass presented below are based on the answers provided by a sample of plants to a questionnaire and to each sections of it, as reported in the table below. The 10 plants in the sample represent about 19% of European production.

Table 10. Number of questionnaires used in the float glass case study

Received	Selected in the sample	Energy prices trends	Energy bill components	Energy intensity	Production costs	Margins
10	10	10	7	10	7	4

Average electricity prices in the sampled plants were on the rise in the period 2010-2012. These increased by about 10% between 2010 and 2012, from 76.7 to 84.3 €/MWh. The spread between the lowest and the highest price is considerably high and has further increased, going from 60 to 82 €/MWh (+37%).

Different price dynamics can be observed across regions. In particular the increase is particularly evident for the 2 sampled operators in Southern Europe, which already paid the highest price in 2010 and in 2012 paid almost twice as much as the 2 plants in Eastern Europe.

Table 11 Descriptive statistics for electricity prices paid by the 10 sampled EU float glass producers (€/MWh)

Electricity price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	76,7	79,3	84,3	9,9
EU minimum	50,6	50,5	55,1	8,9
EU maximum	110,0	113,9	136,6	24,2
Western Europe (average)	78,3	80,4	83,9	7,2
Southern Europe (average)	93	96,7	110,3	18,6
Eastern Europe (average)	59,1	62,6	64,7	9,5

Western Europe includes 6 plants: IE, UK, FR, BE, LU, NL, DE, AT, DK, SE, FI
Eastern Europe includes 2 plants: BG, RO, CZ, HU, EE, LT, LV, SK, PL
Southern Europe includes 2 plants: IT, MT, CY, PT, ES, EL, SI
Note that sampled plants do not come from all the MS in one region. The specific countries cannot be indicated due to confidentiality reasons.
Source: CEPS, calculations based on questionnaires.

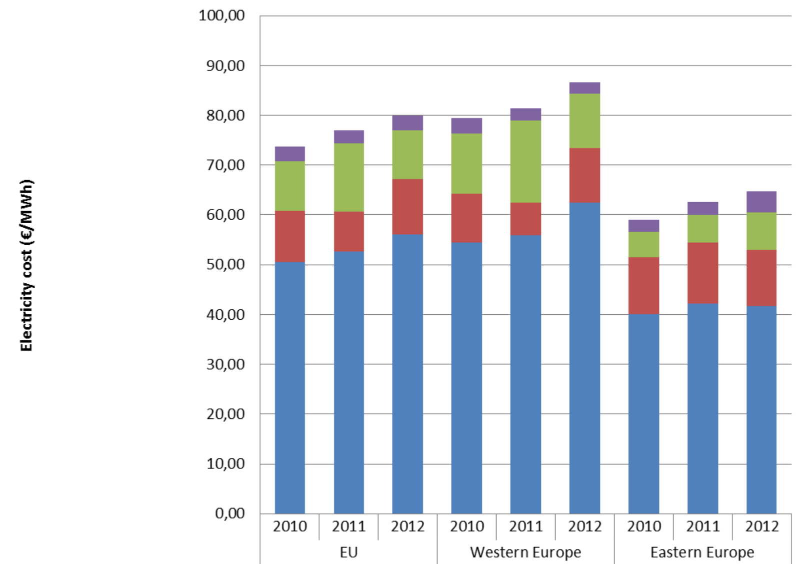
The energy component is the largest component, with a share of about 71% of the total. Based on the 10 sampled plants, between 2010 and 2012, the energy component has increased by 8%, from 52 €/MWh to 56.1 €/MWh. Over the same period different trends can be observed for the other price components. In particular, in the plants surveyed grid fees increased overall by 11% after a decline between 2010 and 2011. At the end of the period their share of total price results only slightly higher compared to the previous year but still in the range of 15%.

The average of RES levies increased by 37% between 2010 and 2011 but decreased afterwards and led to a slight reduction in the relative share of RES in the total price since 2010 (from 12% to 11%). In contrast, other non-recoverable taxes and levies decreased between 2010 and 2011 and then decreasing the following year, registered an overall decrease of about 3% at the end of the period.

Different trends can be observed across regions. In fact, while for the 6 plants in Western Europe the average RES levy and other non-recoverable taxes decreased both in absolute and relative terms, in the 2 plants in Eastern Europe the same components increased in absolute terms by 51% and 64%, respectively, therefore resulting in a higher weight on total price.

In 2012, components other than energy (production costs) in the 2 Eastern European plants accounted on average for about 35% of the total electricity price, compared to 30% in 2010.

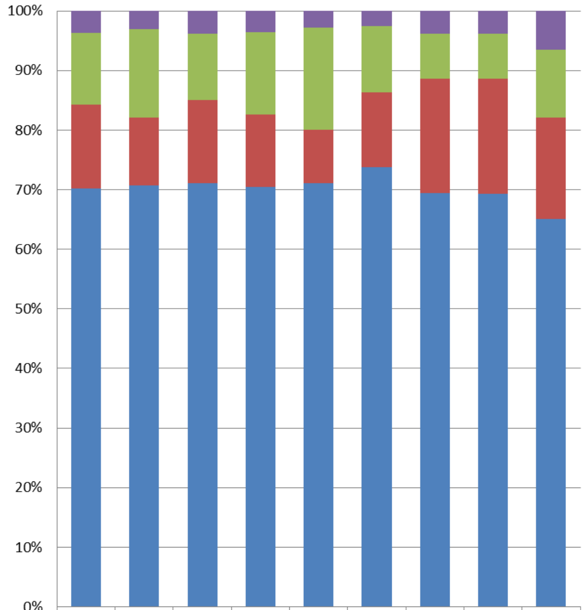
Figure 35 Components of the electricity bills paid by the sampled float glass producers in Europe (€/MWh)



	EU 2010	EU 2011	EU 2012	Western Europe 2010	Western Europe 2011	Western Europe 2012	Eastern Europe 2010	Eastern Europe 2011	Eastern Europe 2012
Other levies & taxes (excl. VAT)	2,93	2,60	2,84	3,11	2,57	2,26	2,5	2,7	4,1
RES levy	10,07	13,80	9,94	12,00	16,37	10,98	5,04	5,49	7,61
Grid fees	10,27	7,96	11,04	9,81	6,64	10,92	11,46	12,21	11,31
Energy component	50,47	52,66	56,07	54,45	55,87	62,45	40,09	42,26	41,65

Source: CEPS, calculations based on questionnaires.

Figure 36 Components of the electricity bills paid by the sampled float glass producers in Europe %)



	EU 2010	EU 2011	EU 2012	Western Europe 2010	Western Europe 2011	Western Europe 2012	Eastern Europe 2010	Eastern Europe 2011	Eastern Europe 2012
Other taxes and levies	3,66%	3,00%	3,76%	3,60%	2,75%	2,57%	3,82%	3,84%	6,45%
Levy for RES and other non-recoverable taxes	12,04%	14,94%	11,21%	13,78%	17,24%	11,08%	7,49%	7,50%	11,50%
Network cost	14,15%	11,36%	13,96%	12,18%	8,89%	12,61%	19,27%	19,32%	17,01%
Energy component	70,15%	70,70%	71,07%	70,44%	71,12%	73,74%	69,42%	69,34%	65,04%

Source: CEPS, calculations based on questionnaires.

1.1.2.4. Ammonia

The results of the case study for ammonia producers are based on the answers provided by a sample of plants to a questionnaire and to each section of it, as reported in the table below.

The 10 sampled plants represent in total about 26% of EU27 production. Considering that about 80% of the global ammonia production is used for the production of fertilisers, the case study focused on ammonia plants that in the vast majority of cases are integrated in large installations that subsequently produce fertilisers. The sample includes 2 small, 4 medium and 4 large-sized plants. The 10 plants are located in 10 different member states.

Table 12 Number of questionnaires used in the ammonia case study

Received	Selected in the sample	Energy prices trends	Energy bill components	Energy intensity	Production costs
10	10	10	10	10	7

Natural gas is the predominant fuel used by the sampled plants, accounting for about 90-94% of their total energy costs. Electricity accounts for about 4-8% of total energy costs of the sampled plants.

Data collected show that the average price of electricity paid by the sampled producers of ammonia has increased by 11% between 2010 and 2012, from 63.9 to 71.1 €/MWh. The gap of prices paid by sampled producers has also increased.

From the 10 sampled plants, similar price increases can be observed in all the geographical regions defined, in line with the EU average. Nevertheless, the surveyed plants in Southern Europe witnessed the highest price throughout the 3-year period assessed.

Table 13 Descriptive statistics for electricity prices paid by 10 sampled ammonia EU producers (€/MWh)

Electricity price (€/MWh)	2010	2011	2012	% change 2010-2012
EU (average)	63.9	72.5	71.1	11.3
Western-Northern Europe (average)	54.0	62.4	61.0	13.0
Southern Europe (average)	86.3	95.5	96.0	11.2
Eastern Europe (average)	64.3	73.6	70.7	10.0

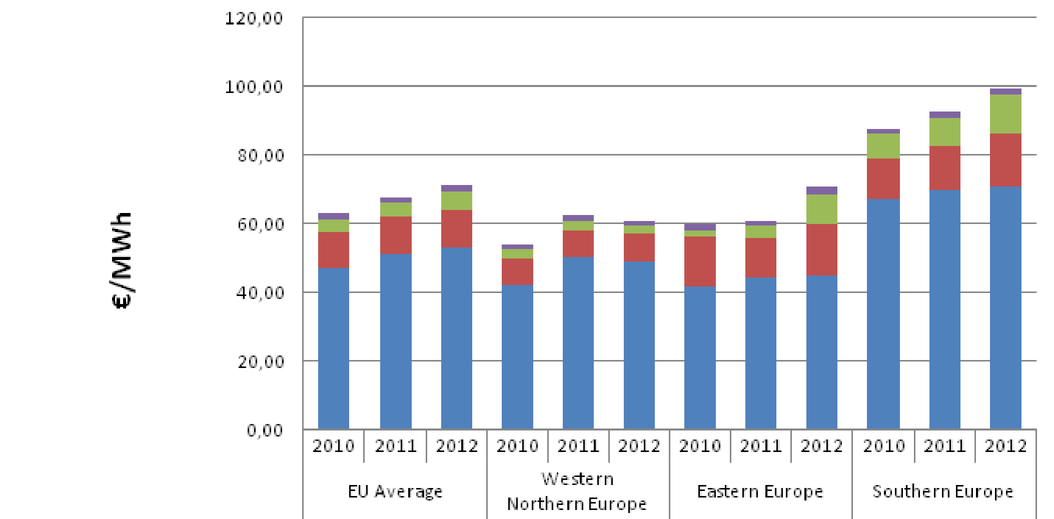
Western-Northern Europe includes: IE, UK, FR, BE, LU, NL, DE, AT, DK, SE, FI
Eastern Europe includes: RO, CZ, HU, EE, LT, LV, SK, PL
Southern Europe includes: IT, MT, CY, PT, ES, EL, SI, BG
Note that sampled plants do not come from all the MS in one region. The specific countries cannot be indicated due to confidentiality reasons. The number of sampled plants per region cannot be disclosed due to confidentiality.
Source: CEPS, calculations based on questionnaires.

With regard to the different price components, the energy part accounts for more than 60% of the total price. Between 2010 and 2012, the energy component increased on average for the whole sample by 12%, from 47.1 to 52.9 €/MWh

For the 10 sampled plants other non-recoverable taxes remained stable both in absolute terms (around 1.6-1.8 €/MWh) and as a share of total price (2.5%). The contribution of RES levies in the total bill has steadily increased from 5.6% in 2010 to 8% in 2012, reaching 5.7 €/MWh in absolute terms in 2012. As for the grid fees, their impact on the total bill decreased from 17.1% in 2010 to 15.5% in 2012. Their absolute value remained almost stable between 2010 and 2012 (around 11€/MWh).

Over the period, the plants in Southern Europe experienced the highest impact of RES levies on the total energy bill. In absolute terms, RES levies increased from 7.17 €/MWh in 2010 to 11.37 €/MWh (+59%) in 2012. The plants in Eastern Europe experienced the highest increase of RES levies, from 1.95 €/MWh in 2010 to 8.33 €/MWh in 2012, with their contribution to the bill increasing from 3.2% in 2010 to 11.8% in 2012.

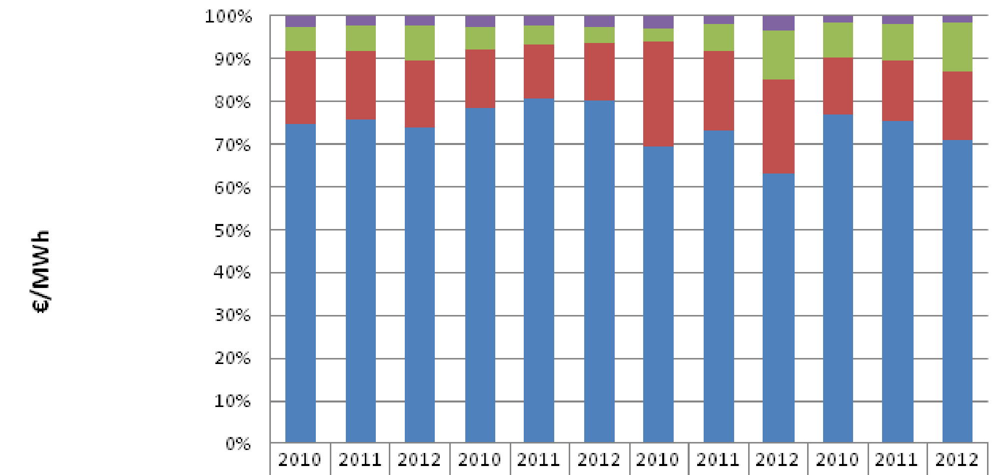
Figure 37 Components of the electricity bills paid by the 10 sampled ammonia producers in Europe (€/MWh)



	EU Average 2010	EU Average 2011	EU Average 2012	Western Northern Europe 2010	Western Northern Europe 2011	Western Northern Europe 2012	Eastern Europe 2010	Eastern Europe 2011	Eastern Europe 2012	Southern Europe 2010	Southern Europe 2011	Southern Europe 2012
Other non-recoverable taxes	1,58	1,45	1,75	1,54	1,43	1,57	1,75	1,28	2,30	1,37	1,92	1,64
RES Levy	3,53	4,13	5,70	2,68	2,87	2,29	1,95	3,63	8,33	7,17	7,91	11,37
Grid Fees	10,78	10,84	11,05	7,44	7,80	8,29	14,51	11,32	15,38	11,83	12,87	15,82
Energy component	47,10	51,36	52,91	42,37	50,36	48,86	41,69	44,56	44,73	67,40	70,01	70,65

Source: CEPS, calculations based on questionnaires.

Figure 38 Components of the electricity bills paid by the 10 sampled ammonia producers in Europe (%)



	EU Average			Western Northern Europe			Eastern Europe			Southern Europe		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
Other non-recoverable taxes	2,5%	2,1%	2,5%	2,9%	2,3%	2,6%	2,9%	2,1%	3,2%	1,6%	2,1%	1,7%
RES Levy	5,6%	6,1%	8,0%	5,0%	4,6%	3,8%	3,2%	6,0%	11,8%	8,2%	8,5%	11,4%
Grid Fees	17,1%	16,0%	15,5%	13,8%	12,5%	13,6%	24,2%	18,6%	21,7%	13,5%	13,9%	15,9%
Energy component	74,8%	75,8%	74,1%	78,4%	80,6%	80,1%	69,6%	73,3%	63,2%	76,8%	75,5%	71,0%

Source: CEPS, calculations based on questionnaires.

1.1.2.5. Chlorine

The results of the case study for chlorine producers presented below are based on the answers provided by a sample of plants to a questionnaire and to each sections of it, as reported in the table below. The 9 sampled plants represent about 12% of EU27 production. The membrane manufacturing technology represents 62% of the capacity of the plants in the sample, the mercury technology 32% and others 6%. The diaphragm technology is not represented in the sample.

Table 14 Number of questionnaires used in the chlorine case study

Received	Selected in the sample	Energy prices trends	Energy bill components	Energy intensity	Production costs
11	9	9	9	9	5

Electricity is the predominant fuel of the 9 sampled plants and accounts for about 91% of total energy costs[53] and for 43-45% of total production costs[54] of the sampled plants. All sampled chlorine producers use electricity as a primary source of energy, while some use steam as a secondary energy carrier[55].

The average price of electricity paid by the sampled chlorine producers increased slightly between 2010 and 2011, and then decreased in 2012.Overall, between 2010 and 2012 the average electricity price fell by 5%, from 59.4 to 56.4 €/MWh. This result is a weighted average and strongly influenced by the trend registered in the 6 plants in Central-Northern Europe, which contains a higher share of the total sampled production capacity. The average price paid by the 6 operators in this region decreased by about 10% (from 60.3 to 54.1 €/MWh) while the price observed in the 3 sampled plants in Southern-Western Europe registered a very significant increase (40%) and in 2012 was 1.3 times higher than the average price in Central-Northern Europe.

With regard to the different price components, the energy part slightly decreased in absolute terms between 2010 and 2012, from 48.7 to 48.9 €/MWh, although its relative share of the total electricity price increased to almost 87%.

For the sampled plants grid fees and RES levy also decreased over the period assessed: grid fees from 6.9 to 5 €/MWh (-29%), RES levy from 2.5 to 1 €/MWh (-59%), which for both components is associated with a reduction in their relative share of the total price (from 11.7% in 2010 to 8.8% in 2012 for grid fees and from 4.2% in 2010 to 1.8% for RES).

[53] Average for the nine sampled plants.
[54] Average for the five plants that provided data on production costs.
[55] The number of data points was too low to allow for an analysis of steam as a secondary energy carrier. Natural gas is used by only one plant in the sample. For these reasons, the analysis is limited to electricity prices and costs (chapter 2).

Table 15 Descriptive statistics for electricity prices paid by the 9 sampled EU producers of chlorine (€/MWh)

Electricity price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	59.4	59.8	56.4	-5.1
Southern-Western Europe (average)	51.9	61.5	72.7	40,1
Central-Northern Europe (average)	60.3	59.5	54.1	-10.3

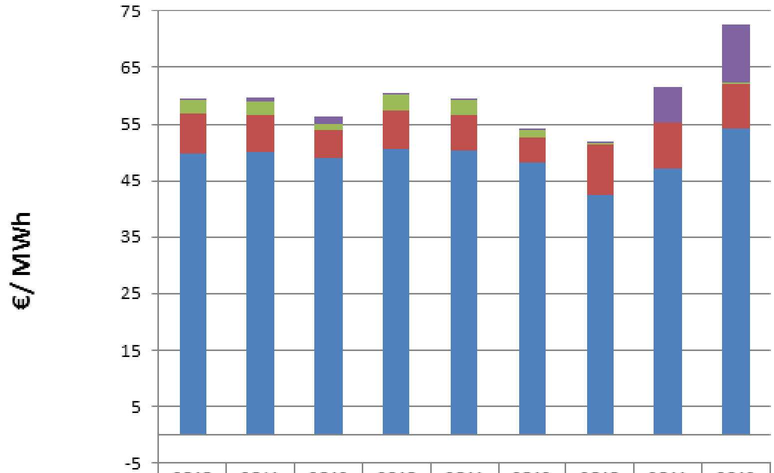
Central-Northern Europe includes 6 plants: IE, UK, BE, LU, NL, DE, PL, CZ, LV, LT, EE, DK, SE, FI
Southern-Western Europe includes 3 plants: ES, PT, FR
For remaining MS, no questionnaires were received and no averages could be calculated.
Note that sampled plants do not come from all the MS in one region. The specific countries cannot be indicated due to confidentiality reasons.
Source: CEPS, calculations based on questionnaires.

On the contrary, although still having a relatively small impact on total price (2.5% in 2012), other non-recoverable taxes registered a significant increase from 0.2 to 1.4 €/MWh.

Looking at regional averages, one can observe a 25 fold increase of non-recoverable taxes in the 3 Southern-Western European plants, from 0.44 to 10.5 €/MWh between 2010 and 2012. As a consequence, their weight on total electricity price paid by the sampled plants went up from less than 1% to more than 14%. In the same region, the energy component increased also substantially in absolute terms, from 42.5 to 54.2 €/MWh (+28%) while other components decreased both in absolute terms and as a share of total price.

As observed before, in the 6 plants in Central-Northern Europe the overall average electricity price decreased between 2010 and 2012. Looking at the different components, one can see that all components decreased except non-recoverable taxes, which remained stable and with a very limited share of total price.

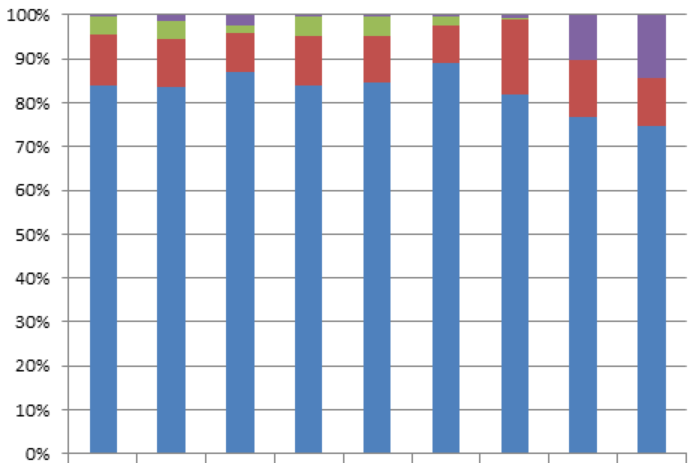
Figure 39 Components of the electricity bill paid by the 9 sampled chlorine producers in Europe (€/MWh)



	EU average 2010	EU average 2011	EU average 2012	Central Northen Europe 2010	Central Northen Europe 2011	Central Northen Europe 2012	Southern Western Europe 2010	Southern Western Europe 2011	Southern Western Europe 2012
Other non-recoverable taxes	0,20	0,87	1,41	0,17	0,17	0,20	0,44	6,24	10,47
RES levy	2,49	2,34	1,02	2,81	2,63	1,15	0,12	0,10	0,07
Grid fees	6,97	6,63	4,98	6,69	6,45	4,58	8,86	7,98	7,97
Energy component	49,76	49,96	48,94	50,66	50,22	48,14	42,49	47,22	54,20

Source: CEPS, calculations based on questionnaires.

Figure 40 Components of the electricity bill paid by the 9 sampled chlorine producers in Europe (%)



	EU average 2010	EU average 2011	EU average 2012	Central Northen Europe 2010	Central Northen Europe 2011	Central Northen Europe 2012	Southern Western Europe 2010	Southern Western Europe 2011	Southern Western Europe 2012
Other non-recoverable taxes	0,3%	1,4%	2,5%	0,3%	0,3%	0,4%	0,9%	10,1%	14,4%
RES levy	4,2%	3,9%	1,8%	4,7%	4,4%	2,1%	0,2%	0,2%	0,1%
Grid fees	11,7%	11,1%	8,8%	11,1%	10,8%	8,5%	17,1%	13,0%	11,0%
Energy component	83,7%	83,5%	86,8%	84,0%	84,4%	89,0%	81,9%	76,7%	74,5%

Source: CEPS, calculations based on questionnaires.

1.1.2.6. Steel

The results of the case study for steel producers are based on the answers provided by a sample of 17 plants, out of more than 500 steel plants in the EU. The sample installations were self-selected by the industrial sector.

Steel making plants can be broadly classified in two different groups, integrated plants and mini-mills. The former use Basic Oxygen Furnaces (BOFs) to transform iron ore and coke into steel. Mini-mills are plants comprising only steel furnaces and rolling and finishing facilities. Mini-mills generally use Electric Arc Furnaces (EAFs) to produce steel and mainly rely on scrap rather than raw iron, which is usually purchased as processed input. The results of the case study for steel producers are based on the answers provided by a sample of plants to a questionnaire and to each sections of it, as reported in the table below[56]. For each technology, sampled plants had different capacity in order to reflect a distribution similar to that of the steel making universe.

The 4 BOF plants included in the sample range from small to medium (up to 4.5 MMt), while very large BOF plants are not covered. The 9 EAF plants included are very diversified in terms of capacity, ranging from small (< 400 thousand tonnes) to large (> 1.3MMt). Consumption of electricity for steel making is very different between BOFs and EAFs. Electricity intensity of the BOF process is about one third of EAF; furthermore, BOF installations usually include a self-generation facility, where electricity is produced out of recycled waste gases from the furnaces. This means that on average sampled BOF producers procure electricity from external sources for about 60% of their total electricity consumption. Once these factors are accounted for, the sample points to the fact that much smaller EAF installation consumes as much electricity as larger BOF ones.

Consumption levels for the 9 EAF plants in the sample range between 150 and 600 GWh per year; as for the 4 BOF plants, the range is between 350 and 750 GWh per year. Given that the production process is standardised, the biggest determinant of electricity consumption is plant capacity, and the presence of hot or cold rolling facilities within the plant premises.

Table 16 Number of questionnaires used in the steel case study

Received	Selected in the sample	Energy prices trends	Energy bill components	Energy intensity	International comparison	Production costs and Margins
17	17	15 (gas) 17 (electr.)	14 (gas) 17 (electr.)	11 (gas) 14 (electr.)	3	*

* Data available from the Cumulative cost Assessment Study (CEPS)

Compared to natural gas, both EU average and EU median electricity prices paid by the 17 sampled steel plants are more stable. EU sample price went up by 7% from 66.8 to 71.4 €/MWh.

[56] In the sample, both technologies are represented, as 4 BOF and 9 EAFs are included plus two national representative facilities mostly referring to EAF producers and two rolling mills. EAF plants, given their higher electricity intensity per tonne of steel and the fact that do not own self-generation facilities running on waste gases, are mostly exposed to the costs of energy.

Different geographical regions have all registered an increasing trend although of different intensity, as it can be seen from the table below:

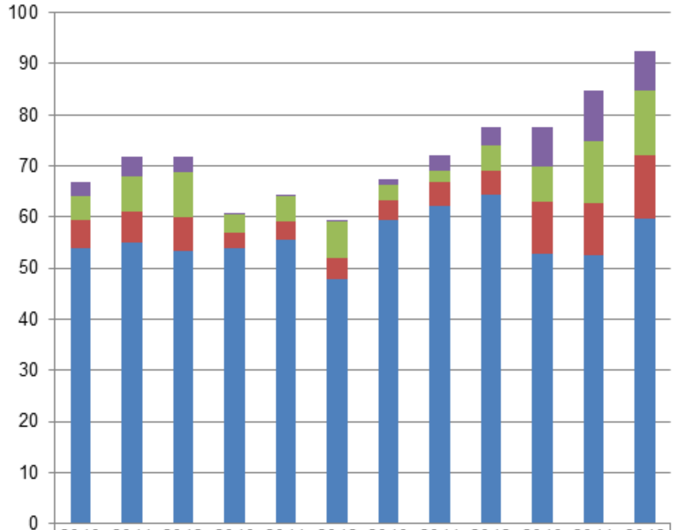
Table 17 Descriptive statistics for electricity prices paid by 17 sampled EU producers of steel (€/MWh)

Electricity price (€/MWh)	2010	2011	2012	% change 2010-2012
EU (average)	66,8	71,2	71,4	6,9
EU (minimum)	51,8	51,0	46,5	-10,2
EU (maximum)	89,6	93,5	104,4	16,5
Central and Eastern EU (average)	77,7	84,7	92,5	19,0
Southern EU (average)	67,7	68,8	74,2	9,6
North-Western EU (average)	60,7	64,3	59,4	-2,1
BOF Average	67,5	73,9	73,9	9,5
EAF Average	65,2	67,0	67,0	2,8

North-Western Europe includes 9 plants: FR, BE, LU, NL, IE, UK, DE, AT, DK, FI, SE
Central and Eastern Europe includes 3 plants: PL, SI, HU, RO, BG, CZ, SK, EE, LV, LT
Southern Europe includes 5 plants: IT, ES, PT, EL, MT, CY
Note that sampled plants do not come from all the MS in one region. The specific countries cannot be indicated due to confidentiality reasons.
Source: CEPS, calculations based on questionnaires.

The energy component is the most significant component of the electricity price paid by the sampled production facilities in Europe. In 2010, the energy component of the electricity price paid by the 17 sampled plants amounted to 53.9 €/MWh (81% of price) and decreased to 53.3 €/MWh in 2012 (-0.1%). However, its share over the total costs shrank from 81% to 74% due to the increase of the other components, mostly RES levies. RES levies reached 8.8 €/MWh (+91%), and in 2012 they represented 12% of the final electricity bill. Network costs and other taxes and levies increased by 24% and 10%, respectively. Note that the steel industry is outside of the scope of the Energy Taxation Directive.

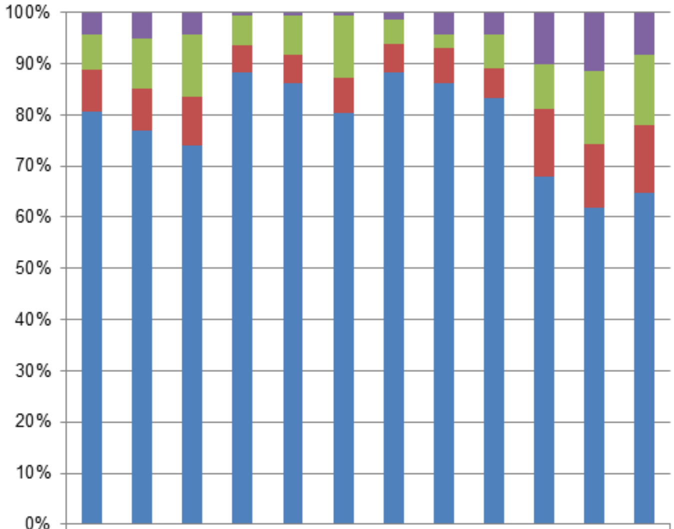
Figure 41 Components of the electricity bills paid by the 17 sampled steel producers in Europe (€/MWh)



	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
		EU			North-West			South			Center-East	
Other Taxes	2,8	3,7	3,1	0,4	0,4	0,4	0,9	3,1	3,4	7,9	9,7	7,6
RES Support	4,6	7,0	8,8	3,6	5,0	7,1	3,2	2,0	5,1	6,7	12,1	12,7
Network Costs	5,5	5,9	6,8	3,2	3,6	4,1	3,8	4,9	4,6	10,4	10,4	12,3
Energy Component	53,9	55,1	53,3	53,8	55,5	47,9	59,4	62,1	64,5	52,8	52,4	59,8

Source: CEPS, calculations based on questionnaires.

Figure 42 Components of the electricity bills paid by the 17 sampled steel producers in Europe (%)



	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
		EU			North-West			South			Center-East	
Other Taxes	4%	5%	4%	1%	1%	1%	1%	4%	4%	10%	11%	8%
RES Support	7%	10%	12%	6%	8%	12%	5%	3%	7%	9%	14%	14%
Network Costs	8%	8%	9%	5%	6%	7%	6%	7%	6%	13%	12%	13%
Energy Component	81%	77%	74%	88%	86%	80%	88%	86%	83%	68%	62%	65%

Source: CEPS, calculations based on questionnaires.

1.1.2.7. Primary aluminium

The evidence presented in the case study for aluminium is based on data collected via a questionnaire from a sample of 11 out of the 16 primary smelters in the EU, representing more than 60% of EU primary aluminium production in 2012. The data has been validated using the CRU database[57].

In contrast to other case studies in this report, no sampling by geographical region is presented. The averages calculated for the whole sample are compared to averages obtained for two subsamples which are of great importance for understanding the issue of energy costs impact on the sector. In particular, subsample 1 refers to 5 plants which procure electricity through long-term contracts or self-generation[58] while subsample 2 refers to 6 plants which procure electricity in the wholesale market.

In terms of price per MWh, the 2012 average price is 44.7 €/MWh[59]. A wide range of diversity is seen in the actual price paid by individual plants in the sample, which can be explained by considering the two main forms of procuring electricity. The average electricity cost for subsample 1 is 24.3 €/MWh while for subsample 2 it is 56 €/MWh, more than 2.3 times higher.

Smelters with low electricity prices (subsample 1) are mainly those which are in a long-term electricity contract or which have their own generation (the minority in subsample 1). These contracts are considered to be non-replicable. As soon as these contracts come to an end, these smelters are expected to move up the electricity price curve and reach the electricity price level of the smelters in subsample 2. Smelters in subsample 2 buy electricity on the market and are impacted by differences in terms of wholesale prices on different markets, national policies, energy mix, grid costs, or other tariffs.

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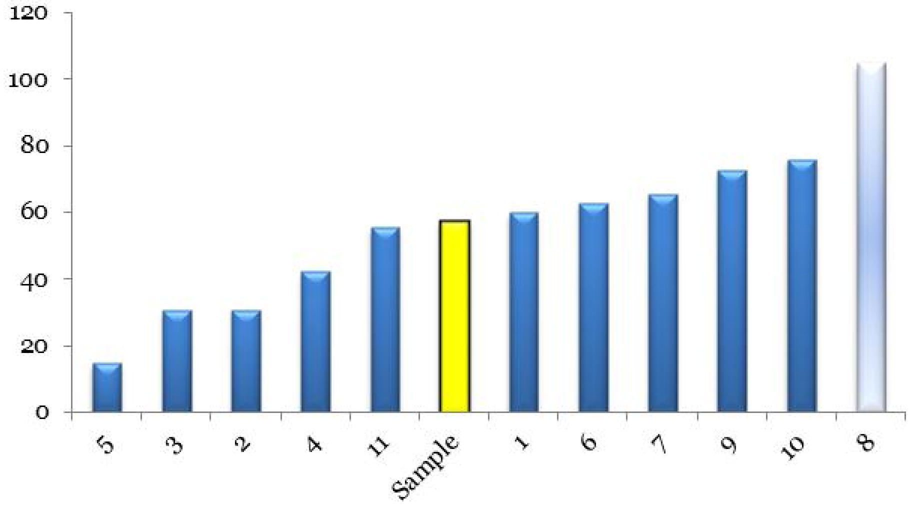
[57] CRU Group in an independent, privately owned company providing business intelligence services on the global metals, mining and fertilizer industries.
[58] The case of long-term contracts is the most frequent.
[59] Average weighted by 2012 production. EUR/USD exchange rate: 1.2848. 2012 annual value, source ECB.

Figure 43 Prices of electricity for the 11 sampled aluminium smelters - 2012 ($/MWh, delivered at plant)

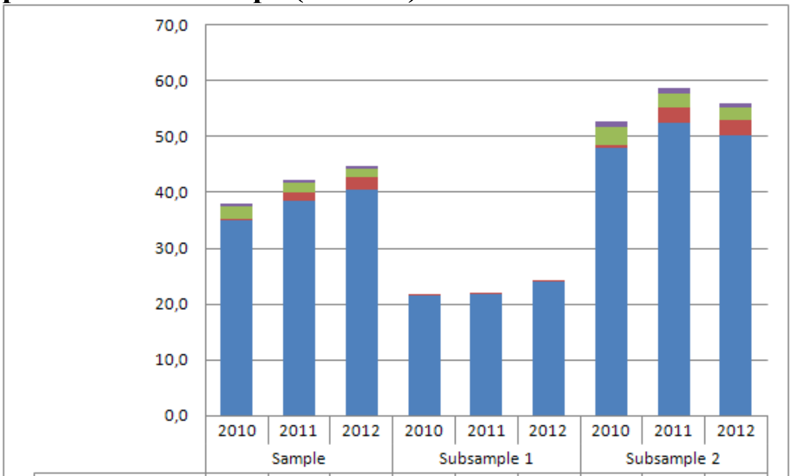


Source: CEPS, calculations based on questionnaires and CRU. Note: plant 8 is now closed.

Plants in subsample 1 are shielded from transmission costs and other taxes while the impact of RES levies is minimal, only slightly increasing from 0.7% to 1.5% of total price between 2010 and 2012.

For plants in the subsample 2, the sum of all components other than energy increased from 8.8% to 10.4% of the total price over the observed period. In particular, the increase is due to the upward trend registered for RES levies, which increased by more than 370% between 2010 and 2012 (from 0.6€/MWh to 2.9€/MWh). Transmission costs decreased by almost 30%, as a consequence of a decrease in two smelters; for all remaining smelters the component remained stable. Other taxes remained stable both in absolute terms as well as share of total price.

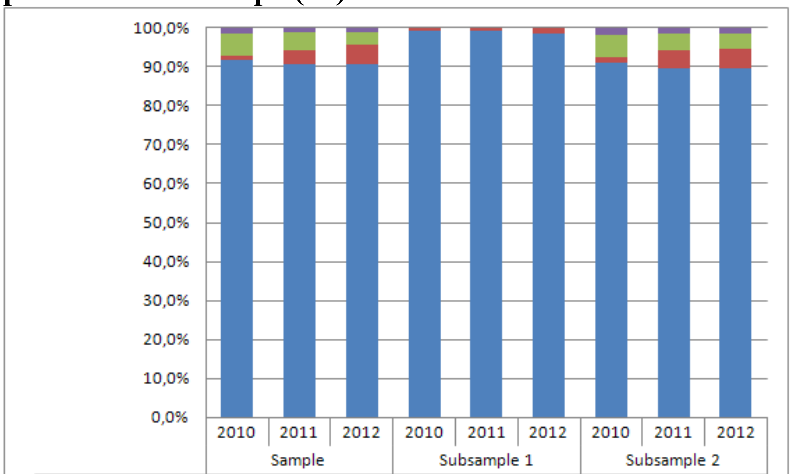
Figure 44 Components of the electricity bills paid by the 11 sampled aluminium producers in Europe (€/MWh)



	Sample 2010	Sample 2011	Sample 2012	Subsample 1 2010	Subsample 1 2011	Subsample 1 2012	Subsample 2 2010	Subsample 2 2011	Subsample 2 2012
Other taxes	0,6	0,6	0,5	0,0	0,0	0,0	0,9	0,8	0,8
Transmission Costs	2,1	1,8	1,4	0,0	0,0	0,0	3,1	2,6	2,2
RES Costs	0,4	1,5	2,2	0,2	0,2	0,4	0,6	2,7	2,9
Energy Component	34,9	38,4	40,6	21,6	21,8	23,9	48,0	52,4	50,2

Note: A certain degree of estimation is included because of the different possibility of singling out all components for all sampled plants.
Source: Calculations based on questionnaires

Figure 45 Components of the electricity bills paid by the 11 sampled aluminium producers in Europe (%)



	Sample 2010	Sample 2011	Sample 2012	Subsample 1 2010	Subsample 1 2011	Subsample 1 2012	Subsample 2 2010	Subsample 2 2011	Subsample 2 2012
Other taxes	1,6%	1,3%	1,2%	0,0%	0,0%	0,0%	1,7%	1,4%	1,4%
Transmission Costs	5,5%	4,3%	3,1%	0,0%	0,0%	0,0%	5,9%	4,5%	3,9%
RES Costs	1,0%	3,6%	4,9%	0,7%	0,8%	1,5%	1,2%	4,7%	5,2%
Energy Component	91,8%	90,8%	90,8%	99,3%	99,2%	98,5%	91,2%	89,4%	89,6%

Note: A certain degree of estimation is included because of the different possibility of singling out all components for all sampled plants.
Source: Calculations based on questionnaires